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THE

Colliery Guardian,

AND

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OF THE

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CONTENTS OF VOLUME CXIV.

Editorial.

	PAGE
By-Product Coking	617
Chemists, The Present Position of	989
Coal Control Bill, The	989
Clifton Tub Case, The	1039
Compensation of Colliery Owners	695
Compensation, Workmen's, in American Coal Mines	989
Commercial Intelligence, Organisation of	451
Competition or Co-operation	1189
Distribution of Coal, Inland	71
Economics of Coal Production	1137
Economy, Coal	211
Education Bill, The	307
Education of Colliery Officials	940
Enginemmen and the Miners' Federation	547
Excess Mineral Rights Duty	1087
Export Organisation, Coal	695
"Father of the House," The	939
Fuel Practice, Chemistry Applied to	117
Fuel Research Board, Work of the	547
Fuel Research Station, New	743
Government Control in Trade	259
Imperial Bank of Industry, An	1239
Index, Our Half-yearly	164
Industrial Councils	793
Industrial Fatigue, Maximum Output and	163
Industrial Peace and Goodwill	1239
Industrial Unrest Commission	163
Inspection in 1916, Coal Mines	597
Inter-Allied Conference, The	403
Iron Ore Resources Once More	23
Labour Programme of Reconstruction, A	891
Labour and the Whitley Report	499
Law of Subsidence, Root Principles in the	117
Mentality of the Welshman	259
Miners and the Stockholm Conference, The	355
Miners' Housing in Scotland	743
National Alliance of Employers and Em- ployed	1039
National Service	695
Nation and the War, The	211
Nitrogen Products and Coal Supplies	1087
Patents and Designs Bill	1137
Petroleum Royalties	843
Petroleum, Search for, in the United Kingdom	355
Prices, Coal	499
Prices and Expenditure	1189
Rating Reform and Colliery Assessments	452
Scottish "Fen Rights" in Mining Areas	483
Shipping and Coal Exports	793
South Wales Ballot, The	891
Spontaneous Combustion, The Problem of	597
Trade Councils	23
Trade of To-morrow, The	403
Trial Boreholes, The Case for	648
Winter Coal Supply for London	307

Articles, &c.

Accidents and Labour in 1916, Mining	1082
Accidents, Colliery	1046
Afforestation	590
Air Compressor Operation, Safe	348
Alberta, Coal Mining in, in 1916	347
Alberta, Methods of Mining in Crow's Nest Pass District	789
American Coal Tar Dye Production	645
American Notes	493
Analysis, A New Method of Coal	302
Ash Analyses of South African Coals	301
Ash, The Melting Point of Coal	1193
Assessments and Public Works, Colliery	350
Belgian Coal and Coke Industry in the War	1193
Boiler Clinker in France, Utilising	1243
Boiler Management with Substitute Labour	1131
Boiler, The Down Draught Smokeless	157
Book Notices	314, 449, 552, 602
Borings in Yorkshire, Kent and Sussex, Deep	981
Boys in Mines, Employment of	1133
Breathing Apparatus, Committee on	216
Briquette Factory, with the "Cava" Pitch Process, A Modern Belgian	1234
Briquetting, Coal	594, 787
Briquetting Plant, Anthracite Culm	1183
British Columbia, Mining in	396
Canadian Mining Industry, Problems of the	17
Canals, Carriage of Goods on	749
Carbonising at Gas Works, Coal	789
Car-dumper Plant at Conneaut	397
Catalogues and Price Lists Received	86, 128, 560, 952, 1000
China, Minerals of	346
Coal Age, Forests of the	251
Coal Areas in Bengal, Development of Deep	345
Coal Concreted from Dust or Ashes	153, 216, 836
Coal-Cutting Machinery in 1916	1133
Coal Export Business, Pooling	1184
Coal Deposits of Reefton, New Zealand, The	543
Coal Fields and Coal Industry of Eastern Canada	591
Coal Fields of Western Europe, Areas of Deposition of the	639
Coal (Household) Distribution Order, 1917	305
Coal Mines Control Agreement	835
Coal O.	458
Coal O.	495

	PAGE
Coal, Pit Price of	497
Coal Prices (Pit's Mouth) Order	738
Coal Prices (Scotland), Retail	505
Coal Prices (Wholesale) Order, 1917	456
Coal Production, The Economics of	1084
Coal Seams, On the Splitting of by Partings of Dirt.—Part. I. Splits that Re-join	883
Coal and Shipping:— XIX. Coal Handling in Germany	153
XX. Coal Weighing	299
XXI. Storage of Coal: Overheating and Deterioration	443
XXII. Stacking and Re-handling Coal	735
XXIII. Bunkers and Reservoirs for Storing Coal	931
XXIV. Coal Cargo Vessels	1079
Coal Trade, The American, 76, 159, 266, 360, 408, 552, 798, 850, 895, 944, 1047, 1093, 1194	645
Coal Trade, The Future of the	28
Coal in War, The Importance of	252
Coal Washing Experiments, Notes on	590
Coal Washing, Observations on Modern	312
Coke Oven By-Products in 1916	1233
Coke Oven Walls, Saline Corrosion of	149
Coke as War Material, Metallurgical	1095
Coking, Recent Developments in Ry- Product	256
Coking, Recent Developments in Japanese By-Product	839
Collier "Elwick," The Steam	457
Commercial Intelligence, Organisation of	15
Compressed Air Calculations, Graphic Solutions of Some	840
Compressors, Theoretical and Actual Air Delivery of	220
Corea, The Mining Industry in	69
Creosote and Other Coal Tar Oils, Sale of	655
Cumberland Surface Workers	553
Current in Mines, High-Tension	1198, 1250
Diaries and Calendars	29
Distillation, Experiments in Low-Tem- perature	592
Drill Bits, Comparative Tests of Hammer Drills, Improvement in Twist Boring	350
Dust Danger from Tubs	1045
Edward Medals for Miners	797
Electrical Apparatus, Drying Colliery	979
Electrical Equipment in Coal Mines, Safety Rules for	111, 156, 254
Electricity Supply Systems in Lancashire and Cheshire, Interconnection of	459
Electric Power Supply	1233
Electrification of Collieries, Points on the	1031
Electrolysis Underground in Mines	849
Employers and Employed, Alliance of	985
Employment Statistics, Mining	114, 350, 552, 750, 985, 1185
Examinations, Mine Managers	1083
Exemptions, Miners'	1096
Explosion at an Indian Colliery, Gas	1035
Explosives in Coal Mines	1047, 1250
Fireclays and Ganisters of the South of Scotland	652
Fireclays, The Texture of	164
Firedamp by the Limits of Inflamma- bility, Estimation of	346
Firemen's, Examiners' and Deputies'	401
Certificates	839
Forest of Dean, Geological Structure of the	347
Forestry, The Future of	1129
Forth Valley, Development of the	384
France, The Coal Problem in	1185
French Advisory Committee on Mines	1182
French Maximum Prices for Coals	738
Fuel Research Board, Report of the	398
Fuel Research in 1915-16	267
Furnace Dust, Blast	933
Gas as Motor Fuel, Coal	444
Gob Fires in Natal	350
Hammer Drills, Comparative Values of	349
Handling of Coal by Hydraulic Means, The	399
Haulage, Anti-Friction Bearings in Coal Mines	642
Haulage, Electric, at the Delagua Col- lieries	115
Housing, Miners and	691
Housing Problems after the War	692, 741, 790, 841
Housing in Scotland, Miners'	20
Ignition of Colliery Refuse Heaps, Spon- taneous	838, 1043
India, Coal Mining in, in 1916	1133
Industrial Reconstruction Council	348
Inflammability of Mixtures of Gases with Air	557
Inspection in 1916, Coal Mines	986
Inventions, The Protection of	155
Ireland's Coal Supplies	1091
Iron Ores of Lorraine, The	885
Jurassic and Lower Cretaceous Rocks in East Kent, The	689, 940
Labour, Mobility of Mining	17
Lamps and Gas Detection, Portable Electric	1135
Lamps in Mines, Safety	1179
Lamps, Lighting Safety, by Electrical Ignition	399
Llewellyn, Sir Leonard W.	206
Locomotive Coaling Plant at Carlisle	20
Lubrication of Mine Machinery, The	400
Maximum Prices of Scrap Wrought Iron and Steel	400

	PAGE
Microscopic Examination of Coal, Note on the	1085
Mine Car Cager, Automatic Safety	457
Mine Cars Safe, Making	1195
Mineral Rights (Excess) Duty: Relief under the New Act	304
Mineral Statistics for 1916	545
Mine Roof Supports, Resistance of Artificial Miners' Conference at Harrogate	886
Mining Classes, Doncaster	700
Monthly List of Recent Coal Literature	594
New Zealand, Coal Mining in, in 1916	172, 364, 606, 802, 1246
Nitrate of Ammonia, The Manufacture of, by Electric Power at Coke Oven Plants	267
Novo Suzhdensk Coal Deposits, Western Siberia	787
Obituary, 27, 82, 418, 263, 315, 362, 407, 463, 504, 545, 651, 704, 752, 853, 895, 998, 1050, 1095, 1148, 1187	207
Oil Prospects of the British Isles	1181
Oxidisable Constituents of Coal: Part I., The	983
Parliamentary Candidates, Miners'	491
Petroleum Production Bill	1194
Pig Iron Dealings, Modified Permit for	349
Pig Iron Regulations and Prices, New, 115, 160 Piston, Martin's Steam Tightening	1085
Pitot Tube, An Improved Modified	112
Pit Props, Ferro-Concrete	945
Prices of House Coal, Local Authorities and Retail	692
Prime Movers; Working Costs of	504
Pyrometers and Pyrometry	783
Reafforesting Association, Midland	895
Recruiting and Miners	160
Recruiting, South Wales Miners and	264, 308, 497, 896
Refractories during 1916, Geological Research on	847
Refractory Magnesia	935
Refractory Materials, Testing	1129
Refractory Properties of Silica Bricks, The	654
Refractories, Report on	459
Research, Report of the Committee of Council for Scientific and Industrial	1236
Rescue and Recovery Operations in Coal Mines	446
Research in Canada, Mining	76
Rock Dust in Mines, The Suppression of	1142
Ropeway at Balgonie Colliery, Aerial Dumping	395
Russian Coal Trade	494
Safety Lamps, New Electrolyte for Miners' Electric	66
Sale of Coal, Directions as to the	848
Sands used in Metallurgical Practice	739
Scottish Miners' Conference	113
Shaft Sinking, Employment of Divers in	937
Shaft Sinking, Water Barrel for	837
Silica Bricks, Improvements in the Manu- facture of	543
Sinking through Wet Strata at Great Depths	788
South African Mining in 1916	494, 593
South Wales Colliery Examiners and Firemen	984
Spontaneous Combustion in Coal Mines	814
Steam Engine, Inflow Notes on the	68
Steel, Maximum Prices for	1127
Stokers, Mechanical, at Collieries	1081
Stone Dusts, Properties and Characteris- tics of Various	109
Storage of Coal (in Bulk)	205
Storage upon the Properties of Coal, Effects of	1084
Storage and Spontaneous Combustion of Coal	982, 1036, 1186
Stresses on Colliery Brickworks, Safe Compressive	1235
Subsidence resulting from Mining	786
Suction Gas from South African Coals	18, 66
Sulphur from Coal, Recovering	687
Tank, A Measurement	690
Tees-Side, Developments on	67
Thin Mine Problem, The	445
Thin Seams, Mining in Intensive	700
Timber, The Control and Prices of	304
Timber, Home-Grown	1091
Timber Trade, South Wales Mining, 27, 75, 115, 163, 215, 263, 305, 359, 401, 449, 50, 552, 601, 652, 699, 748, 791, 817, 895, 937, 987, 1044, 1091, 1141, 1193, 1241	1142
Tipple, New Type of American	416
Trades Union Congress	448, 504
Trade Unionism, 1915	266
Transport Re-Organisation Scheme, Coal	63
University Education in Relation to Mining Engineering	1093
Unrest and South Wales Miners, Indus- trial	255
Unrest in Wales and Monmouthshire, In- dustrial	203
Victoria, Mining in 1916 in	908
Wage Bonus Demand, Miners'	159
Wages: Application for 25 per cent. In- crease, Miners'	257
Wages Demands, Miners'	497
Wages, Miners'	356, 399, 602
Wages and Output, Steel Workers'	545
Wages: Sliding Scale, Changes in	786
Wages of Underground Day Wage Men, 641, 652	641, 652

	PAGE
Wages: War Bonus, Miners'	114
Wagons for the Burma Mines, High- Capacity Freight	935
Wagons, Private Owners' (No. 2) Order, 1917	64
War Bonus, Miners'	748
War Wage, Miners'	849
Welfare, Factory and Workshop	848
Welfare Supervisors	458
Welfare of Workers in Factories and Workshops	217
Wigan and District Mining and Technical College	500, 602
Winding Ropes, Factor of Safety of Wire	1231
Wood Preservation, Practical	848
Workmen's Compensation Act, Some Rec- ent Decisions under the	69, 257
Workmen's Compensation Insurance, Merit Rating of Coal Mines under	944
Workmen's Compensation (War Addition) Act	397
Workmen's War Compensation Act, Dis- abled	996

Meetings.

Association of Mining Electrical Engineers, 1046, 1187	1046, 1187
Association of Students of the South Wales Institute of Engineers	1182
Coke Oven Managers' Association, 16, 209, 1034, 1180	16, 209, 1034, 1180
Institute of Metals	458
Institution of Mining Engineers	404, 539
Lancashire and Cheshire Coal Association	889
Manchester Association of Engineers	739
Manchester Geological and Mining Society 737, 933, 1184	737, 933, 1184
Midland Counties Institution of Engineers	690
Midland Institute of Mining, Civil and Mechanical Engineers	217, 643, 887, 1132
Miners' Federation Conference	159, 216
Mining Institute of Scotland	303, 688, 1130
Mining Students' Association in South Wales	1084
North of England Institute of Mining and Mechanical Engineers	265, 749, 1134
North Staffordshire Institute of Mining Engineers	496, 785
Refractory Materials Section of the Ceramic Society	645
South Wales Institute of Engineers, 206, 595, 1033, 1081	206, 595, 1033, 1081

Current Science and Technology.

Action of Aluminium Chloride on Solvent Naphtha	545
Ammonia Yield, Influence of Size of Coking Coal on	986
Anemometers, Hot Wire	68
Ankylostomiasis in the Madras Presidency	353
Arsenic in Coal and Coke	160
Benzol, Notes on Crude	160
Benzol, Recovery from Gas	1143
Benzol Recovery, The Naphthalene Diffi- culty in	68
Benzol and Toluol from Carburetted Water Gas	1236
Calcium Cyanamide from By-Product Ovens	304
Carbonisation of Coal, Complete	353
Carbonisation of Dust and Soot	353
Carbonisation of Waste Coal, Low Tem- perature	790
Carbonisation, Volatile Products of	401
Cerium-Iron Alloys	353
Coke-Breeze and Gas-Fired Boilers	790
Coke Formation, The Conditions of	256
Coke, The Quenching of	496
Concrete, Effect of Water Content on Strength of	20
Concrete, Reinforced, and Corrosion	1187
Electric Heat Storage in Boilers	986
Firebricks in Oxidising and Reducing Atmospheres	20
Furnace for High Temperatures	20
Gas Flames, The Colour Temperature of Illuminating	68
Ignition, "Stepped"	304
Ions and Electrons, the Motion of through Gases	790
Lubricating Oils, Testing	496
Methane and Air, Pressure on the Electrical Ignition of Influences of	256
Mineral Fuels, Use of Low-Grade	1236
Nichrome-Constantan Thermo-couple	353
Nitric Acid from Coal Gas	68
Peat and Lignite, Distillation of	1187
Petroleum, Cracking, in the Liquid Phase	100
Phthisis Prevention, Miners'	256
Picric Acid from Coke Ovens	160
Pipe Flow Formulas, Simple	1143
Potash from Blast Furnace Dust	449
Potash from Felspar	160
Pumping, Air-Lift	1187
Refractory Brick, Testing	545
Refractory Materials, Melting Points of	449
Spark Lengths in Gases and Vapours	1143
Steam from Peat, Raising	496
Sulphur in Coal and Coke, Estimating	986

	PAGE
Tar from Vertical Retorts	1143
Vacuum Coal Tar	401
Zirconia and Zirconia Apparatus	1113

Law Cases.

Black Mountain Silica Co. Ltd. v. Colliery Investment Trust (Possession of a Railway).....	21
Bolckow, Vaughan and Co. Ltd. v. Compania Minera de Tierra Minera, and the North Eastern Steel Company v. same (Spanish Iron Ore).....	1095
Duke of Northumberland v. Commissioners of Inland Revenue (Excess Mineral Rights Duty).....	1037
Eastern Valley Black Vein Colliery Ltd. v. the Field Colliery Co. Ltd. (Alleged Trespass by Neighbouring Colliery, &c.).....	209
Enemy Coal Associations	209
Hopkins, J. v. Newport-Abercarn Colliery Company (Colliers and unloading Timber).....	360
Inland Revenue v. Murray (Mining Royalties and Excess Duty).....	161
Inland Revenue v. Trustees of Earl of Lonsdale (Excess Mineral Rights Duty).....	115
Mining Rights Decisions	209
Myers, Rose and Company Limited v. D. Marbais (Welsh Coal for France).....	1037
Neate v. Alcock (A Colliery Lamp Case).....	750
Orconera Iron Ore Co. Ltd. v. Fried. Krupp Akt. Ges. (Krupp's Iron Ore Contract).....	257
Paterson, W., etc. v. Thos. W. Todrick (Signals in Coal Mines).....	750
Procurator-General and the Steamship "Alwina." (Coal in Captured Vessel).....	1141
Société Générale de Chemins Fer Économiques v. Cleveux Western Valleys Collieries (Alleged Breach of Contract).....	21
Wallend Slipway Co. (Alteration of Articles).....	161
Wilson and Hall (Coal Mine Ventilation).....	161

Letters to the Editor.

Areas of Deposition of the Western European Coal Fields.....	693
Education of Colliery Officials, Higher.....	993
Iron Ores of Lorraine, The	1141
Oil at Ridding's Colliery, The Discovery of	459
Rope Haulage in Mines	850, 900
Wages and Prices in Anthracite Collieries	1141

Parliamentary Intelligence.

Absenteeism.....	937
Accidents in Mines	944
Afforestation Reconstruction Committee.....	311
Arigna Coal Field	1044
Arigna Mineral Development	161
Bristol Channel Transport Facilities	1092
Canals and Coal Distribution	797
Central (Ireland) Railways and Arigna Minerals Bill	161
Clay Cross Iron Company	264, 305
Coal Field Development	1142
Coal for France and Italy	1184
Coal Mines Control Agreement, The	896, 943, 1044, 1092, 1142
Coal Output.....	1194
Coal Supply	216, 987
Coal Supply (Ireland)	1142
Coal Supply (London)	76
Coal Transport	1194
Coal Trimmers' Disease	27
Delivery of Coke	264
Distress among Durham Miners	987
Distribution, Coal	27, 122, 161, 361
Distribution (Scotland), Coal	311
Durham Collieries	896
Electrical Power and Coal Conservation (Report).....	311
Exemption of Coal Owners	264
Financial Arrangements with Coal Owners	264
Fireclay	161
German and English Minerals	797
Haulage, Scheme, The Coal Controller's.....	1092
Housing Working Classes	264, 312
Hutments for Cleveland Miners	1044
Industrial Councils	896
Irish Coal Reserves and Mineral Resources	264
Irish Coal Supply	122, 896
Irish Colliery, An	797
Lost Coal Cargoes	1142
Mineral Resources Committee	841
Miners' Baths	987
Miners' Wages, Coal	748
Non-Ferrous Metal Industry Bill	1092, 1142
Oil, Creosote	264
Output of Coal	797
Peat Fuel	841
Peat Fuel (France)	311, 361
Petroleum Executive, The	748
Petroleum (Production) Bill	312, 748, 841, 896
Petroleum Production.....	987
Pit Props	987
Price of Coal in Italy	987, 1044
Price of Coal at Pit Mouth	841
Prices in Isle of Wight, Coal	944
Prices in London, Coal	797
Railway Facilities for Miners	1142
Royalties on Petroleum	797
Scientific and Industrial Research	1044
Shipping Freights	264
South Wales Miners' Federation	1044
Sulphate of Ammonia	216
Timber Measurers (Women).....	311
Tower Collieries (Hirwain), South Wales	311
Trains (Taff Vale Railway Company), Workmen's	216
Transport, Coal	122
Transport Facilities (Pitwork).....	311
Wages in Durham	896
Wagon Weighmen's Wages	841

Coal, Iron, and Engineering Companies.

	PAGE
Aadnesen & Dahl Limited	996
Abrasives Limited	605
Adams (David) and Sons Limited	853
Addie (Robert) and Sons Collieries Limited	556
Air Turbines Limited	124
Alabama Coal, Iron, Land and Colonisation Co. Limited	1148
Amalgamated Foundries Limited	752
Anderston Foundry Co. Limited	853
Anglo-French (Transvaal) Navigation Coal Estates Limited	1148
Anglo-Spanish Coaling Co. Limited	704
Ansell, Jones and Co. Limited	704
Antrim Minerals Co. Limited	1198
Argentine Iron and Steel (Pedro Vasena & Hijos) Limited	412
Armouraduct British Co. Limited	1096
Ariston Coal Co. Limited	996, 1046
Ashton Vale Iron Co. Limited	605
Atlas Steel Foundry and Engineering Co. Limited	996
Atwell Foundries Limited	82
Auxiliary Engineering Co. Limited	1049
Avery (W. and T.) Limited	82, 1247
Babcock and Wilcox Limited	801
Bagnall (John) Limited	853
Baker Cramer Engineering Co. Limited	1096
Baldwins Limited	801
Balther (Richard) and Co. Limited	316
Bedwas Navigation Colliery Co. Limited	412
Bellaphone Co. Limited	316
Bell Bros. Limited	508, 1096
Bentley Brothers, Limited	1198
Berry's Electric, Limited	1247
Bessemer (Henry) and Co. Limited	82
Beta Engineering Co. Limited	996
Birkby Coal Co. Limited	853
Birmingham Pitwood Association	605
Birmingham Railway Carriage and Wagon Co. Limited	220, 1049
Birmingham Small Arms Co. Limited	605, 704
Blackwall Engineering and Welding Works, Limited	32
Boiling (J.), Limited	996
Bolckow, Vaughan and Co. Limited	463
Bradford Coal Merchants and Consumers' Association	32
Briggs (Henry), Son and Co. Limited	508
Brightside Foundry and Engineering Co. Limited	124
Brinton (R. C.) and Co. Limited	556
Bristol and South Wales Railway Wagon Co. Limited	316
British Wagon and Carriage Works Co. Limited	316
Brittona Chemicals, Limited	171
British Electric Traction Co. Limited	1049
British Metals Extraction Co. Limited	1198
British Pyro Products, Limited	270
British Sintering Co. Limited	124
British Wagon Co. Limited	220
Briton Ferry Coal and Metals Co. Limited	124
Brodmin's Limited	270
Broomhill Collieries Co. Limited	82, 948, 1096
Brownell, Lindley and Co. Limited	32
Brown, Bayleys Steel Works Limited	32
Brown (John) and Co. Limited	556, 1049
Brunner, Mond and Co. Limited	900
Brynnan Collieries, Limited	1247
Bwlch Colliery Co. Limited	996
Bye-Products Finishing Syndicate Limited	171
Callender's Cable and Construction Co. Limited	658
Cammell, Laird and Co. Limited	508
Canadian Explosives Co. Limited	82, 704
Capron Neutral Sulphate of Ammonia Syndicate, Limited	412
Carden Engineering Co. Ltd.	556
Cardiff Collieries Limited	171
Cardiff Exchange and Office, Limited	412
Cargo Fleet Iron Co. Limited	362, 1148
Carlton Main Colliery Co. Limited	658
Celtic Collieries Co. Limited	32, 82
Chambers Engineering Co. (South America), Limited	556
Channel Steel Co. Limited	658
Chase (A.) and Co. Limited	362
Chemical Engineering and Wilton's Patent Furnace Co. Limited	362
Chemical Engineering Corporation Limited	362
Chinese Engineering and Mining Company, Limited	1148
Chown (W. R.) and Co. Limited	171
Cleveland Bridge and Engineering Co.	1198, 1247
Clyde Valley Electric Power Limited	463
Coal Carbonising Parent Syndicate Limited	463
Coalite Co. Limited	948
Coatbridge Gas Co. Limited	220
Coltness Iron Co. Limited	605, 704
Complete Gas Combustion, Limited	171
Consett Iron Co. Limited	171
Consett Spanish Ore Co. Limited	171
Consolidated Cambrian Co. Limited	316
Corra Engineering Co. Limited	704
Cortonwood Collieries Co. Limited	171, 948
Croasdale (Henry) Limited	82
Crompton and Co. Limited	171
Crossley Bros. Limited	362
Cumberland Pitwood Association Limited	658
Curtis's and Harvey Limited	556
Cynric Rhondda Colliery Co. Limited	658
Cynon Colliery Co. Limited	1247
Dalmellington Iron Co. Limited	605, 704
Dalton (A. L.) Limited	900
Davis (D.) and Sons Limited	270
Deutsch and Brenner Limited	124
Dick, Kerr and Co. Limited	900
Dickson and Mann Limited	1096
Dinnington Main Coal Co. Limited	1097
Dominion Steel Corporation Limited	32, 1096
Dorman, Long and Co. Limited	171, 948, 1096
Du Croo and Brauns Limited	124
Dundee Coal Co. Limited	82
Dunlop and Brand Limited	605
Durban Navigation Collieries Limited	270
East Indian Coal Co. Limited	171
East Kent Colliery Co. Limited	556
E.B.T. Syndicate Limited	1148
Edinburgh Collieries Co. Limited	658
Ebbw Vale Steel, Iron and Coal Co. Limited	32, 124, 948

	PAGE
E.M.P. Engineering Co. Limited	171
Engineering Components Limited	463
Everitt (Allen) and Sons Limited	82
Excelsior Engineering Co. (Leeds) Limited	316
Fassifern Coal Co. Limited	1148
Ferguson (John) and Co. Limited	316
Fernhill Collieries Limited	463
Field (T. W.) Engineering Co. Limited	658
Fife Coal Co. Limited	316
Flexo Shafting Limited	1198
Forncett Engineering Co. Limited	996
Fountain (George) and Son (1917) Limited	1198
Fox (C. J.) and Sons Limited	752
Fox (Samuel) and Co. Limited	270
France (William), Fenwick and Co. Limited	171
Frost Patent Engine Syndicate Limited	171
Fuller (H.) and Co. Limited	1096
Furness, Withy and Co. Limited	171, 704
Gas Light and Coke Co. Limited	171
General Electric Co. Limited	82
General Foundry Supplies Company (London) Limited	1096
General Stampings Limited	1247
Girdwood (E. and E.) Limited	362
Glamorganshire Workmen's Cottage Association Limited	270
Glencoe (Natal) Collieries Limited	412
Gloucester Railway Carriage and Wagon Co. Limited	82, 124
Goodenough (Edward) Limited	853
Gothrough Limited	605
Gosnell (Lewellin) Limited	171
Graham's Navigation (Merthyr) Collieries Limited	171
Gravesend Smelting and Refining Co. Ltd.	463
Greenwood and Batley Limited	171
Grosvener Engineering Works Limited	752
G. and S. Limited	948
Gnest and Chimes Limited	124
Guest, Keen and Nettlefolds Limited	316, 362
Gulf States Steel Co. Limited	704
Gwann-ae-Gurwen Colliery Co. Limited	1096
Hadfields Limited	82
H. A. H. Tractors Limited	948
Haig Colliery Co. Limited	752
Hamstead Colliery Co. Limited	658
Hannay and Clarke Limited	900
Harding (T. L.) and Sons Limited	658
Hardy Patent Pick Co. Limited	556
Harperley Park Coal Co. Limited	508
Harworth Main Colliery Co. Limited	82
Haywood and May Limited	412
Henley's (W. T.) Telegraph Works Co. Limited	270
Herbert (Alfred) (Russia) Limited	124
Higgin Brothers and Jones Limited	1198
High-Speed Machinery Co. Limited	362
Holmes and Jordan Colliery Co. Ltd.	270, 316
Horbury Junction Iron Co. Limited	316
Horden Collieries Limited	853, 996
Humphrey Pump Co. Limited	1247
Hydraulic Gears Limited	605
Inchfield Moor Collieries Limited	1049
Insoles Limited	508
International Coal Co. Limited	605
Irlam Engineering Co. Limited	704
Jackson (J.) Limited	1096
Jennings (F. A.) Limited	704
Jessop (Wm.) and Sons Limited	270
Kayser, Ellison and Co. Limited	658
Keeling (A. D.) Limited	316
Keen (S.) and Sons Limited	833
Kentish Shipbuilding and Engineering Co. Limited	508
Kersons Manufacturing Co. Limited	412
Kinnell Cannel and Coking Coal Co. Limited	704, 853
Kintyre Coal and Oil Co. Ltd.	605
Kirkheaton Colliery Co. Limited	463
Knowles (Andrew) and Sons Limited	124
Korting Brothers (1917) Limited	220
Kwykfire Limited	900
Lambert Bros. Limited	32
Lanarkshire Steel Co. Limited	124
Lancashire, Cheshire and North Wales Colliery Owners' Pitwood Association Limited	316
Lancashire Dynamo and Motor Co. Limited	316, 752
Lancashire Power Construction Co. Ltd.	124
Lancashire Wagon Co. Limited	853
Lancashire and Yorkshire Wagon Co. Ltd.	171
Latham (J. O.) and Co. Limited	948
Lees (J. B. and S.) Limited	270
Lilly (B.) and Sons Limited	412
Limit Gauges and Tools Limited	658
Lincoln Wagon and Engine Co. Limited	463
Lochgelly Iron and Coal Co. Limited	316
Lofthouse Colliery Co. Limited	316
London Foundry Co. Limited	900
Longridge Coal and Cannel Co. Limited	270
Lothian Coal Co. Limited	83
Lowmoor Co. Limited	605
Lowson (Henry) Limited	508
Low Temperature Development Trust Ltd	948
Macfarlane Winch Co. Limited	32
Machan Coal Co. Limited	362
Main Colliery Co. Limited	412
Mann, George and Co. Limited	706
Manor Powis Coal Co. Limited	32
Manvers Main Collieries Limited	463
Marine Metal Co. Limited	82
Marriott (J.) and Co. Limited	32
Mather and Platt Limited	124
Mayfield Engineering Co. Limited	270
McBain Bros. Limited	900
Medway Steel Co. Limited	900
Meerloo Engineering Co. Limited	362
Mersey Shipbuilding Co. Limited	270
Metropolitan Carriage, Wagon and Finance Co. Limited	853
Metropolitan Coal Co. of Sydney Limited	412
Middleburg Steam Coal and Coke Co. Ltd.	1148
Midland Iron Co. Limited	996
Midland Railway Carriage and Wagon Co. Limited	270
Millom and Askam Hematite Iron Co. Ltd.	1148
Minerals Separation Co. Limited	1198
Mond Nickel Co. Limited	124, 1108
Mossleys Estate Limited	853
Motor Gear and Engineering Co. Limited	124
Mount Torlesse Collieries (Broken River, N.Z.) Limited	800
Nantyglo and Blaitha Ironworks Co. Ltd.	900, 1096

Natal Navigation Collieries and Limited	124
National Gas Engine Co. Limited	270
Naylor (J. H.) Limited	270
Neville Foundry Co. Limited	948
New Mon-kron Colliery Co. Limited	220, 412
Newport-Abercarn (Black Vein) Steam Coal Co. Limited	124
New Sharlston Collieries Co. Limited	316
Newton Chambers and Co. Limited	32
Nicklin (Bernard) and Co. Limited	658
Niddrie and Benhar Coal Co. Limited	801, 900
Nobel's Explosives Co. Limited	801
Normanby Iron Works Co. Limited	270, 412
North British Locomotive Co. Limited	220
North Central Wagon Co. Limited	270
North-Eastern Pitwood Association Ltd.	706
North-Eastern Steel Co. Limited	316
North London Engineering Co. Limited	362
North Lonsdale Iron and Steel Co. Limited	1049, 1148
North's Navigation Collieries (1889) Ltd.	32
North Wales Iron and Manganese Co. Ltd.	948
Notts. and Derbyshire Pitwood Association Limited	171
Nova Scotia Steel and Coal Co. Ltd.	1148
Ocean Coal and Wilsons Limited	316
Oxfordshire Ironstone Co. Limited	32
Palmer's Shipbuilding and Iron Co. Ltd.	658
Parkgate Iron and Steel Co. Limited	853
Partington Steel and Iron Co. Limited	605
Pease and Partners Limited	996
Pearson and Knowles Coal and Iron Co. Limited	508, 556
Permanent Mesh Gear Limited	463
Piggott Electrical Co. Limited	270
Pit Timber Supply Co. Limited	753
Player (John) and Sons Limited	318
Powell-Duffryn Steam Coal Co. Limited	508
Power Gas Corporation Limited	1148
Powerite Steam Jointing Co. Limited	124
Producer Gas Plants Limited	706
Provincial Metal Co. Limited	362
Radnorshire Coal, Lime and General Supply Co. Limited	605
Ransomes (Tipton) Limited	270
Redpath, Brown and Co. Limited	1148
Reeves (R. W.) Limited	220
Renton (B. M.) and Co. Limited	1096
Rhymney Iron Co. Limited	1148
Richards (H.) and Co. Limited	220
Richmond and Wordsworth Limited	1247
Roberts (William) (Tipton) Limited	32, 996
Roburite and Ammonal Co. Limited	32
Rollason (Abel) and Sons Limited	706
Russell Brothers (Redditch) Limited	32
Ruston, Proctor and Co. Limited	1049
Rustless Iron (Cowper-Coles Process) Ltd.	948
Sanderson Bros. and Newbould Limited	658
Scottish Iron and Steel Co. Limited	463
Scottish Wagon Co. Limited	171
Scott (Walter) Limited	171, 362
Scriven and Co. Limited	1049
Sheepbridge Coal and Iron Co. Limited	412, 556
Sheffield Forge and Rolling Mills Co. Ltd.	270
Sheffield Reduction Co. Limited	220
Shelton Iron, Steel and Coal Co. Limited	220
Shotts Iron Co. Limited	996
Siddons (H. C.) and Co. Limited	1148
Skinner and Holford Limited	1198
Slack and Parr Limited	124
Sneyd Collieries Limited	704
Snowdown Colliery Co. Limited	508
South Durham Steel and Iron Co. Limited	220, 270, 362, 853, 948
Southern Counties Pitwood Co. Limited	220
South Hetton Coal Co. Limited	412, 948
Stanton Iron Works Co. Limited	996, 1247
Staveley Coal and Iron Co. Limited	412, 508
Steel Company of Canada Limited	1148
Steel Company of Scotland Limited	605
Stewarts and Lloyds Limited	362
St. Helens Colliery and Brick Works Co. Limited	605
Stoic Steel and Tool Co. Limited	605
Stokes Castings Limited	463
Storey (E.) and Co. Limited	32
Successors to the Otto Coke Oven Co. Ltd.	32
Summerlee Iron Co. Limited	362
Swan, Hunter and Wigham Richardson Limited	316, 362
Tatnes (Geo. P.) and Co. Limited	508
Thames Side Engineering Co. Limited	1198
Thornycroft (John L.) and Co. Limited	1096
Tilmanstone Miners' Dwellings Building Syndicate Limited	508
Tinsley Park Colliery Co. Limited	82, 1148
Tredegar Iron and Coal Co. Limited	900
Udston Colliery Co. Limited	1049
U.K. Minerals Development Limited	171
United Alkali Co. Limited	171
United National Collieries Co. Limited	32
United Ores Limited	124
United Wire Works Limited	1049
Vaalbank (Transvaal) Colliery Limited	508
Vickers Limited	270
Vulcan Foundry Co. Limited	658, 801
Wael Silica Land Co. Limited	1148
Wagon Finance Corporation Limited	32
Walkers (C. and W.) Limited	171, 948
Ward (Thos.) Engineering Co. Limited	853
Warnes and Co. Limited	171
Warwickshire Coal Co. Limited	1096, 1148
Waste Heat and Gas Electrical Generating Stations Limited	270
Watercroft Detachable Power Installations Limited	463
Watson (John) Limited	316
W. and D. Conveyor Engineering Co. Ltd.	996
Weardale, Steel, Coal and Coke Co. Ltd.	948
Wedmore Engineering Co. Limited	220
Wellman Seaver Rolling Mill Co. Limited	1198
Wells (J. and G.) Limited	508
West Bromwich Metal Castings Co. Ltd.	752
West Canadian Collieries Limited	1247
Western Wagon and Property Co. Limited	220
West Ham Engineering Co. Limited	1247
Weyburn Engineering Co. Ltd.	900
Westinghouse Brake Co. Limited	853
Wheway (John) and Sons Limited	270
Whitehaven Haematite Iron and Steel Co. Limited	
Whitehouse and Pendleton Limited	
Wigan Coal and Iron Co. Limited	41
Wilson, Copple and Co. Limited	

	PAGE		PAGE		PAGE		PAGE
Yates (G. H.) (Dudley Port) Limited	220	Argentine's Coal Discovery	494	Future of Chemical Trade	652	Prices in Paris, Coal	403, 600
Ynyslas Colliery Co. Limited	463	Ascertainment of Selling Prices: Work-	794	Gas, Need for Using More	209	Prices in Russia, Coal	305
Yorkshire Electric Power Co. Limited	220	men's Dissatisfaction	1244	Gas Traction	1100	Production of Coke, Increased	544
		Austria's Iron Supplies	1141	German Coal for Holland	701, 1040	Production in the Donetz Basin, Coal	115
		Berlin's Coal Shortage	496, 985	German Coal and Iron for Switzerland	591	Products, Imports and Exports of Coal	412
		Brazilian Coal Developments	112	Guere's Anglo-Brazilian Coal Co. Ltd.	466	Prohibited Exports	944
		Brazil's Fuel Imports	691	Heriot-Watt College, Edinburgh	74	Proposal to Secure Coal Output	1237
		Brazilian Coal Measures	651	Higher Wages Applications	889	Proposed Chemical Cartel	122
		Brazilian Peat	407	Holland Seizes British Consul's Coal	738	Props, Imports of Pit	551
		Briquettes from Olive Cakes	853	Holland's Fuel Supply	159, 255, 608	Prospecting in the Lityr (Calvador) Coal	947
		Bunker Coal at Panama	608	Home-Grown Timber for Pitwood	693	Pyrometers and Pyrometry	1235
		Canada's Winter Fuel Supply	503	Hong Kong Coal Imports	303	Raasay Miners and Mr. Smillie	1000
		Canadian Coal Supply	349	Hong Kong Coal Supply	28	Reduced Working Hours in America	603
		Canadian Steel Company's Coal and Iron	498	Household Coal Distribution Order, 1917	641, 752	Re-Examination of Colliery Firemen	902
		Properties	492	Housing Difficulties in Colliery Districts	853	Refractory Materials	608
		Cards in Berlin, Coal	356	Housing in South Wales	700	Registration and Publication of Directors'	362
		Cards for Paris, Coal	1202	Huts for Women's Auxiliary Army Corps	945	Names	115
		Caucasian Coal Field, New	1081	Imports and Exports of Coal Products	552, 748, 1189	Re-Organisation Scheme, Coal Transport	1141
		Causes of German Coal Shortage	747	Imports of Pit Props	305, 552, 752, 1181	Requisitions for Coal	837
		Ceramic Society, The	894	Increase in German Coal Prices	698	Requisitions for Household Coal	1036
		Cheap Coal in South Africa	86	Indian Coal Rationing	1033	Requisitions for 1918	850
		Chilian Coal, Argentine Navy and	112	Industry after the War	1044	Researches on Tin and Tungsten	1082
		Chinese Coal Output	1196	Institute of Metals	21, 1047	Reserves for Retailers	1191
		Cinder Order, Tap	27	Institution of Civil Engineers	856	Residuals from Pit Heaps	368
		Coal for the Allies	257	Institution of Mechanical Engineers	894	Rights in County Leitrim, Mining	409
		Coal in Angola	1144	Institution of Petroleum Technologists,	942, 1150	Russian Brown Coal, South	1085
		Coal in Corea	985	Irish Coal Mining	82	Russian Coal Finance	305
		Coal at Cowes	1189	Irish Demurrage Action	948, 1250	Russian Coal Production in 1916	217
		Coal for France and Italy	494	Iron Ore Developments in the Midlands	171	Russian Loans to Coal Masters	305
		Coal for Holland	645	Iron Ore Handling at Sunderland	645	Russian and Spitzbergen Coal	301
		Coal near Odessa	1000	Iron Ore Output Bonus	463	Russian State Coal Monopoly	847
		Coal and Coke in Canada, 1917	220	Iron and Steel Combine	1129	Saskatchewan Coal Fields	595, 651
		Coal Contracts, Pre-War	32	Iron and Steel Institute	399, 504	Scotch Iron Moulders on Strike	161
		Coal Cutters, Electric	606	Iron and Steel Trades Advisory Committee	1130	Scottish Timber Supplies	360
		Coal in Dutch East Indies	504	Iron and Steel Wages in the Midlands	1095	Ship Owners' Demands, Cargo	887
		Coal for London Flats	75	Iron and Steel Works for Spain	737	Shortage in America, The Coal	1180
		Coal Sweepings on Vessels	444	Italian Coal Output	704	Shortage in Denmark, Coal	220
		Coal Tar Regulations	600	Italy's Imports of American Coal	368	Shortage at Hong Kong, Coal	1232
		Cockerill Works, The	1091	Japanese Coal and Iron Outputs	752	Shortage in New Zealand, Coal	409
		Coke for Motor Vehicles	791	Japanese Coal Exports	552	Slag Dumps, Notification of	894
		Coke Oven Patents	645	Jersey's Winter Coal	316	Smillie on Industrial Unrest, Mr.	641
		Coke Oven Plant for Ontario	1187	Kharkoff Coal: Reduced Output	318	South African Industrial Developments	495
		Collier Sold for £33,500	701	King's Appreciation of Miners' Patriotism	998	South Africa's Record Coal Output	399
		Colliers' Time for Starting Work	217	Labour Representation	1146	of Mines	652
		Colliery Deal, South Wales	1141	Lancashire and Cheshire Colliery Under-	940	Spanish Coal Production	217
		Collierymen's Wages	660	Manager's Association	593	Spanish Coal Syndicate	316
		Commissions and Committees, Coal	264	Lancashire Mineral Oil	856	Staffordshire Iron and Steel Institute	1091
		Committee on Housing	1050	Lantern Slides for Lectures	492	Stanton Iron Works, The	707
		Conciliation Board, Coal	1150	Lead Taken Over	895	State Grant for Purchase of Peat Machines	1242
		Concrete Institute, The	983	Leeds University and the Gas Industry	1150	State Ownership in America?	263
		Conservation of Natural Resources	397	Licences for Italy, Coal	610	Strikes in Australia, Serious	224
		Control in America, Effective Coal	1187	Lighting of Safety Lamps	1248	Sulphate of Ammonia, United States Out-	1183
		Control of Steel Supplies	1047	London Coal Trade	1091	put	700
		Criminal Appeal Case	544	Low-Grade Fuels	895	Swedish and American Coal	172
		Crisis in Germany, Coal	462	Malaya, Coal in	28	Tar Oils	853
		Dean Forest Iron Mining	889	Managers' Examinations, Mine	212	Tar Products in Switzerland	608
		Decimal Coinage	270	Manchester Ship Canal Charges	257	Timber Supplies	347
		Depot for Sydney, New South Wales, Big	82	Maximum Prices for French Coals	1248	Tin as War Material	1233
		Coaling	836	Middlesbrough Iron & Steel Shipments	889, 1092	Tin-plates in Rolls	981
		Deputies' Association, Yorkshire	887	Midland Coal diverted to London	408	Trade Abroad, Promotion of British	176
		Detachable Power Installations	887	Midland Industries, Development of	21	Trading with the Enemy	660
		Deterioration of Storage Coal	1142	Minerals of the Empire	706	Trading with the Enemy Acts	401
		Develop British Export Trade, Scheme to	794	Mine Rescue Research Committee	692	Trading with the Enemy Regulations	457
		Development of Spanish Mining	794	Miners and Housing	944	Transvaal Coal Combine	158
		Directory of Colliery Companies in South	798	Miners and Industrial Trade Unionism	748	Truck Deliveries of Coal in London	1081
		Wales	499	Miners and the Price of Coal	844	Tweefontein United Collieries	610
		Discovery in Italy, Reported Coal	840	Miners and Recruiting	349	United Kingdom Trade with Switzerland	698
		Distillation of Oils from Coal	1092	Miners for Shipyard Work	1187	United States, Coal By-Products in the	36
		Distribution of Mining Labour	209, 263	Miners in Volunteer Corps, Coal	708	United States Coal for Canada	700, 798
		Donetz Coal Accumulations	543	Mining of Iron Pyrites	1193	United States Coal Industry Warned	785
		"Down Tools" Ballot, Miners'	943	Mining in Kuangtung and Kuangsi, China	1192	United States Coal Output in 1916	459
		Drill Holes and Blasting Charges	885	National Association of Colliery Under-	839	United States Coal Prices	1243
		Dunderland Company, New	204	Managers	218	United States Coal Shipments, Control of	66
		Dust Barriers in Coal Mines	1232	National Association of Industrial Chemists	896	United States Coke Output in 1916	27
		Dutch Iron and Steel Scheme	851	Nationalisation of Austrian Coal Mines,	896	United States Export Trade	902
		Economy, Gas and Coal	128	Proposed	449	United States Pig Iron Production	505
		Edward Medal Awards	115, 648	Natural Gas at Pisa	1146	United States Steel Industry Mobilised	1133
		Electric Power in Indian Collieries	264	Navy Oil	696	University of Birmingham: School of	74
		Emergency Storage of Coal	595	New Coal Order	350	Miniug	1135
		Empire's Commerce and Commercial	689	New Men in the Mines	457	Use of Inland Waterways	1187
		Requirements, The	368	New South Wales Coal Mines Comman-	660	Utilisation of Fuel Waste	1242
		Empire Trade, Fostering	1096	deered	752	Utilise Mine Gases, To	791
		Engineering Works' Canteens	798	New Zealand Coal	412	Wages and Compensation, Miners'	560, 704
		Escape Openings for Coal Trimmers	463	North of England Iron and Steel Prices	1091	Wages, Profits, and Prices	1183
		Examination under Coal Mines Act, 1911	945	Norwegian Fuel Question	206	Wagon Hire for Iron Ore	741
		Excess Profits on Mining Shale	267	Norwegian Railways Coal Contracts	263	Wagons for Winter Coal	1202
		Exempted Mine Workers	840	Norwegian Railways Coal Orders	655	War Office Peat Fuel Contract, The	1040
		Explosives Combine, The	257	Organisation of Engineering Training, The	310	Wastage, Coal	693
		Exporters as Ship Owners, Coal	605	Output of the Loire Basin, Coal	896	Welsh Miners' Strike Ballot	593
		Exporting to Italy, Coal	657	Owners and Control Bill, Coal	693	Welsh Patent Fuel Prices Fixed	603
		Export of Coal by Barges	347	Owners and Wages Advance, Coal	158	West Australia Coal Output	310
		Export of Coke to France	645	Peat Deposits, Irish	894	Wharf for Rouen, New Coal	16, 65, 174, 1235
		Exports Embargo	1043	Peat Substituted for Coal	312	Wigan and District Mining College,	693
		Exports Order, Coal	457	Pekin Syndicate: Coal Output Satisfactory	86	Association	693
		Facilities at Cape Town, Coaling	349	Peru, Coal Production in	1052	Witbank Colliery Limited	700
		Families in France, Coal Miners'	947	Peruvian Coal Fields	746	Workmen's Compensation Act	1033
		Famine in Spain, A Coal	791	Peruvian Coal Output	651	Worm Gearing	836
		Faraday Society	257	Petroleum Oils	806	Zirconia as a Lining for Open Hearth	305
		Fatalities in the United States, Mine	1000	Petroleum Research	449	Furnaces	
		Fire at Kensington	837	Pit Props from France, Exports of	28		
		First-Aid	798	Pit Props from Newfoundland	497		
		Food Blockade, Miners'	164	Plant at Balboa, Coaling	272		
		Freights to Norway, Coal	75	Pocahontas Developments	114		
		French Coal Imports, Financing of	556, 606	Ports, Coaling at United States	416		
		French Coal Production	34	Portuguese Coal Outputs and Imports	985		
		Fuel for our Army in France	846	Poverty among Durham Miners	397		
		Fuel Economy	499	Power from Sawdust	593		
		Fuel Economy in the United States	1180	Prices at Alexandria, Coal	406		
		Fund for Huts, Coal Trade		Price of Coal (Limitation) Act			

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Graphic Solutions of Some Compressed Air Calculations.

By C. W. CRISPELL.

The four nomograms presented in this article were designed to simplify and make more rapid the calculations connected with the compression and transmission of air. The formulæ involved are rather complicated, but the graphic solutions are simple; their use requires an ability to follow explicit directions and to interpolate values on a logarithmic scale.

For the sake of convenience, the nomograms will be divided into two classes, and the purpose and accuracy of each will be discussed.

Compression.

It is frequently desirable to determine the horse-power necessary to compress a given amount of free air from atmospheric pressure to a certain final pressure. The nomograms in figs. 1 and 2 present a rapid method of calculating the horse-power required to compress 1 cu. ft. of free air per minute by single- or two-stage compression. The general formula for the horse-power required to compress air adiabatically is:—

$$HP = \frac{S \times 144}{33,000} \cdot \frac{P V^n}{(n-1)} \left[\left(\frac{P'}{P} \right)^{\frac{n-1}{n}} - 1 \right] \quad (1)$$

where P = absolute atmospheric pressure at compressor, in lb. per sq. in.; P' = final absolute pressure of compressed air, in lb. per sq. in.; V = volume of free air compressed per minute, in cu. ft.; S = number of stages; n = exponent of the compression curve.

The exponent n is the ratio between the specific heat of air at constant pressure and its specific heat at constant volume. For theoretical adiabatic compression $n = 1.406$. The value of n in actual compression varies with the design of the compressor and the efficiency of the cooling arrangements. In well-designed single-

stage dry compressors, the value of n ordinarily lies between 1.25 and 1.35. Well-designed two-stage compressors give values of n as low as 1.15, though 1.20 to 1.25 is more common. Additional values of n have been added on the nomograms for the sake of completeness. Values of P for different altitudes are given in the tables accompanying figs. 1 and 2.

Speed and Accuracy.

To test the diagrams, six problems have been taken at random, as shown in Tables 1 and 2. They were

TABLE 1. SINGLE-STAGE COMPRESSION.

Problem No.	1	2	3	4	5	6
Final pressure...	70.0	60.0	90.0	80.0	50.0	40.0
n	1.30	1.35	1.40	1.25	1.15	1.20
Atmos. pressure	14.7	13.0	12.0	11.0	10.0	8.0
Horse-power:						
By chart.....	0.122	0.108	0.144	0.118	0.079	0.066
By slide rule..	0.121	0.107	0.143	0.116	0.078	0.065
By logs.....	0.120	0.107	0.143	0.117	0.078	0.065
Per cent. error:						
By chart.....	+1.60	+0.93	+0.70	+0.85	+1.28	+1.54
By slide rule..	+0.80	0.0	0.0	-0.85	0.0	0.0

TABLE 2.—TWO-STAGE COMPRESSION.

Problem No.	1	2	3	4	5	6
Final pressure...	150.0	130.0	110.0	100.0	80.0	60.0
n	1.40	1.35	1.30	1.25	1.20	1.15
Atmos. pressure	14.7	14.0	13.0	12.0	10.0	9.0
Horse-power:						
By chart.....	0.177	0.159	0.139	0.125	0.100	0.080
By slide rule..	0.175	0.158	0.138	0.125	0.099	0.079
By logs.....	0.175	0.158	0.138	0.124	0.099	0.079
Per cent. error:						
By chart.....	+1.14	+0.63	+0.72	+0.80	+1.01	+1.26
By slide rule..	0.0	0.0	0.0	+0.70	0.0	0.0
Mean error:						
By chart.....	0.93%					
By rule.....	0.13%					

solved first by the use of figs. 1 and 2, and then by means of a 20 in. slide rule applied to formula (1). The

where D = the volume of compressed air in cu. ft. per minute discharged at the final pressure; c = a coefficient varying with the diameter of the pipe, as determined by experiment; d = actual diameter of pipe in in.; l = length of pipe in ft.; p_1 = initial gauge pressure in lb. per sq. in.; p_2 = final gauge pressure in lb. per sq. in.; w_1 = the density of the air, or its weight per cu. ft., at initial pressure.

The nomogram, fig. 3, allows the solution of this equation without reference to tables for values of $c \sqrt{d^5}$ and $\sqrt{\frac{p_1 - p_2}{w_1}}$ which are ordinarily used for this purpose.

The following cases may arise in connection with the transmission of compressed air through pipes:—

(1) Given the volume of compressed air, the length of pipe, the initial pressure, and the maximum allowable drop in pressure; required, the diameter of the pipe.

(2) Given the length of pipe, the diameter of pipe, the initial pressure, and the maximum allowable drop in pressure; required, the volume of compressed air which the pipe will carry.

(3) Given the diameter of the pipe, the volume of compressed air, the initial pressure, and the maximum allowable drop in pressure; required, the maximum length of pipe of the given diameter which can be used under these conditions.

(4) Given the diameter of the pipe, the volume of compressed air, the length of pipe, and the maximum allowable drop in pressure; required, the pressure at which the air must enter the pipe.

(5) Given the diameter of the pipe, the volume of compressed air, the length of pipe, and the initial pressure; required, the drop in pressure.

The graphic solution of each of these problems may be obtained from fig. 3, as follows:—

Case 1.—With a straight edge, join the length of pipe and the cu. ft. of compressed air (not free air); note the intersection on axis A; join the initial pres-

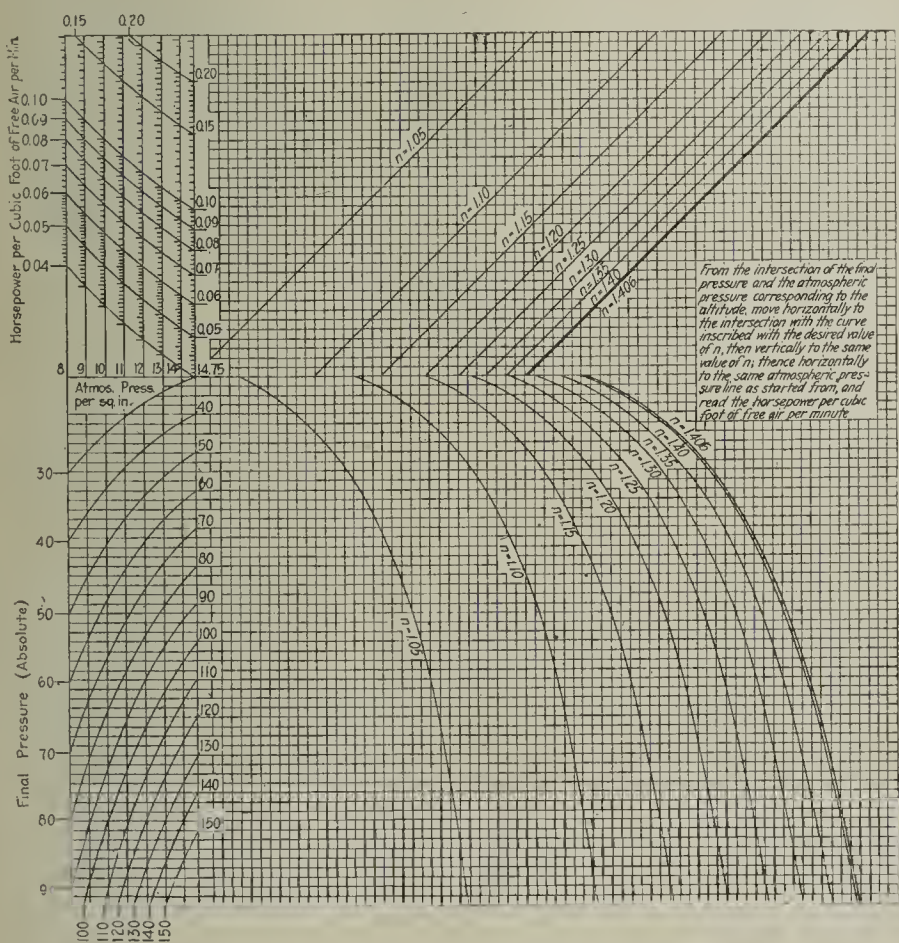


FIG. 1.

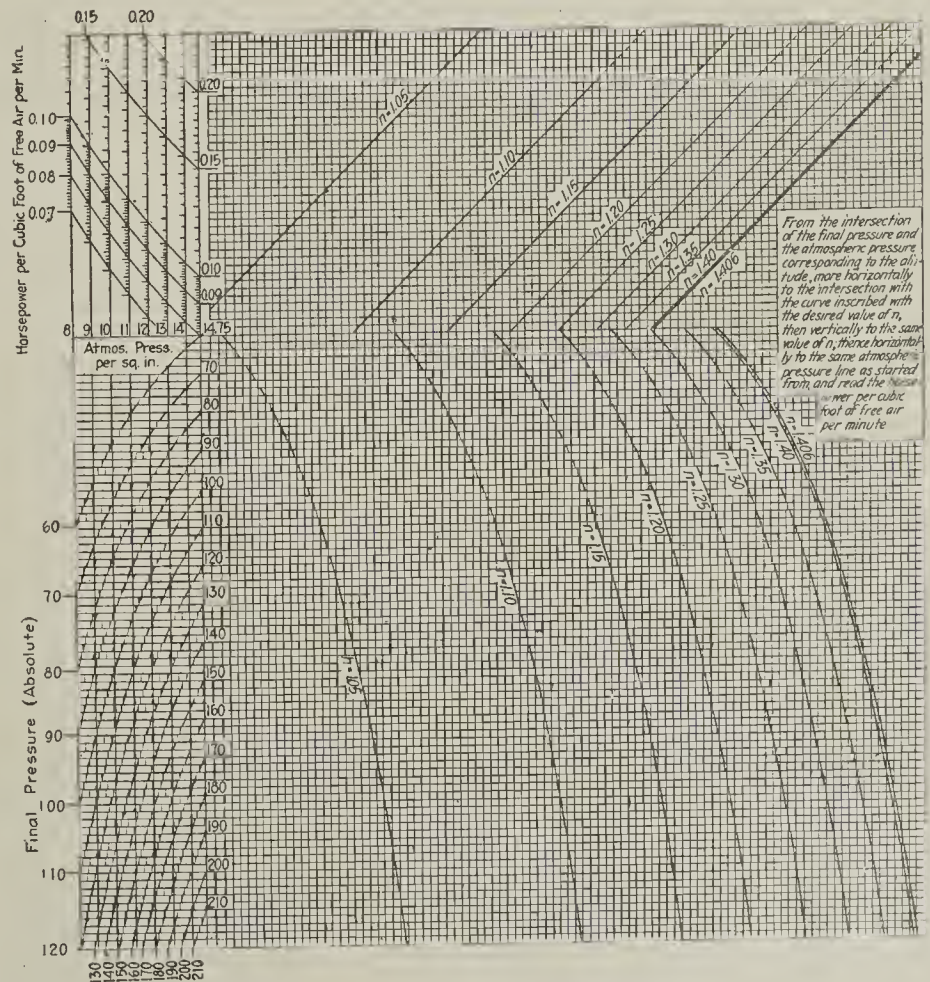


FIG. 2.

Altitude. Ft.	Barometric pressure.		Altitude. Ft.	Barometric pressure.		Altitude. Ft.	Barometric pressure.		Altitude. Ft.	Barometric pressure.	
	Inches, mercury.	Lb. per sq. in.		Inches, mercury.	Lb. per sq. in.		Inches, mercury.	Lb. per sq. in.		Inches, mercury.	Lb. per sq. in.
0	30.00	14.75	4,000	25.76	12.67	8,000	22.11	10.87	12,000	18.98	9.34
1,000	28.80	14.20	5,000	24.79	12.20	9,000	21.29	10.46	13,000	18.27	8.98
2,000	27.80	13.67	6,000	23.86	11.73	10,000	20.49	10.07	14,000	17.59	8.65
3,000	26.76	13.16	7,000	22.97	11.30	11,000	19.72	9.70	15,000	16.93	8.32

stage dry compressors, the value of n ordinarily lies between 1.25 and 1.35. Well-designed two-stage compressors give values of n as low as 1.15, though 1.20 to 1.25 is more common. Additional values of n have been added on the nomograms for the sake of completeness. Values of P for different altitudes are given in the tables accompanying figs. 1 and 2.

Directions for using figs. 1 and 2 are printed on them. It should be noted that the scale for the horse-power per cubic foot of air starts from a different ordi-

* Transactions of the American Institute of Mining Engineers.

average time required to solve a problem with the diagrams was 1 minute 45 seconds, as compared to 3 minutes 45 seconds for the slide rule. The mean error in these calculations, disregarding + and - values, was 1.15 per cent. for the graphic solution and 0.28 per cent. for the slide rule.

Transmission.

Fig. 3 gives a graphic solution of D'Arcy's formula for the transmission of compressed air in pipes. This formula is:—

$$D = c \sqrt{\frac{d^5}{w_1 l} (p_1 - p_2)} = \frac{c \sqrt{d^5}}{\sqrt{l}} \sqrt{(p_1 - p_2)} \quad (2)$$

sure with the drop in pressure; note the intersection on axis B. A line joining the two points on A and B will intersect scale number 3 at the required pipe diameter.

Case 2.—With a straight edge, join the initial pressure with the drop in pressure; note the intersection on axis B; join the intersection on B with the diameter of the pipe; note the intersection on axis A. A line joining this point on A with the length of pipe will intersect scale number 2 at the required volume of compressed air.

Case 3.—With a straight edge, join the initial pressure with the drop in pressure; note the intersection on

axis B; join the intersection on B with the diameter of the pipe; note the intersection on axis A. A line joining this point on A with the given cu. ft. of compressed air intersects scale number 1 at the required length of pipe.

—With a straight edge, join the length of the pipe with the volume of compressed air; note the intersection on axis A; join the intersection on A with the diameter of the pipe; note the intersection on axis B. A line joining this point on B with the allowable drop in pressure intersects scale number 4 at the required initial pressure at the entrance of the pipe.

Case 5.—With a straight edge, join the length of pipe with the volume of compressed air; note the intersection on axis A; join the intersection on A with the diameter of the pipe; note the intersection on axis B. A line joining this point on B with the given initial pressure will intersect scale number 5 at the required drop in pressure.

Speed and Accuracy.

The six problems given in Table 3 were worked out to test this nomogram. An average time of 1 minute 15 seconds was required to solve a problem, using a 20 in. slide rule in connection with the tables published in "Peele's Compressed Air Plant." These same problems were solved by the nomogram in an average time of 1 minute. The mean error of the nomogram is less than 0.5 per cent., as shown by Table 3.

TABLE 3.—D'ARCY'S FORMULA.

Problem No.	1	2	3	4	5	6
Size of pipe	2	4	6	8	10	12
Length of pipe	100	1,000	2,000	3,000	4,000	5,000
Initial pressure	40	60	70	80	90	100
Drop in pressure	2.0	2.0	3.0	4.0	5.0	8.0
Cu. ft. of air:						
By chart	78.2	133.0	309.0	574.0	930.0	1,600.0
By slide rule	78.8	133.6	308.2	573.0	935.0	1,603.0
By logs	78.9	133.4	308.3	573.0	935.0	1,603.0
Percent error:						
By chart	-0.88	-0.30	+0.22	+0.17	-0.53	-0.18
By slide rule	-0.12	+0.15	-0.03	0.0	0.0	0.0

Many of the data on the capacity of air compressors and the air consumption of rock drills or other

COKE OVEN MANAGERS' ASSOCIATION.

MIDLAND SECTION VISIT TO THORNCLIFFE.

About 60 members of the Midland section of the Coke Oven Managers' Association paid a visit to the Thorncliffe and Rockingham works of Messrs. Newton, Chambers and Company Limited on Saturday last, June 30.

The new Semet-Solvay ovens under construction at Thorncliffe were first inspected. Considerable interest was manifested in the lay-out of this plant, which embodies the most modern ideas and many novel features. The well-known Semet-Solvay practice of using small bricks in the construction of the 28 ovens has been followed, with very substantial middle walls, and the provision for the regulation of the hot air supply for the consumption of the gases met with the general approbation of the visitors. The waste heat flows direct from the ovens to a battery of four Lancashire boilers, raising steam for the power plant. The extremely steady running of the 650 horse-power gas engine was another source of interest. Another feature of the new plant, which was quite a novelty to most of the visitors, was the construction of the pure benzol still, in which the cover plate is not only serrated, but also perforated; it is fitted with a fairly deep seal, and heated by direct steam, without coils; the superimposed trays are of 18 in. depth. An interesting method of distribution of the washing oil was also explained. Instead of being delivered direct into the irrigators, it goes direct into an overhead reservoir, which feeds the scrubber. The design of a proposed benzol rectification plant for the making of pure benzol was also shown.

Motors afterwards conveyed the party to the company's Rockingham chemical works at Birdwell, where they found much to interest them in the extensive plant for producing pure benzol. This has evidently been the subject of much experimentation, on ingenious and carefully thought out lines, on the part of the staff, and some very successful results have been achieved. There are two batteries of ovens (30 and 15), embodying a combination of the waste heat and

thing for the collieries which produced so much small coal. He hoped the future of the industry was more promising than it appeared to him. They had had in the past a great deal of competition with Germany, and the question was: would that continue? If coke oven enterprises in this country could find a market for their products—and especially if the farmers could be persuaded to take more of their commodities—and foreign competition could be kept out, he believed the industry might succeed; but if once they opened the door to free trade he was not very sanguine about the coke oven industry in this country. A good deal was heard now about low-temperature distillation. He was a great believer in this, and had been "pegging away" at it for the last seven years, and he was confident it would be a thing of the immediate future. He could see no insuperable difficulty in producing low-temperature coke where there was semi-bituminous coal obtainable. There were certainly difficulties resulting from the production of too large a quantity of oils of the paraffin nature, but these difficulties, he believed, could be overcome, and his firm had made some progress in that direction. But having got over that difficulty, and that of getting the coke out after distillation—he was, of course, referring to the continuous system, because he did not consider any other system would pay—there was no reason why low-temperature distillation should not succeed. Indeed, at Thorncliffe they were pioneers in that line, and, though the plant was not quite ready for inspection, he hoped to have an early opportunity of showing the Coke Oven Managers what they were doing. If difficulties did arise, it was for the chemists connected with that industry to solve them. Could they so treat the oil and tar to make it commercially successful? They had got high-temperature distillation to very nearly a high state of efficiency, and they could now devote their leisure to the study of low-temperature problems. The difficulty was, of course, in regard to paraffin. He could not see that there was going to be a very big market for candles. In order to get the various fractions from low-temperature distillation, they might have to put down very costly plant. He had been told

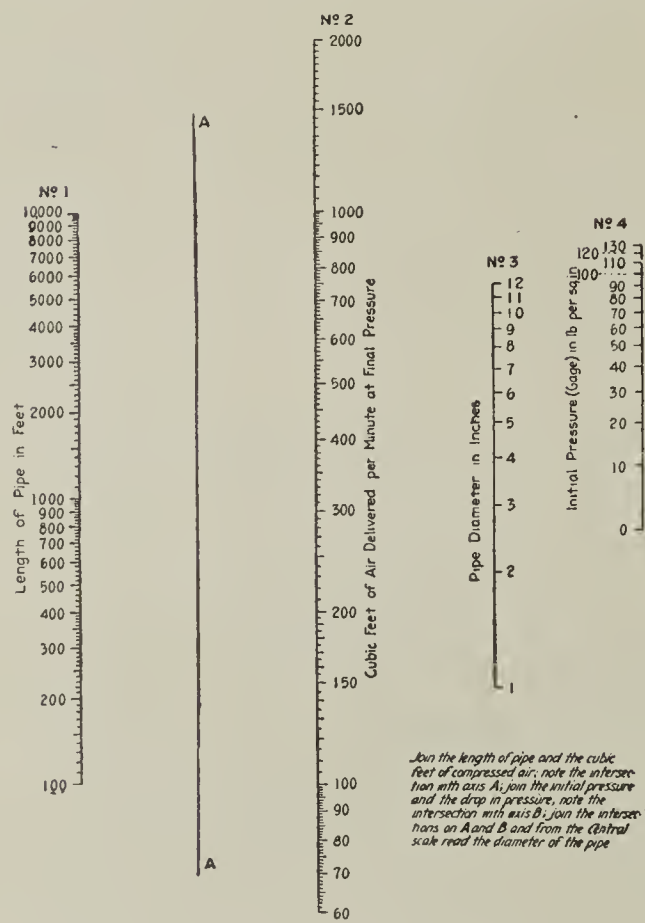


FIG. 3.

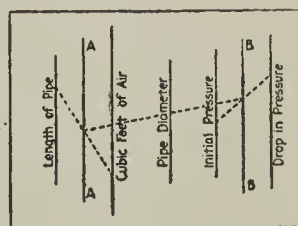


FIG. 4.

machines are expressed in terms of cu. ft. of free air. The volume of compressed air to be transmitted must be known before the nomogram for D'Arcy's formula, fig. 3, can be used. Volumes of free air at different altitudes can be converted into corresponding volumes of compressed air at different absolute pressures by means of nomogram on fig. 4. This diagram is based on the equation:—

$$p v = p' v'$$

where p = initial absolute (atmospheric) pressure in lb. per sq. in.; v = initial volume of air in cu. ft.; p' = final absolute pressure of compressed air in lb. per sq. in.; v' = volume of compressed air in cu. ft.

Electric Coal Cutters.—An Australian newspaper just to hand (dated May 16) quotes a Sydney despatch to the effect that Judge Fitzhardinge, who was umpire in the recent Bulli Colliery coal-cutting case, decided that the practice of using electrical coal cutters in the Bulli seam of the Bulli Colliery was dangerous, and, in the interests of the miners and of the mine, should be at once discontinued. His Honour directed that the cost of the umpire and arbitrators, and of the Arbitration Court, shall be paid by the owners of the Bulli Colliery.

Wigan Mining and Technical College.—The governing body of the Wigan and District Mining and Technical College have had under consideration the arrangements for classes during the session 1917-1918, and have decided that, as regards evening classes, substantially the same provision shall be made as last year, but, as regards day work, an important addition shall be effected by the inauguration of a day commercial school, which, in fact, has been the subject recently of negotiation and co-operation between the college governing body and the County Education Committee. The day commercial school will be opened during the first week of the session, and will be organised in two sections to accommodate 100 pupils. The school will have completed a course at the secondary schools respectively. The senior section will present provide a one-year course.

regenerative systems, and the surplus gases are used by means of Terbeck and Cumberland burners.

From the Rockingham works the company drove through Wortley Park to the Wortley Arms Hotel, where tea was provided by Messrs. Newton, Chambers and Company Limited. Mr. W. HAY, general manager of the collieries, presided, and, in welcoming the visitors on behalf of his fellow directors, expressed the belief that the new plant under construction would be found to be the best in the country, though, owing to circumstances connected with the war, it was in some particulars of a rather mixed type. Its success would, of course, be largely dependent upon gentlemen connected with the very important industry represented by that association. Upon them, he felt, depended in a very large measure the future prosperity of the nation. The collieries produced for them a substance of almost unknown possibilities, and it was for those connected with the coke oven industry to manipulate that product to the fullest advantage. For instance, in the matter of tar distillation, they got out a certain number of fractions, but how many more were there still remaining of a commercial value. Sometimes scientific gentlemen like Prof. Fearnside, who he was pleased to see with them that day, were inclined to be forgetful of the commercial aspect of the industry. Directors, on the other hand, had to look at their concerns purely as a commercial proposition. There was no doubt that in the past the coke oven undertaking had been fairly remunerative, but what was in store for it it was not so easy to foretell. Sometimes he was rather pessimistic about it, but he hoped his pessimism would not be justified. Twelve or 13 years ago he was more optimistic. He had at that time the pleasure of going round the Grassmoor works, and then wished he had got coke ovens. He had since had experience with them, and was not quite so keen about them. He could, at that time, however, foresee that coke ovens were going to be great users of small coal, and that, of course, he realised, would be a good

within the past few days that some people of high standing in the commercial world had been approached in connection with a projected expenditure of two million pounds upon a low-temperature distillation plant, from which the supply of gas would enable them to reduce power at 0.2d. per unit. That project had been seriously put forward before certain people not very far distant from Sheffield. Some idea of the gigantic nature of the undertaking would be gathered from the fact that the gas would be conveyed in a pipe of 15 ft. diameter. He could assure them that it was seriously proposed that two million pounds should be subscribed for the development of low-temperature distillation plant, and possible users of the power had been told that they could have it at 0.2d. per unit. He thought from this the members of the Coke Oven Managers' Association would realise the importance of studying the question of low-temperature distillation, and he hoped when next they met they would be able to give some answers to the problems he had put before them.

Mr. T. V. MILES, endorsed Mr. Hay's welcome to the Coke Oven Managers, and humorously reproached them for the interest they manifested in everything connected with the coke oven industry except coke, and challenged any one of them to explain exactly what coke consisted of. They did know that the Ministry of Munitions had decided that this country had to double its output of steel. Twenty-five years ago this country produced by far the largest amount of iron and steel in the world, but America to-day produced over 40 million tons per annum, and it was absolutely essential that this country should double its output at the earliest opportunity. To meet the requirements of the Ministry of Munitions, it would be found necessary to produce 11 million tons of coke per annum over the pre-war standard within the next two years.

Mr. G. CHURCH, president of the Midland section of the Coke Oven Managers' Association, expressed, on behalf of the members, their great appreciation of the

hospitality shown by Messrs. Newton, Chambers and Company, for the extremely instructive visit they had provided, and for the valuable suggestions thrown out by Mr. Hay. Personally, he was convinced that there would be scope for both high- and low-temperature distillation; but to get the fullest advantage of either system called for the co-operation of the commercial and scientific interests concerned. He confessed to some surprise to find a gentleman like Mr. Hay, who had been associated with the coke oven industry since its inception, so pessimistic, and hoped his anticipations would not be realised.

A vote of thanks to the directors of Messrs. Newton, Chambers and Company Limited was cordially passed, on the proposition of Mr. B. W. HAGEN (Barnsley Main), seconded by Mr. C. P. FINN, B.Sc. (Hems-worth).

In acknowledging this, Mr. HAY conveyed the regrets of Mr. Newton Drewe at being prevented, by military duties, from attending to join in the welcome to the Coke Oven Managers.

PROBLEMS OF THE CANADIAN MINING INDUSTRY.

In a paper presented to the Canadian Mining Institute, Mr. W. J. DICK said that one of the most important problems confronting Canada to-day was what should be done in order to take adequate care of the returned soldiers. Canada had raised some 400,000 soldiers in defence of the Empire; and whilst some people were of the opinion that the soldiers should be placed on the land in agricultural pursuits, past experience had shown that unless these men were farmers, such attempts would prove disastrous.

The great development of Western Canada had been due to railway construction and the borrowing of 1,500 million dollars of English and foreign capital. In addition, Canada had been piling up a large war debt; and the problem of paying for all these expenditures could only be solved by increasing the output of mineral products (not merely raw materials) in Canada, so that the exports would pay for the indebtedness. Canada, in connection with her mineral industry, had been content too long with being the mere "hewers of wood and drawers of water" for other countries.

Co-operation of Producer and User.

In the past, great quantities of Canadian ores and unrefined mineral products had been exported for treatment, refining, and manufacture. Industries had been established in Canada which required these products, but at present, in many cases, the manufacturer either did not know that the products he required in manufacture could be, or were, manufactured in Canada, nor would he, if asked to state what he used, and how much was imported, give the desired information to the producer of mineral products, for fear of losing the foreign contracts upon which his business was based.

One way in which the mineral industry might be benefited was by having mining trade experts attached to the Department of Trade and Commerce, who could act in co-operation with the Manufacturers' Association, Provincial and Federal Departments of Mines, and British trade and consular officers abroad. The correlated statistics could then be sent to producers and users in the form of weekly or monthly mining trade bulletins, thereby encouraging trade in mineral products both at home and abroad.

After dealing with the electro-chemical industries and the refining of metals and non-metallic minerals in Canada, Mr. DICK turned to the coal trade.

Coal Trade.

The coal deposits of Canada compared favourably with those of the greatest coal mining countries of the world in respect of quality, quantity, and accessibility for mining purposes, but owing to their location in the eastern and western portions of the Dominion the large central market was supplied by imported coal.

United States bituminous coal was used in the area between a north and south line through Farnham, Quebec, and a line drawn from Battleford to Moose Jaw, and thence to Estevan, Saskatchewan. Although a considerable quantity was used in Manitoba and Saskatchewan, these provinces were also supplied by coal from the Crow's Nest, Canmore, Edmonton, Lethbridge, and Souris districts.

Eastern Canada possessed no deposits of anthracite coal, and as this class of coal was admirably suitable for domestic heating and cooking purposes, it was imported in considerable quantity from the United States, and sold over an area extending from Nova Scotia in the east to Battleford, Saskatchewan, in the west. The imports in 1913 amounted to over 1,640,000 tons, being more than double the imports of 1906. From this, it could be seen that the demand for this class of coal was increasing, notwithstanding the increasing prices; again, the supply of anthracite coal in the United States was limited, and there was no assurance that its export to Canada would be long continued. In 1913, it was estimated that there were 16,153,000,000 tons of anthracite coal in the United States. In 1913, 91,524,922 tons were mined, and, as it had been estimated that for every ton of coal lost a ton and a-half was sold or used, the exhaustion was proceeding at the rate of 152,541,536 tons per annum. If the production continued at the same rate, it would exhaust the anthracite of the United States in little over 100 years. It must, therefore, be expected that the price would gradually increase until only the wealthy few could afford it. Coincidentally with the rising price, production would decrease, thus prolonging the life of the mines.

Of the total consumption during 1913, 42.6 per cent. was domestic coal, and 57.4 per cent. imported coal, or, in other words, more coal was imported than was produced. The importance of this fact might be more fully recognised when it was realised that the value of

the coal production in 1913 greatly exceeded that of any other mineral, and mounted to over 25 per cent. of the total mineral production of Canada for that year, being valued at about 37,335,000 dols. The situation, therefore, was this: although Canada had over 17 per cent. of the world's reserve of coal, the production was small, and more was imported than was produced.

It was desirable both from the mining and national standpoint that these conditions should be changed; and the problems to be faced were the following:—(1) Domestic fuel problem in Central Canada; (2) imported bituminous coal fuel on railways in Central and portions of Western Canada; (3) domestic fuel problem in prairie provinces; and (4) cheap power problem in prairie provinces.

Domestic Fuel Problem in Central Canada.—This might be solved: (a) By the installation of by-product coke ovens at certain points on the St. Lawrence and Great Lakes system, the coke being used for domestic purposes in place of anthracite coal; (b) by the development of a peat industry in certain well chosen localities; (c) eventually, no doubt, electric energy would to a certain extent, replace coal for heating purposes in this area.

Railway Fuel Problem in Central Canada.—This could be met by the electrification of the railways, which for economic reasons could be undertaken step by step. In so far as the railway fuel problem in certain portions of the prairie provinces and Western Canada was concerned, this might be solved by coal dust firing (using Western lignites or sub-bituminous coal), the use of a suitable briquetted fuel made from lignites or bituminous coal, and the further use of Canadian bituminous coal.

Fuel for the Prairie Provinces.—There were at present two problems of great importance in these provinces, and their solution would become a matter of even greater moment in the future, viz., the problem of cheap power, and the problem of a domestic fuel supply. In Western Manitoba, in Saskatchewan, and in Eastern Alberta water power development costs were generally high, but these districts were within reach of great deposits of lignite. It was therefore of great importance that something should be done with a view to utilising the low-grade fuels underlying the greater portion of Alberta and part of Saskatchewan and Manitoba. In order to make the coal transportable and suitable for domestic and power purposes, it would be necessary for it to be of sufficient value to bear the cost of transportation, able to withstand handling and a certain amount of weathering, and that it should be a suitable fuel for domestic and power purposes. Coal briquettes and carbonised lignite briquettes fulfilled these conditions.

The Mines Branch, in co-operation with the Advisory Council on Industrial and Scientific Research, was working earnestly on the first of these problems, and indications pointed towards an economic solution.

Standardisation of Special Mining Equipment.

In June 1916 an Order in Council was passed appointing a Committee of Council to consist of the Minister of Trade and Commerce, the Minister of the Interior, the Minister of Mines, the Minister of Inland Revenue, the Minister of Labour, and the Minister of Agriculture, which shall be charged with, and responsible for, the expenditure of any moneys provided by Parliament for scientific and industrial research, and also an Honorary Advisory Committee, responsible to the Committee of Council, to be composed of nine members, representative of the scientific and industrial interests of Canada, who should be charged with the following duties:—

(a) To consult with all responsible bodies and persons carrying on scientific and industrial research work in Canada, with a view to bringing about united effort and mutual co-operation in solving the various problems of scientific and industrial research which from time to time present themselves.

(b) To co-ordinate as far as possible the work so carried on so as to avoid overlapping of effort, and to direct the various problems requiring solution into the hands of those whose equipment and ability are best adapted thereto.

(c) To select the most practical and pressing problems indicated by industrial necessities and present them when approved by the Committee to the research bodies for earliest possible solution.

(d) To report from time to time the progress and results of their work to the Minister of Trade and Commerce as chairman of the Committee of Council.

In addition to the necessity for scientific research in connection with the mining industry, there was a need for the testing and standardisation of special mining equipment and chemical and mineral products. For example: Standardising of oxygen and caustic soda or caustic potash for use in mine rescue apparatus; the testing of miners' safety lamps and lamp parts; the testing and standardisation of explosives for use in different mining operations; and the standardisation of chemical fertilisers and other chemical products. The same remarks would apply to the testing of toxic, measuring apparatus, etc.

Imported products were now used in Canada which might or might not have been tested or standardised in Germany, the United States, or elsewhere; but if it were intended to manufacture these products in Canada, it would be necessary to provide some means for guaranteeing their standard of purity.

On account of the importance of this subject, and to the increasing purchases made by the different departments of the Government, it would appear advisable that a National Bureau of Standards, similar to that in the United States, be established in Canada.

The French Government, which some time ago took control of the distribution of coal mined in France, has now extended its authority so as to include all coal imported. A Paris correspondent says that in many quarters it is believed that the result will be that importers of coal will close their offices, and the Government will have to take over the entire business.

PORTABLE ELECTRIC LAMPS AND GAS DETECTION.

[BY AN ENGINEERING CONTRIBUTOR.]

Ever since the introduction of the incandescent lamp, inventors have been trying to produce a portable self-contained lamp that should displace the old oil-burning lamp; and at the present time it may fairly be claimed that they have been completely successful in solving one part of the problem, the furnishing of a reliable steady light; but, so far as the writer is aware, no electric gas detector has yet been placed upon the market for general use.

For a long time inventors were divided between the claims of the primary and secondary batteries, and up to a few years ago it looked very much as though the primary battery had a good chance of winning. The secondary battery had a bad record when used in very much larger sizes than was possible in a miner's lamp; and, in addition, it was known to be very unreliable, and to be subject to failure apparently without cause. It may be mentioned that the secondary batteries that are employed to-day for other purposes, such as ignition for motor cars, are also often found unreliable. With the primary battery, as complete dismantling was necessary after every run, it was apparently possible to ensure all being right before the lamp was taken down the pit. Also, it was an easy matter to arrange for running a few primary battery lamps for trial without any very heavy expenditure; whilst with secondary battery lamps it was necessary to provide some means of re-charging the batteries after each run, and it was often very difficult to know if anything was wrong with the interior of the battery. With all secondary batteries it is of the very highest importance that they should not be allowed to discharge below a certain pressure, 1.8 volts for the lead battery; and with colliery work, even when special apparatus was provided, for re-charging, it was often impossible to avoid this. One very large colliery in the county of Durham was successful with secondary battery lamps in the very early days of their introduction, but this success was only attained by adding a small accumulator factory to the lamp room. At the present time, the secondary battery has won, and it is not likely that the primary battery will ever get another look in. The introduction of the metallic filament incandescent lamp, by reducing the current required to about one-third of that of the carbon filament lamp, greatly simplified the problem for both forms of battery; it enabled single-cell batteries to be used, and so lessened the number of connections and the danger of a broken connection. What has led, however, to the final success of the secondary battery has been the development of the use of electricity in mines for light and power. There are very few collieries now where there is not a service of electric current, either generated on the ground, or taken from the district power supply station; and it becomes a very simple matter to provide the required pressure and current for charging a large or small number of secondary batteries. As is well known, a number of colliery lamp cabins have been laid out specially for secondary battery electric lamps, where the current supplied by a motor generator, the motor taking its current from the power or lighting service, and the generator being arranged to furnish whatever pressure may be desired. The writer would prefer to run the battery charging service at the pressure required for a single lamp; but the more common practice is to connect a certain number of cells in series, and to insert a tell-tale lamp in each series, so that the lamp-man can see that each series is being charged. The objection to the series parallel arrangement is that individual cells may not be receiving current.

The difficulties in the way of the primary battery lamp tend to increase with the number in use at any particular colliery; whilst with the secondary battery lamp the reverse is the case. The difficulties in the way of the primary battery lamp were the cost of the materials, the difficulty of arranging for their supply to a large number of lamps, and the even greater difficulty of getting rid of the resultant products. If a system could have been arranged to collect all the resultant products economically and to work them up, the primary battery might have been a very paying proposition; but under present conditions, it has not a chance from the economical point of view against the secondary battery.

The matter of the connections between the battery and the lamp and switch gave considerable trouble to inventors of both forms; but, again, the secondary battery, as at present constructed, offers better chances for making them strong and stable. The matter of mechanical strength was also a great difficulty with both forms; but in the later patterns of secondary battery, this part of the problem appears to have been completely solved.

Indicating Gas.

As mentioned above, up to the present no electric gas indicator seems to have been placed on the market, though several inventors have been working at the problem for a long time past. One set of workers have employed the difference in pressure set up on the two sides of a porous diaphragm, when methane is present, but no successful apparatus has so far been produced. The great majority of inventors have made use of the peculiar property of catalysis. A platinum or palladium wire is raised to a certain temperature by means of an electric current, and the wire, which is protected from the possibility of igniting gas by a gauze in the usual way, forms part of an apparatus arranged that when methane impinges upon the wire, the temperature of the latter is raised, its electrical resistance being also raised, and an indication being given. In the most advanced form of apparatus this indication is given on a dial, showing the percentage of gas, the heating of the wire, and the

increase in electrical resistance being proportional to percentage of gas present. The writer believes a simple form of apparatus on these lines will be marketed shortly, if not already in process of being there.

SUBSIDENCE RESULTING FROM MINING.*

By L. A. YOUNG and H. H. STOEK.

(Continued from page 1215, vol. cxlii.)

Strength of Roof.

In determining the limits of mining under heavy wash, D. Bunting considered the strength of slabs of roof rock supported by pillars. "In deriving a formula for computing the breaking load of a slab of stone from the formula $\frac{P}{e} = M_m$, let W represent the distributed loading plus the weight of the beam itself in pounds; b, d, L represent the breadth, depth, and span respectively in inches; and R equal the modulus of rupture in pounds per square inch."

Bunting suggests that the modulus of rupture does not express the actual stress in the extreme fibre of the beam of rock, but is a quantity useful only as a basis of comparison. He gives the following safe unit stresses for stone, recommended by W. J. Douglas, as illustrative of possibly a fair average of safe stress:—

	Compression. Lb. per sq. in.	Shear. Lb. per sq. in.	Tension. Lb. per sq. in.
Granite	1,200	200	150
Limestone	800	150	125
Sandstone	700	150	75

The maximum bending moment for a constrained or prismatic beam is equal to $\frac{WL}{12}$. By substituting in

the formula for flexure $\frac{P}{e} = M_m$ we obtain the

formula $W = \frac{2bd^2}{L}R$. Likewise the maximum moment at the centre of such beam being equal to $\frac{WL}{24}$, the

formula becomes $W = \frac{4bd^2}{L}R$.

It is evident that failure of flexure would theoretically take place at the points of support, and not at the centre of the span.

In applying the formula $W = \frac{2bd^2}{L}R$ to the case of a slab spanning a breast or other mine opening, the weight of the overlying material will be taken at 108 lb. per cu. ft., and the depth of the opening below the surface will be designated by d' in feet.

Then, $W = \frac{108Ld'}{12}$, which would be the loading of the slab with a breadth of 1 ft. Substituting this value of W in the equation $W = \frac{2bd^2}{L}R$ and simplifying, the equation $d^2R = \frac{3}{2}L^2d'$ is obtained. If, however, the weight of the overlying material per cubic foot be represented by w , the expression becomes $d^2R = \frac{wL^2d'}{288}$.

In the use of the formula derived for determining the minimum safe thickness of rock over mine openings for various depths below the surface, consideration must be given to a number of conditions, the more important of which are:—Nature of the top immediately above the coal seam and its comparative strength and liability to disintegration upon exposure to the atmosphere; nature and thickness of the bed, the ability of the pillars to resist squeezing, and the liability of disturbance of the overlying strata, due to covering or squeezing in underlying beds; probable errors in relative vertical location of top of rock and mine workings; and possibility of the existence of deep gorges and pot holes.

In order to arrive at a brief solution in calculating pillars of quartzite for Rand mines, Richardson made use of the following formula:—

Bending:—1. $F_b = 106 \frac{Kt}{l^2w}$; 2. $L = 10.2 \sqrt{\frac{Kt}{w}}$;

3. $W = 106 Kt^2 - l^2tw$.

Shearing:—1. $F_s = \frac{34.2dk}{l^2w}$; 2. $L = 5.85 \sqrt{\frac{dk}{w}}$;

3. $W = (34.2dk - l^2tw) t$; in which F_b = factor of safety for bending, F_s = factor of safety in shearing, l = length of side of slab or distance from centre to centre of pillars, L = length of side of a slab which will only support its own weight, W = total distributed load which the slab will carry in addition to its own weight, K = compressive strength of pillar material pounds per square inch, t = thickness of slab in feet, w = weight of a cubic foot in pounds, d = diameter of pillars in feet. He presumes that where the slope areas are not extensive, the weight of the upper masses will be supported by their own strength, and calculates the size of pillar which will support continuous slabs of rock, homogeneous, and uniformly loaded. By use of the formula he prepared a table of sizes of pillars for various spaces, and concluded that slabs usually break up by shearing, and that the strength to resist this depends on the size and distance apart of supports.

Filling Methods.

Various materials and methods are employed to protect the surface if it is deemed advisable to remove all the material deposit, or if the material left in the forms of pillars is found inadequate to support the surface.

Waste material resulting from the regular mining operations may be used for this particular purpose may be dumped into the excavation. If sufficient material is not available underground, it

From the Illinois Engineering Experiment

may be lowered or dropped from the surface, and stowed where needed. Crushed materials may be introduced from the surface and transported through pipes and stowed by water or compressed air. Timber, steel, or various forms of masonry may be employed to support areas upon which important structures may be erected.

This entire subject was studied by the engineers engaged upon investigations of subsidence and surface support in the Pennsylvania anthracite field, who stated most coal beds consist of interstratified layers of coal, fireclay, slate, and bony coal, the latter three composing the principal refuse material of the mine. In these beds, in which it is necessary to remove some of the roof rocks or take up some of the floor of the mine in order to obtain height sufficient for the mules and the men to travel along the roads, much mine refuse is produced, which is stored in the chambers. In beds less than 4 ft. thick many chambers are filled with mine refuse or gob from floor to roof. In places this gob is merely thrown in carelessly, or is shovelled in; in other localities it is packed as tightly as possible by hand. When there is much interstratified fireclay or bone in the coal beds there will be larger quantities of the gob, and the thinner the bed the greater will be the quantity of mine rock raised or taken down for roads. The supporting value of stored gob depends upon the compressibility of the material of which it is composed.

Griffith's Method of Filling.—It has been suggested by Griffith that worked-out portions of mines be filled by blasting up the bottom and shooting down the roof. The suggestion was made in connection with a report to the Scranton Mine Cave Commission. The process is stated to be applicable to beds less than 6 ft. in thickness, and consists simply in blowing up the floor and shooting down the roof of the mine, each to a depth equal to the thickness of the coal bed. This produces a total thickness of loose rock equal to three times the thickness of the coal. The rock would be well packed together, and have great supporting power, and, moreover, the desired ends would be attained in a comparatively inexpensive manner.

The method of blasting stowing material from the hanging or foot walls is commonly used in metalliferous mines.

Gob Stowage in Longwall Mining.

In longwall mining, the rock obtained from brushing the roof, that which remains after building the pack walls, and the clay obtained from undermining the coal, are thrown behind the pack walls lining the roads. The gob area is usually filled with rock and clay to within 2 to 5 ft. of the coal face. This loose rock and clay helps to support the roof and control the weight on the coal face. The waste should fill the gob sufficiently to allow the roof to come down gradually without breaking off short at the face of the pack walls, but should not fill the gob so completely that it carries too much of the roof, and does not throw enough weight on the face of the coal. The width of the pack wall, called "building," necessary to prevent the walls from squeezing out and filling the roadway when the roof weight comes on them depends upon local conditions. The Third Vein District Agreement between the Illinois Coal Operators' Association and the United Mine Workers of America provides: "The miner shall build 4 yds. of wall at each side of his road, and if he has more rock than is required therefor he shall not load any of it until he has filled his place therewith." Room centres at the longwall face (in Illinois) are usually 42 ft. apart.

Gob Piers.

In some cases, especially when the prevention of any movement of the surface is especially desirable, gob piers are used. These are pillars of waste rock, either laid up by hand throughout, or having the outer wall carefully laid while the interior is filled with refuse shovelled in. The resistance of such supports to compression depends upon the material used, and the care with which they are built.

Concrete and Masonry Piers.

These forms of support are more expensive than those previously mentioned, and are likewise more substantial. Masonry has frequently been used to support the roof below important structures and occasionally to support the walls of inclined beds and the overburden.

One of the earliest and also one of the most notable examples of the extensive use of masonry in metal mines was the construction at the Tilly Foster iron mines. The total masonry constructed amounted to 20,189 cu. yds.

Whenever possible, the concrete used is introduced from the surface through boreholes. An interesting example of such use of concrete is reported by Mr. Temple Chapman, of Webb City, Missouri. In a zinc mine six concrete piers were constructed, 35 ft. high by 16 ft. wide and 20 ft. long. The measures were horizontal, and the distance from the surface to the roof was 150 ft. First, a 6 in. hole was drilled from the surface to the roof with a churn drill, at a cost of 0.90 dol. per ft. A large pile of tailings was close at hand, consisting of crushed rock passed through a $\frac{1}{2}$ in. hole, and containing some finer material and sand. The mixture was six parts of tailings to one part of cement, which is about equal to four parts of gravel, two of sand, and one of cement. This was mixed mechanically, and discharged direct from the mixer into the drill hole. Underground, two men were kept busy building up the form, which was made of 1 by 12 in. board laid on edge and 2 by 6 in. set vertically at 2 ft. intervals, and wired together across through the form. Worn perforated trommel screen jackets cut in strips 10 ft. long by 4 in. wide were used to reinforce the concrete. These were laid east and west 1 ft. apart, and the concrete was poured. A foot higher similar strips were placed at right angles to the first, and so on. A few 60 lb. rails were put into the tops of the piers, projecting from pier to pier where possible. These piers were placed between ore pillars, the plan being to remove these ore pillars. The piers were built

at a cost of 3 dols. per cu. yd. at a time when the ore in the pillars was worth 12 dols. per cu. yd.

A novel method of using concrete in connection with packing or stowing was employed in France, and reported by J. H. Piffant. The coal bed, quite thick and highly inclined, was worked in 8 ft. slices in descending order. Upon the floor of a slice was spread a layer of coal dust from 1 to $1\frac{1}{2}$ in. thick; then a layer of concrete from 8 to 10 in. thick; and upon this was placed ordinary packing. As the working place had previously been timbered, the concrete surrounds the base of the posts. When the next slice is removed, the concrete floor of the upper slice acts as a roof for the lower slice, which is timbered in the regular manner in order to support the concrete loaded with packing. It is claimed that this has proved satisfactory in the mining of thick beds.

Cogs.

Cogs are cribs of timber filled with waste rock. They may be erected quickly, and they have great strength. They find some use in the ordinary course of mining, but they are especially useful in preventing an impending squeeze, or in stopping one that has already started by supplying such support that the overlying strata break through to the surface. Their strength is, of course, lost when the timber decays.

Special Types of Cogs and Piers.

William Griffith has recently developed a cog which it is expected will be many times as strong as the ordinary timber cog, and both stronger and more durable than the common concrete pier. The objection to concrete cogs or piers is that when the compressive strength is exceeded the mass of concrete will go to pieces, and will give no support whatever. With rock and timber piers, even though the percentage of compression may be large, the piers do not go to pieces, but have some supporting power. The concrete pier will collapse suddenly, while the other types of piers will be gradually deformed. Mr. Griffith says that what is needed is something that will bear up under the heaviest weight, that will "give" to a certain extent, and will then withstand the continuing burden. In his new pier, concrete is the basic material, with timber to reinforce it. The piers are constructed so that it is impossible for the timber to pull away, and for the concrete to be crushed. The timber should be creosoted, and after the pier is constructed it should be coated on the outside with cement by the use of the cement gun.

Tests show that a cog or pier, 40 days old, will sustain, for each square foot of horizontal area, 7 tons with a compression of 1 per cent., 130 tons with a compression of 3 per cent., and 240 tons with a compression of 14 per cent.

Iron Supports.

From time to time various types of metal supports have been tried in the working places of mines. Where iron props or posts have been installed in the Scranton district, no subsidence occurred, and it is the opinion of the local engineers that the effectiveness of such props has not been demonstrated. Rolled steel shapes are being quite extensively used as legs and collars and as beams for the support of wide openings, such as shaft bottoms. Iron supports have also been tried in metalliferous mines, but, except for the support of the shafts, stations, and passageways, they have never found extensive application. Iron props have been used in foreign mines.

Hydraulic Filling.

One of the most important methods of protecting the surface above mine workings is by filling the workings with fine material carried by water through pipes. The process has been used in (a) extinguishing mine fires, (b) arresting mine squeezes, (c) supporting the surface, (d) reclaiming pillars and increasing the yield of coal, (e) disposing of spoil banks, and (f) in lessening stream pollution.

Flushing appears to have first been used in August 1884 by John Veith, of the Philadelphia and Reading Coal and Iron Company, who employed it to extinguish a fire in the Buck Ridge slope near Shamokin, Pennsylvania. In 1886, Frank Pardee, of Hazleton, Pennsylvania, used the system to stop a squeeze which threatened the slope and breaker of the Laurel Hill Colliery at Hazleton. He accomplished this by flushing adjacent breasts with culm. The breasts were steeply pitched. The squeeze was stopped by means of natural pillars, each 10 yds. wide, and two breasts filled with culm, each 10 yds. wide, and the subsiding rock broke off.

The most extensive early use of flushing was at the Kohinoor Colliery, at Shenandoah, Pennsylvania. In 1884 it was found that because of workings in the thick Mammoth seam, a large part of the town of Shenandoah was likely to be affected by a subsidence of the surface. The Mammoth seam was from 40 to 60 ft. thick, thus making timbering impossible. The coal was about 400 ft. from the surface. After various methods had been suggested, the officials of the company decided to flush culm into the workings, none of those engaged in the enterprise knowing of the previous use of culm for roof support by F. Pardee.

A very detailed description of the method used in flushing the culm into the workings can be found in Bulletin No. 60 of the United States Bureau of Mines.

The materials that have been used or may be available for hydraulic mine filling include culm, ashes, crushed refuse from coal washing plants, sand, gravel, clay, loam, granulated slag, and crushed rock.

The methods employed and results accomplished have been described by Davies, Griffith, and Enzian. The process consists of conveying culm, sand, ashes, etc., to the desired place by means of water, the method used depending upon conditions. If the pipe line can be laid on a steep grade from end to end, the material will flow easily, and little water will be required. On the other hand, if the grade is light, or if it must be reversed over part of the line, a larger quantity of water is required, and, of course, a larger pipe. There must always be sufficient velocity to prevent settling

of the solids, and this can be obtained only by having sufficient head. Naturally, the whole operation is easiest when the grade is steep, the pipe short, and the curves and connections few.

To avoid blockage of the pipe, clear water should be allowed to flow for a few minutes before filling is added, in order to establish a current throughout the pipe, and when the flushing is to be interrupted, the addition of filling should be stopped some time before the water is shut off, so that the solid matter may be washed out of the pipe. The proportion of water required depends upon the velocity of the current and the nature of the filling material. In general practice, about 90 per cent. of the material carried by the line is water. Good practice requires absolute control of the filling until it is deposited at the desired place. This necessitates carrying the pipe line to the place of deposit, no allowance being made for flow in chambers.

As the filling should be interrupted after 200 to 400 cu. yds. have been deposited, and the material be allowed to settle for 15 to 18 hours, it is desirable that branch lines be laid to different points, so that the process, as a whole, need not be interrupted. During the period of settling, water seeps out, and the material shrinks from 1 to 10 per cent. in volume. It is necessary that the drainage be so controlled that the least possible solid matter will be carried away. The finest part of the filling has an important part in the cementation of the mass.

The process requires careful and continuous attention, though the number of men employed need not be large. Generally, there should be one man for the surface, one to patrol each 1,000 ft. of pipe line, and one to inspect the filling.

The results obtained have been very satisfactory, and a large amount of material formerly deposited on the surface is now washed back into the mines.

In discussing wastes in Illinois coal mining, G. S. Rice noted the use of culm for filling in Pennsylvania, and stated that in Illinois the substitute would have to be surface sands and gravel. That this would be impracticable in the great majority of cases throughout the State is self-evident, particularly if water, the usual vehicle for transportation, is employed, inasmuch as the majority of the thick seams in Illinois have clay under them which water would soften, and thus tend to cause a "squeeze." Aside from this, much farm land would be destroyed in getting the filling material.

In longwall mining the application of hydraulic filling under present practice does not seem to be generally feasible. Hydraulic filling in flat seams worked on the longwall plan was inaugurated near Liège in 1913, but has not been employed on a sufficiently large scale to justify a statement that it is practicable for flat seams.

Over a hundred collieries in Upper Silesia have employed hydraulic filling in seams varying from 4 to 40 ft. in thickness. Subsidence has been reduced from 30 to 70 per cent. to 0.3 to 7.8 per cent. of the height of the seam. In 1914, 27 collieries, employing 40 equipments, used hydraulic filling. The sand commonly used in Silesia for filling is mined with steam shovels, and then transported by railroad, sometimes for considerable distance, to the mine, where it is dumped on a grizzly to remove the boulders, and then mixed with a suitable amount of water to flush it into the mine. At one mine, at least, the boulders are crushed and mixed with sand filling. A detailed description of the methods used in Upper Silesia will be found in the reports of the Upper Silesia Mining Association. In the Saarbrücken district there are on State-owned lands more than 20 independent hydraulic filling installations. This method is employed for iron and potash mines as well as in the coal mines.

The only fairly extensive installation at work in Britain is that of the Wishaw Coal Mining Company, Motherwell. There are other installations in a small form, or under consideration, but nothing yet has been adopted on an extensive scale. A small trial outfit has been installed at one of the Fife pits, and there is a proposition to use hydraulic stowing where the seams run under the sea. There is a small installation at the Crowgarth iron ore mine.

In France it has been used, especially at the collieries in the department of the Pas-de-Calais, and also in the coal fields of St. Etienne. In Belgium it is used at several collieries. In Spain, the Penarroza Colliery is erecting a plant, and several collieries in Austria, as well as Poland and Russia, are employing the system. It is used also at lignite mines in Manchuria, and in the gold mines of Australia and the Transvaal.

Gullachsen reports that in order to avoid the great expense of pumping to the surface the water used in hydraulic filling the Cinderella Deep mine introduced a system by which sand is sent into the mine in a dry condition. A wooden box launder was constructed, measuring 12 by 11 in. in inside cross section. This launder was carried down the vertical shaft to a depth of 3,900 ft. to the level at which the filling material was required. The sand, which should not contain more than 7 per cent. of moisture, is stored in a surface bin, from which it is taken on a conveyor belt to the top of the shaft, and there discharged into the launder. On reaching the bottom of the launder, it falls on a steeply inclined iron plate, at which point jets of water are turned into the sand, which is then carried away as a pulp. The great objection to this system is the difficulty of securing a constant supply of dry sand. As soon as the sand contains more than 7 per cent. of moisture, it is inclined to adhere gradually to the sides of the launder, which in time becomes choked. The launder was connected to a Roots blower, and jets of compressed air introduced, the idea being to assist the drying of the sand and to increase the velocity of the falling stream, but this device was found to result in only a very slight improvement.

Pneumatic Filling.

The stowing of crushed rock by means of compressed air has been successfully employed in the Lake Superior

copper district at several mines, having been developed at the Champion mine of the Copper Range Company by F. W. Denton. Stamp sands or tailings from the concentration plant are hauled in railroad cars a distance of 18 miles, and discharged through pipes into the worked-out stopes. It is claimed that by the use of this material a saving is made over the method of support formerly used. In order to provide sufficient material for filling the stopes, waste rock secured from sorting in the stopes was supplemented by rock blasted out of the walls. At present the sand is used in addition to the waste material discarded in the stopes.

Supporting Power of Filling.

The problem of support of surface by filling suggests two important points, in addition to the controlling factor of the cost of filling. When the worked-out portions of the mine are filled by the natural process of caving, the factor of increase of volume of material should be known. Moreover, as the overlying beds sink upon this filling the factor of compressibility of the filling must be considered. Fayol made extensive and careful investigations along these lines, and his determinations of the increase of volume are shown in the following table:—

INCREASE IN VOLUME OF MATERIALS IN FILLING. Relative volumes.

	Clay.	Shale.	Sand-stone.	Coal.
Unbroken	100	100	100	100
Crushed to powder.....	196	213	219	207
Grains 0.078 to 0.118 in.	209	210	214	224
Do. 0.393 to 0.59 in.	226	221	211	199
Do. 0.59 to 0.787 in.	225	224	310	223
Mixtures, grains and fine dust.....	216	229	214	202

The mixture of large and small pieces of sandstone and shale commonly used for stowing increases in volume about 60 per cent. The greater the increases in volume, the more easily is the crushed material compressed. Fayol's results of tests of compression upon crushed material are given below.

RESULTS OF TESTS OF COMPRESSION UPON CRUSHED MATERIAL (FAYOL).

	Clay.	Shale.	Sand-stone.	Coal.
Space occupied before being broken	100	100	100	100
*Space occupied under pressure of—				
(1) 1,422 lb. per sq. in.	100	128	136	130
(2) 2,844 do. do.	90	116	125	125
(3) 7,110 do. do.	75	110	120	118
(4) 14,220 do. do.	70	97	105	109

* Rocks having been previously crushed or broken.

The pressures noted in lines (1), (2), (3), and (4) correspond to depths of strata of 1,638, 3,276, 8,190, and 16,380 ft. respectively.

Fayol concluded that the material which ordinarily fills the goaves of mines always occupies a larger space than it did originally, and after an expansion of about 60 per cent. it appears to undergo in workings of from 300 to 900 ft. in depth a compression of about 30 per cent., which leaves a volume about 12 per cent. larger than the volume of the unbroken rock.

The supporting strength of dry filling, as studied in connection with the problem of surface support at Scranton, Pennsylvania, is shown in tabular form below.

SUPPORTING STRENGTH OF DRY FILLING AT SCRANTON.

Kind of material comprising the artificial supports.	Approximate depth, in feet, of column of coal measure rock, 1 ft. square, necessary to compress artificial roof support.					
	1	3	5	10	20	30
Per cent. of compression.						
1. Rectangular gob piers, ordinary construction	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
2. Circular piers of mine rock, well constructed	—	10	12	36	125	*306
3. Timber cogs filled gob, average construction	—	46	75	146	292	*512
4. Loose pile of broken sandstone through 1½ in. ring, 40 p.c. voids	—	8	68	182	270	*419
5. Pile broken sandstone, 40 p.c. voids, voids filled with sand	—	—	20	53	124	*298
6. Loose pile large size broken sand rock, 45 p.c. voids	—	21	53	186	351	*465
7. Mine room filled with large broken sand rock, 50 p.c. voids.....	—	48	66	121	351	*492
8. Mine room filled with broken sandstone, 40 p.c. voids	12	27	45	117	434	(a)615
9. Mine room filled with broken sandstone, 40 p.c. voids filled with sand	—	44	74	177	619	1,310
10. Mine chamber filled with dry coal ashes, 64 p.c. voids	—	46	77	325	6,000	(b)8,860
11. Mine room filled with dry river sand.....	—	13	25	70	143	332
12. Mine room filled with dry river sand.....	12	40	70	442	1,715	6,640
13. Mine room filled with river sand flushed in with water.....	111	522	891	2,310	8,860	(c)8,860
14. Mine chamber filled with coal culm flushed in with water	32	118	190	472	1,822	5,905
14. Concrete pier, one part cement, seven parts sand and gravel; five months old	117	1,092	(e)	—	—	—
Resistance of flushed culm	1.0	1.0	1.0	1	1	†
Resistance of flushed sand	3.5	4.4	4.7	5	4	†
Concrete pier	3.6	9.0	(d)	(d)	(d)	†(d)

(a) 27 per cent. settlement; (b) 23 per cent. settlement; (c) 20½ per cent. settlement; (d) worthless; (e) gradually cracked to pieces under continuous load equal to 600 ft. of rock. * Free to expand laterally. † Comparative.

Anton Frieser reports that in coal mining in Bohemia hydraulic filling has been carried on extensively, and that, with such filling at depths of from 60 to 200 ft., the roof pressure compresses one volume of ordinary stone and sand packing to 0.6, clay packing compresses to 0.5, and puddled sand and ashes to 0.8 or 0.9.

In the Ruhr coal district of Germany, filling has been used extensively, and the amount of compression has been noted carefully. This has been possible as new openings were driven through workings, which had been filled from two to eight years previously.

Dr. Niesz has found that gobbing, under pressure, may lose four-tenths of its height, small grained pit heap material 25 per cent., and pure loose sand 8 per cent.

The Commission reporting upon the slide at Turtle Mount, Frank, Alberta, Canada, commented upon the efficiency of various kinds of filling in mine workings. The general statement was made that under average conditions the settlement would be 5 per cent. of the

EXTENT OF FILLING IN THE RUHR COAL DISTRICT.

Per cent. of compression.*	Area worked out. Sq. m.	Average depth from surface.	Age of workings.†	Composition of filling.
29	14,400	370	8	Waste rock, slate, and sandstone from surface.
28	20,800	450	2	Granulated slag and waste rock (clay and slate).
37	104,000	360	5	Waste from seam and from roof and footwall.
39	26,400	300	4	Waste from seam and from roof and footwall.
60	36,000	270	5	Waste rock from bottom of gangways.
21	21,000	380	2	Waste rock from surface, granulated slag and clay slate.
28	25,000	440	2	Same as preceding.

* Referred to original thickness. † At time of reopening.

thickness of the bed if ordinary sand were used; an inappreciable amount if granulated slag were used; 10 to 15 per cent. with loam, sandy clay, and ashes; and 40 to 60 per cent. with dry packing. Under the conditions at Frank the coal pillars left merely serve to delay the process (of movement), for under the great pressures due to depth, shales, such as here constitute the hanging wall, will "flow" and seal all openings.

Construction Over Mined-Out Areas.

When a building is threatened by subsidence resulting from mining operations, or when it is planned to erect a structure upon land which has been undermined, and which does not offer sufficiently stable material for a foundation, various steps may be taken to prevent damage to the structure erected or proposed.

Owing to the danger of surface subsidence, the Central Railroad of New Jersey introduced sand into the old mine workings beneath the site of a proposed depot in Scranton in 1911. The Diamond and the Rock seams had been worked, and after investigation of the workings it was decided that it would not be necessary to fill the entire area of the workings, but only to reinforce sufficiently the smaller pillars in both seams, and fill the wider areas in the Diamond seam so as to prevent any further caving of the roof. In an 8 in. borehole, drilled for this special purpose, a 6 in. pipe was placed. The depth to the lower seam was 80 ft. Sand was brought in railroad cars, and flushed into the workings, a total of 9,400 cu. yds. being placed at a cost for labour of 29c. per cu. yd. of sand filling.

The problem of constructing a six-storey building, 60 ft. wide by 157 ft. 7 in. long, on Wyoming-avenue, in Scranton, Pa., was solved by constructing a series of concrete columns. The Big, or 14 ft., bed was close to the surface, and had been mined beneath the property, but no maps were available to show the exact location and size of the pillars, and the old workings were inaccessible. Beneath the 14 ft. bed other thinner beds had been worked. Five lines of holes were drilled to the rock under the 14 ft. bed, the average depth being 40 ft. They were spaced 14 ft. 10 in. in one direction, and 16 ft. 4 in. in the other; 12 in. steel pipes were driven into the holes and filled with con-

crete, and, on the top of these, reinforced concrete beams were built. The Scranton Electric Company flushed ashes into the old workings under its new power house on Washington-avenue. At the present time it is sinking a shaft to be used for dumping ashes into these workings, thus avoiding the expense of hauling them away.

In Pittsburgh the residential section of the city extends over areas from which coal has been mined, and it has been thought advisable to construct special foundations under buildings which might be endangered by surface subsidence. Exploratory holes at Beacon-street and Shady-avenue showed that the mine workings were 35 to 55 ft. below the surface. Some of the roof had fallen, but some pillars had been left, and it was anticipated that subsidence might not be uniform. A pillar of coal extended under one corner of the site for a house. Holes 10 and 14 in. in diameter were drilled to the rock below the coal, and six concrete columns were constructed in order to provide support for that part of the house which would be

unaffected by caving over the rooms in the mine. No column was constructed under the corner of the house. The coal pillar was located. The concrete columns were 8 in. and 12 in. in diameter inside the iron lining which was placed in each hole. The lining was slightly smaller than the hole, so that the columns might sink without disturbing the columns. The column was reinforced, and upon these columns were erected reinforced concrete girders, which served as a foundation for the house.

When it is proposed to remove all the mineral in a horizontal bed beneath a structure, it is advisable to mine out the coal in advance in a direction at right angles to the longer axis of the structure, and to advance the face at a uniform rate as rapidly as possible, so that the structure may be subjected to stress for as short a period as possible.

When surface movement is anticipated, the foundations of buildings and bridges may be reinforced, long buildings may be divided into units, joints permitting expansion and contraction may be provided, expansion pieces may be placed in railroad tracks, pipe line, cables, etc. In cities in German coal mining districts, gutters and kerbing are laid with elastic and waterproof joints. Asphalt, cement, and concrete pavements are not used, because they are not easily repaired.

Restoring Damaged Lands.

When subsidence causes breaks and pit holes in agricultural lands, the surface may be rendered temporarily almost valueless for certain kinds of tilling. When the land is of great value for farming, these holes may be filled with waste rock from the mine, cinders, and other refuse, to within 4 ft. of the surface. The remainder of filling necessary to restore a regular surface slope should consist of good soil. At a number of mines in Illinois where such surface damage has resulted from mining operations, the mining companies co-operate with the farmers in filling the pit holes with mine rock.

When subsidence does not break the surface, but simply causes shallow basins below the general drainage levels, large ponds form during the spring, and may result in the permanent flooding of valuable land. In Northern Illinois, in the longwall field, the topography is such that tile drains have been laid to permit the use of the land. Longwall mining frequently causes a surface movement sufficient to destroy the usefulness of such artificial drainage systems. Referring to the problem in Northern Illinois, G. S. Rice stated that it may be solved to a certain extent through draining the sunken lands by pumping, but even with such a method, aside from the expense, there is a serious difficulty from storm water. When the subsidence is from 2 to 4 ft., it will render previously level lands of little use for raising crops until the particular area has come to full settlement, and has been re-tilled. If it were possible to systematise mining so that the land nearest the water courses was first undermined and then in succession the land further away, the damage done to farming would be minimised.

(To be continued.)

SPONTANEOUS IGNITION OF COLLIERY REFUSE HEAPS.

In the discussion which followed the reading of Dr. J. S. Haldane's paper on "The Spontaneous Firing of Coal," it was stated that the washery redd refuse could be cited as the cause of the spontaneous firing of refuse heaps. In corroboration of that statement, it may be interesting to quote a case in point, in which a large redd bing—the accumulation of 20 years' mining—gave no trouble or sign of heating until a washery was started at that particular colliery. Not only was the "refuse" from the washery placed on the bing, but the sludge containing fine grains of coal and stone was pumped on to ponds formed on the top of this bing. The ponds were formed by ash embankments, and the sludge allowed to settle therein, the view being that the water, in percolating down through the bing, would issue into the rivers in a clear state. This percolation in time filled up the cavities in the bing, and the water refused to issue, bringing about a condition suitable for heat generation. Fire actually did take place recently in this particular bing, and the treatment with water was of little avail, owing to the solid condition of the mass. The fire was only effectively dealt with by cutting out. This solidity can also be traced to be the cause of many railway embankments formed by colliery refuse spontaneously igniting. On the other hand, another colliery company had a large refuse bing on fire, and after cutting some out, washery debris was filled in with a view of preventing further trouble in that respect, the idea being that the washery debris, being small, would fill up the cavities. Another instance might be quoted where the seat of a bing fire was found to be at the bottom of a large wood trestle, which was something like 20 ft. into the bing.

Partnership Dissolved.—The *London Gazette* announces that the partnership of J. Clark and J. A. Clark, trading as Clark and Martin, engineers and iron founders, 76, Craumer-road, Liverpool, has been dissolved.

Coal Supply Associations.—The Chief Registrar of Friendly Societies, in his report for 1915, states that returns were received from 14 societies formed for the purpose of supplying coal to their members. The membership totalled 27,000, and the sales returned amounted to £267,000. The latter figure represents an increase of £47,000 on that for the preceding year, the increase no doubt being mainly attributable to advances in prices. The associations possessed share capital amounting to £52,000, and a profit and reserve of £20,600. Of the total profit, £10,000 was distributed as dividend on purchases. The societies were active in the Northern district of Scotland, and in the Mid-Scotland district, these two districts having a total membership of £190,000. The largest society was the Coal Society, with sales of £61,000.

CURRENT SCIENCE AND TECHNOLOGY.

Behaviour of Firebricks in Oxidising and Reducing Atmospheres.

Dr. J. W. Mellor (Refractory Materials Committee report) gives the following measurements of the expansion or contraction of firebricks when heated under oxidising and reducing conditions respectively:—

Type of brick.	Percentage after expansion or contraction (means of duplicates).					
	Oxidising atmosphere.			Reducing atmosphere.		
Silica brick*	0.44	...	C	0.77	...	C
Do. †	0.58	...	E	0.48	...	E
Firebrick	0.21	...	E	nil	...	—
Do.	nil	...	—	0.33	...	C
Do. ‡	1.12	...	C	1.27	...	C
Silica brick§	0.20	...	E	0.13	...	E
Do. ¶	0.13	...	E	0.12	...	E

* Unusually fine grained; † high in "iron"; C = contraction; E, expansion; the specimens marked ‡ were fired at cone "12" for two hours, and the others at cone "14."

These results show a general tendency for silica bricks to give a less expansion in a reducing atmosphere than in an oxidising atmosphere; and for (fire-clay) firebricks to give a greater contraction in a reducing than in an oxidising atmosphere. This result might have been anticipated, because it is in agreement with the much greater fluxing effect of "iron" in a reducing than in an oxidising atmosphere.

The magnitude of the fluxing effect induced by the reducing atmosphere depends upon a number of factors. For example:—(1) It depends upon the strength of the reducing atmosphere; that is, on the proportion (and kind) of reducing gases in the given atmosphere; (2) it will also depend upon the rate the gases penetrate into the interior of the brick, and this in turn depends upon the character of the superficial skin, and on the porosity of the brick; and (3) on the time and temperature the brick is bathed in the reducing atmosphere. It is, therefore, difficult to get comparable results with the contraction test under reducing conditions. This agrees with some previous results obtained by determining refractory tests under reducing and oxidising conditions.

For similar reasons, a neutral (or slightly oxidising) atmosphere was prescribed for the refractory test, until further experiments showed how this source of variation could be eliminated. It would be unwise to prescribe a test which gives variable results. It is expected that further experiments on this subject will be ready for the next annual report; meanwhile, it is recommended that the "contraction test" be conducted like the refractory test—that is, in as nearly a neutral atmosphere as practicable.

Electric Furnace for High Temperatures.

Mr. A. W. Fahrenwald (*Metallurgical and Chemical Engineering*) describes an electric furnace in which can be obtained a temperature up to the melting point of platinum, which is simple in construction, and inexpensive, also comparatively long-lived. The heating unit of this furnace is a helix of Acheson graphite made by sawing around the tube, the material sawed out being replaced with alundum cement, which forms then a solid tube, which is comparatively strong, and can be handled with ease without breaking. The alundum cement also insulates one turn from the other, and prevents gases from passing through the helix. This is essentially a spring-like structure, and if stretched out would give a film of graphite 20 ft. or more in length, and $\frac{3}{8}$ times $\frac{1}{4}$ in. or more in cross section, depending upon the size of furnace. The one described requires from 25 to 30 ampères at 100 volts for temperatures ranging from 1,100 to 1,500 degs. Cent. Temperatures up to 2,000 degs. Cent. are readily obtained.

This furnace, in principle, is essentially the same as that of Arsem, but is not so complicated, and is not used in a vacuum, which is inconvenient for most experimental work. Instead of using the graphite resistance coil in a vacuum, it is confined in a space between alundum tubes—graphite tubes may be used—to or from which gases cannot readily pass, and in which the gas constitutes an atmosphere in which the resistor element is chemically in equilibrium. The gases present and surrounding the resistor are chiefly carbon monoxide and nitrogen.

The body of the furnace is inexpensive and simple in construction, and if, when put together, the joints are plastered with alundum cement, it is practically impossible for air to find its way to the graphite resistor, which is readily oxidisable in air above a red heat. In this furnace, 36 heats have been made, ranging in temperature from 1,100 to 1,600 degs. Cent., each for a period of five hours, making 180 hours of service, and the furnace is apparently in good shape yet. When it gives way a new one is readily put in its place by removing the top iron plate, the fireclay plate, and top electrode immediately below it. Also the inner alundum tube, if necessary. The new unit is placed in and the furnace assembled in about a period of one hour.

Effect of Water Content on Strength of Concrete.

The results of a number of experiments upon the strength of concrete, conducted at the research laboratory of the Lewis Institute, Chicago, show that with a certain aggregate of the same grading and sufficient water to produce a concrete of a given plasticity, the strength of the concrete, within the usual range of mixes, is proportional to the quantity of cement in a unit volume of concrete. With a given aggregate and the same quantity of cement, the strength of the concrete is a maximum with the smallest quantity of water which can be used to produce a plastic mix; any increase in the quantity of water is accompanied by a very rapid falling off in the strength of the concrete. With a given aggregate mixture, the same quantity of cement, and sufficient water to produce a concrete of definite plasticity (a) the strength of the concrete increases with "coarseness" of the aggregate up to a

certain limit; (b) this limit of "coarseness" is higher for a larger quantity of cement and lower for a smaller quantity of cement; (c) the limit of "coarseness" of the aggregate which it is feasible to use varies slightly with the character of the material, being somewhat lower for a mixture of sand and crushed stone than for sand and well-rounded pebbles, and lower still for mixtures in which crushed stone or similar material is used as fine aggregate. For given proportions of cement and aggregate the quantity of water required for a definite plasticity depends largely on the grading of the aggregate, and to only a minor degree on the character of the material, shape of particles, etc. For a given aggregate the quantity of water required to give concrete of the same relative plasticity is directly proportional to the quantity of cement.

As a result of these tests the following procedure is recommended:—In mixing concrete—viz., to use the least quantity of water that will produce a workable mix; and then give the concrete as much water as possible after it has begun to harden.

THE LUBRICATION OF MINE MACHINERY.*

By JAMES A. BOYD.

The subject embraced by the title being a comprehensive one, the writer proposes in this present paper to discuss certain phases of it only.

Steam Cylinders.

To lubricate a steam cylinder, the choice of an oil should be governed to a large extent by: (1) The temperature and pressure of steam; (2) physical condition of steam; (3) type of engine and valve; and (4) location of lubricators. It is recognised, of course, that the oil should be atomised by the steam, so that it goes to the cylinder as a spray or mist, and thus coats every part of the valves and cylinder. Hence, good results cannot be obtained with high-grade cylinder oil, when this is fed between the throttle and cylinder, or directly on the top of valves, even when operating under dry steam conditions, because the oil would thus be given very little chance to atomise, and if the flash point is too high, the tendency is for the oil to gum and to give uneven lubrication to the different parts. Such feeding also necessitates the use of more oil. Again, too often the oil pipe is inserted into the steam pipe 2 ft. or less from the cylinder, and only protrudes into the steam pipe a short distance. As a result, the oil drags along the side of the steam pipe, and so does not atomise properly. Better results would be obtained if the oil pipe, when possible, were placed 6 to 8 ft. from the cylinder. This would allow the steam more time to atomise the oil; while also less oil of a finer quality having a higher flash could be used. If a good cylinder oil adheres to the sides of the sight feed glass of the lubricator, the difficulty can be remedied by lengthening the condensation connecting pipe. An atomiser can easily and quickly be made, as follows: Insert the oil pipe into the steam pipe at least three-fourths of the way across. That is, if the steam pipe is 8 in. in diameter, have the oil pipe project into it, say, 6 in. Plug the end of the oil pipe, and bore four to five holes in one side, and place the pipe so that the small holes will face the same way as the steam is passing. This will tend to wipe off the small drops of oil from the pipe, and also assist in drawing oil from the lubricator. The oil coming to the steam in small drops will atomise quickly and more thoroughly. The use of this atomiser, of course, is not always possible where steam is delivered vertically upward to the cylinders. Good judgment must be exercised, as it is sometimes impracticable to place this atomiser back from the throttle.

The physical conditions of steam referred to are moisture, and alkaline properties, often imparted to it by boiler compounds. It is known that mineral oil and water will not unite so as to form a mixture that will adhere to damp cylinder walls, and hence a small addition of fat is needed. Excessive moisture comes from over-taxed or priming boilers, or from dab piping. Sometimes this moisture contains foreign matter, other than alkali, which, on entering the cylinder, adheres to the oil, and becomes very hard under dry distillation. With overloaded boilers, the moisture is apt to be delivered irregularly, especially if the load is fluctuating; or if piping is long, condensation is sure to be a steady factor to be reckoned with. Short piping may have bends and pockets in which water will collect and be delivered to the engine in sudden rushes. This action will explain why an engine will seem suddenly to lack lubrication at times, although most of the time lubrication may be excellent. A boiler compound used continuously in small quantities will cause little trouble, but whenever an extra amount is put in the boiler to remove scale, time is necessarily required to restore the boiler to a normal working condition. Soda ash is a satisfactory boiler compound, and is not as dangerous as some of the advertised boiler compounds, and is also much cheaper. The amount of cylinder oil to use depends largely, of course, on steam pressure, location of lubricator, length of stroke, and type of valve. Two drops should be sufficient ordinarily, and one drop in many cases is ample. The best results, in fact, are obtained by the use of the least amount of oil necessary for good lubrication. Putting a solution of salt or potash in the sight feed glass will increase the density of the water and cause the oil to flow in smaller drops; glycerine has the same effect. At coal mines are found many engines that carry a variable load; sometimes these are at less than 75 per cent. of their rated capacity, and with the pressure often falling below 85 lb. The oil

* From *Bulletin* of the Canadian Mining Institute.

in these circumstances should be a compound filtered cylinder stock having a low flash point.

External Bearings.

In the lubrication of external bearings, the method of supplying the oil is of greater importance. The old way was to oil by hand feeding. There are a number of self-acting oil feeding appliances which can be applied to the automatic oiling of old machinery originally designed for hand oiling. There is only one good way to oil any part of a machine, and that is by feeding the oil automatically. Hand oiling is in every way wasteful and unsatisfactory. The machine receives a feast or a famine of oil, and most of the excess oil is wasted. Thurston says: "The oil bath sometimes reduces friction to one-nineteenth the amount observed with the hand oiler."

Viscosity.

Not less important than the methods for delivering oil to a machine is the use of an oil having the right body. Fluid friction, that is, oil friction, is very important in high-speed machinery. A part of the oil between journal and bearing sticks to the journal and turns, and a part of it sticks to the bearing and does not turn. These two films of oil slip upon and along one another, and some friction is set up between them. The thicker the oil, the more, and the thinner the oil, the less, there is of this interior friction. Full lubrication is obtained by the use of the thinnest oil that keeps journal and bearing apart. The friction in the oil itself depends largely on speed. In slow speed machinery, with high journal pressure, a heavier bodied oil should be used. The law of friction in the oil itself at high speed is: The friction increases as the square of the speed. Increase the speed by 10, and you increase the friction by 100; increase the speed by 100, and you increase oil friction by 10,000. At high speed, friction is almost incredibly great in amount. A large number of engine and machine oils sold by jobbers are doped to increase body and flash point. Emil F. Diedriche, a former large jobber, and an authority on the compounding of oils and greases, says: "To give oils a viscous consistency (*i.e.*, to increase their viscosity) they are often compounded with proportions of oleate of lead (lead plaster) dissolved in the oils at a temperature of from 140 to 160 degs. Fahr. One or two per cent. of unvulcanised rubber is also dissolved in the oil and stirred together under heat until thoroughly diffused. Soap in various proportions and thoroughly dried is also compounded in petroleum oils by heating and stirring until freely dissolved. Lubricating oils have also been made by avaricious and ignorant compounders by mixing heavy resin oils with lighter petroleum oils, in the proportion of 2 to 4 lb. to the gallon."

The viscosity or body of such oils appears deceptively superior to some of the best lubricating oils, but as they form resinous deposits under the influence of frictional heat, they are entirely unfit for lubricating purposes, their effect being to gum up the bearings, and friction is as a result greatly increased. This class of dope might be used for oiling slow speed machines without disastrous consequences, but one can readily see that with high-speed or even medium-speed machinery an enormous increase in friction is inevitable. Therefore, in oiling shafting, engines, etc., use the self-oiling principle wherever possible, and an oil with the right body. An oil suitable for self-oiling bearings should be a straight mineral oil with a gravity of 24 to 29, and a flash test of 375 to 400 degs. Fahr.

Filtering Oil.

A good engine oil can be filtered indefinitely, as many as 700 times. A very good filter can be made as follows: Lay a fold of cheese cloth over 3 in. of white cotton waste, well picked, this on fine felt about $\frac{1}{2}$ in. thick. The whole on a perforated sheet or a fine wire cloth. The oil, after passing through the filtering medium, drops into a funnel connected with a $\frac{1}{2}$ in. pipe. At the lower end of the pipe there is a funnel-shaped flange of smaller diameter than the funnel at the upper end of the pipe. The small pipe is of such length that the lower end comes within 1 in. of the bottom of the tank or vessel having at least 14 in. of water. This kind of filter is easy to make and easy to clean. The cheese cloth gathers all the coarse dirt which can be shaken off, the cotton waste removes finer material, and the felt removes most of the remainder, and the final cleaning is effected by the water, yielding practically pure oil. Heating the oil increases the filtering rate, but does not yield a superior product. For this reason some of the oil filters on the market are equipped with a steam coil.

Lubricating Compressors.

A pure mineral oil having a high flash point is required.

Air-Driven Mining Tools.

A pure mineral oil having a low cold test should be used.

Cable Lubrication.

First treat with light bodied oil. This oil acts as a lubricant between the strands, preventing too great friction in the body of the cable. Next apply a coating of anti-corrosive chain and cable coating. This acts as a seal, and prevents corrosion. After operating for some time, an application of black oil should be used. This will assist in reducing abrasion.

Pit and Mine Car Lubrication.

The proper lubrication of pit car journals is of more than ordinary importance, and the writer has observed that it receives but scanty attention in some of the districts visited. The desirability of adopting a standard pit car journal is a matter worthy of attention. At present there is a wide variation in the types in use. There are thousands of pit cars in daily use in coal mining operations in Canada, and each car having four wheels, it will readily be seen that no inconsiderable part of the cost of maintenance is chargeable to pit car wheels. Nevertheless, the lubrication of pit car journals is not done systematically

and with the care and attention requisite to ensure the best results. There are a number of reasons for this: one of the most prominent is due to the present type of wheel and the poorly designed oiling device used to lubricate the journals. Much of the pit car oils used is wasted, in the writer's opinion. This loss is fully 60 per cent. of the quantity used, and this figure is probably often exceeded. The men, or frequently boys, employed at coal mines to look after the oiling of pit cars, seem to think that it is their duty to fill the cavity in each wheel with oil until it runs out in a small stream at one of the openings in the wheel cavity, and then pass on to the next wheel with the oil-can in an inverted position, leaving a trail of oil from one end to the other of the string of cars being oiled, the position of each wheel being marked by a pool of oil. Thus frequently more oil is wasted than would oil every wheel and journal if applied in a proper manner on the bearing surfaces.

Briefly, mining cars may be divided into two classes—those making use of the self-oiling principle, and those with bearings of the open type. For the former, winter and summer black oils have been found satisfactory, or a cheap semi-fluid grease. In one case, experiments with different kinds of oils and greases were made, and it was found that if the bearings were periodically cleaned thoroughly, the cheaper grades of oils and greases gave fully as efficient lubrication as the highest-priced lubricants.

With reference to the latter type of cars, the use is recommended of an automatic greaser, consisting of a scalloped wheel or brush which revolves in a trough of grease, and makes contact with the axle. With such a greaser, a special grease of a sticky nature, not costing more than 3c. a lb., is advised.

Again, many mine superintendents could materially reduce the amount of car oil used, and at the same time secure equally as good, if not better, lubrication. This result could be achieved by placing a competent man in charge of the oiling. Such a man will more than earn his wages, even if somewhat higher than the ordinary wages for his work. The monthly quantity of oil used should be recorded carefully and systematically, and charged against the monthly production. The quantity of oil used per ton mined should be reduced until finally a safe working point has been established, and therefore maintained under normal conditions. Of course, if the tonnage falls off to any considerable extent under established conditions, the car oil will not drop in the same ratio.

Storing Lubricating Oils.

It is useless to maintain an oil house unless a record is kept of where the oils are being used, and in this connection it might be well to keep a record of the amount of oil required by the different oilers. Each man should receive a card upon which his receipts of oils and greases are recorded, and a charge made against his particular station, that is, against machinery or equipment he oils. Each card serves for one month; at the end of the month all cards are turned in, and an estimate made of the quantity of oil requisitioned and on hand. Any wastage of oil by an individual oiler will soon become apparent, as will also any misuse or misappropriation. The moral effect on the oiler of this practice is also good, and results in making him less wasteful in his use of oil.

LAW INTELLIGENCE.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.—July 2.

Before Mr. Justice PETERSON.

Possession of a Railway.

Black Mountain Silica Company Limited v. Colliery Investment Trust.—This action related to the possession of a railway, and has been before the court for many months. On the last occasion the matter was mentioned (May 11), his lordship said when the case came on again in its turn he would hear no further applications for postponement.

Mr. Percy Wheeler now said the parties had come to an arrangement, and everything except the actual form of agreement had been settled, so that the case could be taken out of the list.

His lordship ordered the case to stand out generally, with liberty to either party to apply to restore.

KING'S BENCH DIVISION.—July 4.

Before Mr. Justice ROWLATT.

Alleged Breach of Contract.

Societe Generale de Chemins fer Economique v. Clevees Western Valleys Collieries.—Plaintiffs claimed damages for alleged breach of contract by the defendants to supply 4,000 tons of Hood's Merthyr large steam coal for shipment from Cardiff to Savona.

Mr. Mackinnon, K.C., for the plaintiffs, said they required the coal for use on one of their light railways in Italy. There was no question that no coal had been delivered. The coal here was to be supplied by defendants as merchants from another colliery, but eventually the steamer was requisitioned by the Admiralty, and later defendants repudiated the contract.

Mr. Leck, K.C., for defendants, said his clients were protected by a clause in the contract providing for shipment only if the permission of the Government were obtained. The Admiralty, however, required all the coal from the colliery until a year later, and withheld permission for the shipment.

His lordship, giving judgment, said he did not think the taking of the "Hermia" prevented the defendants from shipping the coal. He was of opinion that there really was no defence to the action. The plaintiffs were entitled to damages, and he would award them a difference of £2 per ton. There would therefore be judgment for the plaintiffs of £6,262, with costs.

Messrs. Ruston, Proctor and Company Limited, engineers, Lincoln, have removed the business of their London office from 46, Queen Victoria-street, E.C., to West Africa House, Kingsway, W.C. 2.

THE GERMAN COAL AND IRON TRADES.

We give below further extracts from the periodicals that have reached us, showing the condition of the coal and iron trades in Germany:—

German Coal Regulations.

German industrial consumers of coal, coke, and briquettes who use more than 10 metric tons of coal per month, have to notify the Coal Controller by July 5 the amount of fuel they had in stock at the beginning of June, the quantities since received, the consumption, and the stock in hand, also whether any decline in the amount received in June was the cause of any diminution of their productivity. At the same time, they must send in their orders for the current month, and say what they expect to need in the following month. This compulsory notification applies also to the authorities of the Federal States, communities, public bodies, and associations carrying on industrial enterprises, but not to the State railways, naval bunker coal, or fuel for agricultural or gas works use. Other exemptions include ship owners, in respect of bunker coals; colliery owners, in respect of coal, coke, and briquettes produced and consumed on the premises—general purposes, coke ovens, tar distilling, producer gas making, generating other kinds of gas, and briquetting; bakeries, slaughter-houses, inn-keepers, baths, and similar undertakings. The question whether any consumer comes under the notification order is to be decided by the local coal authority, or, failing this, the competent higher authority.

Coal distribution centres have been established as follow:—

Essen.—For the pits belonging to members of the Westphalian Coal Syndicate; the Rhenish brown coal mines; the collieries of the Aachen district; and the State collieries at Obernkirchen, Ibbenbüren on the Deister—excluding the sphere of operations of the Coal Kontor.

Mannheim.—For the Saar district collieries, the Lothringen, Pfalz, and Bavarian collieries, the brown coal mines in the Grand Duchy of Hesse, and the district served by the Coal Kontor.

Halle.—For the brown coal mines of Saxony, Brandenburg, Posen, Silesia, the administrative district of Cassel, and in the Duchies of Brunswick and Anhalt.

Dresden.—For the collieries and cokeries and the brown coal mines of Saxony and Saxe-Altenburg, kingdom of Saxony.

Kattowitz.—For the collieries in Upper and Lower Silesia.

Berlin.—For coals obtained from foreign collieries. The notifications are to be addressed to the local distributing centre, and if the supplies come from more than one district or seller, copies must be sent to all. The seller must transmit the notification card to the colliery from which the supplies are obtained, or to the middleman from whom he buys, who in turn must follow the same plan, so that the notification eventually reaches the colliery.

The object of the system is not to interfere between the producer and consumer, but to afford the Controller a basis for any alterations that may be considered advisable. Breach of the regulation entails penalties of imprisonment up to 12 months and a fine up to 10,000 mk.

Increase in the Price of Brown Coal Briquettes.

The Brown Coal Briquette Syndicate has been authorised to increase the price of briquettes by 1 mk. per ton, as from July 1. There will be no further increase before September 30.

German Coal Tax Regulations.

Regulations have been issued under the Coal Tax Law of April 8 last (which exempted from taxation domestic coal supplied to small dwellings), empowering the communal authorities to decide what constitutes a small dwelling, and how much coal is to be allotted to the inhabitants as a year's supply, including coke. Coke oven coke is to be ordered from the cokeries, and to pay a tax of 10 per cent. *ad valorem*; whilst in the case of gas coke, the coal is to be ordered from the collieries, subject to the payment of the same tax, 100 parts of coal to be considered as producing 70 of coke. The communal authorities must take steps to ensure that the house coal is supplied at prices which are lower than the usual local rates for similar quantities by at least the rebate on the tax, and see that such coal is supplied only to the inhabitants of small dwellings, and in accordance with the allotment. In the purchase and distribution of these coals, the communal authorities may act through dealers, public or private administrations, or co-operative societies. Inhabitants of small dwellings must use the coal themselves, and not dispose of it to others. Breach of the regulations issued by the local authorities entails fines up to 300 mk.

The great scarcity of coal has compelled the authorities in Berlin to cut down the lighting of the city generally by two-thirds.

The Institute of Metals.—The council of the Institute of Metals announce that an extra election of members will take place on July 18. Those desirous of applying for membership of the institute are invited to write to the secretary of the institute, 36, Victoria-street, Westminster, S.W. 1, for a copy of the new membership booklet. The annual autumn meeting of the Institute of Metals will be held on Wednesday, September 19, in the rooms of the Chemical Society, Burlington House, London, W. 1.

Development of Midland Industries.—Prof. W. S. Boulton, of the Birmingham University, speaking at the Rotary Club, observed that Birmingham and the Black Country had flourished industrially because of the wealth of coal and iron in the South Staffordshire coal field. But the iron ore had long ceased to be worked, and the coal the visible coal field was approaching exhaustion. The paramount importance of winning coal beyond the limits of the exposed coal field buried under a cover of rocks of triassic or permian age.

CONTENTS.

EDITORIAL ARTICLES:—	PAGE
Our Resources Once More	23
Councils	23
Solutions of Some Compressed Air Calcu- lating Problems of the Canadian Mining Industry	15
Electric Lamps and Gas Detection	17
Subsidence Resulting from Mining	18
Spontaneous Ignition of Colliery Refuse Heaps	20
The Lubrication of Mine Machinery	20
The German Coal and Iron Trades	21
South Wales Mining Timber Trade	27
Obituary	27
The Importance of Coal in War	28
Mining Industry and Military Service	28
Experiments in Low-Temperature Distillation	29
Labour and Wages	29
Open Contracts	32
The Freight Market	34
Catalogues and Price Lists Received	34
Abstracts of Patent Specifications Recently Accepted	34
New Patents Connected with the Coal and Iron Trades	36
Publications Received	36
REPORTS OF MEETINGS:—	
Coke Oven Managers' Association	16
THE COAL AND IRON TRADES	24-27
The By-Products Trade	27
The Tin-plate Trade	27
The London Coal Trade	27
CURRENT SCIENCE AND TECHNOLOGY	20
LAW INTELLIGENCE	21
PARLIAMENTARY INTELLIGENCE	27
NOTES FROM THE COAL FIELDS	30
COAL, IRON AND ENGINEERING COMPANIES	32
MISCELLANEA:—	
Electric Coal-cutters—Wigan Mining and Tech- nical College	16
Partnership Dissolved—Coal Supply Associations	20
The Institute of Metals—Development of Midland Industries	21
Coal for the Allies—United States Coke Output in 1916	27
Pit Props from Newfoundland—Coal in Malaya— Hong Kong Coal Supply	28
Pre-War Coal Contracts—Angola Coal	32
Fuel for Our Army in France	34
Coal By-products in the United States	36

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Must be reliable and experienced man to take charge of screens and
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apply, stating experience and wages required, and giving references.—
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Prices on application delivered any Station,
ANTHRACITE COAL for Malting, Hop Drying,
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ACTON EDUCATION COMMITTEE.

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delivery of kitchen NUTS and ANTHRACITE during the year
ending 31st July, 1918. Approximate consumption, about 370 tons of
kitchen nuts and 200 tons of anthracite.

Particulars and forms of tender may be obtained upon application to me,
and tenders, endorsed "Supply of Fuel," must be delivered to me not later
than 2 noon on Thursday, 12th July, 1917.

The Committee do not bind themselves to accept the lowest or any tender,
and canvassing the Members of the Committee or Council, either directly or
indirectly, will disqualify.

Educational Dept., Council Offices,
Acton, W. 3, July 2, 1917.

F. A. EVERITT,
Secretary.

COUNTY BOROUGH OF WIGAN.

GAS DEPARTMENT.

TENDERS FOR SUPPLY OF GAS COAL.

The Gas Committee invite Tenders for

the supply of GAS NUTS, COBBLES or SCREENED or
UNSCREENED COAL.

Particulars and Forms of Tender may be obtained on application to
Mr. F. Betley Gas Engineer, (Gas Works, Wigan).

Tenders, sealed and endorsed "Tenders for Gas Coal," to be delivered to
me on or before the 13th inst.

Municipal Office, Wigan.

WILLIAM HENRY TYBEE,
Town Clerk.

TO CONTRACTORS.

The Urban District Council of Athlone

invite Tenders for the supply of about 1500 tons of best GAS COAL,
delivered and stored at their Works at Athlone, in good and dry condition,
in such quantities as may be required during the period of one year from
the date of Contract. The lowest or any Tender not necessarily accepted.

Tenders should reach the undersigned not later than 6 o'clock p.m. on
Wednesday, the 25th July.

Town Hall, Athlone

F. V. C. MURTAGH,
Clerk.

COUNTY BOROUGH OF STOCKPORT.

GAS DEPARTMENT.

COAL SUPPLIES.

Tenders are invited for the supply of

COAL, NUTS &c.

Tender form and further information may be obtained on application to the
Gas Engineer, Great Wood Street, Stockport, and should be
returned addressed to the Chairman of the Gas Committee, Town
Clerk's Office, Town Hall, Stockport, on or before July 10th, 1917.

The Corporation do not bind themselves to accept the lowest or any
tender.

Town Hall,
Stockport.

(By order) **ROBERT HYDE,**
Town Clerk.

URBAN DISTRICT COUNCIL OF DARTFORD.

HOUSE COAL.

The Council invite Tenders for the early

delivery, at Dartford, of 500 tons of HOUSE COAL.

Conditions and form of tender may be obtained on application to the
undersigned.

Tenders in envelopes, endorsed "House Coal," should be delivered at the
Council Office, Dartford, not later than 12th July.

Council Office, Dartford.

28th June, 1917.

W. KAY,
Clerk to the Council.

COUNTY BOROUGH OF OLDHAM.

The Gas Works Committee invite

Tenders for the supply of about 20000 tons of GAS COALS, com-
mencing as early as possible, and the whole quantity to be delivered by
June 30th 1918.

Conditions and Forms of Tender may be obtained on application to
Mr. Isaac H. Massey Gas Officer Oldham to whom tenders are to be
delivered not later than Tuesday, July 17th, 1917.

Oldham.

June 27th, 1917.

J. H. HALLSWORTH,
Town Clerk.

Colliery or Coal Area Wanted to Pur-

CHASE. Full particulars to—

J. R. LOCKWOOD, 18, Bank-street, Sheffield.

For Sale.—

12 sets of 9 in. WHEELS and AXLES, 18 in. gauge.

19 sets of 12 in. ditto ditto 24 in. gauge.

39 0 yds. nearly new 14 lb PORTABLE RAILWAY, 24 in. gauge.

15 sets of POINTS and CROSSINGS to suit.

1,000 yds. 20 lb. PORTABLE RAILWAY, 24 in. gauge.

6 sets of POINTS and CROSSINGS to suit.

12 steel 1 yd. SIDE-TIPPING WAGONS to suit.

21 steel 3 yd. ditto ditto.

12 Second-hand COLLIERY TUBS, 1 yd. cap., 24 in. gauge.

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engine 3 crank, tandem compound.—Box 6780, Colliery Guardian Office,
30 & 31, Furnival-street, Holborn, London, E.C. 4.

For Sale.—Lancashire Boiler, 30 ft. by

8 ft. 6 in., in excellent condition, 160 lb. working pressure; price

£700. A so four, 30 ft. by 7 ft. 6 in., for 200 lb. working pressure; price on

application.—**JNO. F. WAKE, DARLINGTON.**

Wanted.—Weighbridge, 10 tons

capacity, with plate about 14 ft. by 7.—Box 6777, Colliery
Guardian Office, 30 & 31, Furnival street, Holborn, London, E.C. 4.

Wanted, for immediate shipment

Abroad, one or two LARGE BOILERS (Tubular type preferred),
new or second-hand, pressure not less than 120 lb. per sq. inch. Tenders,
with full particulars, to be sent to—

"K. L. M." c/o J. W. VICKERS & CO. LTD., 5, Nicholas lane, E.C.

Wanted.—One Second-hand Locomo-

TIVE, 6 wheels coupled, inside cylinders 18/20 in. dia. by 22 in.

stroke, with short wheel base and working pressure of 150/160 lb. per sq.

inch.—Apply, 20, Exchange, Cardiff

For Sale.—24 pairs of Railway Wagon

WHEELS and AXLES, suitable for use on wagons to run on private

sidings.
ROBERT HOLLIDAY & SONS, East Ardsley Collieries, near Wakefield.

Westinghouse Motor, 104 h.p., for Sale;

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HELLEWELL & CO., Royal Exchange, Manchester.

For Sale.—Heavy Horizontal Boring

MACHINE, 5 ft. vertical lift 5 ft. boring spindle, horizontal travel

about 3 ft. 6 in. double saddle; fitted with secondary spindle 2 1/2 in. dia. for

light boring, etc.; weight about 25 tons; makers, a pair, of Manchester.

Can be used for internal screw cutting; excellent condition, price £700.

JNO. F. WAKE, DARLINGTON.

300-kw. d.c. Generating Set for Sale,
Browett & Wadley compound engine, direct coupled to compound-wound dynamo 487/550 volts.
BELLEWELL & CO., Royal Exchange, Manchester.

For Sale.—One Horizontal Steam-driven
AIR COMPRESSOR, 12 in. by 8 in. by 12 in. stroke mounted on steel air-receiver about 12 ft. 3 in. by 2 ft. 9 in., by Schram & Co., capacity 150 cubic feet free air per minute.
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For Sale.—Pump, Tangye Duplex, 12 in.
steam 2 1/2 in. water cylinder, brass lined; £65.
Ditto single 14 in. steam 10 in. water cylinder; £30.
PULSON & CO., No. 5; £20.
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* * For other Miscellaneous Advertisements see Last White Page.

The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
(At present on Active Service).

LONDON, FRIDAY, JULY 6, 1917.

The London coal traders are still busy. Loaded wagons are coming forward with increasing regularity by rail, but the seaborne quantities are less. Steam coals, kitchener cobbles and bakers' nuts are very scarce.

On the Tyne and Wear the better classes of coal are inclined to be stronger. Generally, the market tone is quiet but firm. A brisk enquiry for house coal and manufacturing fuel is current in Yorkshire, and scarcity of best fuel in Barnsley is specially referred to. No fresh feature is presented in reports from Midlands. Cardiff has been so unsettled by the Coal Controller's new scheme, that transactions of any importance have been deferred. The position in Scotland is dull, and a good deal of broken time occurs in the eastern coal field.

Freights are still dull through scarcity of tonnage and the effect of the Coal Controller's orders. In South Wales the French Atlantic has had almost a monopoly of fixtures at full limitation prices.

About 60 members of the Midland section of the Coke Oven Managers' Association paid a visit to the Thorncliffe and Rockingham works of Messrs. Newton, Chambers and Company Limited on Saturday last.

A meeting of the Central Executive Committee of Great Britain for the supply of coal to France and Italy was held on Thursday. The meeting gave approval to various decisions, which are still subject to the French Government's approval.

Many local authorities are discussing the supply and storage of coal for the winter in connection with the scheme of a controlled distribution. Considerable purchases have been made by some of the London borough councils.

Iron Ore Resources Once More. At the instance of the Advisory Council, a report has been drawn up by Mr. G. C. LLOYD, secretary of the Iron and Steel Institute, for the purpose of assisting the Standing Committee on Metallurgy in their survey of the field for research in connection with iron and steel. The publication of this report has been decided upon in the expectation that it may be of service to the iron and steel industry. It is not the first of its kind. A comprehensive discussion of this subject was undertaken by Prof. H. Louis in his report to the Stockholm Geological Congress in 1910, and there have been still later contributions to the subject. A great deal of information is also to be found in the *Memoirs* of the Geological Survey. Much of this valuable material, however, is scattered and more or less inaccessible. Last year, the Society of Engineers, with commendable energy, published an elaborate paper by Prof. FEARNSIDES covering the same ground, and this store of information, although the latest work upon the subject, appears to have been entirely ignored in the present report, for no very obvious reason.

The subject of our iron ore resources is so important at the present time that we welcome every attempt to bring together, within a convenient compass, all available information upon it. The view has often been expressed that this question is of even greater importance than that of our coal supplies, with which it is, of course, naturally bound up. It has been stated, with some show of authority, that we are nearer the point of exhaustion of our iron ores than is generally realised. The cheapness and high quality of imported foreign ores have led to the comparative neglect of our home supplies, not on account of their scarcity, but because of their low grade and the impossibility, under pre-war conditions, of working them with profit. But the war has brought new conditions into play, and iron ore mining in this country is rapidly undergoing a process of transformation, the full effect of which cannot yet be fully estimated. Mr. LLOYD, after giving some statistical details, which reveal the position up to the year 1913, proceeds to discuss in turn the quality of the iron ore deposits in the various counties, in the course of which he reviews too briefly, in our opinion, the evidence bearing upon the discovery of new supplies. Interesting prospecting work is going on in the hæmatite districts of Cumberland and Lancashire, to which we recently drew attention in these columns. There is much untried ground in this region, perhaps the most promising area being situated beneath the sands of the Duddon estuary. There are also important developments in progress in other areas. The Cornish deposits, often of excellent quality, are now also receiving increased attention, but any extensive increase in the output does not seem to be probable.

Mr. LLOYD then proceeds to a review of the important iron ore resources of the Cleveland district, and the deposits of Northamptonshire, Leicestershire and adjoining areas. Undoubtedly there are very large reserves in the jurassic strata of England, and Prof. FEARNSIDES has recently discussed the prospects of an increased yield from this source. Mr. LLOYD also covers this ground, the chief features of which are too well known to require further comment. Attention, however, may be called to the fact that in the Kent coal shafts there has been proved an important seam of oolite ore, of corallian age, 16 ft. thick, and extending over about 20 square miles, which has not yet been exploited.

The coal measure ores of England and Scotland, and the well-known tertiary deposits of Antrim, are treated concisely in this report, but no new information appears to be available. The same may be said for the iron ore resources of the British Dominions.

Part II. is devoted to the iron ores of foreign countries, the information being based largely upon the Stockholm report of 1910, with some important references to more recent publications. In connection with this portion of the subject we will wander somewhat from the text of Mr. LLOYD's report in order to call attention to the valuable object lesson afforded by Germany in regard to the practical importance of ascertaining the nature and extent of all workable deposits of iron ore wherever they may be situated. Before the war many of the large German metallurgical concerns have acquired an interest in foreign iron ore deposits. Of these the Gelsenkirchen Mining Company may be taken as typical. This company, in addition to rich coal mines in Germany, possessed iron ore concessions in Lorraine and Luxemburg. These, however, were not enough; so the company secured the option of rich deposits in Sumatra, and was likewise a prominent member of a syndicate formed for the purpose of securing certain important deposits in Brazil. The same company also controlled about 4,900 acres of iron ore beds in France. Equally enterprising was the firm of August Thyssen, which, in addition to being a large owner of French mining property, held agreements with Swedish iron ore concerns in Lapland, and with the Russian Kolatchewski Company. The Thyssen firm carried its peaceful penetration in France to the extent of arranging to work the Normandy deposits, while the French iron masters were still unwilling to regard them seriously. It was even contemplated by Thyssen to erect blastfurnaces at Caen. Similar efforts to secure foreign concessions have been made by the firm of Röehling Brothers, and by the Phoenix, Haspe, Hoesch and Aumetz-Friede combine.

We mention these facts, which are only a few out of many which point to the danger arising from the neglect to develop home resources by native capital and under native control. This side of the iron ore problem was amply developed by Prof. FEARNSIDES in his paper referred to above. Mr. LLOYD does not attempt to deal with the political aspect of the question, but confines himself to details concerning the ore deposits themselves, their quality and mode of occurrence. From the point of view of the Advisory Council, at whose suggestion this report was drawn up, this method of treatment was, perhaps, demanded; but we miss the help which an index would have given to such a compendium of facts as is here presented. For the volume deals with so many details that the table of contents, ample as this is, scarcely affords sufficient information as to the scope of the compilation. We miss also references to some of the exhaustive surveys of metallurgical ores contained in the *Bulletin* of the Imperial Institute and others in the *Annales des Mines*, while the report of the Nickel Commission appears to have been published too late for mention. Nevertheless, Mr. LLOYD's work is a valuable addition to the literature of iron ore deposits, and contains many references to original memoirs and other sources of information which are in danger of being buried in the obscurity of the reference library.

Trade Councils.

THE Sub-Committee of the Reconstruction Committee, appointed to examine the relations between employers and employed, has issued an interim report, which the Ministry of Labour has circulated among the leading employers' associations and trade unions. In a covering letter Sir D. J. SHACKLETON points out that this report represents the views of prominent representatives of each of the parties interested. As far as the coal industry is concerned, it is enough to state that both Sir THOMAS RATCLIFFE-ELLIS, representing the coal owners, and Mr. ROBERT SMILLIE, representing the miners, are members of this sub-committee, and this will alone suffice to give a stamp of authority to the recommendations that have been made for the better regulation of industry after the war.

The object in view is to secure a permanent improvement in the relations between Capital and Labour, with the hope that in this way certain grave industrial difficulties which threaten to retard the work of reconstruction after the war may be avoided. It is clear that this end can only be secured by a continuance in times of peace of the same spirit of co-operation between employers and employed as has been manifested during the war. Labour and Capital have combined to win the war, and they must also combine to win the blessings of peace. The two phases, warfare and reconstruction, are, in fact, the component parts of the great crisis through which the nation is passing. We cannot win the war unless we succeed in bringing to a successful conclusion each of these stages. It is difficult to say which is the more important. It may be likened to the sick man struggling against enteric. He must fight both the disease and the convalescence if he wishes to win through; and it is said that the latter is not seldom the more serious problem. A rigid regimen is essential, and one not always congenial to the patient. Both employers and employed must realise this important fact, for they constitute together the life of the nation, and it is this which will be as much at stake when the crisis is over and peace is signed, as it is now during the acute stage of the struggle in the field. Let us examine for a moment the regimen that is proposed for the convalescent stage of the nation, during which recuperation will be necessary after the exhaustion of a long and arduous war. It is a regimen designed to strengthen and maintain the integrity of the national constitution by the harmonious working of its two prime factors. It aims at securing for the employed improved conditions of work and a higher standard of life, and for the employer the continued promotion of industry.

The machinery by which these ends are to be sought is of the simplest description, and consists merely of the establishment for each industry of trade councils, representing both employers and the working classes. These councils are to meet at regular and frequent intervals, and are to consider all questions that may arise in connection with the

industries concerned. Amongst these will be found the first instance the problems connected with the restoration of trade union action and the restoration of trade union action. Neither the Government nor the employers desire to repudiate any of the guarantees which have been given for the resumption of all suspended rules and customs. Nor, it is to be hoped, will the workmen desire to close their eyes to the experience which the war has brought, and the lessons that have been learned at so great a cost.

The National Trade Councils are recommended to call together for their assistance two separate bodies—viz., district councils, representing the trade unions and employers' associations in each industry; and works committees, representative of both the management and the workers in each concern. Thus, it is proposed to set up a triple organisation which will weld together in a single scheme the workshops, the districts and the national industry. Each workshop or factory will be a unit in the scheme, the success of which must necessarily depend upon the smooth working of its prime elements. The delimitations of the respective functions of the three main bodies thus constituted are not yet clearly defined. This must necessarily be left to the particular requirements of each industry, and some care will be needed to avoid overlapping and internal friction. Thus a works committee might desire to take a course which the district council might not be willing to approve.

Already there are individual methods which differ from those in general use in the district; and industrial customs vary much in different parts of the country. But there are general principles which are vital to industry as a whole, and these are the questions with which the National Councils will endeavour to control.

Some of the more important problems claiming attention have been formulated in the report before us. These include such subjects as the better utilisation of the practical knowledge of the workmen; the workmen's share in responsibility for the conditions under which the work is carried on; the general conditions of employment and adjustment of wages; the settlement of disputes; security of employment; piece-work rates; technical education and training; industrial research; consideration of inventions and improvements designed by workmen themselves; new and improved processes and industrial experiments; and, lastly, all proposed legislation affecting any industry. It must be confessed that this list is formidable both in its range and in the difficulty of the problems concerned. Each one of these questions could be made the subject of exhaustive comment; some of them have been standing puzzles from time immemorial. But the very complexity of the problems is an argument in favour of their full and free discussion by the parties concerned. There must necessarily arise much divergence of opinion upon their respective merits. Let us take, for example, piecework rates and standard wages. Acute differences may, and certainly will, arise in respect of such matters. It is hoped, however, that the suggested scheme of trade councils will enable such questions to be discussed, and a reasonable solution to be found, without the danger of constant friction that has hitherto existed.

There will, of course, be some who will not welcome this effort to bring about a reconciliation between Labour and Capital. Without attempting to discuss the merits of such extreme views as are held in certain quarters, we may venture to state that the suggestions now offered are intended to avert the evil which must result from a continuance of pre-war conditions during the critical period of reconstruction. Reverting to our original metaphor, the national welfare demands a strict regimen if a speedy recovery is to be made from the effects of the present titanic struggle of the nations. We give the British nation, both employers and employed, all alike workers for the national welfare, credit for sufficient common sense to realise the dangers of industrial strife when the war is over. To those who desire to learn more of the inner bearing of the scheme outlined by the Reconstruction Sub-Committee, we commend the study of that admirable memorandum drawn up last year by the Garton Foundation, in which the question of the relations between employers and employed is reviewed at length, and it is expressed that the unparalleled military strength may give us the capacity to meet the requirements of

THE COAL AND IRON TRADES.

THURSDAY, JULY 5.

Scotland.—Western District.

COAL.

Conditions in the Scotch coal trade generally are dull and uninteresting. Prospects are not bright in view of depleted demands, lower prices and a continuous high level of costs. In the West of Scotland district the industrial demand is pretty full, and most qualities are fairly well disposed of, despite the curtailment of the export trade. Shipments for the week amounted to 109,369 tons compared with 123,247 in the preceding week and 121,269 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	17/-19/6	17/6-19/6	24/-27/6
Ell	18/6-20/	18/6-20/	25/-30/
Splint.....	21/-26/	21/-26/	33/-45/
Treble nuts	23/6	23/6	23/
Double do.	22/	22/	22/
Single do.	20/	20/	21/

IRON.

No change has occurred in the Scotch iron trade, and the strength in the various departments is fully maintained. Pig iron is very strong. Hematite is particularly active, and No. 1 foundry is not far behind. All brands are becoming scarce, and consumers have to depend on the day-to-day production. Prices are all very firm, and it is said that some makers are asking a shilling or two extra for any available material. Labour difficulties have arisen, but these it is hoped will be speedily cleared away. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. The pressure on the malleable iron works is increasing. Private demands are receiving little or no attention, Government requirements accounting for the bulk of the output. Black sheet makers have a large number of orders on hand for the heavier gauges, but irregular supplies of raw materials are restricting the production. Trade in galvanised goods is exclusively for war purposes, the cost in any case being prohibitive to the ordinary consumer. Shipbuilding yards and engineering works are excessively busy, and good progress in the new work on hand is reported from the former. The export trade is practically dead in all departments, with the exception of Allied requirements.

Scotland.—Eastern District.

COAL.

Collieries in the east of Scotland are experiencing a considerable amount of broken time owing to the want of an adequate local outlet sufficient to make good the loss of the export turnover. In the Lothians shipping orders are very scarce, and Admiralty requirements are evidently not so heavy at present, and the outlook is not encouraging. Clearances amounted to 18,094 tons against 21,295 in the preceding week and 38,439 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	20/	20/	35/-37/6
Secondary qualities.....	18/	18/	34/-36/
Treble nuts	22/	22/	23/-25/
Double do.	20/	20/	22/-24/
Single do.	19/	19/	21/-22/6

Conditions in Fifeshire are no better than in the Lothians, but, as in other districts, values are fairly well maintained. Shipments were 23,880 tons against 19,598 in the preceding week and 60,337 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	27/	27/	45/-50/
Unscreened do.....	23/	23/6	42/-45/
First-class steam coal.....	23/	23/	40/-50/
Third-class do.	19/	19/	32/-35/
Treble nuts	24/	24/	23/-25/
Double do.	22/	22/	22/-24/
Single do.	20/	20/	21/-23/

The aggregate shipments from Scottish ports during the past week amounted to 151,343 tons, compared with 164,140 in the preceding week and 220,045 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The market is now slowly readjusting itself to work under new conditions. The new Order has not resulted in a very great check to trade, for business in the open coal market was almost non-existent just before the new Order was promulgated. The incidence of the local holidays combined with the scarcity of neutral shipping to render transactions exceedingly difficult, and it is fortunate that the new schedule was issued at a time when "coalmen" had an abundance of leisure in which to assimilate its provisions. The price list given at the close of this report refers to selling values for destinations other than France and Italy. To France and Italy prices are fixed and invariable; to all other destinations, including Allies other than France and Italy, the figures may be advanced but not reduced. As compared with the scheduled figures which ruled last week, the new f.o.b. prices show the following variations:—Best Blyth steams are unaltered; best Tynes are quoted at 29s. 6d. as against 28s. to 30s.; Blyth seconds are from 2s. 6d. to 3s. advanced; Tyne seconds, from 4s. to 4s. 6d. dearer; unscreened, from 5s. to 5s. 6d. up; Blyth smalls, 2s. more; Tynes, 1s. 6d. to 2s. 6d. higher; specials, 6d. to 1s. 6d.

increased; smithies, 4s. risen; gas bests, 1s. reduced; seconds, 4s. 6d. to 6s. more; specials, 1s. to 3s. 6d. less; unscreened bunkers, Durhams, 6s. to 7s. 6d. advanced; Northumbrians, 5s. to 6s. higher; coking coals (unscreened or smalls), 5s. to 6s. risen; households, firmer; foundry coke, stronger; blastfurnace coke, 2s. 6d. dearer; and gas coke unchanged. At the time of writing, neutral consumers have barely had sufficient opportunity to study the new Order and schedule, but enquiries are coming forward more numerous, and, given an adequate supply of neutral tonnage, a large amount of business would result at an early date. Almost the entire output is being taken up on official and contract account, and the supplies of coal and coke available to individual merchants are very scanty. An exception to this rule is to be found in the case of bunkers, which are offering plentifully. There is nothing to report regarding the Danish State Railways' enquiry for 30,000 tons of best steams for delivery over the quarter just commenced.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	50/-52/6
Do. Tynes (Bowers, &c.)	29/6	28/-30/	50/-52/6
Secondary, Blyths	25/6	22/-23/	45/-50/
Do. Tynes (Hastings or West Hartleys) ...	27/	22/6-23/	45/-50/
Unscreened	23/6-25/	18/-20/	35/-37/6
Small, Blyths	20/	18/	31/-32/6
Do. Tynes.....	18/6	16/-17/	27/6
Do. specials.....	20/6	19/-20/	30/-32/6
Other sorts:—			
Smithies.....	25/	21/	35/-37/6
Best gas coals (New Pelton or Holmside)	25/	25/-26/	36/
Secondary gas coals (Pelaw Main or similar)	23/6	17/6-19/	34/-35/
Special gas coals	26/6-30/	30/-31/	37/6
Unscreened bunkers, Durhams	24/-25/	16/6-19/	33/-35/
Do. do.			
Northumbrians	24/-25/	18/-20/	35/-37/6
Coking coals	24/-25/	18/-20/	33/-35/
Do. smalls	24/-25/	16/-18/	32/-33/
House coals	28/6-30/	27/6-30/	50/
Coke, foundry	42/6	40/-42/6	43/6-47/6
Do. blast-furnace	42/6	40/	42/6
Do. gas	30/-32/	30/-32/	32/6

Sunderland.

COAL.

The coal market is firm, and for inland consumption the demand is heavy, the factories again working full time and requiring full contract quantities. The Government demand is also on an extensive scale, and with improved supplies of tonnage the majority of the collieries are fully occupied, so that only small quantities are finding their way on to the open market. The new control Order is still delaying transactions until the conditions are thoroughly understood and until buyers on the other side have had time to communicate with their representatives. Meanwhile the tone throughout is well sustained, and producers have no anxiety as to placing their output. Wear gas and special qualities of steam are in short supply. Steam smalls are plentiful. Coking and smithies are taken up for inland demands. Bunker trade is quiet and unchanged. Coke is firm and in good demand. Quotations are as follow:—

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	30/6	30/	40/
Secondary do.	18/	18/	34/
House coals:—			
Best house coals	30/	30/	52/6
Ordinary do.	22/	22/	45/
Other sorts:—			
Lambton screened	29/6	28/6	50/
South Hetton do.	29/6	28/6	50/
Lambton unscreened ...	17/6	17/6	35/
South Hetton do.	17/6	17/6	34/6
Do. treble nuts	20/	20/	35/6
Coking coals unscreened	18/	18/	34/
Do. smalls	17/	17/	33/
Smithies.....	21/6	21/	35/
Peas and nuts	22/	22/	37/6
Best bunkers.....	18/	17/6	36/6
Ordinary bunkers.....	16/6	16/	34/
Coke:—			
Foundry coke	42/	41/6	47/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	32/6-34/

Outward chartering is still held up by the difficulty of attracting neutral owners.

Middlesbrough-on-Tees.

COAL.

A firm tone characterises the fuel market, but business is temporarily checked through the new control prices and minimum rates for neutrals. Renewal of enquiries, however, is confidently anticipated. Government requirements continue heavy, with the result that production is still well taken up. Best Durham gas coal is 25s., seconds 23s. 6d., and specials range from 26s. 6d. to 30s. Bunker coal is in moderate request. Ordinary Durham is 24s., best 25s., and special 30s. Best household coal is quoted 28s. to 30s. Coking coal continues to be well taken up at about 25s. Good demand for coke for home use and our Allies maintains values well. Best foundry coke is quoted 42s. 6d., and gas-house product is round about 30s. Local needs keep very heavy, and descriptions needed for the blastfurnaces continue to command fixed maximum rates, average kinds ruling 28s. at the ovens, and qualities low in phosphorus selling at 30s. 6d. at the ovens.

IRON.

A steady but rather quiet business is passing in Cleveland pig iron. Prompt issue of liberal July allocations has resulted in arrangement on a considerable scale for the month's supplies, but demand generally is less than it has been in recent months, several home foundries not directly engaged on certain work, needing less iron, and demand of consumers north of the Tweed being a good deal curtailed by the approaching Scottish holidays. Substantial business is being done in shipping iron, mainly to France, and with tonnage facilities improving, despatches to our Allies promise to be heavier. For home consumption No. 3 Cleveland pig, No. 4 foundry, and No. 4 forge all stand

at 92s. 6d., and No. 1 is 96s. 6d. per ton. Forge, however, is still very plentiful, and in some cases is said to be obtainable at a little below the recognised market quotation. For shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1, 107s. 6d. In the east coast hematite branch there is unabated demand. Intense pressure for delivery to steel works continues, and enquiries from abroad are as insistent as ever. Under strict official control deliveries to home consumers are adequate, but the surplus iron available for foreign business is not large. Substantial shipments to the Allies are reported under old contracts, but a great deal of new business is accumulating awaiting the settlement of prices. There is still disinclination to sell for shipment abroad, owing to the prevailing feeling of uncertainty as to prices in the near future. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France, and 142s. 6d. for export to Italy. Manufactured iron and steel quotations are stiff, but facilities for transaction of ordinary commercial business are very limited, as Government needs and demands of the shipyards continue to absorb almost the entire output.

Cumberland.

Maryport.

COAL.

The half-year's shipments of coal from the Maryport docks amounted to 72,095 tons, compared with 93,415 tons in the previous half-year and 101,787 tons at the corresponding period of 1916. The coastwise demand is very firm, and Irish merchants are still able to take all the coal that is available. The shipments for June were 14,620 tons against 13,340 tons for May. Business, more particularly in the home market, is much brisker, and in nearly all departments except landsale the pressure of demand is almost as keen as it was at the beginning of May. Gas coal is very steady. During the last few days some of the vessels have been arriving and sailing more regularly. Coke makers are working at high pressure, and all the ovens in the county are in full operation. Prices, both in the home and export markets, are unchanged. Current quotations are as follow :—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal „ „	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit.....	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts „ „	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	25/	25/	25/
30/	30/	30/	
Bunkers (mixed nuts and steam coal) (coastwise) Do. (foreign)	21/6	21/6	21/6
25/	25/	25/	
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

The hematite pig iron trade in Cumberland and the Furness district remains in a firm and brisk condition. Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., while warrants at cash are idle at 115s. per ton. Special iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton f.o.t. The ferro-manganese market is firm, but owing to the scarcity of supplies, very little business is being done. Rails are only being rolled occasionally, but the output of special work is very large and increasing. Steps are being taken in some parts of the district to secure an increase in the production of native ore.

South-West Lancashire.

COAL.

No change is to be reported in household coal for the inland trade. The actual consumption, of course, is much less, but the demand is far above the normal, the difference going into stock either into wharves, or more often into the consumers' own premises. Requirements for general bunkering and export purposes do not on the whole vary much, being restricted by the scarcity of shipping tonnage. Very little spare coal is in evidence. Prices are now of course regulated in accordance with the Coal Controller's circular of June 28. Commencing this week, the shipments of Lancashire coal to Ireland will be of course in accordance with the Controller's instructions, and this tonnage so obtained will be diverted to gas works in the Lancashire area, to provide for shortages, and replace fuel hitherto coming from other counties, which will in its turn be diverted in other directions. The holidays in first one and then another of the manufacturing towns are on, or coming on, and consequently temporary supplies of slack for the short periods of stoppage are available for sale in other directions.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Best	21/-22/	21/-22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/upwds.	23/upwds.	24/upwds
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	24/6-25/6	25/-26/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds

* In accordance with new Control list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. There is a brisk enquiry for house coal, and the supplies are not sufficient really to meet it; the same remark applies to manufacturing fuel. Steady shipments continue, chiefly on contract account. Perhaps the chief topic discussed on the Exchange was the coal control and the proposed curtailing of the areas of distribution. Nothing more can be said at the moment. Prices generally are as below :—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Best	22/-23/	22/-23/	21/-22/
Medium	19/6-21/	19/6-21/	19/-20/3
Common	18/-18/6	18/-18/6	17/6-18/
Furnace coal.....	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	—*	25/-26/	abt. 22/
Best slack	16/upwds	16/upwds	15/6upwds
Common slack	14/6upwds	14/6upwds	14/upwds

* Now subject to new list.

IRON.

Very little No. 3 pig iron offering except Derbyshire at 98s. 8d. This iron is now the cheapest, and foundries that never used Derbyshire pig before are now glad to avail themselves of it. The ordinary jobbing founder is not well off for work, and complaints of the shortage of suitable labour are heard on all sides. Forges and steel works are all busy on Government work, and the ordinary civilian has no chance of getting supplies of either iron or steel. Engineers and wagon works are fully employed.

Yorkshire and Derbyshire.

Leeds.

COAL.

The market was again very largely attended. The demand was very strong for all qualities and descriptions of fuel, particularly for house coal. The attendance was representative, the number of merchants and factors from a distance, notably London, Hull and Lancashire, being noticeable. The collieries are working full time, and the supply of empty wagons being fairly good, the production is quickly cleared. There are a few complaints of delays to long-distance traffic, otherwise loaded trucks are running expeditiously on the railways. The demand for house coal was, perhaps, the outstanding feature of the market. The pressure for supplies for London and the south shows hardly the slightest ease. While some falling off in the retail trade at the depots is reported, merchants have so many stocking orders in hand that, except in rare cases, it has been impossible to secure ground stocks at the depots against next winter's demand. In the conversation with regard to the scheme of distribution in connection with State control, there was considerable uneasiness concerning the possibility of the sending of Yorkshire house coal to the west of England being prohibited. In the coastwise branch a moderate quantity of coal is being shipped from the Humber for the Thames wharves and the south coast, but it is mainly on contract account, although a few sales of medium Silkstone house coals at limitation prices are reported. Freights are appreciably lower, and it is now possible to secure an occasional boat at 15s. per ton Hull to London. In the West Riding, notwithstanding that the public demand for house coal has eased somewhat, merchants do not find it easy to secure ample supplies, especially of best qualities, of which there are more offering. It is almost unprecedented to find best house coals so absolutely unprocurable at this period of the year. Pit prices for the West Riding, very largely nominal :—Haigh Moor selected, 21s. to 22s.; Silkstone best, 20s. to 21s.; Silkstone house, 18s. to 19s.; other qualities 17s. to 18s. The renewal of contracts for gas coal is now practically completed, having made smooth progress, with no difficulty as to prices, seeing that the latter are on last year's basis. Practically nothing is doing in the shape of open market business, for the reason that the collieries have as much as they can do to keep up with contract deliveries. The fear that was entertained and mentioned in last report, that the proposals for the distribution of coal would affect the supply of Yorkshire gas coal to Lancashire towns, appears to have been removed, and no interruption in the usual arrangements is now expected. There is any amount of demand for slacks for manufacturing purposes, and coking smalls are as scarce as ever, while every ounce of washed furnace coke goes immediately into consumption without satisfying the demand.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Prices at pit (London) :			
Haigh Moor selected ...	20/-21/	20/-21/	20/-21/
Wallsend & London best	19/-20/	19/-20/	19/-20/
Silkstone best	19/-20/	19/-20/	19/-20/
Do. house	17/-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull :—			
Haigh Moor best	23/-24/	23/-24/	23/-24/
Silkstone best	22/-23/	22/-23/	22/-23/
Do. house	20/-21/	20/-21/	20/-21/
Other qualities	19/-20/	19/-20/	19/-20/
Gas coal :—			
Prices at pit :			
Screened gas coal.....	16/-17/	16/-17/	16/-17/
Gas nuts.....	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/	15/-16/	15/-16/
Other sorts :—			
Prices at pit :			
Washed nuts.....	17/-18/	17/-18/	17/-18/
Large double-screened engine nuts	16/-17/	16/-17/	16/-17/
Small nuts.....	15/-16/	15/-16/	15/-16/
Rough unscreened engine coal.....	15/-16/	15/-16/	15/-16/
Best rough slacks.....	14/-15/	14/-15/	14/-15/
Small do.	12/-13/	12/-13/	12/-13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke :—			
Price at ovens :			
Furnace coke	25/8	25/8	25/6-26/

Barnsley.

COAL.

Though considerable attention is being paid to the proposals for the control of the distribution, little is known as to the effect in this area. Anything in the way of forward

business is held up, unless subjected to what limitations may be placed by those in authority. The feeling of uncertainty as to where supplies may be obtained does not preclude the renewal of contracts. The supply of fuel, though the output is well maintained, is not so good, but cheaper-grade fuel is very welcome. The pressure in respect to steam fuel is practically unaltered. The supply is still of moderate dimensions, but as previously stated there is no difficulty whatever in disposing of the substantial production on home account. The pressure of the railway companies for regular contract deliveries is insistent, and supplies are still diverted for prompt needs. A strong enquiry also prevails for steam nuts, but again very little of this fuel can be procured for other than use by munition firms and other engineering concerns. The supply of coking slack required by the extensive by-product ovens can only be procured by drawing supplies over an extensive area, and the need for furnace coke for North Lincolnshire and other districts is more pressing than of late. The supply of gas coal is fairly satisfactory, though the expected margin for placing to stock is not in accordance with expectation, and a fairly brisk enquiry is prevalent for supplementary lots which are still rather difficult to obtain. Ordinary slacks are again more freely offered, but this is about the only weakness so far as values are concerned.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals :—			
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs.....	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	16/6-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals :—			
Best hard coals.....	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts.....	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals :—			
Screened gas coals	16/6-17/6	16/6-17/6	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/6	15/6-16/
Gas nuts.....	16/	16/	16/
Furnace coke.....	25/8	25/8	25/6-26/

Hull.

COAL.

Little business has been done at the new rates, but northern neutrals who are willing to pay £10 to £14 per ton of coal for freight should not object to pay 6d. a ton more for the coal. Of course the fixing of minimum prices may for a time restrict competition among sellers, but any grievance under this head would be removed were the market to take an upward turn. The outlook for more neutral shipping coming for coal is somewhat better, but foreign shipowners, as a rule, are rather inclined to fight shy of the stipulation that they must do one or more voyages in the French trade before loading for a neutral port. The new minimum prices for neutrals and overseas are as under, and approximately represent current values :—Best South Yorkshire hards, 30s.; washed doubles, 25s.; dry doubles, 24s.; washed singles, 24s.; dry singles, 23s.; screened Parkgate, 30s.; West Yorkshire Hartleys, 27s. 6d. (Goole), 28s. 3d. (Hull); screened gas, 26s.; unscreened gas, 25s.; rough slack, 20s. Derbyshire steam hards, 30s. (at Grimsby or Immingham).

Chesterfield.

COAL.

All classes of coal continue to be called for in large quantities, and collieries are doing everything possible to meet the extraordinary demand but are unfortunately powerless to fully satisfy consumers' requirements. House coal is wanted for stocking purposes, and orders are coming to hand in considerable numbers. Fuel for munition works is in great demand, particularly the class of coal comprising cobbles and nuts, of which there is a scarcity. There is a satisfactory enquiry for slack for boiler firing, and heavy supplies are going forward daily for the Lancashire cotton mills. Gas coal, and steam coal for locomotive use, continue in great request, much difficulty being experienced in obtaining adequate tonnage of these classes of fuel. The export trade shows no signs of improvement so far as this district is concerned, as the prohibition of the shipment of Derbyshire steam coal is in force. No immediate relaxation is anticipated. There is no change in the coke trade, which is in a steady condition, and a full demand is maintained for all qualities of coke.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

The market is good in tone, and orders for all classes of iron are plentiful.

Nottingham.

COAL.

There has been no particular change in the condition of the coal trade in this district, the demand generally being maintained. For domestic fuel, local merchants are having an exceptional run of orders for the time of the year, householders continuing to get in stocks, but it is expected that it will greatly relieve the pressure in the early autumn. A good tonnage is being sent to London. Sales at the landsale depots have to some extent to be restricted, the demand in this department being far above the average.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/6-17/6
Best hard coals.....	16/9-17/6	16/9-17/6	17/-18/
Secondary do	16/-16/6	16/-17/	16/-17/
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

In the steam coal branch unusual activity prevails, and it is difficult for collieries to cope with contract requirements, although in many cases the arrears have been reduced to a minimum. The slack market maintains a good tone, and medium qualities being in active request. The market is just now rather more plentiful.

Leicestershire. COAL.

Great uncertainty prevails as to the probable course of events in the distribution of coal during the coming autumn and winter. Pressure is being brought to bear on the purchase of coal in large quantities by local authorities for distribution during the cold weather among small consumers who have no facilities for storing supplies in advance. This threatens a great dislocation in the ordinary course of business; but there would be enormous practical difficulties to be overcome. Local authorities have no staff and appliances for dealing with heavy quantities of coal, and the officials are complaining that they are already overburdened with administrative work. Colliery managers state that under existing conditions it would be physically impossible to supply coal as suggested. The colliery sidings are overcrowded with private wagons, and merchants are being urged not to forward any more at present, as there is no surplus coal available. The preference for London and district supplies dominates the whole position, and country merchants are complaining that their essential needs are being neglected. All classes of household are in great demand for London, and a very big business is being done in main and deep cobbles and nuts as well as in small nuts for mechanical stokers. The deliveries for munition works are at the maximum. There are no reserves of any kind either at country stations or at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	16/6-18/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-16/
Deep screened cobbles ...	16/ -17/	16/ -17/	16/6-17/
Deep large nuts	16/ -16/6	16/ -16/6	16/ -16/6
Bakers' nuts	15/ -15/6	15/ -15/6	15/ -15/6
Small nuts	14/6-15/	14/6-15/	14/6-15/
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/ -12/3	12/ -12/3	12/ -12/3
Small dust	6/ -7/	6/ -7/	6/ -7/
Main nuts for London kitcheners	13/6-14/	13/6-14/	13/ -13/6
Steams, best hand picked ..	14/ -14/6	14/ -14/6	14/ -14/6
Steams, seconds	13/ -13/6	13/ -13/6	13/ -13/6
Main cobbles for kitcheners ..	13/6-14/	13/6-14/	13/6-14/
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The anticipatory demand for house coal for winter consumption continues on a large scale, far beyond the present capacity of merchants. Some hard grades are being diverted to works purposes. There are no stocks to speak of at the depots, and coal on the open market is scarcely obtainable. The demand for steams, nuts, good class slacks, and industrial fuel generally is on a heavy scale, and munition works have preference.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

Intense pressure continues to be the dominating feature of the market. Pig iron deliveries are proceeding on a full scale, but mill and forge owners are clamouring for further supplies. Foundry grades are urgently required, but smelters, having taken stock of the situation, show no inclination to make sales covering any long period ahead. Cooler weather has made for the better production of puddled bars. The quotation is given at £12 5s., but the output is so far short of demand that it is difficult to test prices on the open market, transactions being so rare. Makers of finished iron are certainly not moving quickly in the matter of applying for an advance in finished prices, and the feeling seems to prevail that it is a matter for national rather than local action by conference or negotiation between the iron associations of the country. The present prices are very firm, and in uncontrolled branches the tendency is upward. Small rounds, squares, and flats, for instance, have advanced to £16 15s. minimum for three-eighths sizes, with heavy extras for thinner gauges. Steel rounds range from £18 to £18 5s. for half inch to five-eighths sizes, £18 10s. three-eighths sizes, and upwards for lighter sizes; an extensive demand exists. The sheet trade is carried on under considerable difficulties. Copper sheets are retained at £165 a ton. The bulk of the output is allocated to people engaged in rolling metal for war purposes, but recently quantities have been released for the manufacture of sprayers, powder boxes, and a few other "side lines." Scarcity of steel is acute as before, the pressure being tremendous for military and naval requirements. The finishing mills very much miss the billets they formerly had from America. Discards are extensively used. The market in South Wales, and the price of coal works out at about £11 2s. 6d., a price which is not a very high one. The demand for wire is very heavy, but Government use of all wire rods, whether

made in this country or abroad. The uncontrolled price of gas strip ranges from £15 5s. to £15 10s., and steel strip is about £18.

Forest of Dean.

Lydney.

COAL.

The house coal trade in this district has undergone practically no change since last report. The business is more than enough to absorb the whole output with the collieries working the full six days each week. A large number of arrear orders still await attention. Cargo orders are very plentiful, and there is much delay in loading. The output in all cases is quite inadequate to meet the heavy requirements. In the steam coal branch of the trade consumers are experiencing much difficulty in procuring supplies. The demand for all qualities is very brisk.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	16/6	13/	15/
Steam coal —			
Large	20/ -21/	20/ -21/	18/ -19/
Small	16/ -17/	16/ -17/	16/ -17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

Messrs. W. Wade and Son report that house and steam coal are in good demand in the south-western district, at late quotations, and supplies are being forwarded promptly by the railway authorities, who have constructed various new sidings in order to expedite deliveries. There is a general feeling that the railway companies have met the coal trade difficulties with ability.

THE WELSH COAL AND IRON TRADES.

THURSDAY, JULY 5.

Monmouthshire, South Wales, &c.

Newport.

COAL.

The coal market is still very much disturbed by a variety of circumstances. There is a scarcity of tonnage, and a deal of time is lost at the pits. The question of price is not nearly so troublesome as freights. To cite an instance. The rate from Cardiff or Newport to Barcelona a few years ago did not exceed 13s. 6d. per ton. It is now up to £8 5s., and there is very much the same advance to all other neutral countries. It is now a question of tonnage more than anything else. Prices quoted this week are purely nominal, as, with the small amount of free coal, there has been a good deal of fluctuation from reputed standards.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	27/- 29/	27/- 29/	49/ -51/
Western-valleys, ordin'y	24/6-26/	24/6-26/	48/ -49/
Best Eastern-valleys ...	23/6-24/6	23/6-24/6	47/ -48/
Secondary do.	19/6-21/	19/6-21/	39/ -43/
Best small coals	14/6-16/	14/6-16/	26/ -28/
Secondary do.	9/ -12/	9/ -12/	23/ -24/
Inferior do.	6/ -8/6	6/ -8/6	20/ -21/
Screenings	15/ -17/6	15/ -17/6	27/ -28/
Through coals	19/ -21/	19/ -21/	25/ -30/
Best washed nuts.....	—	—	30/ -33/
Other sorts:—			
Best house coal, at pit...	25/ -26/	25/ -26/	23/ -24/
Secondary do. do. ...	22/ -23/6	22/ -23/6	22/ -23/
Patent fuel	27/6-30/	27/6-30/	55/ -60/
Furnace coke.....	—*	—*	50/ -52/6
Foundry coke	—*	—*	61/ -62/

* Nominal.

IRON.

Great activity is maintained in the iron and steel trades of the district. Prices are purely nominal. It was stated this week that preparations for large extensions are in progress at the sheet mills of Messrs. John Lysaght Ltd. at Newport, where a very extensive output is kept up. The arrival of pitwood has been about on average, but prices have shown a decline in some directions, the leading quotation being 68s. to 72s.

Cardiff.

COAL.

Although the new schedule of prices fixed by the Coal Controller came into operation on Friday last, the result has been, not to improve, but to depress the market, and business has been more or less at a standstill. Buyers find it difficult to reconcile themselves to the new conditions, and the position appears to be uncertain with regard to sales to neutral countries, which of course continue to be made only under licence. A week ago ordinary and second class Admiralty coals under the competitive system could be secured at 26s. to 28s., but under the new scale buyers must now pay 30s. to 30s. 9d. The disparity is even greater in smalls. Whereas best bunkers did not realise more than 15s. to 17s., and cargo qualities 12s. to 14s., sellers are not now permitted to sell under 23s. and 20s. respectively. It had been thought that the classification of the various coals would assist in defining the position, but although the committee sat all day on Tuesday and Wednesday their work has not been completed, and it is understood that the original classification list has had to be considerably modified. Any colliery undertaking not satisfied with the status given to their products will have a right of appeal. This inevitably means delay, and in the meantime the market remains stagnant. It is recognised that the work of classification is extremely difficult, and the task of the committee is an onerous one. A few years ago the best Admiralty coals were considered to be confined to six or eight collieries, but with the extension of the Admiralty list in recent times, when all coal used for naval purposes has practically been on the same level so far as prices are concerned, it is easy to imagine that certain owners are unwilling to have their coal graded

below what was understood to be the best Admiralty standard. The practice to-day is to test a coal by its analytical results, and in all probability, apart from the general experience of buyers and salesmen on the open market, this course will have to be adopted now in the difficult operation of classification. In some quarters it is considered that the existing schedule is unworkable, and must be modified. In other circles it is thought that the basis of remuneration to the collieries, which has now practically been fixed by the Government, has had a great deal to do with the schedule of prices issued by the Controller. For some days the tonnage position has been unfavourable, stocks are accumulating, and wagons are so scarce that in a number of instances stoppages at the pits have had to be resorted to. Chartering last week only amounted to a little over 22,000 tons, and there has been no improvement this week. It may be mentioned that in order to economise rolling stock as much as possible, instructions have been given that coal which was to be supplied from the Midlands to Ireland will now be shipped from South Wales, and the Midland supplies will be diverted to London, where there is a great shortage. Up to the present, the patent fuel industry has not been touched by the new regulations. The manufacturers pointed out that if they had to pay the new fixed prices for their small coal, it would be impossible to supply either France or Italy at the limitation rates. The result is that quotations are more or less nominal at 30s. to 32s. 6d. for best grades. The pitwood position is easier, not because there has been any increase in the imports, but in consequence of the scarcity of wagons to convey the props from the quayside to the collieries. After being in some cases as low as 65s., the present quotations are on the basis of 70s. to 72s. 6d. There is no alteration in coke, which remains at the maximum price of 47s. 6d. per ton.

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	—*	—*
Superior seconds	31/6	—*	—*
Seconds	30/9	28/ -29/	50/ -52/
Ordinary	30/	27/ -28/	48/ -50/
Best bunker smalls	23/	16/ -17/	30/ -31/
Best ordinaries.....	21/6	13/6-15/6	27/ -28/
Cargo qualities.....	20/	10/ -12/	21/ -25/
Inferior smalls	18/	8/6-10/	19/ -21/
Best dry coals	30/	29/ -30/	45/ -47/
Ordinary drys	28/6	27/ -27/6	42/ -44/
Best washed nuts	30/	29/ -30/	36/ -38/
Seconds	28/6	28/ -29/	33/ -36/
Best washed peas.....	27/6	27/6-28/6	32/ -35/
Seconds	26/6	26/6-27/6	30/ -32/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	28/ -29/	50/ -52/6
Western-valleys	29/	27/ -28/	49/ -50/
Eastern-valleys	29/	26/ -27/	48/ -50/
Inferior do.	28/	25/ -26/	40/ -45/
Bituminous coals:—			
Best house coals (at pit)	33/	25/6-26/6	23/ -24/
Second qualities (at pit)	30/9	23/6-24/6	21/ -22/6
No. 3 Rhondda—			
Bituminous large.....	30/9	27/ -27/6	45/ -48/
Through-and-through ..	—	23/6-24/6	37/6-40/
Small	26/	18/ -19/	30/ -35/
No. 2 Rhondda—			
Large	27/	23/6-24/6	35/ -37/6
Through-and-through ..	25/	18/ -19/	29/ -31/
Small	20/	12/6-13/6	24/ -25/
Best patent fuel	30/ -32/6*	29/ -30/	50/ -55/
Seconds	—	28/ -29/	48/ -50/
Special foundry coke	47/6	47/6	62/ -65/
Ordinary do.	47/6	47/6	55/ -60/
Furnace coke	47/6	47/6	52/ -55/
Pitwood (ex-ship)	70/ -72/6	72/6-75/	38/6-42/6

* Nominal.

IRON.

There was a big improvement in the output of tin-plates last week, the receipts from works amounting to 62,143 boxes compared with 29,976 boxes the previous week and 89,935 boxes a year ago. Shipments were lower, and only amounted to 24,866 boxes, leaving 111,554 boxes in stock in the docks warehouses and vans, against 74,277 boxes the previous week and 201,375 boxes in the corresponding week last year. The market continues very firm, and many makers are unable to undertake further business for some time ahead. Heavy orders have been received on French Government account for stock sizes, and when these are executed it is stated that existing stocks will be considerably depleted. For class A work the price rules about 36s. for Bessemer standard cokes, but for "free" parcels 40s. and upwards is being realised without difficulty. Siemens and Bessemer steel bars are nominal, and the same applies to Welsh pig iron. In the galvanised sheet trade there is no alteration and quotations continue nominal. The strike of engineers which affected a number of works and caused temporary stoppages has been settled, the men being granted an increase of 15 per cent. instead of the 25 per cent. which they had demanded. The South Wales and Monmouthshire Steelworkers' Sliding Scale Committee have awarded an advance in wages of 2 per cent. from July 1, making the percentage now 89½ above the standard.

Swansea.

COAL.

In the early part of last week there was some degree of activity in the trade of the port, but this was not maintained, owing to the decline in arrivals of tonnage. The exports of coal and patent fuel were much reduced as compared with the week previous. The shipments amounted to 61,343 tons. Orders were being held up on the anthracite and steam coal market, pending the publication of the classification of the various qualities. There was a good demand for anthracite machine-made classes. Steams and bunkers were steady.

Llanelli.

COAL.

The position of the coal trade locally is most difficult, and new business at the moment is practically at a standstill. The new orders received from the Coal Controller are not giving satisfaction, and it seems to be the general opinion that business will be more difficult than ever to transact. Collieries are now waiting to hear under which heading their coal is classified, and will not quote prices until they know. The big difference allowed between shipping and inland prices is bound to act to the detriment of home con-

sumers, and there will be big delays in having their orders executed. Prices this week are:—

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Anthracite:—			
Best malting large	24/-25/6	24/-25/6	30/6-32/6
Secondary do.	21/6-23/	21/6-23/	28/-30/
Big Vein large	19/-20/	19/-20/	26/6-28/6
Red Vein do.	18/-19/	18/-19/	25/6-27/6
Machine-made cobbles...	32/6-35/6	32/6-35/6	35/-37/
Stove nuts.....	32/6-35/	32/6-35/	34/-36/
French do.	34/-36/	34/-36/	31/6-36/6
Paris do.	34/-36/	34/-36/	33/6-35/6
Machine-made beans ...	28/6-30/	28/6-30/	32/6-34/6
Do. peas	20/6-22/	20/6-22/	22/-23/
Culm	10/6-11/6	10/6-11/6	13/-13/6
Duff.....	5/3-5/6	5/3-5/6	5/-5/6
Other sorts:—			
Large steam coal	25/6-26/6	25/6-26/6	36/6-38/6
Through-and-through...	20/9-22/3	20/9-22/3	30/-32/6
Small	9/6-13/	9/6-13/	20/-22/
Bituminous small coal...	17/6-19/	17/6-19/	29/-31/6

THE IRISH COAL TRADE.

THURSDAY, JULY 5.

Dublin.

There is no further change since the 1s. per ton advance last week. Merchants are busier than usual for the time of year, owing to the anxiety on the part of consumers to lay in stocks in case of any shortage in the winter. Good supplies of Scotch coal are available. Current quotations in the city are as follow: Best Orrell, 45s. per ton; Yorkshire brights, 44s.; best Wigan, 43s.; best slack, 37s.; best coke, 45s. per ton; Welsh steam coal, 41s. per ton; Scotch steam, 39s. Irish coals at the Castlecomer Collieries, co. Kilkenny, are: Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d.—all at the pithead. Coals from the Wolfhill Collieries, Queen's County, are: Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.r. Athy, the nearest railway connection with the mines. The total quantity of coal discharged upon the quays during the past week was 31,126 tons, compared with 30,000 tons the week previously. On behalf of the Arigna coal mines, co. Leitrim, authority is being sought under an Order in Council for the construction of a line of railway between the mines and Callooney, co. Sligo, thus providing direct access to all parts of the country. It is stated that the colliery company propose to build the line themselves.

Belfast.

Demand from the inland districts continues to be good, but locally the market shows no change, either in prices or the amount of business current. The scarcity of tonnage and the restricted supply of English house coals are still the outstanding features, and freights keep steady. Prices are as follow: Best Arley, 43s. 6d. per ton; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Scotch, 39s. 6d.; Orrell slack, 39s. 6d.; coke, from about 40s. to 48s. per ton. Irish coal at the Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton, and 30s. per ton delivered in Belfast.

THE BY-PRODUCTS TRADE.

Tar Products.—The position remains unchanged, both in London and the provinces. London pitch is quoted 38s. per ton f.o.b. at makers' works, and fair quantities have been shipped. Creosote is in demand, at 4½d. to 4½d. per gallon; and solvent naphtha (naked at makers' works) continues firm at 2s. 3d. per gallon. The basis of provincial prices is as follows:—Tar (gas works), 20s. 6d. to 24s. 6d. Pitch, east coast, 16s. 6d. to 17s. 6d. per ton; ditto, Manchester, 15s. 6d. to 16s. 6d.; ditto, Liverpool, 16s. 6d. to 17s.; ditto, Clyde, 17s. to 18s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½d. to 6½d. Solvent naphtha, naked, north, 1s. 8d. to 1s. 9d. Heavy naphtha, north, 1s. 2d. to 1s. 3d. Creosote, in bulk, north, 3½d. to 3½d. Heavy oils, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included.

Sulphate of Ammonia.—A fair amount of prompt business is passing.

THE TIN-PLATE TRADE.

Liverpool.

Tin-plate makers who are willing to quote against enquiries require some finding. They are fully booked up for three months, at least, and generally will not quote for delivery beyond this. A good deal of business has been arranged by the authorities in cases where quick delivery is essential. For class A orders, current rates may be taken at about 36s. for IC 14 x 20 cokes, and about 37s. to 39s. basis for odd sizes, f.o.b. Wales, but very few works indeed will quote at all for odd sizes now. "Free" sizes command 40s. basis and upwards for either primes or wasters, and are becoming very scarce. Charcoal tins (class A only) are firm, at 42s. 6d. basis and upwards, according to finish. All f.o.b. Wales, less 4 per cent.

Coal for the Allies.—A meeting of the Central Executive Committee of Great Britain for the Supply of Coal to France and Italy was held at the Savoy Hotel, London, on Thursday. Sir Daniel Stevenson presided, and members were present from South Wales, Hull, Newcastle, Liverpool, and Scotland. A letter was read from the President of the Board of Trade expressing warm appreciation of the assistance which the Committee had given the Government in connection with the scheme. Sir Albert Stanley added: "I am glad to think that there is a prospect of the difficulties in connection with the working of the scheme being met, at least to a large extent, under the new arrangements." Various points which had arisen between the High Commissioner of the French Republic (M. Guernier) and the Committee were discussed, and the decisions come to were approved generally, but it was pointed out that these were subject to confirmation by the French Government. The directions regarding the sale of coal issued by the Controller of Mines on June 28 were considered by the Committee, and suggestions made to facilitate the working of the scheme will be submitted to him for his consideration.

THE LONDON COAL TRADE.

THURSDAY, JULY 5.

Traders have been seriously occupied with the important question of stocking coal for the winter. The general public responded most vigorously to the Controller's suggestion that every householder should lay in a sufficient stock, wherever possible, before the end of July, and orders have been pouring in at all the order offices. The quantity of coal available has been short, but the arrivals have been fairly prompt and satisfactory. Difficulties of cartage and delivery are still making themselves felt on all sides. The market has been quiet, yet very firm. Some of the qualities are exceedingly short; others are coming forward more regularly. The actual consumption of all household qualities is now confined to the kitchen fires, so that merchants are able to deal with orders for stock coal with greater regularity. No change has taken place in either pit prices or public delivery prices, and freights for sea-borne coals are unaltered; 21 vessels were reported as arriving in the River Thames for Monday's market and 12 for Wednesday, but all were contract cargoes. It is now understood that the new plans of the Coal Controller will be in the hands of the trade generally within the next few days, and that very vigorous measures are to be adopted for securing a good supply for London for the winter. The borough councils are also busy making arrangements for a fairly good stock, not only for their own use as a council, but to get in a stock in anticipation of any special demand from the poorer neighbourhoods. The Coal Controller is understood to be taking wide powers with regard to the distribution of supplies, and some of the railway coal sidings are to be commandeered for stock purposes. As a whole, the northern part of the Metropolis has been far better supplied recently with loaded coal wagons than the south, but, as the orders at the colliery are now being dealt with largely in accordance with the date of acceptance, there will soon be a better supply all round. It has been computed that some millions of tons of coals will be in the cellars and outhouses all over London before the summer is over, and ample provision will be made for the smaller houses and flats where a weekly supply only can be taken in and where it is impossible to store any large quantities of household fuel. Hard steam coal and kitchen cobbles have been very scarce on account of the unusual demand from the munition centres and the large public bodies. The railway companies are bringing forward the loaded wagons with great promptitude, some of them arriving within a day or two of leaving the colliery sidings, but there is still a good deal of delay in the return of empties. It is not at all unusual for the journey to and from the depot and the colliery to occupy a month. Trolleys have been practically withdrawn from the streets of London, as the merchants find every vehicle and every man are needed for the ordinary carting and delivery orders on hand. Supplies are still very irregular, and merchants who have no contracts with the collieries are dependent almost entirely upon factors and those who have contract quantities bought. A good deal of Durham coal has lately found its way to London by rail whilst the shipping freights have been so high. The holidays in the Newcastle district owing to the races, have interfered with the tonnage, but the bulk of the collieries have kept at work regularly. A new schedule of prices came into effect on Friday last in the South Wales area, but very few quotations are officially notified yet. Coke is in good supply, and the demand is strong. Bakers' nuts are difficult to obtain.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, JUNE 29.—The sea-borne house coal market was firm, with no cargoes reported sold. Cargoes, 28.

MONDAY, JULY 2.—The slight change in the weather caused an improved enquiry for sea-borne house coal, but no cargoes were on offer. Cargoes, 21.

WEDNESDAY, JULY 4.—There was no alteration in the sea-borne house coal market, but no available cargoes on offer. Cargoes 12.

SOUTH WALES MINING TIMBER TRADE.

Foreign pitwood prices have become easier. Best French fir in a number of places was offered at 70s., and even lower in one or two cases, owing to the scarcity of wagons. Vessels arriving with pitwood, subject to heavy demurrage costs, sought to force sales by sharp concessions to collieries, and from 75s. per ton, at which level foreign pitwood has been standing for some time, 70s. per ton was put forward. Thus, foreign and British pitwood have reached round about the same levels. At 70s. per ton, there is little or no profit left for pitwood merchants, as the prime cost of the wood at the French ports is 50s. per ton, to which must be added heavy freight and insurance costs, discharging costs, and the loss in weight due to barking, which falls upon the pitwood importer. This loss in weight is an important item. A steamer recently discharged at Cardiff was 30 tons less than the weight accepted at loading port. The importers are now divided into two contending interests, the agents for the Admiralty collieries and the other pitwood importers. Such competition effectually checks the tendency of imported wood from rising to higher levels. Last week, for instance, quotations at Bordeaux Docks advanced by 5 fr. per ton, but prices on this side declined by shillings. The imports of foreign mining timber for the week ending June 29 amounted to 14,174 loads, which is much below the usual. Of this, 11,174 loads were received from France. The actual cargoes imported were as follow:—

Cardiff (Barry and Penarth):—

Date.	To—	Loads.
June 23—	Blane, Wright and Martinez.....	3,000
" 23—	Morgan and Cadogan	96
" 25—	Morgan and Cadogan	720
" 25—	Marcesche and Company	1,140
" 25—	Lysberg Limited	2,040
" 25—	Lysberg Limited	600
" 27—	Lysberg Limited	3,360
" 28—	Powell Duffryn Coal Company ..	1,246
" 28—	Powell Duffryn Coal Company ..	892
" 28—	Lysberg Limited	660
" 28—	Morgan and Cadogan	420

Total.....14,174

Thus, 6,660 loads were received by the agents of the Admiralty collieries, and 7,514 by other importers.

The quantity of foreign mining timber allowed to be imported during the month of July amounts to 70,000 tons, of which 43,750 tons will be allocated to the Admiralty agents, while the remainder, 26,250 tons, will be given

as a general licence. Out of the 26,250 tons the Admiralty agents will be allowed to import, the promises given by the Controller to bring forward the wood prior to the scheme being formed will be respected. Arrears of takings from one month to the next are not allowed. The position, therefore, is as follows:—

Admiralty Agents.—43,750 tons allowed, a decrease of 6,250 tons over June allowance.

Other Importers.—26,250 tons allowed, a decrease of 3,750 tons over June allowance.

Total decrease over June allowance—10,000 tons.

This means that, approximately, 2,500 tons of home-grown timber will be needed every week this month over and above the quantities received by collieries during June.

Cutting and delivery of home-grown wood has been impeded by the recent inclement weather, the roadways being in a serious state in places. The general demand for larch and fir is very heavy, and several contracts have recently been fixed up at prices ranging from 65s. to 75s. per ton delivered, the quotations ranging according to the quality of the wood and distance such wood has to be carried.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.—July 3.

Distribution of Coal.

LORD RATHCREEDAN asked what steps, if any, were being taken to secure an adequate supply of coal for the poorer classes of the community during the coming winter; and whether information could now be furnished to municipalities and county councils as to quantities likely to be forthcoming in order that arrangements might be made as regards distribution.

LORD HYLTON said the Government recognised the importance of the question raised, and they were taking steps to secure an adequate supply of coal for the poorer classes during the coming winter. The Coal Controller was sending his draft scheme to the local authorities, with an intimation that they should discuss it at an early date.

The Marquis of CREWE hoped that the Coal Controller would see that sufficient stocks of coal were brought not only to London, but to the other great towns. He could not say to what extent the London County Council would be prepared to constitute themselves a distributing authority for coal or any other commodity, but he knew they would do all they could to help in the present emergency.

VISCOUNT HARCOURT thought that if persons who could store more than 20 tons of coal were permitted to do so, they would not require to come into the market during the cold weather, when it was necessary to have coal distributed amongst the poorer classes.

HOUSE OF COMMONS.—July 4.

Coal Trimmers' Disease.

MR. CROOKS asked the Home Secretary whether there were any statistics showing the percentage of men engaged in coal trimming on ships who contract disease as a result of their occupation; whether any inspection was carried out of the conditions under which the men work; whether any consideration had been given to the possibility of introducing machinery which would render the occupation less unhealthy; whether further legislation in this direction was necessary; and, if so, would he take the steps.

SIR G. CAVE replied that the Home Office had no information to show that coal trimmers were specially liable to any disease in consequence of their occupation, and had not hitherto received any representations on the subject. He would enquire into any specific case mentioned to him.

OBITUARY.

Lieut. C. L. Blair, Royal Engineers, of St. Bees, who was recently awarded the Military Cross, has been killed in action. The deceased was an engineer by profession, and before joining the Colours held an appointment at the works of the Whitehaven Hæmatite Iron and Steel Company at Cleator Moor. He was about 30 years of age.

Second-Lieut. C. R. Smith, Royal Engineers, recently killed in action, was the son of Mr. Joshua Smith, chairman of the Bradford Coal Merchants' and Consumers' Association and chairman of the coal merchants' section of the Bradford and District Chamber of Trade. Lieut. Smith was educated at the Bradford Grammar School and the Leeds University. He joined the Leeds O.T.C. in August 1915, obtained a commission in the West Yorkshire, afterwards being transferred to the Royal Engineers for special service.

The death took place recently at Harrogate of Maj. W. H. Holden, of Ulverston, one of the oldest employees of the North Lonsdale Iron and Steel Company, and for some years head of the sales department. Maj. Holden, who was 56 years of age, was a native of Garstang, and the son of a former superintendent of police at North Lonsdale.

United States Coke Output in 1916.—The production of beehive coke in 1916 was the greatest ever recorded in the United States, and the average value per ton was higher than in any previous year. The official figures for 1916, just published by the United States Geological Survey Department of the Interior, show that 35,464,224 tons of beehive coke, valued at 95,468,127 dol., were produced last year. The output in 1916 represented an increase over 1915 of 7,955,969 tons, or 29 per cent. in quantity, and 28,522,584 dol., or nearly 68 per cent. in value. The average value per ton of the coal used in making beehive coke in 1916 was 1.26 dol., an increase of 21c., or 20 per cent., and the average value of the coke was 2.69 dol., an increase of 62c., or 30 per cent. The number of active beehive ovens in 1916 was 65,605, as against 48,985 in 1915, an increase of 16,620. The number of idle ovens was 25,976, as against 44,125 in 1915. Abandoned ovens numbered 2,265, of which nearly 1,800 were in Pennsylvania and West Virginia. No new establishments, and but 104 new beehive ovens at old works, were reported to be under construction at the end of 1916, a low record compared with recent years, especially in view of the high prices and steady demand for coke throughout the year. The coke producers evidently recognise the fact that because of the beehive oven is passing, and that after the present abnormal condition is over, most coke will be made by-product ovens. The official figures showing the production of coke in by-product ovens in 1916 have not yet been compiled.

THE IMPORTANCE OF COAL IN WAR.

In a presidential address before the annual meeting of the Mining Society of Nova Scotia, Mr. D. H. [Name] said that the energies of the members had for the last three years daily expended in the coal, iron, limestone, gold and antimony working up of these raw materials into the finished products of war. They had realised as never before their own importance, and the world had realised it also. They had had some facts driven home upon them that they had not previously thought much about or had taken for granted. The fundamental principles of their daily business had been forcibly brought to their attention, and they had been learning new things every day since August 1914.

As one they had honoured with the office of president of the Mining Society of Nova Scotia, and speaking in the metropolis of the steel and coal industries of Cape Breton, he believed he needed no excuse to enlarge a little on the part played in this war by coal.

To put within the compass of one sentence the importance of coal, he ventured to state that no single department of the machinery of modern warfare can move or act without coal. This might seem a comprehensive statement, but a little consideration would reveal its accuracy.

Nova Scotia coal was at the present time, and had been throughout the whole course of the war, used for war purposes, some of which might be briefly enumerated.

The St. Lawrence patrol and the large auxiliary cruisers in North Atlantic waters used Nova Scotia coal, and, in addition, there had been a never-ending stream of trans-Atlantic transports sailing from the various ports of Eastern Canada. The railways from Montreal east, conveying troops and materials for shipment to Europe, used Nova Scotia coal as their motive power. At the various steel and munitions works in Nova Scotia the coal seams had provided the power for the manufacture of shells of every calibre, wire for entanglements, nails and other steel products used in war, or, it would be more proper to say, used in this war. Large quantities of toluol, the base of the most widely used explosive in the war, had been distilled in Nova Scotia. Sulphate of ammonia, a most necessary and valuable article in agriculture, was another of their coal products that had assumed increased importance in these days of food shortage.

It was hardly an exaggeration to say that, with the exception of the domestic use of coal in the Maritime Provinces and Newfoundland, almost the whole of the coal produced in Nova Scotia was being used directly or indirectly for the prosecution of the war.

It had needed this war to demonstrate the value of coal in another way, i.e., as the equivalent of gold as a medium of commercial exchange and as a stabiliser of currency. The financial strength of Great Britain, which was the wonder and admiration of the world, had been much assisted by her ability to export coal, in addition to keeping her own fires burning. It had been a most helpful fact in maintaining British credit and the purchasing value of the pound sterling.

If they followed the course of the war, they would see that the action of the German and Austrian armies, and later, the action of their Turkish and Bulgarian allies, was directed by a desire to obtain control of the coal and iron fields of Europe, and of that other important source of motive power, petroleum. This was a fact so patent and obvious that it was unnecessary for him to do more than mention it. The successful strategy of our own armies was at the present time quite evidently actuated by a determination to recover the coal fields of Northern France.

In the light of these events it was therefore a most serious matter to know that the output of coal from the Nova Scotia collieries during 1917 would be one of the lowest recorded during the past 10 years, and would be some two million tons below the capacity of the mines for output. The reason for this decline was a matter of common knowledge. It was due to the disproportionate enlistment of miners. In no other coal mining centre in the British Empire had the authorities allowed enlistments to so seriously reduce the production of coal. The damage to the industry was done, and was irreparable for the further duration of the war. No advantage was now to be gained by labouring the point. There was just one thing that could be done, namely, to prohibit further enlistments from among the mine workers of Nova Scotia.

The question of immigration after the war was one that had been given a good deal of attention in the newspapers recently, and there was an impression abroad that the close of the war would see a great influx of emigrants into Canada. Of this he had great doubts, and indeed there were some good grounds for believing that after the war the movement of population would be towards Europe rather than to North America. It might be that the period immediately following the war would see a greater percentage of British-born emigrate into Canada, but there was reason to believe that there would be not only a cessation of emigration from those countries of South-Eastern Europe which had in the past been the chief source of labour for North America, but a repatriation on a large scale of natives of these countries whose movements had been restricted during the period of the war.

It was a significant fact that the industrial revival of Canada since the spring of 1915, and the prosperity in manufacturing activities that had since been noticeable, had been experienced in just that portion of Canada which was within the radius of the supply of the bituminous coal of Nova Scotia. The Canadian West had experienced, and was even yet under the influence of, a trade depression.

Unfortunately, the increased demand for coal brought about by the manufacturing activity in Eastern Canada had been accompanied with a coal shortage and a consequent increase in the price of coal. This was caused by Admiralty requisitions, and the requisitioning of coal from Nova Scotia had fallen from a normal figure of 1,000,000 tons to a quantity that in 1917 was only 1,000 tons.

As a result, Nova Scotia had lost the market which was the natural outlet for the coal mined there in excess of the requirements of the Province. The Montreal trade had been developed by the expenditure of large sums of money and by years of patient work, which, in the face of the strenuous American competition, had allowed only very moderate financial returns. Large sums of money had been expended on the improvement of coal preparation, in the provision of transportation and discharging facilities, and in educating the consumers of Montreal to the excellent qualities of Nova Scotia coal. When conditions again became normal, the recovery of the Montreal market would present no light problem. Apart from the difficulty of displacing American competitors, they would be faced by increased costs in every department of coal mining. Wages and materials would, in all probability, assume normal dimensions more slowly than they had increased.

The difficulty of transportation, owing to the loss of tonnage during the war, would persist for a long time into the future. The difficulty of procuring an adequate supply of labour he had already hinted at, and he believed that coal mining would be one of the last industries to recover a sufficient labour supply. The physical difficulties of coal mining in the meantime would have materially increased. Mining operations would be carried on at a greater depth. A very large proportion, almost the whole of the coal produced in Cape Breton, would be won from submarine areas, and while, to some extent, the same conditions would affect their competitors in the United States, they were and always would be under a constant handicap by reason of the much simpler and less expensive mining operations which were possible in the coal fields of the United States that competed with Nova Scotia coal in the Montreal market.

A large body of earnest men and committees from associated scientific societies of the Empire were devoting their attention to trade after the war and the vast subject usually referred to (and, he thought, somewhat misleadingly) as "industrial preparedness," which was a new term for the old virtue of efficiency.

As coal was the basis of all modern manufacturing industries it followed that the greatest efficiency of industries was obtained when they were located in the coal fields, thereby eliminating as a factor of expense unnecessary transportation. Although from the immediate viewpoint of the coal operators, the loss of the Montreal market might present a serious problem, yet from the larger viewpoint of Canada's national efficiency, and certainly from the viewpoint of the province of Nova Scotia, there was a good deal to be said for a greater concentration of manufacturing activities within the coal fields of Nova Scotia. The transportation of millions of tons of coal, by water and by rail, to be used in the manufacturing industries of large centres of population, such as Montreal and Boston, was not really an efficient and economically sound proceeding.

These were some of the problems facing those who happened to be engaged in the production of coal in Nova Scotia. The prospects, while their difficulties might stimulate to still greater endeavour, did not promise a smooth road to travel. If they were to survive and hold their own in Canada, and, he might add, as a factor of world trade, in the days of depressed trade conditions which must inevitably follow the conclusion of the war; sooner or later, it was obvious that they must do two things, they must fully appreciate their difficulties and then proceed to overcome them. Greater difficulties had been overcome in the past in the coal trade of Nova Scotia, by study and concentration and by looking ahead of present conditions, and the road for them to-day was no easier than it was for their predecessors.

As the factor of increased cost was a certainty of the future in coal mining, they would have to develop more efficient and therefore cheaper methods of mining practice. In such everyday problems as the haulage of coal, the mechanical cutting of coal and the mechanical loading of coal, they would find opportunities for improvement, and they would find, as they had found in the past, that best results followed naturally upon exchange of views among the men who had these problems before them every day.

No better medium for such exchange of thought and experience was to be found than a mining society. The apparent cessation of their activities during the past two years had been due to the greater urgency of their daily work, and he hoped and believed that the future of the society would more than fulfil the promise of the first meeting in Sydney.

One lesson they had all learned recently was how to adapt themselves to changed conditions, and he thought they were all more alert and better men in consequence.

His remarks would be incomplete if he were to conclude without voicing for the society their appreciation of the honour that was to-day reflected upon the profession by the presence on the firing line of more than a full brigade of Nova Scotia coal miners. Many of these men had already given their lives. They could do no more. Nothing that he had said as to the influence of enlistments on the production of coal was intended in the slightest degree to dim their sense of pride in their own men or to diminish the glory of their patriotism and their achievements already recorded, and others that they had yet to hear of. The miners of Nova Scotia had played in this war the part of brave and generous men. They had given freely of themselves and their sons and their earnings. They had worked steadily in the production of coal, and in years that were to come the knowledge of good work done would be a pleasant remembrance to all.

Pit Props from Newfoundland.—United States Consul James S. Benedict, St. John's, reports that there are 65,000 cords of pit props of fir and spruce, valued at 520,000 dols., cut during the past two winters, lying at the various ports. Owing to the impossibility of getting ships to take these pit props to their intended destination, the Government has decided to permit their exportation to Canada and the United States.

MINING INDUSTRY AND MILITARY SERVICE.

On the subject of recruiting, the Pontypridd and Rhondda district have decided to deal with the calling up of youths as an emergency measure, it being considered that many of these should be allowed to remain in the mines.

The Western Valley miners at Monmouth have passed a resolution which states "the district views with indignation the statement of Mr. Clement Edwards, M.P., with reference to recruiting of single miners, and challenges his statement that the leaders of the South Wales Federation do not represent the opinion of the majority."

A similar resolution of protest was carried at a mass meeting of Llanerch and Blaenserchan Colliery on Sunday, especially against Mr. Edwards' statement that there were plenty of young colliers willing to join the Army, only they were prevented from doing so.

At Abertillery on Monday, the Western Valley miners' council of Monmouthshire met and discussed a circular letter on recruiting. A resolution was passed, protesting against the calling up for military service of men who had temporarily left the mines, and also against sending for medical examination men who were not of military age on August 4, 1914, before their cases were dealt with by the colliery recruiting court. It was decided to ask the Federation executive to call a conference, so that the question of recruiting might be dealt with.

With regard to the "combing out" of miners, Coun. Hubert Jenkins, agent for the East Glamorgan district, made a statement at the monthly meeting on Monday. He said that at the miners' conference a scheme had been drafted which, if adopted, was of considerable importance. It provided that where half the total number of members of a family of military age were serving in the Army or Navy, or had served, the remaining members were not to be called up; but this did not apply to those who had entered the mines since August 1914. The intention was to secure as far as possible equality of sacrifice.

The South Wales miners' executive on Tuesday decided that the chairman (Mr. Winstone) and the secretary (Mr. T. Richards, M.P.) should seek an interview with Mr. Dyer Lewis, the chief inspector of mines, in order to discuss difficulties that had arisen in "combing out" colliery workmen for military service.

At the Tredegar tribunal, the declaration was made by Mr. Jenkins: "It is nothing short of murder to take a man like this for the Army." The observation had reference to a wages clerk employed by the Tredegar Company, and it was stated that he could not run 100 yds., and that he would be laid aside by illness if placed in a draught. He was a most experienced man, doing important work in connection with the pay of workmen; and it paid the company to "nurse" him and so keep him at work as regularly as possible.

At the Worsley tribunal, the military representative said he had no objection to a colliery pay clerk, aged 31, married, C3, employed by the Earl of Ellesmere, and considered by the mines inspector to be indispensable, being granted conditional exemption; and this was agreed to. He objected, however, to a similar exemption being given a colliery traffic clerk, aged 28, Class A. Married since the war began, this man was before the tribunal on a personal appeal, and got exemption, but on men under 31 coming up automatically for review, his certificate was cancelled. The case was adjourned to the next sitting.

The calling up of men who have entered the mines since the outbreak of war continues throughout Scotland to keep large numbers of men in this position uncertain as to whether they can appeal against being taken to the Army. The result is that daily miners from all parts of Lanarkshire, and even outside the county, call upon Mr. John Robertson, who has been interested in the soldiers and their welfare since the outbreak of war.

Newcastle tribunal has granted conditional exemption to a coal owner and ship owner, aged 33 years.

The same tribunal sympathetically considered the case of a retail coal merchant, single, aged 30, and passed B2, who stated that he was leading 30 tons of coal per week in a poor district, and, having previously been rejected, had taken over part of the round of a "pal." He was given two months' exemption, with leave to appeal again.

Coal in Malaya.—In his yearly review on mining in the Federated Malay States, the Senior Warden of Mines (Mr. W. Eyre Kenny) reports that the supply of coal was a source of anxiety until the Malayan Collieries got into full work. The existence of a local colliery obviated a serious shortage of this class of fuel. Work was carried on at the Malayan Collieries throughout the year, but for some time the output was restricted owing to a "want" having been encountered in the North Mine. Shortage of labour and certain essential supplies tended to restrict the extension of operation. The output was 101,846 tons.

Hong Kong Coal Supply.—The United States Consul-General at Hong Kong, China, states that high freight rates and other conditions have led to a shortage in supplies of coal in Hong Kong, Canton, and South China ports generally, which has had a marked influence upon South China industry. Coal, which under ordinary conditions before the war was sold in Hong Kong and Canton at 8 to 10 dols. (local currency) per ton, now costs 30 dols. (local currency) per ton, and cannot freely be had at that price. An advance in the cost of tug boat service, railway rates, etc., has followed, and many industries in which American importers are interested have been embarrassed. Coal imports into Hong Kong for the past year amounted to about the same as for 1915, but were considerably below normal. The total imports are placed at 1,089,866 tons, as compared with 1,052,869 tons in 1915, 1,613,111 tons in 1914, and 1,487,750 tons in 1913. The imports during 1916 were as follow: Japanese, 764,926 tons; Chinese, 211,463 tons; Tonkin, 80,746 tons; Formosa, 15,889 tons; other, 16,842 tons—total, 1,089,866 tons, compared with 1,052,869 tons in 1915. As a result of increased industrial activities in Japan, there has been an increased demand for fuel in that country, and this naturally affects the supply for export, and has advanced the price of coal generally from 1-50 to 2-50 dols. gold per ton. The shortage of tonnage for the export trade, particularly to this field, causes coal to cost at least double, and even more, than in normal times upon a yearly contract basis. Normally, contracts are made for a supply of coal for the year by large industries in Hong Kong, but few such industries have been able to make contracts for the current year, and small dealers and small industries are practically out of the contract market. Of the coal imported in 1916, 189,000 tons were exported to Canton. This is about 25 per cent. below the usual proportion of the trade.

EXPERIMENTS IN LOW-TEMPERATURE DISTILLATION.

The following experiments in the low-temperature distillation of coal were carried out by Fischer and Ghud at the German Coal Research Institute. The idea of using a stationary still was abandoned in favour of the rotary iron drum shown in the illustration. The coal is finely powdered before introduction into the drum, which is heated from below in such a way that only the particles of coal in direct contact with the metal of the drum are warmed, and since the drum itself rotates at low speed, there is no transmission of heat through the layers of coal, local overheating being thus precluded. When the temperature reaches the point at which tar begins to come off, the particles of coal in course of gasification are in position above the cooler layers, and thus allow the tar vapours to escape freely without having to traverse the latter. The expulsion of the tar vapours is facilitated by blowing steam into the drum from one end of the hollow shaft, the mixture of steam, gas, and tar vapour being driven out through the other end, and so to the condenser. By this means the distillation is completed in one to two hours.

The results of treating the recovered tars are given in the accompanying Tables 1 and 2. A bituminous coal (100 kilogs.) furnished 3 kilogs. of tar and 4 cu. m. of gas; and a gas flaming coal, 10 kilogs. of tar and 6 cu. m. of gas; whereas ordinary coking produces about six times the quantity of gas. The tar was found—as was the case with previous workers—to be entirely free from naphthalene and anthracene, but containing paraffin. After separating the phenols, distillation of the tar with superheated steam—in the same manner as employed in the petroleum industry—furnished excellent lubricating oils of very similar character to those obtained by the extraction of coal with liquid sulphurous acid. These oils, which are of a golden red colour, and agreeable smell, furnish lubricating fractions ranging in viscosity from 2 to 28 degs. Engler at 50 degs. Cent., and flashing at 200 degs. Cent. It seems, therefore, certain that the distillation of coal at low temperature may be utilised as a source of excellent lubricating oils, the amount varying from 10 to 15 per cent. of the weight

TABLE 1.
LOW-TEMPERATURE TAR FROM BITUMINOUS COAL.
(100 kilogs. of coal yielded about 3 kilogs. of tar.)

	Per cent.
Highly viscous oils (lubricating oils) ...	15.2
Paraffin	0.4
Non-viscous oils	33.5
Phenols	14.0
Resin	1.2
Pitch	19.2
Loss and water	13.5
	100.0

TABLE 2.
LOW-TEMPERATURE TAR FROM GAS FLAMING COAL.
(100 kilogs. of coal yielded about 10 kilogs. of tar.)

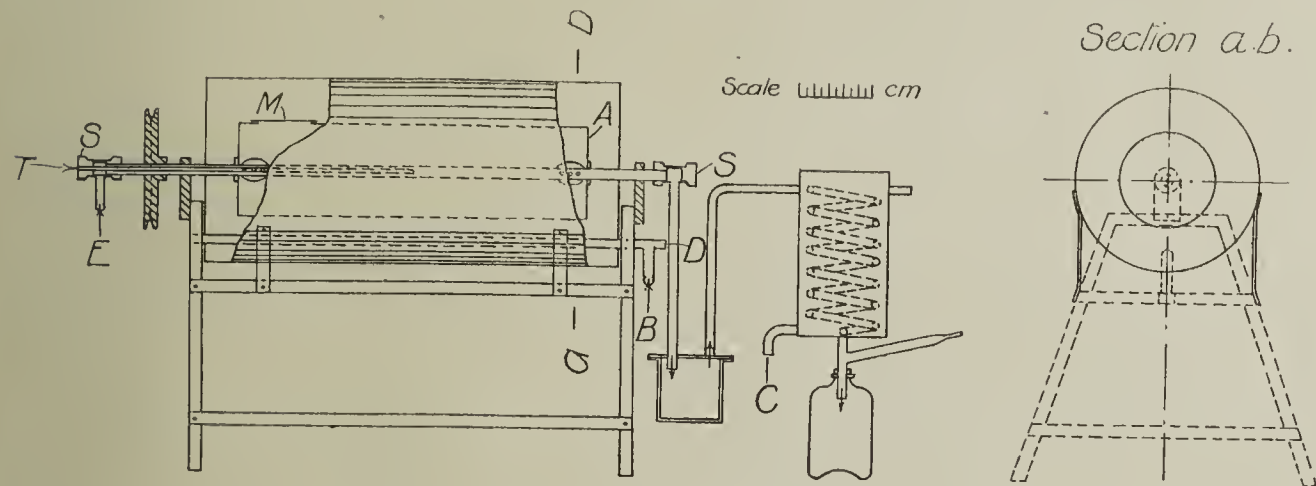
	Per cent.
Highly viscous oils (lubricating oils) ...	10.0
Paraffin	1.0
Non-viscous oils	15.0
Phenols	50.0
Resin	1.0
Pitch	6.0
Loss and water	17.0
	100.0

TABLE 3.
CONSTITUENTS OF A TECHNICAL LOW-TEMPERATURE TAR.

	Per cent.
Highly viscous oils (lubricating oils) ...	11.3
Paraffin	0.8
Non-viscous oils (including spindle oil, grade 4)	17.7
Phenols	37.8
Resin	0.7
Pitch	15.0
Loss (including 13 to 14 per cent. water)	16.7
	100.0

much that is new and useful. Scientific considerations apart, low-temperature tar, as has been the case with coke oven tar, is capable of forming the raw material for numerous industries; and it may now be claimed that coal can be regarded as a source of supply of the hydro-aromatic and aliphatic compounds, as well as of the aromatic series.

The volume of gas obtained by the above low-temperature process amounted to 40 litres per kilogramme of



EXPERIMENTAL PLANT FOR THE LOW-TEMPERATURE DISTILLATION OF COAL.

A, rotary drum; B, gas burners; C, cooling water; D, compressed air; E, steam inlet; M, manhole; S, stuffing-boxes; T, thermo-element.

of the tar, according to the kind of coal taken. The non-viscous oils mentioned in the tables resemble petroleum, and have been found to contain unsaturated hydrocarbons and true naphthenes of the $C_{10}H_{18}$ series. The similarity to petroleum is further confirmed by the fact that they are—even though but faintly—optically active. With regard to the tar phenols, the amount obtained ranges from 14 per cent. in the case of bituminous coals to 50 per cent. from gas flaming coal; but no carbolic acid is present, the products consisting entirely of the higher members of the series, from the cresols onward.

Experiments have quite recently been carried out with a view to the closer investigation of the light hydrocarbons contained in the gases obtained by the distillation of coal in the same apparatus, and it has been found that the usual method of washing out these products with oil—in the same manner as benzol is extracted from coke oven and retort gas—gives but poor results. A trial was therefore made with compressing the gas at 20 atmospheres in presence of vaseline oil, drawing off the oil and distilling it with steam. In this manner the light hydrocarbons are readily taken up by the vaseline oil and recovered therefrom. The amount so recovered is equivalent to about 0.2 to 0.3 per cent. of the weight of coal taken; and the products, which are practically free from benzol, have boiling points between 20 and 100 degs. Cent. They represent mixtures of benzines, and have the corresponding low specific gravity of about 0.65 at 20 degs. Cent. They do not solidify even at -100 degs. Cent., and furnish on distillation all the petroleum benzines: petroleum ether, ligroin, light and heavy benzene. A similar quantity of these benzines is also present in the tar, so that, in all, they amount to about 0.4 to 0.6 per cent. of the coal. The actual composition of the individual products has not yet been ascertained, attention having necessarily been confined to the practical side of the question, but the ultimate analysis (carbon 83.5 per cent., hydrogen 14.5 per cent.) shows them to be much richer in hydrogen than benzol (7.5 per cent.) and its homologues.

From these investigations it can be said that a properly conducted low-temperature distillation of coal will furnish all the products of the petroleum industry, viz., paraffin, lubricating oils, petroleum oils, and benzines. Broadly speaking, the chief difference between this low-temperature tar and crude petroleum consists merely in its more or less high content of phenols. The complete investigation of this matter will take a good deal of time, but will certainly yield

bituminous coal, and 60 litres from the gas flaming coal. The calorific value was relatively high, viz., over 9,000 units, this being due to the fact that about 70 per cent. of the gas consists of methane, ethane, and heavy hydrocarbons. Had the benzene been left in, the value would naturally have been still higher.

The economy of low-temperature distillation is, however, dependent on the utilisation of the resulting coke. If it be found possible, by suitable devices, to produce a sufficiently solid coke in the rotary apparatus described, then low-temperature coking will acquire importance as an independent process. Experiments carried out by the authors have shown, in the opinion of various experts, that the solid product may be termed a semi-coke, which is sufficiently firm to find application as a smokeless coal, for though it still contains a percentage of combustible volatile constituents, these burn away with the coke, without producing any smoke. Even, however, if it be found impossible, when operating on the large scale, to obtain a sufficiently dense and hard coke, the low-temperature process will still have a future before it in combination with a gas producer, the still hot semi-coke being fed continuously into the producer and converted by the latter into producer gas.

In the absence of large plants for the low-temperature distillation of coal, the authors have been trying to ascertain whether the valuable low-temperature tars can be obtained with existing devices of another type, and have arrived, on the basis of theoretical considerations, at a simple method which will be reported later.

With regard to brown coal, if sufficient steam be employed, the above low-temperature distillation furnishes, without resorting to a vacuum, tars containing undecomposed mineral wax, and therefore of comparatively high solidification point. Treated in gas producers under the same conditions as employed for obtaining low-temperature coal tar, brown coal yields a large quantity of tar which can be advantageously worked up into motor fuel and paraffin.—*Stahl und Eisen.*

The will has been proved of Mr. Ebenezer Morgan, late manager of Cymmer Colliery, Porth, who died on April 11, and left estate of the gross value of £1,945.

The strike of 80,000 coal miners in Western Canada, which has been in progress since April last, has come to an end. The Commissioner appointed by the Government to investigate the conditions has ordered an immediate resumption of operations.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The Sliding Scale Committee of Steel Workers in South Wales and Monmouthshire have decided that the wages of 2 per cent. on the standard is to be given on July 1. This makes the percentage 89½ above the standard.

Difficulties which arose regarding the right of engineers to increased wages led to the stoppage of thousands of men not directly concerned, both in the steel and in the tin-plate works. In Port Talbot, 1,600 men were idle on account of about 90 engineers; at Morriston, the strike of 50 engineers stopped nearly 1,000; and these cases are typical, several other centres being involved, and the stoppage lasting a week. Apparently the strikers claimed to benefit under two modes of operation; whereas, they having been advantaged under one award, it was contended in opposition to them that they could not benefit additionally under the other. In all, between 15,000 and 20,000 employees were indirectly affected by the strike of a relatively small section who occupied a key position. The strike was unauthorised by the engineers' union; and the question at issue involved also the Tin-Plate Conciliation Board, for engineers in the tin-plate works as well as those at steel works were concerned. A war bonus was granted by the Tin-Plate Board to all men under its control; and the engineers who had previously been advantaged by an award of the Committee on Production did not benefit by the Conciliation Board's decision. There was a question also which involved the Welsh Artisans' Union, this organisation not being connected with any federation, and claiming that their conditions of work were to be regulated solely by the Conciliation Board. Discussion has taken place between representatives of the unions, and a suggestion by the employers was made that 10 out of 15 per cent. should be granted in order to level up the difference; but this the men declined. The matter was submitted to the Committee on Production, but meanwhile the strike took place on very brief notice, and lasted for a week. Negotiations between the unions and the committee having taken place in London, there was a conference of delegates of four trade unions in Swansea on Friday of last week. The men demanded 25 per cent. additional war bonus, and certain concessions in regard to other conditions; and at a general meeting held on Saturday a ballot vote was taken, when it was agreed that work should be at once resumed, the men to accept 15 per cent. additional bonus, with certain improved conditions.

The Avon Valley miners' meeting at Port Talbot on Saturday decided once again to approach the railway companies in an endeavour to secure rebate in the train fares of men who are working only part time. It was reported that, with the exception of two pits, all the collieries in the district had been working better during June than had been the case for many months. The old question of obtaining payment for small coal once again came forward; and it was decided to support the agitation for securing payment, seeing that the market prices of small coal had considerably increased, and the men considered it should be paid for on the same basis as large coal. The agent's report contained a strong appeal that every effort should be made to avoid unpleasantness in the collieries by "using a little common sense." A vote of congratulation was passed to Second-Lieut. David Jenkins, son of the agent, upon his having been awarded the Military Cross.

The Western Miners' Association held its monthly meeting in Swansea on Saturday, when the agent reported the result of arbitration in claims at the Ashburnham Colliery, Barry Port, through which about 50 men were resuming work. It was decided that one of the agents should give evidence before the Industrial Unrest Commission, and should lay special stress upon the low wages earned by day men.

The secretary of the anthracite miners has issued a circular to the members of his branch of the Federation; and in this he gives them information as to collieries in the steam coal and house coal areas where men are wanted. It is stated that between 3,000 and 4,000 men may be taken from the anthracite area where employment has been so slack, and work found for them in the more eastern part of the coal field.

Three new seams are being opened at Nine Mile Point Colliery; and the men's agent reported at the Tredegar meeting that he had had a preliminary conversation with regard to the price-list, and hoped for a successful issue, which would relieve the double shift that had so largely prevailed. The meeting was also informed that the Federation council had decided to give evidence before the Industrial Unrest Commission on behalf of the South Wales miners; and that, whilst the first reason for discontent amongst the wage-earners was the high cost of food, another cause was the consciousness that they were more important to the nation as wealth producers than the privileged classes, and were demanding their full rights.

The Pontypridd and Rhondda district received a report on Monday from their agent, Mr. Ben Davies, as to a visit by the deputation to the Home Office, where they also saw Mr. Hugh Bramwell, the company's managing director. An agreement was reached that the men engaged in safe places in the Maritime Colliery should return to work, and that new places should be found for those in whose stalls gas had been discovered.

The Tredegar Valley monthly meeting of miners received a report on Monday as to the Tytrist Colliery washery workmen, who desired to come under the Conciliation Board agreement, and to be paid like other colliery workmen, and not to be under the iron and steel workers' agreement as at present. It was stated that the case was coming before the appeal court.

Over 500 men ceased work at the Cynon Colliery because of an alleged grievance of a returned soldier, who was said to have been removed from one position to another which had lower pay. Upon the advice of their agent, however, the men returned to work, pending consideration of the matter by the emergency committee.

A dispute is reported from Blaenavon, Monmouthshire, arising out of which 50 men and 20 boys (colliers) claim a day's pay from the employers. It appears that for a considerable time an agreement was in force at the local colliery under which a number of workmen were given tonnage allowances owing to deficient height. The employers recently stopped the allowances, with the result that 70 men and boys declined to proceed to work, although they had descended to the pit bottom. Unsuccessful efforts having been made to recover a day's pay, the matter was referred to Mr. James Winstone (miners' agent and acting-president of the South Wales Miners' Federation) who has since advised the men concerned that they have no claim, and that, in fact, the employers had a claim against them. The management had said the agreement referred to was terminated, and the miners' district had instructed him (the agent) not to proceed further with the matter.

In his monthly report to the Monmouthshire Eastern Valley miners, at a meeting at Pontypool on Monday, the

Mr. Gibson has also published a letter directing attention to peculiar circumstances that have necessitated reference to Sir George Askwith, Chief Industrial Commissioner. Mr. Gibson states the facts briefly, which are—that under instructions from the Commissioner, the Coal Owners' Association entered into an agreement with the South Wales Miners' Federation on the question of non-unionism, the agreement being made in April of last year. Its purpose was to prevent any interruption of output during the war. It was agreed "the workmen employed at the collieries shall be required to become members of one or other of the recognised trade unions," any difficulty arising through the working of the agreement to be reported to the Chief Industrial Commissioner, so that his department might take action. In March last, complaint was made to the local Joint Disputes Committee by Mr. Winstone, acting-president of the Federation, that certain men had seceded from the Federation and had joined the Colliery Craftsmen's Association. He asked the coal owners to

assist the Federation in compelling those men to rejoin it; but the coal owners declined to be parties to such action, disclaiming all responsibility as to the particular trade union to which the workmen should belong. They held that they were observing the terms of the agreement so long as their workmen were members of one or other of the recognised unions. This difference was referred to Sir George Askwith, and his decision is: "Any recognised union has a free field to recruit among the non-unionists and to obtain their adherence to the union, but once in the union the men should not move from union to union; and one union should not take over or induce a man in another recognised union to join their union." Mr. Gibson points out that the effect of this decision is, that not only must every workman in the coal mines of South Wales belong to a recognised union, but also that once he has joined any particular union, a man is prohibited from changing the membership to that of another, and so apparently "the coal owners are expected to participate in a course of action to compel men to rejoin a trades union of which they may not desire to remain members, and which, in the first instance, they may have been induced to join under pressure."

It is the recognised policy of the Federation to bring into operation only one union for the whole of the coal field, embracing all classes of workmen; and there has for a long time past been contention between the Miners' Federation and the Association of Enginemen, Stokers and Craftsmen. On one or two occasions a ballot has been taken of members of the association upon a proposal that their membership should be merged in the Federation; but, although an actual majority approved of this idea, the proposition was not carried by the requisite two-thirds vote which is necessary. The difficulty of the employers in this matter is great; and certainly is not lessened by the reply which they have received from the Industrial Commissioner.

Lord Aberconway, at the annual general meeting of the Tredegar Iron and Coal Company, said the South Wales coal fields came under the control of the Government in December last, and after six months' delay, with negotiations between the representatives of the coal owners and the Controller, a definite arrangement had now been made, which at present was not public property, but of which they knew sufficient to be able to say that it very seriously affected the discipline and conduct of businesses such as theirs. They were now really to a certain extent agents of the Government. The latter controlled the distribution of their output, they had the right and power to interfere with labour disputes, and, more than all, were imposing additional taxation on their profits. The Finance Act of this year was taking 80 per cent. of the excess profits from all concerns, but in the case of collieries the 20 per cent. left to other industries had been reduced to 5 per cent., the other 15 per cent. being utilised to form a fund which was intended to maintain a standard dividend in the case of the weak collieries so far as that might be necessary, and any surplus not absorbed in that way would, he supposed, go into the Exchequer. None of them desired to make profits out of the war, but all they asked was that the coal companies' difficulties should be recognised. If they had their pre-war profits, and the Controller allowed them to keep their collieries in a thoroughly efficient condition, he did not think they should complain. He would be quite content if nothing were done by the Controller to injure the prospects of the business, and he did not think anything of that kind was in contemplation. If they had a clear 5 per cent. over and above their pre-war profits the shareholders should not complain. But he would point out that they were being treated on a worse basis than labour.

A colliery case remitted from the High Court came before the stipendiary magistrate at Aberdare. The circumstances have been previously reported. It affects a man who was summoned for having a match in his coat pocket in the mine—the summons being dismissed originally upon the inference that the match had not been placed in the pocket by the defendant himself, or that it was there by inadvertence. The High Court, however, decided that there should be a conviction unless defendant could prove that the match was dropped into his pocket by some other person; and upon this point no evidence had been offered. It was stated that defendant had examined his clothes before going underground, so that at most it was only an oversight. His coat had been hanging for three hours at the top of the tip, where many men passed to and fro. At the resumed hearing in Aberdare, the stipendiary considered that a fine of 10s. would be adequate, and this penalty was imposed.

North's Navigation Collieries Limited have a scheme involving an expenditure of between £400,000 and £500,000 for developing new mineral takings of about 4,000 acres in the Llynny Valley, extending to Tondy, Aberkenfig, Brynmenyn, and Brynecethin. It is intended to sink new pits, and also to establish near Tondy an extensive by-product plant. Part of the scheme is to utilise as far as possible the Park Slip Colliery, which was temporarily closed some years ago. Preliminary work in the form of trial drifts and borings will be started shortly, and the erection of the by-product plant is to be proceeded with.

The manager of the Cefn-y-Bryn Colliery, near Port Talbot, and the colliery company, have been summoned for breach of the Explosives Act by keeping explosives in an unauthorised place. It was admitted by the prosecution that the company had commenced the erection of the proper magazine for storing the powder, etc., but the building was not completed; and, for the defence, it was stated that because of the difficulty in obtaining building materials and labour, the erection of the magazine had been delayed. A promise was made that steps should now be taken to complete it. The company were fined £20 and the manager £5.

Mr. T. E. Watson, president of the Cardiff Chamber of Commerce, has published a letter in explanation of the Coal Controller's directions as to sales. He remarks that the clause relating to payment of 2d. a ton commission to specified local agents (not being exporters), refers to cases where an exporter of cargo small coal employs an agent on 'Change to get a number of small parcels from various collieries to make up the cargo; or where a colliery employs such an agent for a similar purpose. This commission is payable by the person employing the local agent, and is not to be added to the commission charged by the exporter to the foreign buyer.

At the East Glamorgan meeting of miners' delegates, the agent submitted a report as to the case which had come before the county court judge at Pontypridd. A woman claimed compensation for loss of her grandson, aged 14, who had earned 4s. a day. The company, however, contended that the boy was rated at 3s.; whereas evidence was tendered that colliers were entitled to pay boys of this age 4s. 9d. per day under the minimum wage award; and under normal conditions they could pay more if they desired. The judge awarded £160 compensation.

The serious outlook in respect of water supply of the Western Valleys of Monmouthshire, due to colliery developments, was discussed at the Abertillery and District Water Board. The heavy rainfall has helped matters materially hitherto, but, a few days ago, Oakdale, which is supplied from Tredegar, failed to get any water, and the Water Board has had to arrange for a supply to the village one hour per day from the Abercarn surface reservoir. With regard to Ynysddu, it is proposed to tap a stream of water near the old Tredegar Arms, and thus materially help the local supply. The Abercarn Council also intend to augment their supply by tapping a spring at the Cwncarn Valley, collecting the water into a reservoir of the capacity of 100,000 gals.

The retirement of Mr. Beasley from the management of the Taff Vale line, which is the chief mineral railway of South Wales, is a matter of something more than local interest, because of the great part that that gentleman has played in numerous industrial questions of the past quarter of a century. Chief assistant in the Great Western office, he accepted appointment as general manager of the Taff Vale Railway and Penarth Docks in 1891, when the then recent opening of the Barry Railway and Docks had reduced Taff Vale earnings to such an extent that dividends were about one-third of what had previously been paid. He proved himself to be a manager of singular ability, as was manifested in the 10 per cent. dividends. He pursued an independent line, severing the understanding with the Bute interest (now Cardiff Railway Company), which was held to have proved inadvisable; and one striking proof of his ability is seen in the fact that, whilst the capital of the undertaking has since 1891 increased by only one-sixth, the net revenue has almost doubled.

The Coal Owners' Association appointed a committee to classify coals under the Controller's scheme; and it has sat at Cardiff for two days this week, Mr. B. Nicholas being in the chair. There has been much discussion as to suggested classification issued from the collieries, and some variation in this respect has been necessary, the committee not being able to agree with the suggestions, more particularly as to Monmouthshire outputs. Their classification is subject to approval by the Controller, and any objection from the different coal owners will be dealt with by him.

The miners' executive, at a meeting in Cardiff on Tuesday, received a deputation which proposed that the South Wales miners should contribute the cost of ambulances for the men in France and on other battlefields. Capt. Bailey submitted the proposal, and a French representative (the Duc de Clemence Tonnaire) endorsed it, with the result that the executive decided that mass meetings of the men should be called.

Northumberland and Durham.

Compensation Decisions. Miners' Association Returns—Furness Group Management Changes—Lambert Brothers' Shipbuilding Interests.

Mr. John Reece, of Annfield Plain, checkweighman at Morrison Colliery for many years, has been made the recipient of a gold watch and albert by the owners, officials and workmen at the pit, on his retirement.

At the inquest touching the death of Percy Dowse, 15, a pony driver at East Holywell pit, it was stated that, after having been injured, Dowse told his father that he was coming out with a set of tubs as another set was going in. The pony shied, and kicked him underneath the travelling tubs. Another driver, however, stated that deceased's pony, which was a new one, "crossed out" and bumped another pony. Deceased seemingly got frightened, loosed his pony's head, and tried to get behind the tubs. As he was doing so the other pony "crossed out," and pushed him between two wagons of his own set, underneath the second of which he fell. A verdict of "Accidental death" was returned.

At the inquest on William Mann, 69, wasteman at Tursdalc Colliery, it was stated that he had received a blow on the head from the roof in the mine, but had not reported the accident. Both the coroner and the mines inspector emphasised the importance of workmen reporting accidents, no matter how trivial they might be.

The jury at the inquest touching the death of Leonard Harrison, master stoneman, of Blackhall, decided that deceased was accidentally killed through falling from a cage in motion, owing to its not stopping at the proper seam, and that such accident was owing to an error of judgment on the part of the onsetter at the Low Main seam, in not giving the requisite signals to the signalman before setting the cage in motion. It was stated by the onsetter in the Five-quarter seam that he received five raps from the banksman at the top, which was the signal to set an empty cage away. Witness rapped nine back, to signal that the cage was clear to go to the top. At that time the cage containing the deceased had not reached witness's seam. Directly it did, and he saw a man in it, he rapped once to the top to stop the cage. The cage stopped dead level by the seam, and witness opened the shaft gate to enable the deceased to get out. He attempted to do so, and was just on the point of putting his foot on to the ground when the cage was taken away. The deceased caught his head against the bar of the shaft gate, and the collision doubled him up, and caused him to fall to the bottom of the shaft, a distance of 240 ft.

The new seal of the Shildon Urban Council is to contain representations of three shields, embodying the "Royal George" engine (built at Shildon by George Stephenson), the arms of the Lilburn and Crozier families (leading families in the district), picks to commemorate the coal industry, and a hammer symbolical of the wagon building works.

The claim, at Newcastle County Court, of James William Robinson, hewer, for £9 10s. compensation from the Stella Coal Company Limited, failed, Judge Greenwell holding that the accident did not arise out of or in the course of the man's employment. It appeared that Robinson was going through a timber yard on the way to his work, when he fell on some ice, and injured his ankle. For him, it was contended that the employers' liability began when the man entered the yard which was owned by the company. Mr. Meynell, for the respondents, submitted that the man was a hewer, and that his work was underground; therefore, the accident in the timber yard did not arise out of or in the course of his employment.

Judge Greenwell decided, at the Newcastle County Court, that if an accident were proved to arise out of a man's employment, the fact of serious and wilful misconduct did not matter in a compensation claim. The case was that in which John Johnson, hewer, who lost his eyesight by a shot-firing accident on January 8, claimed compensation from the East Wallbottle Coal Company Limited. The company opposed the claim on the ground that the man committed a breach of a most serious order by staying on the stop after the fuse was fired. The applicant's solicitor stated that while engaged in drilling

holes for the firing charges, Johnson was told to light a fuse and shot-firer, named Wood, to fire the last charge. He lit the fuse before he had properly connected the third pellet of explosive; but although, having done so, it in a wrong way, he was doing what he had been told to do. The respondent company submitted that the accident must not treat with contempt the rules and regulations in operation in every pit in the kingdom. The shot was fired without any stemming. Giving judgment for the appellant, his Honour said that it appeared to him that the case was covered by the authorities, and what it amounted to, at the worst, was that the accident, which resulted in serious and permanent injury, had been caused by the man's serious and wilful misconduct. It was absolutely impossible, however, to say that it did not arise out of his employment, because he was actually doing the work he had been ordered to do. It seemed to be clearly established by cited cases that, if the accident arose out of the employment, serious and wilful misconduct did not matter. Therefore, Johnson was entitled to his compensation.

Mr. J. W. Robinson, manager of Bebside Colliery, is leaving to take up an appointment with the Wallsend and Hebburn Coal Company Limited.

Messrs. Lambert Brothers Limited, coal exporters, have acquired a considerable interest in the shipbuilding firm of Sir Raylton Dixon and Company Limited, Middlesbrough. Mr. Harold R. Dixon and Mr. G. M. Harroway will be managing directors of the company, and Messrs. Wayman Dixon, Thomas Dixon, and H. Bolekow will retire from the board.

The latest returns in connection with the Northumberland Miners' Association show 25,886 full members and 4,670 half-members. The number of enlisted full members is given as 9,655, and of half-members as 932. The number of miners seeking exemption from payment of the political levy has increased from 225 to 389. These exemptions show some interesting fluctuations. At South Tyne, where 70 were exempted recently, none is now exempted. At Cramlington Ann pit, however, the number is 251 as against *nil* a quarter ago; at Newbiggin, six as against one; at Bomarsund, 47 as against 44; and at Eltringham, 74 as against 97.

The following important changes in connection with the management of the Furness group of coal and iron companies have been made:—Lord Furness becomes chairman of the South Durham Steel and Iron Company Limited and the Cargo Fleet Iron Company Limited, in place of Capt. J. E. Rogerson, who takes over the chairmanship of the Weardale Steel, Coal and Coke Company Limited and the Broomhill Collieries Limited. Lord Furness will remain on the boards of the Weardale Steel, Coal and Coke Company Limited and Broomhill Collieries Limited as deputy chairman, and Capt. Rogerson will remain on the boards of the South Durham Steel and Iron Company Limited and the Cargo Fleet Iron Company Limited as deputy chairman. Owing to advancing age, Mr. J. H. Beckingham has resigned the managing directorship of Broomhill Collieries Limited. He retains his seat on the board. Mr. E. L. Beckingham has been appointed managing director.

The Tyne Improvement Commission has secured the sanction of the Board of Trade to increase its statutory rates, tolls, dues, and charges on vessels, goods, coal, and coke by one-third, and the increase has been levied as from Sunday, July 1.

Cumberland.

On Monday morning, the Allerdale Coal Company commenced their drift and water level for the Rattler Band seam of coal in the "Harry Gill" wood. The boreholes which have been put down by the company have proved satisfactory, and show a fairly good spread of coal, which it is hoped to win by the drift at an early date.

The Midlands.

The South Staffordshire Mines Drainage Commissioners' engineers, in their report for June, state that the rainfall during the last four weeks had been 2.54 in. The pumping had been 12,279,800 gals. per 24 hours, as compared with 12,148,800 gals. the previous month, and 12,904,500 gals. in the corresponding period last year. The Moat old engine had been worked part time and Gospel Oak Mond gas-driven plant full time to assist Moat new engine. There was little change to report in the height of water at Tibbington bye-pit of the Empire Colliery.

Kent.

The output of the Tilmanstone and Snowdown collieries last week was 5,600 tons.

One of the principal ideas underlying the fusion of Kent Collieries Limited (owners of Shakespeare Colliery, Dover) and the Channel Collieries Trust, which was approved at the meeting on Friday of last week, is the development of the extensive beds of iron ore that have been proved in the Dover district. It was during the sinking of the Shakespeare Colliery that this iron ore deposit was first opened out, and its presence has resulted in the strong financial support given by Messrs. Dorman, Long and Company and Messrs. Bolekow, Vaughan and Company, two of the great Northern firms of iron masters; and in this connection borings have been put down for some miles north and west of Dover, to prove the extent of the iron ore beds, and tests of the ore have been made. These borings and the tests have given highly satisfactory results, and the Dorman-Bolekow group is largely interested in the new amalgamated company to work the ore and consider the erection of iron and steel works locally as soon as financial conditions permit of raising the necessary capital. This group has undertaken to subscribe for 50,000 preferred ordinary shares of £1 each in the new company at par, and to provide the cash in order to maintain the properties and carry out the necessary preliminary investigations for the erection of the works, etc., pending the time when operations can be effectively started.

Scotland.

Burntisland Exports—Labour for Iron Ore Mines. A Pit Prop Contract.

Mr. William Bridgewood, who for several years has been manager at Blairadam and Lindsay Collieries, Fifeshire, has been appointed agent to the Fife Coal Company in the Leven district.

Mr. David Gilmonr, secretary of the Lanarkshire Miners' Union, has taken up his duties at St. Ermins, London, as one of two permanent advisers on labour questions in connection with the National Service scheme. Owing to the closing down of Wallsend and Druntuthill collieries, belonging to John Nimmo and Company, Dunfermline, the whole plant was offered for sale by auction.

The export of coal at Burntisland dock for the week showed a total of 8,680 tons, as compared with 12,980 tons in the previous week. The total export was constant.

A considerable number of Scottish miners, influenced largely by the short time which is being experienced in the pits throughout Lanarkshire, Fifeshire, and the Lothians, have been replying to advertisements offering to

employment in the iron ore mines in England. The question of the transference of men from coal to iron has been under consideration. It has been at the Ministry of Munitions has been pressing the Service Department to arrange for such of labour, owing to the urgency and necessity of the output from the iron ore mines. A meeting was held at Whitehaven the other day, at which representatives of the Cumberland Iron Ore Employers' Association and the men's delegates were present. Officials of the following Government departments were also in attendance: Ministry of Munitions, National Service, Coal Controller, and Steel Production Board. The men's representatives stated that a good deal of dissatisfaction existed regarding the present conditions of labour in iron ore mines. Mr. Gilmour and Mr. Small, trade commissioner under the National Service scheme, informed the conference that no arrangements for the suggested transference of men could be made until the conditions in regard to employment were put on a perfectly satisfactory basis. They explained that it would be necessary for the Government departments to consider the situation in the light of the discussion at the conference. Meanwhile, Mr. Gilmour is desirous that Scottish miners should not volunteer for the iron ore mines until a definite pronouncement is made by him or the other officials of the Scottish Union of Mine Workers.

In the Court of Session, a reclaiming note was made for the defenders against Lord Dewar's interlocutor in the action of Oakbank Oil Company Limited, who sued Messrs. Love and Stewart Limited for £1,800 as breach of contract. The pursuers invited tenders for supply of pit props, one of the conditions being: "The company's specifications, conditions, and form of tender must be strictly adhered to, and not altered in any way whatever." Defenders received one of the schedules in June 1914, and a contract was concluded, under which they agreed to supply the quantity of props required. In June 1914 they commenced to supply the props, and on August 6 they wrote to pursuers, directing their attention to a note printed in red ink at the top of their notepaper: "All offers are subject to stoppages through strikes, etc., and the right to cancel is reserved in the event of any of the countries from which supplies are drawn becoming engaged in war." The defenders maintained this note in red ink formed part of contract. Pursuers denied this, and stated their attention had not been directed to it before contract was entered into, and they refused to agree to its cancellation. On September 25, 1914, the defenders wrote declining to supply further orders unless pursuers recognised cancellation of contract and paid 25 per cent. increase on the contract prices. In consequence of the defenders' refusal, the pursuers were obliged to purchase elsewhere at prices in excess of those fixed in the contract. In the Outer House, the Lord-Ordinary found the defenders liable, and granted decree against them for the sum of £1,633, with expenses. The court recalled the Lord-Ordinary's interlocutor, and assuaged the defenders with expenses, on the ground that the letters which passed formed part of the contract, and that the red ink note must be held to be part of the letters.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Bradford Coal Merchants' and Consumers' Association.—The report for the year ended March 31 states that the profits, after providing for bad and doubtful debts, depreciation, managers' and directors' salaries, etc., amount to £18,629, which with the amount brought forward makes £22,171. After deducting preference and interim dividends and providing for central office and administration expenses, income tax, etc., there is left £9,312. The directors propose paying a dividend of 3 per cent. on the ordinary shares for the six months ended March 31, making 5 per cent. for the year; to place £1,000 to reserve, and to carry forward £3,818.

Browett, Lindley and Company Limited.—The report for 1916 states that the net profit, after providing for interest charges and writing £6,134 off for depreciation, was £9,450, out of which the full year's dividend of 6 per cent. has been paid on the preference shares, together with an extra distribution of 3 per cent. on account of arrears, and a dividend of 4 per cent. on the ordinary shares, leaving £3,540 undivided, subject to excess profits duty.

Brown Bayley's Steel Works Limited.—An interim dividend of 5 per cent. A year ago the same rate was paid.

Celtic Collieries Company Limited.—Interim dividend for the past half-year at the rate of 10 per cent. per annum on the ordinary shares.

Dominion Steel Corporation Limited.—The report for the year ended March 31 states that the net earnings, after making due provision for bad and doubtful debts and other contingencies, were 12,967,874 dols. For depreciation of plants and properties, sinking funds, etc., there has been reserved 1,859,595 dols. This is in excess of the amounts reserved for similar purposes in past years, but is rendered necessary by prevailing conditions. The total production from all collieries amounted to 4,279,772 tons, against 5,261,198 tons in the previous year. The earnings, after deducting all manufacturing, selling, and administrative expenses, etc., were 12,967,874 dols. After making provision for sinking funds and deducting depreciation, renewals, etc., interest on bonds and debentures, and discount on securities, the net earnings amounted to 9,551,165 dols., which, with the balance brought forward after paying preference dividends on the Dominion Steel Corporation and constituent companies, makes 12,608,554 dols. After paying a dividend of 1 per cent. on common shares of Dominion Steel Corporation and the arrears of dividend on preferred stock of Dominion Iron and Steel Company, there is a balance of 11,937,577 dols.

Ebbw Vale Steel, Iron and Coal Company Limited.—The directors recommend a dividend of 15 per cent. on the ordinary shares for year ended March 31, less tax.

Lambert Brothers Limited.—A bonus in the form of two new shares for every three shares now owned will be distributed. This increases the ordinary capital from £300,000 to £500,000. The money to pay for the new shares is to be taken from the reserve fund, which now stands at £235,000. There will be left £35,000.

Manor Powis Coal Company Limited.—Interim dividend on preference shares for the half-year ended April 30 at the rate of 6 per cent. per annum, and 1s. per share on the ordinary shares, both less income tax.

Newton, Chambers and Company Limited.—After allowing for all other exceptional charges, the profit for the year ended March 31 was £64,400, which was itself the profit for 1914-15. The ordinary dividend for 1914-15 was 10 to 12½ per cent., and £30,000 is set aside for expenditure. The carry forward is

North's Navigation Collieries (1889) Limited.—The directors have declared a dividend of 7½ per cent. (actual) on the ordinary shares for the half-year ended June 30, being at the rate of 15 per cent. per annum.

Roberts (William) (Tipton) Limited.—The accounts for the year ended March 31 show a profit of £7,959, which, with the balance brought forward, makes a total of £8,307. After deducting interest on debentures, etc., there remains a balance of £4,814. It is proposed to pay a dividend at the rate of 5 per cent. per annum, and to carry forward £1,264.

Roburite and Ammonal Company Limited.—Mr. H. A. Krohn, who presided at the annual meeting of shareholders in London, said the past year's accounts could not be completed, but they proposed a dividend of 10 per cent. on the ordinary shares. The Government have offered them a contract at what he described as starvation terms. They had been compelled to stop the manufacture of commercial ammonal owing to the costliness of aluminium. When the terms for the combination of explosive makers are settled, they will be laid before the shareholders.

United National Collieries Limited.—A dividend on the ordinary shares at the rate of 1s. per share, free of tax.

Wagon Finance Corporation Limited.—Interim dividend of 10 per cent. per annum, free of tax.

NEW COMPANIES.

Blackwall Engineering and Welding Works Limited.—Private company. Registered June 28. To carry on the business of electricians, mechanical and electrical engineers, founders, etc. Capital, £3,000 in 2,850 £1 preference shares, and 2,000 ordinary shares of 1s. each. Directors to be appointed by the subscribers. Subscribers: H. Andrews and G. Steel.

Macfarlane Winch Company Limited.—Private company. Registered June 25. To carry on the business of mechanical, electrical, and general engineers, etc. Capital, £12,005 in 100 1s. shares and 12,000 £1 shares. Directors: E. T. L. Williams and G. T. Macfarlane.

Marriott (J.) and Company Limited.—Private company. Registered office, 11, Temple-street, Wolverhampton. Registered June 25. To carry on the business of mechanical engineers, iron founders, etc. Capital, £1,500 in £1 shares. Directors: J. Finlayson and J. Crossley. Qualification, 10 shares.

Oxfordshire Ironstone Company Limited.—Private company. Registered June 29. Nature of business indicated by title. Capital, £100,000 in £1 shares. Directors to be appointed by the subscribers. Subscribers: J. R. Wright and another. Qualification, 100 shares.

Russell Brothers (Redditch) Limited.—Private company. Registered office, Littleworth, Redditch. Registered June 20. To carry on the business of mechanical and general engineers, manufacturers, etc. Capital, £10,000 in £1 shares. Directors: F. W. Russell and Leila C. Russell.

Storey (E.) and Company Limited.—Private company. Registered office, 34, Castle-street, Liverpool. Registered June 29. To carry on the trade or business of coal, coke, iron, and ore merchants, etc. Capital, £36,000 in £1 shares. Directors: J. H. Eccles, J. Rigby, and D. E. Ainsworth.

Successors to the Otto Coke Oven Company Limited.—Private company. Registered June 28. Nature of business indicated by title. Capital, £100,000 in £1 shares. Subscribers: J. Christie Mellington, N. Hawdon, and two others. Qualification, £500.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

ACTON, JULY 12.—Tenders are invited by the Acton Education Committee for the supply and delivery of kitchen nuts and anthracite during the year ending July 31, 1918. Approximate consumption, about 370 tons of kitchen nuts and 200 tons of anthracite. Particulars and forms of tender from F. A. Everitt, secretary, Education Department, Council Offices, Acton, to whom tenders, endorsed "Supply of fuel," must be delivered not later than July 12. The Committee do not bind themselves to accept the lowest or any tender, and canvassing the members of the Committee or Council, either directly or indirectly, will disqualify.

ATHLONE, JULY 25.—The Urban District Council of Athlone invite tenders for the supply of about 1,500 tons of best gas coal, delivered and stored at their works at Athlone in good and dry condition in such quantities as may be required during the period of one year from the date of contract. The lowest or any tender not necessarily accepted. Tenders should reach the clerk, Town Hall, Athlone, by July 25.

DARTFORD, JULY 12.—The Dartford Council invite tenders for the early delivery at Dartford of 500 tons of house coal. Conditions and form of tender may be obtained on application to the undersigned. Tenders, in envelopes endorsed "House coal," should be delivered at the Council Offices, Dartford, not later than July 12. W. Kay, clerk to the Council, Council Offices, Dartford.

OLDHAM, JULY 17.—The Gas Works Committee invite tenders for the supply of about 20,000 tons of gas coals, commencing as early as possible, and the whole quantity to be delivered by June 30, 1918. Conditions and forms of tender may be obtained on application to Mr. Isaac H. Massey, Gas Offices, Oldham, to whom tenders are to be delivered not later than Tuesday, July 17.

STOCKPORT, JULY 10.—The Stockport Corporation invite tenders for the supply of coal, nuts, etc. Tender forms, etc., from the gas engineer, Great Portwood-street, Stockport.

WIGAN, JULY 13.—The Gas Committee invite tenders for the supply of gas nuts, cobbles, or screened or unscreened coal. Particulars and forms of tender may be obtained on application to Mr. F. Betley, gas engineer, Gas Works, Wigan. Tenders, sealed and endorsed "Tenders for gas coal," to be delivered to the town clerk, Municipal Offices, by July 13.

Abstracts of Contracts Open.

BARKING, JULY 10.—800 tons good quality house coal, 25 tons steam coal, 120 tons coke, for Urban District Council. Forms from surveyor, Public Offices, Barking.

CARDIFF, JULY 13.—House and steam coal for the Cardiff Union. Forms from the clerk, Union Offices, Queen's Chambers, Cardiff.

CLONAKILTY, JULY 13.—40 tons best Newport red ash or Whitehaven house coal for Clonakilty Guardians. Forms from the clerk.

DEAL, JULY 10.—100 to 300 tons best hard steam coal or screened nuts, to be delivered Walmer Station, July, August, and September, for Deal and Walmer Joint Water Board. Sealed tenders to the clerk, Queen-street, Deal.

DUNGANNON, JULY 12.—250 tons Scotch or English coal for Board of Guardians. Forms from the clerk, Work-house.

EVESHAM, JULY 14.—Coal for the Guardians. Forms from the clerk, Union Offices, Evesham.

HALIFAX, JULY 11.—Coal for the Halifax Education Committee. Particulars from the secretary, Education Offices.

HEREFORD.—Coal for the Corporation. Forms from the city surveyor.

HERTFORD, JULY 9.—60 tons best house coal and 40 tons of steam coal, also coke, for the Hertford and Ware Joint Hospital Board. Tenders to the clerk to the Joint Board, Ware.

HOLBEACH, JULY 10.—Coal and coke for the Gedney, Fleet, Whaplode, and Sutton St. Edmund schools. Tenders to Mr. S. S. Mossop, Holbeach.

HOVE, JULY 10.—Household coal, also coke, for Hove Borough Education Committee. Forms from the secretary to the Committee, Third-avenue, Hove.

KINSALE, JULY 11.—130 tons of coal for the Kinsale Union. Tenders to the clerk of the Union, Clerk's Office, Kinsale.

LARKHALL, JULY 10.—5,000 tons Virtuewell coal for Larkhall Gas Company Limited. Tenders to the secretary.

LONDON, E., JULY 12.—100 tons large nuts for the Bethnal Green Board of Guardians. Forms from the clerk to the Guardians, Bishop's-road, Bethnal Green, E. 2.

LONDON, W.C., JULY 11.—Coal and coke for the National Hospital for the Paralyzed and Epileptic, Queen-square, Bloomsbury, W.C. 1. Forms from the secretary of the Hospital.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport, Isle of Wight.

OMAGH, JULY 12.—500 tons steam coal and 200 tons best English house coal for immediate delivery to Omagh District Asylum. Tenders to the clerk of the Asylum, Omagh.

PETERBOROUGH.—Coal for the Education Committee. Forms from the clerk to the Committee, Queen-street, Peterborough.

STRATFORD-ON-AVON, JULY 19.—400 tons coal suitable for steam and household purposes for the Guardians. Forms from the clerk, Union Offices.

WARE, JULY 9.—50 tons small steam coal for the Ware Rural District Council. Tenders to the clerk, Town Hall.

WARRINGTON, JULY 10.—500 tons steam coal and 300 tons house coal for the Union Institution. Forms from the clerk, Union Offices, Warrington.

WARRINGTON, JULY 14.—50,000 tons of gas coal for the Corporation Gas Department. Particulars from the Gas Department, Mersey-street, Warrington.

WEYMOUTH, JULY 20.—Coal and coke for the Borough of Weymouth and Melcombe Regis Education Committee. Sealed tenders to the clerk to the Education Committee, East-street, Weymouth.

WHALLEY, JULY 10.—House coal, gas coal, and coke for the Queen Mary's Military Hospital (County Asylum), Whalley. Forms from the steward.

The date given is the latest upon which tenders can be received.

Pre-War Coal Contracts.—A recommendation from the Advisory Committee, "that all pre-war contracts be cancelled," occupied the attention of the members of the council of Newcastle and Gateshead Chamber of Commerce at Wednesday's meeting, and resulted in the confirmation of the principle of the motion, but in the referring back of the wording so that the resolution should be made more explicit. This latter course was decided upon after Mr. R. Temperley, barrister, had pointed out that the motion was extremely wide, and should be carefully re-drafted. To say "that all pre-war contracts be cancelled," might be construed to mean far too many things. They would have to decide (1) what contracts they referred to, and (2) what they meant by cancelling them. In the course of the discussion, it was stated that, practically at the instance of that Chamber, the Government had appointed a Parliamentary Committee to take into consideration the question of such pre-war contracts.

Angola Coal.—Dr. Marloth, of Cape Town, has tested some specimens of highly bituminous coal brought from Angola by Mr. McKinnon, which is stated to be found in huge quantities at Quilungo, 90 miles from Loando, and about seven miles from Zenze railway station. The coal is very easy to mine, being accessible by means of adits to the mountain. It is now being worked to supply a Government contract, and is taken out by boys, who clean it by hand, and carry it in 50-kilog. loads to the railway station. The contract coal is used for fuel, but the coal in its raw state is said to be too bituminous to make good fuel, though the by-products are valuable. Dr. Marloth finds that the coal on distillation yields 31 per cent. crude oil, 56 per cent. coke. The oil when refined furnishes a good benzine, suited for cleaning, petrol for fuel for motor engines, paraffin suitable for illumination or for fuel, lubricating oil suitable for delicate machinery, a thicker lubricating oil suitable to be used on engines worked by steam, and, lastly, vaseline. So that, from the raw coal, 60 per cent. very valuable commercial products result. Owing to its richness in volatile hydrocarbons of high illuminating power, the coal should also prove of great value to gas works, where it will serve as a substitute for coal in order to enrich the gas. Its chief value, however, lies in its large yield of oil, in which it is richer than Scottish shale and the shales of Antm. For example, the yield of the Scottish shale is 30 gals. raw oil per ton of rock, leaving a coke with 9 per cent. of carbon. The Quilungo material yields 70 to 75 gals. of raw oil and a coke of over 50 per cent. carbon, which is suitable for railways, factories, agricultural and domestic purposes.



The Silent Conveyor

(Spence's Patent).

A Fair Example of Results.

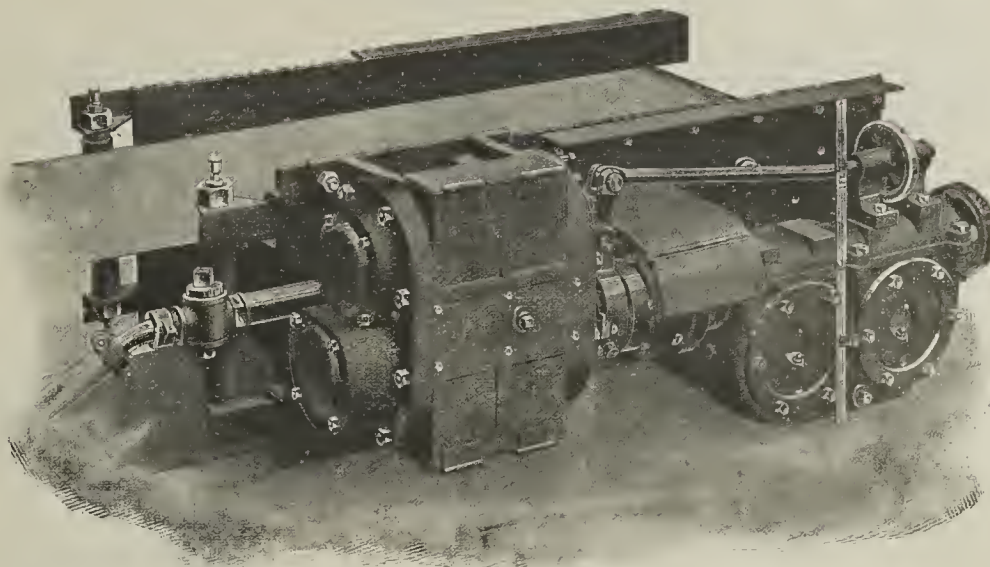
Length of Face - - 80 yards

Height of Seam - - 2 ft. 9 in.

Average Gradient
against load 1 in 12

Average discharge
(5 men) - 60 tons per shift

Average load (input) - 4 B.H.P.



Meco Belt Conveyor Head, Spiro-turbine Drive.

Perfectly noiseless in operation.

Positive in action, will convey equally well uphill or down.

Most economical in power consumption.

Electric or air-driven.

Will take the place of your enlisted men and will increase tremendously your output of coal.

Write to-day for Illustrated Catalogue and full particulars.

The Mining Engineering Co. Ltd.

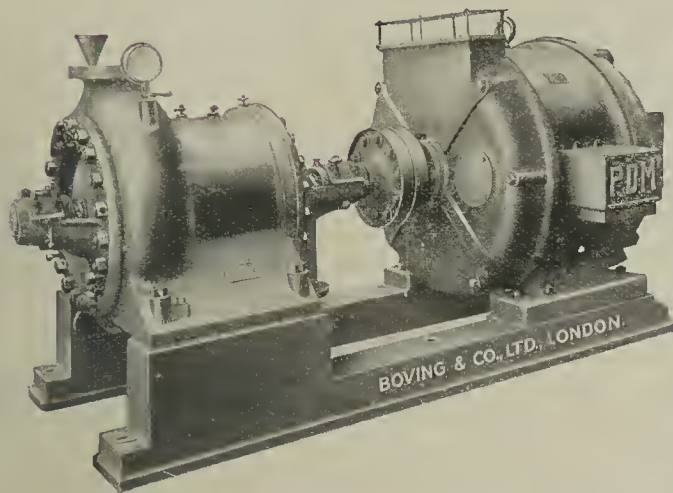
Meco Works, Moorfields,

SHEFFIELD.

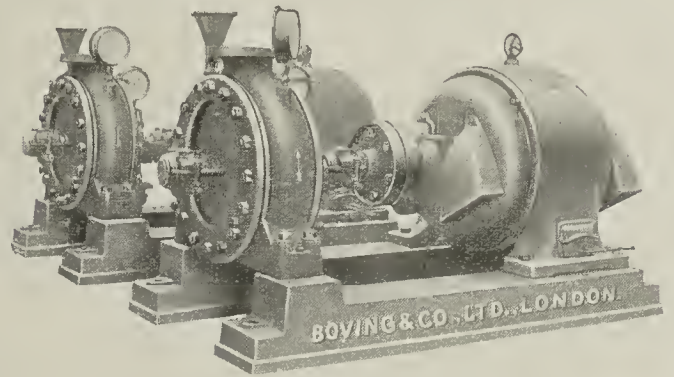
Telegrams: "Meco, Sheffield."
Telephone: 4530 Central (2 lines).

BOVING TURBINE PUMPS.

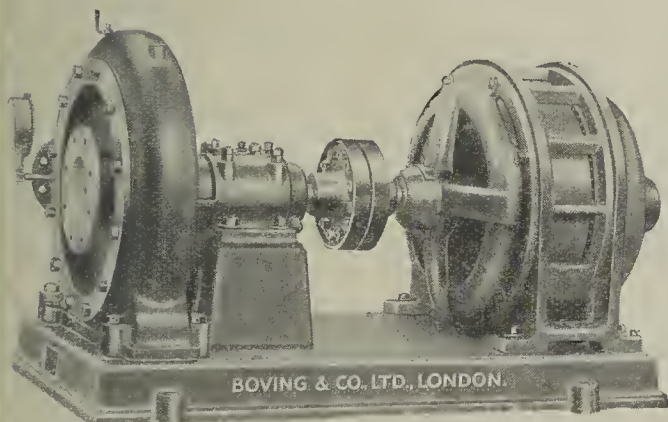
THE MOST RELIABLE AND EFFICIENT
BRITISH MADE PUMP.



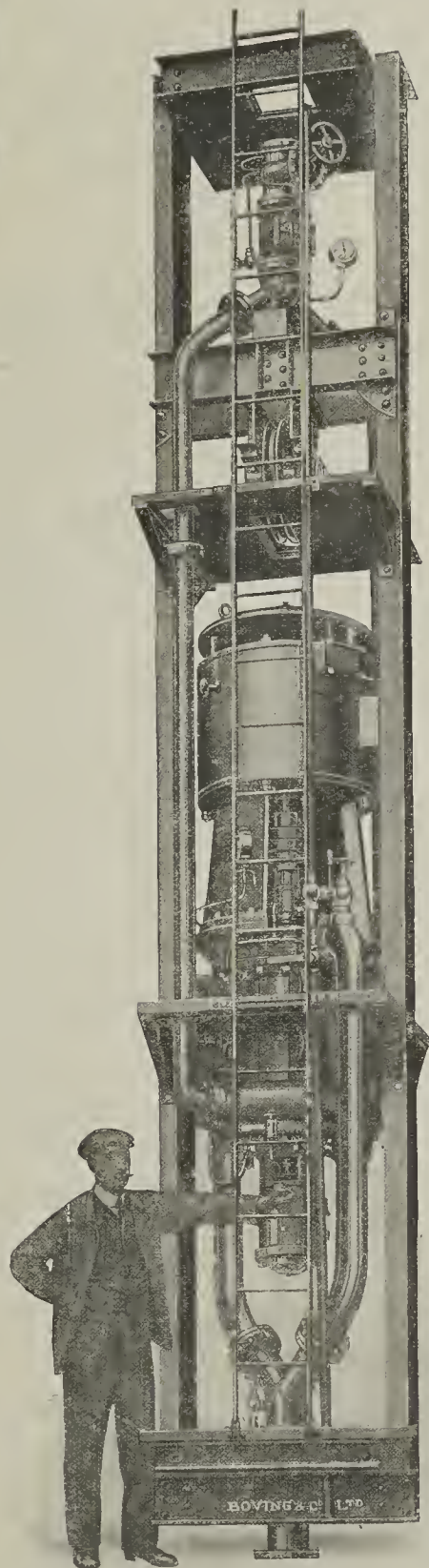
LARGE MINING PUMP
(6 Repeat Orders).
860 g.p.m.
755 feet.
1,450 r.p.m.



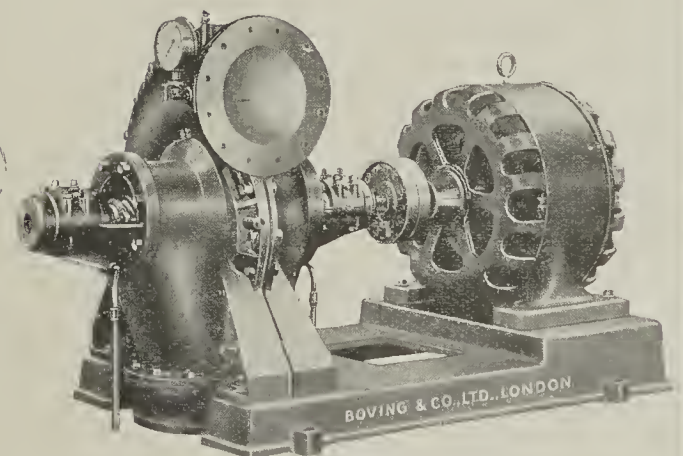
2 SMALL MINING PUMPS.
220 g.p.m.
328 feet.
2,900 r.p.m.



STEEL WORK PUMP,
Medium Pressure.
800 g.p.m.
125 feet.
1,450 r.p.m.



2 SINKING PUMPS
as shown (Repeat Order).
333 g.p.m.
475 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Low Pressure.
3,000 g.p.m.
40 feet.
725 r.p.m.

BOVING and CO. Limited,

HYDRAULIC ENGINEERS,

Telegrams :
"JENORTEN, WESTCENT."

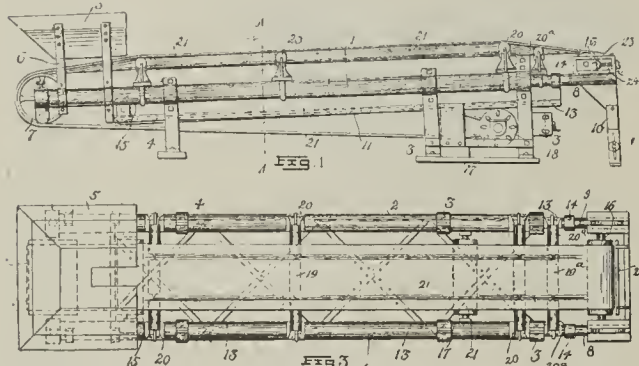
Telephones :
HOLBORN 6420 (3 lines).

56, Kingsway,
LONDON, W.C.

by in such wise that there is no risk of injury to the flame of the lamp. A device according to the invention comprises a supporting plate of leather, leather substitute, or other comparatively rigid material pierced to afford holes for rivets or other means of attachment to the cap, and a hole for engagement by the end of the usual hook on the lamp. The plate is bent or up-turned to conform approximately with the contour of the cap, and is

formed or provided with improved means whereby the lamp is retained against lateral displacement, such means consisting of a clip of light sheet metal or other material, preferably deformable material, secured to the plate, and adapted partially to embrace the lamp. The invention is illustrated in the accompanying drawings, in which fig. 1 is a part vertical section, part side elevation; fig. 2 a front elevation; and fig. 3 a plan showing one form of the device. Referring to the drawings, 1 denotes a plate bent, as shown, to conform with the contour of the cap 2, the plate being provided with rivet holes engageable by rivets 3, and with a hole for engagement by the end of the hook 4 on the lamp 5. 6 denotes a clip secured to the plate, and adapted to embrace the lamp. (Two claims.)

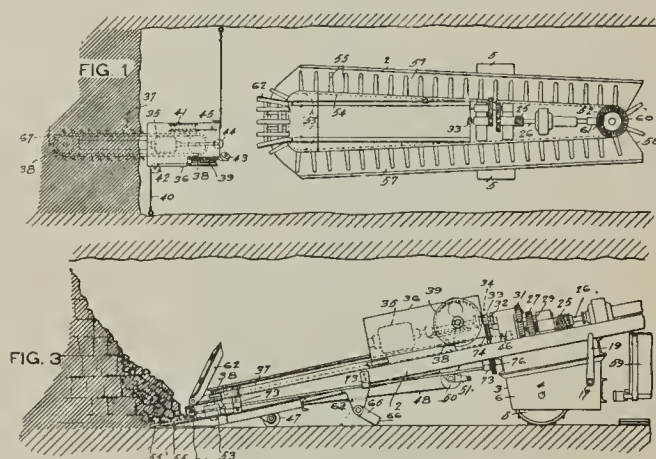
106239. *Improvements in Conveyors.* T. H. Martin, 201, Montgomery-street, Montreal, Canada.—The invention relates to improvements in extensible conveyors of the class having telescopic frames in which travels an endless conveyor belt arranged to take an S-shaped course over rollers carried by the telescoping frames, some of such rollers being troughing ones for the purpose of shaping the belt. The objects of the invention are to provide a simple device, cheap of construction, durable, and easy to operate. Fig. 1 represents a side elevation of the invention in its non-extended position; fig. 3 is a plan view of fig. 1. In the drawings, 1 and 2 are parallel tubes supported at one end by the frame 3, and at the other end by the standards 4. 5 is a hopper suitably supported above the said tubes 1 and 2; and 6 is a roller suitably journaled between said tubes 1 and 2 at their rear ends. 8 and 9 are parallel rods telescoping in the said tubes 1 and 2; and 10 are standards or legs, secured to the outer end of said rods 8 and 9, and adapted to support same. 11 and 12 are rails suitably secured to said frame 3 and standards 4, below said tubes 1 and 2 and parallel thereto; and 13 is a frame adapted to slide on said rails 11 and 12, and secured at one end to the rods 8 and 9 by means of the brackets 14. 15 is a roller suitably journaled at the rear end of said frame 13. 16 is another roller suitably journaled in the outer or forward part of the rods 8 and 9. 17 is a roller suitably journaled within the frame 3, and actuated by the motor 18. 19 and 19a are rollers provided at intervals, and mounted on frames on the said tubes 1 and 2 and on the rods 8 and 9 respectively, and 20 and 20a are obliquely disposed rollers mounted on



the said frames of said tubes 1 and 2 and on the rods 8 and 9 respectively, the latter rollers being adapted to dish or curve upward the sides of the conveyor belt 21. The endless belt 21 passes over the rollers 7, 19, 20, and 16, and back over the roller 15. From the roller 15 it passes over the roller 17 and back to the roller 7. The frame 13, being secured to the rods 8 and 9, will be carried forward when the rods 8 and 9 are pulled out from the tubes 1 and 2 if it is necessary to extend the conveyor, thus carrying with it the roller 15. The roller 15, being carried forward with the frame 13 and the rods 8 and 9 and the roller 16, will eliminate any slack in the belt, as the increase in the distance between the rollers 16 and 7 will be equal to the decrease in the distance between rollers 15 and 17. The objects of this invention are to provide a simple device for the transmission of coal or such like substances, and to be capable of being lengthened or shortened as desired without stopping the machinery. It may also be equally well used either as a portable or a stationary appliance. An important point is that in extending or in closing the conveyor, the tension on the belt will not be interfered with. This conveyor has been designed for loading coal over ship-board, but it will be found helpful anywhere that a conveyor is required to carry material between two points. An adjustable scraper 22 (fig. 3) is placed against the belt at the roller 16, in order to keep the belt free from any material that might otherwise stick to it. 23 are sliding blocks adjusted by a tension screw 24 adapted to advance the roller 16 in order to take up any slack caused by the wearing of the belt. (Two claims.)

106366. *Apparatus for Mining Coal.* H. A. Kuhn, 505, South Linden-avenue, Pittsburgh, Pennsylvania, U.S.A.—The object of this invention is to provide a method of and apparatus for mining coal, by means of which the coal, after it has been undercut and shot, may be readily and quickly removed without involving the risk of loss of life, and at the same time dispensing with the digging of the coal by means of picks, as in the method now commonly employed. The invention consists, generally stated, in making an undercut in the solid wall of coal, and following its lines of cleavage, substantially provided by the cut or undercut, there an undercut is made on the floor of the coal, or swelling into the cut wherever the coal along the line of the same time conveying it to the point

of loading. In the accompanying drawings, fig. 1 is a plan view showing the primary cutting or undercutting unit making the original cut or undercut in the coal, and the secondary cutting, digging and conveying unit in the rear thereof; fig. 3 is a side elevation of the whole digging and conveying machine in operation, the coal having been shot and settled into the original undercut. In mining coal with this apparatus, the primary cutting unit is dragged off the frame 2 by its power, the jacks or anchor being properly set to effect this desired result, and an undercut is made in the wall of the coal. The primary cutting unit is indicated in fig. 1 as making this cut across the wall of the coal, and when the cut has been made the wall of coal will have the undercut 67. The feed rope 40 is then connected up to the hook 46 on the frame 2, and the primary cutting unit drags itself under its own power up over the skid 62, and up on to the frame 2. In some seams of coal the coal is not cut along the floor, but the cut is made elsewhere in the seam, such as at the top or side, and the coal is loosened from its bed by explosives, and expanded into the space made by the cut wherever it may be. It will be noted that the primary cutting unit lends itself to any plan of cutting, either horizontally or vertical, as it is small and flexible, with power to move and cut in any direction the rope end is anchored. The shot holes 68 are then drilled in the face of the coal by the drills, one at approximately the middle point and one at each upper corner extending upwardly at an angle. After these shot holes have been drilled, the proper charge of powder or other explosives is introduced, and the coal is blasted first in the middle, and then shots in the corners follow one after the other. The upper coal when shot will expand into the space made by the settling of the lower coal, the front coal falling in loose lumps on the floor, leaving their native bed. It is at this point of the operation that the complete digging, lifting and conveying apparatus is brought into play, and power to operate the same is obtained from the motor of the primary cutting unit, the shaft is connected up with the mechanism for operating the



digging, lifting and conveying apparatus, as fully hereinbefore set forth. The lever 19 is moved to drive the traction wheels 5, and the digging and conveying apparatus is brought up into proper position when the chain 54, being driven by the connections described, causes the scrappers or cutters 55 to cut under or undermine the body of coal which has been expanded and disrupted, forming a second undercut, and by this action dislodging the disrupted coal, so that it will drop on to the pan 57, and be conveyed by the flights 55 along said pan until discharged into the mine car 59. By having the frame 2 set at an incline in the manner indicated, it will be noticed that the conveyor flights and the cutters as they advance into the mass of coal, not only cut and dislodge, but wedge upwardly, so with a lifting force under the overlying mass as to assist the dislodgment of the coal, by further disrupting it along lines of its cleavage. This feature, however, is not strictly essential, and the same effect may be obtained by advancing the machine on a plane parallel or substantially parallel with the floor of the mine. In case the cutters should strike an obstruction in the floor, and it is desirable to raise the machine slightly so as to clear such obstruction, the dog 65 is thrown over to the position indicated by dotted lines in fig. 3. (Nine claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

Adaptable Moulding Machine Company. Foundry moulding machines. (9106)

Akt.-Ges. für Zink-Industrie vorm. W. Grillo. Mechanical charging apparatus for roasting or calcining furnaces. (9127)

Akt.-Ges. für Zink-Industrie vorm. W. Grillo. Hydraulic mechanism for actuating, stirring, and feeding apparatus of mechanical roasting and calcining furnaces. (9128)

(American Steam Conveyor Corporation). Ash conveyor systems. (9330)

(American Steam Conveyor Corporation). Ash conveyors of the steam jet, etc., type. (9331)

Arundel, H. Means for indicating level of liquids in vessels. (9107)

Atherton, J. Electric signalling devices. (9108)

Barfield, E. P. Furnace for hardening steel, etc. (9169)

Barfield, E. P. Indicating condition of steel, iron, etc., during heat treatment. (9170)

Brown, R. J. Wainwright. Pumps, etc. (9173)

Drake, J. W., and Drakes Limited. Apparatus for removing coke discharged from retorts or furnaces. (9188)

Gill, H. A. (American Steam Conveyor Corporation). Ash conveyor systems. (9330)

Gill, H. A. (American Steam Conveyor Corporation). Ash conveyors of the steam jet, etc., type. (9331)

Gridley, J. Clinometers. (9154)

Hawkins, S. G. Guide tips for turbine or centrifugal pumps, etc. (9454)

Higginson, J. Means for indicating level of liquids in vessels. (9107)

Hutchins, T. W. S. Retorts or furnaces for destructive distillation and carbonisation of carbonaceous materials. (9234)

Jackson, W. J. Mellersh- (Seaman Waste Wood Chemical Company). Destructive distillation of wood, etc. (9485, 9487)

Johnston, W. Puddling and heating furnaces. (9155)

Koppers, H. Door for furnaces, retorts, etc., for producing gas, coke, etc. (9402)

Korte, C. Metal briquetting machinery. (9441)

McDonald, G. Means for conveying coal, etc., along a wall face underground. (9314)

McKenzie, N. Adjustable conveyors or elevators. (9189)

McKibbin, J. B. Rolling metals. (9304)

Norwich Components Limited. Process and composition for treating cast iron, etc. to prevent rusting thereof, and apparatus for applying said composition. (9439)

O'Keefe, W. M. Foundry moulding machines. (9106)

Schefczik, W. Mechanical charging apparatus for roasting or calcining furnaces. (9127)

Schefczik, W. Hydraulic mechanism for actuating stirring and feeding apparatus of mechanical roasting and calcining furnaces. (9128)

Scott, W. H. Process and composition for treating cast iron, etc., to prevent rusting thereof, and apparatus for applying said composition. (9439)

(Seaman Waste Wood Chemical Company). Destructive distillation of wood, etc. (9485, 9487)

Shiner, A. E. Rotary pumps. (9333)

Stamper, C. W. Compensation for cables used in haulage. (9461)

Whiteley, J. T. Apparatus for casting hollow metal ingots. (9419)

Whyte, S. Production of hard cast iron articles. (9297)

Wild, L. W. Furnace for hardening steel, etc. (9169)

Wild, L. W. Indicating condition of steel, iron, etc., during heat treatment. (9170)

Williams, A. Shoulder guard for hammer drill boring machine. (9436)

Williams, R. N. Process and composition for treating cast iron, etc., to prevent rusting thereof, and apparatus for applying said composition. (9439)

Complete Specifications Accepted.

To be published on July 19.

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.

8525. Stone and Company, J., and Parsons, W. S. Centrifugal pumps. (107226)

9543 and 9545. Davis, H. N., and Twigg, W. R. Furnaces. (107263, 107264)

9627. Donaldson, J. Elevators for handling ore and the like, more particularly in ships' holds. (107267)

10035. Zwicky, J. Pumps and compressors. (107273)

10564. Bray, C. H., and Le Bas, E. Chill moulds and the manufacture of chill bar castings. (107280)

10974. Seymour, G. E., and Porter, A. F. Construction of transporter, truck, or the like. (107283)

11064. Jones, O. S. Magnetic separators. (107284)

11279. Hall, I. Crucible melting furnaces. (107286)

11395. Wadsworth and Sons, W., Cryer, J. W., and Mangnall, N. Belt driving gear. (107287)

12065. Tregaskes, S. T. Truck or trolley for general transport purposes. (107293)

13394. Douglass, A. E. Apparatus for making briquettes. (107310)

14120. Jenkins, H. C., and Ellacott, E. Belt conveyors. (107317)

16012. Aktiebolaget Svenska Kullagerfabriken. Rope supporting devices in rope hauling or winding systems. (102610)

16530. Stein and Atkinson Limited, Atkinson, J. S., Kayser, Ellison and Company, and Kayser, C. W. Heating furnaces. (107332)

18657. Thomas, H. S., Smith, C. A., and Onions, Z. Webb. Annealing covers and manufacture of same. (107343)

1917.

25. Illemann, R. Fuel. (107344)

78. Kilburn, B. E. D. (Sulzer Frères Soc. Anon.). Apparatus for the continuous distillation of tar. (107345)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.

8225. Pozzo, A., and Colonnetti, G. Process of and apparatus for testing iron. (107376)

8926. Bradley, L. Method of and apparatus for the electrical treatment of gases. (107389)

PUBLICATIONS RECEIVED.

"Bulletin No. 153 of the Institution of Mining and Metallurgy," dated June 28, 1917, edited by C. McDermid; "Industrial Management" (Vol. 53, No. 3), June 1917, edited by John R. Dunlop, price 25c.; "The Mining Congress Journal" (Vol. 3, No. 6), June 1917, price 20c. per copy; "Monthly Bulletin of the Canadian Mining Institute" (No. 62), June 1917; "The Journal of the Society of Architects" (Vol. 10, No. 3), July 1917, price 6d.; "Boletín del Cuerpo de Ingenieros de Minas del Perú" (No. 83), "Estadística Minera en 1915," por Carlos P. Jimenez; "Report of the Department of Mines for the Year 1915 for Western Australia"; "Cassier's Engineering Monthly" (Vol. 52, No. 1), July 1917, price 1s.; "The M. and C. Apprentices' Magazine" (Vol. 1, No. 2), price 3d.; "Western Australia—Water Supply, Sewerage, and Drainage Department—Fourth Annual Report, Year 1915-16"; "The Principles of Industrial Administration," by George Edson Toogood, introduction by M. W. L. Hichens (A. Brown and Sons Limited, publishers), price 1s. net.

Coal By-Products in the United States.—The Bureau of Foreign and Domestic Commerce, with the co-operation of its district offices, has prepared a revised list of manufacturers in the United States producing coal tar crudes, intermediates, artificial colours, and vegetable dyestuffs and extracts. The list furnishes the names of 158 manufacturers, classified by production under the following headings: Crudes, 23; intermediates, 70; artificial dyestuffs, 99; vegetable dyestuffs and extracts, 18. According to these figures

THE COLLIERY GUARDIAN

AND

JOURNAL OF THE COAL AND IRON TRADES.

VOL. CXIV.

FRIDAY, JULY 13, 1917.

No. 2950.

COAL TRANSPORT RE-ORGANISATION SCHEME.

The following is the text of an Order of the Board of Trade, dated July 4, 1917, made under Regulations 2F to 2JJ and 9G of the Defence of the Realm Regulations:

The Coal Transport Order, 1917.

In pursuance of the powers conferred on them by Regulations 2F to 2JJ and 9G of the Defence of the Realm Regulations and all other powers enabling them in that behalf, the Board of Trade hereby order as follows:—

1. With a view to effecting economies in transport and of facilitating the supply of coal, such restrictions may be placed on the transport of coal from particular areas or particular collieries in the United Kingdom to particular areas or particular destinations as the Board of Trade may from time to time consider necessary, and when such restrictions are so placed it shall be the duty of every person affected thereby to comply with the requirements of the Board of Trade for the purposes of giving effect thereto.

2. Contracts for the sale of coal shall be abrogated to such extent, and as from such dates as may be deemed by the Board of Trade to be necessary in order to secure compliance with their requirements under this Order.

3. The requirements of the Board of Trade under this Order shall be notified in the form of directions issued from time to time by the Controller of Coal Mines. Such directions may relate to any or all of the following matters:—

(a) The restriction or discontinuance of the transport of coal from particular areas or particular collieries to particular areas or particular destinations, either absolutely or by any specified method of transport or otherwise than by such methods of transport as may be specified.

(b) The contracts which are to be regarded as abrogated with a view to facilitating compliance with such directions.

(c) Furnishing information by and to such parties and in such forms as may be specified in the directions.

(d) Any other matters for which provision may be necessary for the purposes of this Order.

4. Infringements of this Order are summary offences subject to penalties under the Defence of the Realm Regulations.

5. This Order may be cited as the Coal Transport Order, 1917.

Signed on behalf of the Board of Trade, this 4th day of July, 1917.

H. LLEWELLYN SMITH.

The Re-Organisation Scheme.

With this Order is published an explanatory memorandum, embodying directions of the Controller of Coal Mines, dated July 4, 1917, for the purpose of re-organising the transport of coal by public railway for inland consumption.

These directions are issued under section 3 of the Coal Transport Order, 1917, made by the Board of Trade under Regulations 2F to 2JJ and 9G of the Defence of the Realm Regulations.

The Controller directs that no person shall, after September 8, 1917, without the consent of the Controller of Coal Mines, buy or sell, or offer to buy or sell, coal to be forwarded by public railway for inland consumption to any area other than those to which the coal in question may be so forwarded under the Coal Transport Re-Organisation Scheme, as set out in these directions.

For the purposes of the aforementioned scheme, Great Britain has been divided into areas numbered 1 to 20 on two maps† of England and Wales and of

Scotland respectively, and the following table shows the areas to which coal produced in each of the areas specified in the first column may be forwarded by public railway for inland consumption for the purposes indicated in the second, third and fourth columns.

Area of production.		Areas to which the forwarding of coal by public railway for inland consumption is confined by these directions.		
		Steam and manufacturing.	Gas and coking.	House.
No.		Area No.	Area No.	Area No.
1.	Northumberland	1, 2, 3.	1.	1, 2.
2.	Cumberland	2.	2.	2.
3.	Durham	2, 3.	2, 3.	2, 3.
4.	Lancashire	4, 6.	4.	4.
5.	Yorkshire	3, 4, 5, 7, 8, 10, 11, 14, 16.	4, 5, 7, 8, 10, 11, 13, 14, 16.	4, 5, 7, 8, 10, 11, 14, 16.
6.	North Wales	6.	6.	6.
7.	North Stafford	6, 7, 9.	7, 9, 10.	6, 7, 9.
8.	Eastern Counties	—	—	—
9.	Shropshire	9, 12, 13.	9, 13.	9, 12, 13.
10.	Birmingham and District	9, 10, 11, 13, 14.	—	9, 10, 11, 13, 14.
11.	Northants to Essex	—	—	—
12.	South Wales and Monmouthshire	12, 13, 14.	12.	12, 13.
13.	South-Western Counties	13.	13.	13.
14.	South-Eastern Counties and London	14.	14.	14.
15.	Derby and Nottingham	4, 6, 7, 8, 10, 11, 13, 14, 15, 16.	4, 7, 8, 10, 11, 14, 15, 16.	4, 6, 7, 8, 11, 14, 15, 16.
16.	Leicester	10, 11, 14, 16.	—	10, 11, 14, 16.
SCOTLAND.				
17.	South-Eastern	17.	17.	17.
18.	North-Western	18.	18.	18.
19.	North-Eastern	17, 18, 19.	19.	17, 18, 19.
20.	South-Western	18, 20.	20.	20.

Contracts.—In accordance with the provisions of sections 2 and 3 of the Coal Transport Order, 1917, every contract for the sale of coal is hereby abrogated as from 6 p.m. on September 8, 1917, in every case in which this is necessary in order that the re-allocation of the supplies of coal, as provided for in clause 6 of these directions, may be effected. [On and from September 10 new contracts for the sale of coal affected by the scheme will come into operation, and all necessary arrangements to this end must be completed not later than September 8, but it is obviously desirable that completion should be reached as much in advance of that date as possible.]

Colliery Returns.—Every colliery owner shall, on receipt of instructions from the District Coal and Coke Supplies Committee in whose area the colliery is situated, furnish the committee with returns giving the following information as respects forwardings by public railway, for inland consumption during June 1917, of each description of coal produced at the colliery:—

(a) In the case of coal sold direct to consumers or retail merchants, the name and address of the consumer or retail merchant, and the tonnage of each description forwarded by rail to each in the areas specified by the committee, for each of the following purposes: (a) Steam raising and manufacturing, (b) gas making, (c) coke ovens, (d) household use.

(b) In the case of coal sold to factors and wholesale merchants, the name and address of the factor or wholesale merchant and the tonnage of each description forwarded by rail to each in the areas specified by the committee, for each of the following purposes: (a) Steam raising and manufacturing, (b) gas making, (c) coke ovens, (d) household use.

(c) In the case of every consignment of coal during June, the destination of which was unknown to the colliery owner, the name, address, and business of the purchaser and the weight and description of each consignment.

(d) Such information as to the provision of wagons as the committee may require.

Every colliery owner shall furnish the above returns to the District Coal and Coke Supplies Committee, so as to be in the hands of the committee within seven days of the date of the despatch of the instructions by the committee to the collieries in their area.

Factors and Merchants.—In every case in which the area of consumption of coal sold to a factor or merchant is unknown to the colliery owner, the District Coal and Coke Supplies Committees will apply to every such factor or merchant for a statement giving, as respects such coal, the tonnage of each description forwarded by rail for consumption in each of the areas as referred to in clause 4 of these directions, for each of the purposes named therein: (a) Steam raising and

manufacturing, (b) gas making, (c) coke ovens, (d) household use; and every such factor or merchant shall furnish such return to the committee so as to be in their hands within three days of the date of application.

In cases where coal is sold by one factor or merchant to another, and the area of consumption of the coal is unknown to the seller, the seller shall state on the above-mentioned return the name and address of the purchaser and the weight and description of coal in each case.

Supplies Committees.—On receipt of the returns specified in clause 4, the District Coal and Coke Supplies Committees will arrange for meeting the requirements of purchasers whose supplies have been affected by the scheme, out of the tonnage of coal which will be available and sufficient for the purpose, by diversion from other areas under the operation of the scheme. This tonnage will consist of the following:—

(a) The tonnage of coal hitherto forwarded by public railway from the areas specified in the first column of the table shown in clause 2 of these directions, to areas other than those specified in the second, third, and fourth columns as permissible areas for the coal in question.

(b) Such portion of the tonnage hitherto forwarded to other areas as it may be necessary for the committee to divert under detailed instructions from the Controller of Coal Mines.

The District Coal and Coke Supplies Committees will inform each of the colliery owners in their area of the tonnages (if any) to be diverted from these areas, and will specify the factors, merchants, and direct consumers, whose supplies are to be reduced or discontinued, with the descriptions and quantities of coal to be diverted from each.

Notification of Collieries.—The whole tonnage of coal diverted under the operation of the scheme as mentioned in clause 6 shall be reserved by the collieries for disposal in accordance with instructions to be given by the District Coal and Coke Supplies Committee, who will notify each colliery owner in their area of the factors, merchants, and direct consumers to whom the coal is to be supplied after September 8, 1917, and of the descriptions and quantities to be supplied to each.

Provision of Wagons.—The collieries will then communicate direct with the factors, merchants, and direct consumers allotted to each, and in offering the authorised weight and description of coal will, at the same time, state whether wagons can be supplied by the colliery. If the colliery is unable to provide wagons, or can provide only a portion of them, this must be stated when offering the coal, and the factors, merchants, and direct consumers asked if they can provide wagons. In cases where factors, merchants, and direct consumers state they are unable to provide wagons, the colliery must at once notify this, with full particulars, to the District Coal and Coke Supplies Committee, who will then endeavour to arrange for supplies of wagons, and if unable to do so, report the circumstances to the Controller of Coal Mines. It must, however, be understood that where factors, merchants, and direct consumers are to-day providing the

† Copies of these maps, also a diagram illustrating the effect of the scheme on the area interchanges, have been prepared by the Railway Clearing House, and may be obtained, with a pamphlet embodying full instructions, by all concerned, post free, on application to the Secretary, Railway Clearing House, 123, Seymour-street, London, N.W. 1.

wagons for the existing supplies which are to be discontinued as from September 8, under the instructions of the District Committee, they must continue to provide wagons for the new supplies substituted by the scheme, except in cases where the collieries indicate inability to meet demands with their own wagons of railway companies.

Notification of Factors, etc.—Every colliery shall notify all factors, merchants, and direct consumers to whom coal has been sold, the delivery of which will be affected by the scheme, of the discontinuance or reduction of supplies as from September 8, 1917. Such notifications shall be made:—

(a) In the case of coal forwarded to areas prohibited under clause 2 of these directions, as soon as possible after the publication of these directions;

(b) In the case of coal forwarded to other areas in reduced quantities, as soon as possible after the receipt of instructions from the District Coal and Coke Supplies Committee as to the factors, merchants, and direct consumers whose supplies will be affected.

These directions are designed so as to leave the initiative with the District Coal and Coke Supplies Committees. Factors, merchants, and direct consumers whose supplies after September 8, 1917, are affected by the scheme are not to apply to collieries for supplies in substitution, but must wait until they receive communications from such collieries as are instructed by the District Coal and Coke Supplies Committees to provide the supplies required under the scheme. Provided that if any factor, merchant, or direct consumer does not hear from a colliery or collieries respecting such supplies as affected under the scheme by August 27, a communication shall at once be sent to the District Committee controlling the area, responsible for supplying such factor, merchant, or direct consumer, furnishing details of the quantities and description of coal required, together with the names of collieries from whom such supplies were actually drawn, and would continue to be drawn up to 6 p.m. on September 8, 1917. Also that if a colliery has not, by August 20, 1917, received particulars of the allocation of its coal which is being displaced under the scheme, it shall, on that date, communicate with the District Coal and Coke Supplies Committee concerned.

Special Certificates.—The Controller of Coal Mines will furnish the District Coal and Coke Supplies Committees with information regarding the present distribution of certain special descriptions and qualities of coal which are required for certain purposes, such as for coke ovens, gas producers, and automatic stokers, and the names of firms who are entitled to priority in respect of their requirements of such fuel. Such firms will receive certificates issued by the Controller of Coal Mines entitling them to receive specified supplies of the special fuels mentioned in the certificate, and the committees will take steps to provide the fuel in question, by diversion, where necessary, from firms who have not received certificates. Every person shall comply with the instructions of the District Coal and Coke Supplies Committees with regard to the distribution of descriptions and qualities of coal, which it may be necessary to deal with, as special fuels under this clause.

Limitation of the Order.—These directions do not affect:—

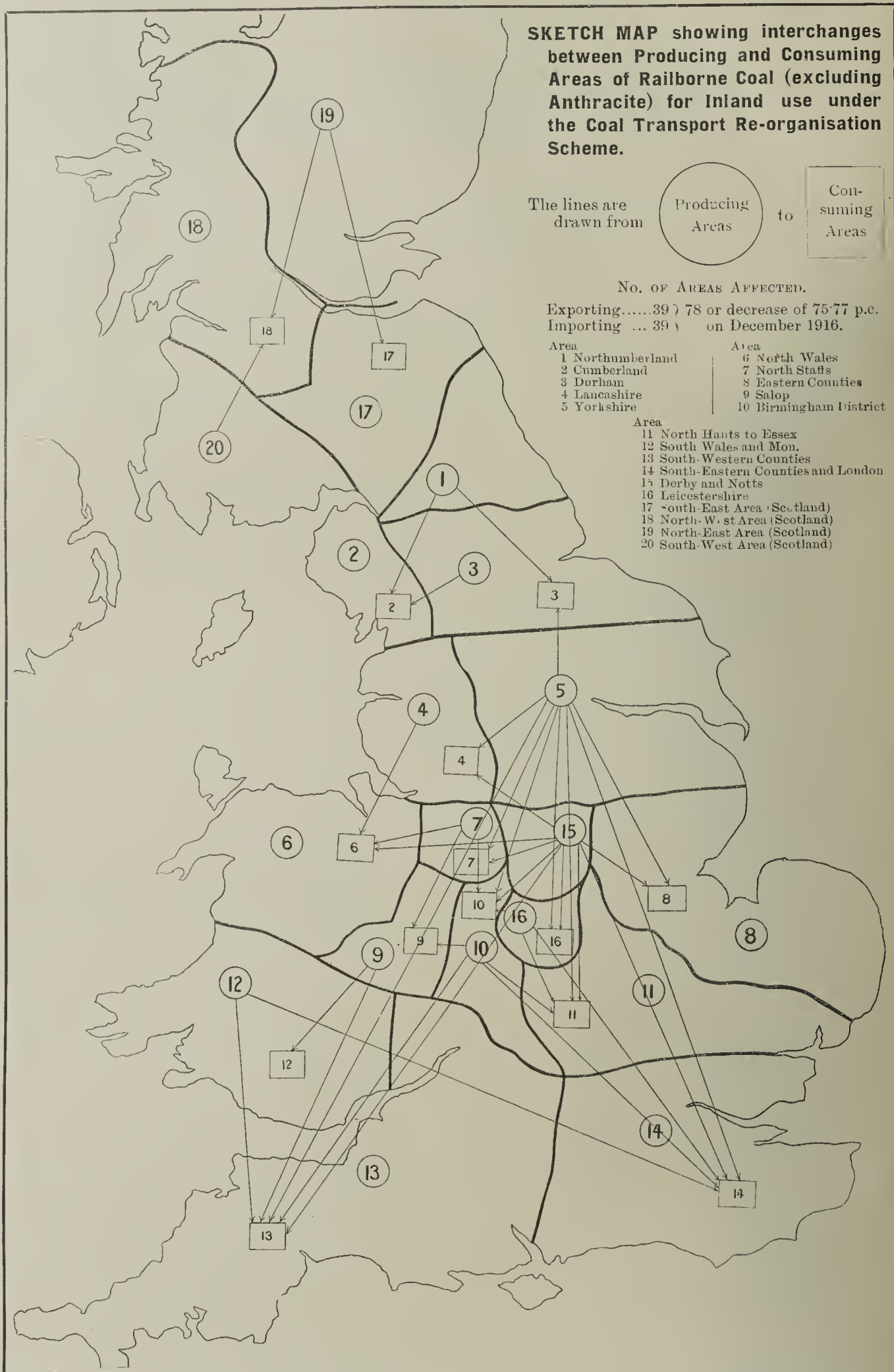
(a) Coal conveyed to a port for shipment, whether for export, coastwise, or bunkers.

(b) Coal conveyed otherwise than by public railway from the colliery.

(c) Anthracite.

In the case of railborne coal transhipped for delivery by barge or to be delivered by road vehicle, the point to which the traffic is forwarded by public railway is to be regarded as the destination for the purpose of complying with these directions.

These directions may be revoked or varied by the Controller of Coal Mines as occasion arises.



LIST OF DISTRICT COAL AND COKE SUPPLIES COMMITTEES RESPONSIBLE FOR THE VARIOUS AREAS.

Area.	Secretary of District Coal and Coke Supplies Committees.
No.	
1. (Northumberland)	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
2. (Cumberland)	T. P. Martin, Esq., 19, Falcon-street, Workington.
3. (Durham)	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
4. (Lancashire)	Sir T. R. Ratcliffe-Ellis, 18, King-street, Wigan.
5. (Yorkshire)	
South Yorks Collieries	Messrs. Parker Rhodes and Co., 14, Moorgate-street, Rotherham.
West Yorks Collieries	A. B. Smith, Esq., Central Bank-chambers, Leeds.
6. (North Wales)	W. H. Haswell, Esq., Elwy House, King-street, Wrexham.
7. (North Stafford)	Major J. Selby Gardner, Cannock, Stafford.
8. (Eastern Counties)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
9. (Shropshire)	Major J. Selby Gardner, Cannock, Stafford.
10. (Birmingham and District)	Do. do. do.
11. (Northants to Essex)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
12. (South Wales)	Finlay A. Gibson, Esq., Park-place, Cardiff.
13. (South-Western Counties)	J. G. Dennehy, Esq., Albion-chambers, Bristol.
14. (South-Eastern Counties and London)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
15. (Notts and Derby)	Do. do. do.
16. (Leicester)	Do. do. do.
SCOTLAND.	
17. (South-Eastern Counties)	R. Baird, Esq., 105, St. Vincent-street, Glasgow.
18. (North-Western Counties)	
19. (North-Eastern Counties)	
20. (South-Western Counties)	

The places named below are just within the borders of the respective areas:—

Area (1). Northumberland.—Berwick, Velvet Hall, Norham, Twizell, Coldstream, Sunilaws, Deadwater, Kershopefoot, Longholm, Longtown, Lyneside, Scotby, Housie, Nook, How Mill, Brampton Town, Jarrow, Naworth, Low Row, Gilsland, Greenlaw, Bardon Mill, Haydon Bridge, Fourhills, Corbridge, Riding Mill, Stocksfield, Wylam, Wylam, Heddon-on-the-Wall, Lemington, Scotswood, Elswick, New-

castle Central, Manors, St. Peters, Heaton, Walker, Walker Gate, Wallsend, Howdon-on-Tyne, Percy Main, North Shields, Tynemouth.

Area (2). Cumberland.—Bowness, Port Carlisle, Greta, Floriston, Rockcliffe, Harker, Carlisle, Wreay, Southwaite, Calthwaite, Plumpton, Penrith, Eamont Bridge Junction, Clifton and Lowther, Shap, Tebay, Low Gill, Sedbergh, Middleton, Barbon, Kirkby Lonsdale, Ingleton, Melling, Hest Bank.

Area (3). Durham.—South Shields, High Shields, Tyne Dock, Jarrow, Hebburn, Pelaw, Felling, Gateshead, Ben-

sham, Redheugh, Swalwell, Derwenthaugh, Blaydon, Elrington, Featherstone Park, Cumwhinton, Cotehill, Armathwaite, Lazonby, Little Salkeld, Langwathby, Culaith, Cliburn, Temple Sowerby, Kirkby Thore, Appleby, Ormside, Crosby Garrett, Gaisgill, Raveston Dale, Kirkby Stephen, Hawes Junction, Dent, Ribbleshead, Leyburn, Sinderby, Otterington, Levesham, Scalby.

Area (4). Lancashire.—Morecambe, Bare Lane, Lancaster, Halton, Caton, Hornby, Wennington, Low Bentham, Bentham, Clapham, Horton, Settle, Long Preston, Hellfield, Bell Busk, Gargrave, Skipton, Elslack, Thornton, Earby, Foulridge, Colne, Nelson, Brierfield, Burnley, Towdley, Holme, Portsmouth, Cornholme, Stansfield Hall, Todmorden, Walsden, Littleborough, Smithy Bridge, Milnrow, New Hey, Shaw and Crompton, Delph, Diggle, Saddleworth, Upper Mill, Greenfield, Friezland, Mossley, Micklehurst, Staley and Millbrook, Staleybridge, Godley, Woodley, Bredbury, Marple, Strines, Hayfield, New Mills, Bugsworth, Chinley, Furness Vale, Disley, Poynton (G. C. and N. S. Jt. and L. and N. W.), Wilmslow, Moberley, Preston Brook, Sutton Weaver, Halton, Runcorn, and thence by River Mersey to the sea.

Area (5). Yorkshire.—Scarboro', Forge Valley, Wykeham, Sawdon, Snainton, Eberston, Thornton Dale, Pickering, Sinnington, Kirby Moorside, Norton, Helmsley, Thirsk, Topcliffe, Baldersby, Melmerby, Tanfield, Masham, Lofthouse-in-Nidderdale, Grassington, Rylstone, Crookrise, Embsay, Bolton Abbey, Cononley, Kildwick, Steeton, Keighley, Eastwood (L. and Y.), Marsden (L. and N. W.), Mottram and Broadbottom (Gt. Cent.), Dore and Totley (Mid.), Killamarsh (Mid.), Uppertorne and Killamarsh (G. C.), Kiveton Park (Gt. Cent.), Barnby Moor and Sutton (G. N.), Beekingham (G. N. and G. E. Jt.), Blyton (Gt. Cent.), Market Rasen (Gt. Cent.), Louth (G. N.), Saltfleetby (G. N.), Theddlethorpe (G. N.).

Area (6). North Wales.—South of the River Mersey to Saltport (inclusive), Frodsham, Mouldsworth, Tattenhall Road, Malpas, Fenns Bank, Bettisfield, Old Woods, Leaton, Hanwood Road, Crookton, Ford and Crossgates, Criggion, Pool Quay, Seven Stars, Caersws, Pontdolgoch, Carno, Talerddig, Llanbrynmair, Commes Road, Machynlleth, Dovey Junction, Aberdovey.

Area (7). North Staffs.—Weaver Junction, Knutsford, Alderley Edge, Adlington, Bollington, Hartington, Alsop-

en-le-dale, Tissington, Fenny Bentley, Thorpe, Cloud, Ashbourne, Clifton, Norbury, Rocester, Uttoxeter, Broomhall, Grindley, Chartley, Weston and Ingestre, Ingestre for Weston, Salt, Great Bridgeford, Tern Hill, Prees, Whitchurch, Wrenbury, Beeston Castle, Delamere.

Area (8). Eastern Counties.—Mablethorpe, Legbourne Road, Hallington, Witheall, Donington-on-Bain, South Willingham and Hainton, Wickenby, Gainsborough, Sturton, Clarboro' Junction, Retford, Checker House, Edwinstowe, Farnfield, Burton Joyce, Radcliffe-on-Trent, Long Clawson and Hose, Scalford, Melton Mowbray, Oakham, Manton, Uppingham, Seaton, Morcott, Luffenham, Ketton, Stamford, Uffington, Barnack, Helpston, Walton, Peterboro', Whittlesea, Benwick, Whitemoor, March, Stonea, Manea, Black Bank, Chettisham, Ely, Soham, Fordham, Kennet, Higham, Saxham and Risby, Bury St. Edmunds, Thurston, Elmswell, Houghley, Stowmarket, Needham, Claydon, Bramford, Ipswich, Westerfield, Derby Road, Orwell, Trimley, Felixstowe.

Area (9). Shropshire.—Wem, Yorton, Hadnall, Shrewsbury, Meole Brace, Redhill, Hanwood, Yockleton, Westbury, Middletown, Buttington, Welshpool, Forden, Montgomery, Abernille, Newtown, Scafell, Bucknell, Woofferton, Easton Court, Tenbury Wells, Newnham Bridge, Bewdley (G. W.), Codsall (G. W.), Haughton (L. and N. W.), Hodnet (G. W.).

Area (10). Birmingham and District.—Stafford, Stafford Common, Hixon, Armitage, Lichfield, Tamworth, Polesworth, Atherstone, Nuneaton, Chilvers Coton, Bedworth, Hawkesbury Lane, Wyken Colliery, Longford and Exhall, Foleshill, Bell Green, Gosford Green, Coventry, Coundon Road, Kenilworth, Warwick (Milverton), Leamington, Southam Road and Harbury, Fenny Compton, Cropredy, Banbury, Kings Sutton, Adderbury, Aynho, Aynho Park, Fritwell and Somerton, Heyford, Bletchington, Blenheim and Woodstock, Kidlington, Yarnton, Oxford Road, Wolvercot, Oxford, Handboro', Charlbury, Ascott-under-Wychwood, Shipton, Kingham, Adlestrop, Moreton-in-Marsh, Blockley, Campden, Honeybourne, Littleton and Badsey, Evesham, Fladbury, Pershore, Stoulton, Abbots Wood Junction, Norton Junction, Spetchley, Fernhill Heath, Droitwich, Hartlebury, Stourport, Kidderminster, Churchill, Hagley, Stourbridge, Brettell Lane, Brierley Hill, Round Oak, Harts Hill, Netherton, Dudley, Dudley Port, Tipton, Princes End, Deepfields, Daisybank, Bilston, Ettingshall Road, Priestfield, Monmore Green, Wolverhampton, Dunstall Park, Bushbury, Four Ashes, Gailey, Penkridge.

Area (11). Northants and Essex.—Edwalton, Plumtree, Widmerpool, Upper Broughton, Old Dalby, Grimstone, Holwell, Ashfordby, Great Dalby, John-o'-Gaunt, Marefield Junction, Tilton, East Norton, Rockingham, Gretton, Harringworth, Wakerley and Barrowden, Ufford Bridge, Orton Waterville, Fletton, Wimblington, Stretham, Burwell, Newmarket, Welnetham, Bentley, Harwich, Parkes-ton Quay, Dovercourt Bay, Brightlingsea, Tollesbury Pier, Langford, Hatfield Peverel, Broxbourne and Hoddesdon, Hertingfordbury, Cole Green, Welwyn, Ayot, Wheathampstead, Harpenden, Redbourne, Hemel Hempstead, Berkhamsted, Wendover, Little Kimble, Haddenham, Ashendon Junction, Islip, Bicester, Ardley, Farthinghoe, Chalcombe Road, Eydon Road, Byfield, Southam and Long Itchington, Marton Junction, Brandon and Wolston, Shilton, Bulkington, Ullesthorpe and Lutterworth, Broughton Astley, Countesthorpe, Great Glen, Thurnby and Scraftoft, Rearsby, East Leake, Gotham, Ruddington.

Area (12). South Wales and Mon.—Ynyslas, Glandyfi, Trewythan, Moat Lane Junction, Knucklas, Knighton, Kingsland, Greenhill, Tram Inn, St. Devereux, Dingestow, Raglan, Llandenny, Portskeewett, thence by River Severn to the sea.

Area (13). South-Western Counties.—Chepstow, Tidenham, Tintern, St. Briavels, Redbrook, Monmouth, Symonds Yat, Lydbrook, Kerne Bridge, Ross, Fawley, Ballingham, Holme Lacy, Hereford, Moreton-on-Lugg, Dinmore, Ford Bridge, Leominster, Berrington and Eye, Worcester Shrub Hill, Wadborough, Defford, Bengeworth, Bretforton and Weston-sub-Edge, Stow-on-the-Wold, Eynsham, Kennington Junction, Radley, Culham, Didcot, Upton and Blewbury, Churn, Compton, Hampstead Norris, Hermitage, Newbury, Woodhay, Highclere, Burghclere, Litchfield, Whitchurch, Sutton Scotney, Kingsworthy, Winchester, Shawford and Twyford, Eastleigh and Bishopstoke, Swaythling, Southampton, Bitterne, Woolston, Sholing, Lympington.

Area (14). South-Eastern Counties and London.—Isle of Wight, Netley, Botley, Bishops Waltham, Itchen Abbas, Micheldever, Overton, Thatcham, Goring and Stratley, Cholsey and Moulsoford, Littlemore, Wheatley, Tiddington, Thame, Bledlow, Princes Risboro', Great Missenden, Chesham, Boxmoor, St. Albans, Smallford, Hatfield, Cuffley and Goffs Oak, Cheshunt, North Weald, Blake Hall, Ongar, Chelmsford, West Maldon, Maldon East and Heybridge.

Area (15). Notts and Derby.—Whaleybridge, Chapel-en-le-frith, Edale, Hope, Bamford, Hathersage, Grindleford, Dronfield, Eckington and Renishaw, Spink Hill, Shireoaks, Worksop, Clipstone, Mansfield, Bledworth and Rainworth, Gedling, Carlton and Netherfield, Netherfield, Nottingham, Beeston, Attenborough, Trent, Castle Donington, Weston-on-Trent, Chellaston, Repton and Willington, Eggington, Rolleston-on-Dove, Tutbury, Sudbury, Marchington, Longcliffe, Friden, Parsley Hay, Hurdlow, Hindlow, Harpur Hill, Ladmanlow, Buxton, Dove Holes.

Area (16). Leicestershire.—Burton, Stretton and Clay Hills, Melbourne, Kegworth, Hathern, Loughboro', Barrow-on-Soar, Sileby, Syston, Leicester, Humberstone, Lumberstone Road, Wigston, South Wigston, Whetstone, Barboro', Croft, Elmesthorpe, Hinckley, Higham-on-the-Hill, Elford, Croxall, Wichnor, Alrewas.

Area (17). Scotland, South-Eastern Counties.—Burnmouth, Ayton, Carham, Sprouton, Kelso, Roxburgh, Kirkbank, Nisbet, Jedfoot, Jedburgh, Saughtree, Steele Road, Newcastleton, Kirkpatrick, Kirtlebridge, Eccleachan, Lockerbie, Netherclough, Dinwoodie, Wamphray, Jeatock, Moffat, Elvanfoot, Crawfordjohn, Thaukerton, Rankhead, Tarbrax, South Cobbinshaw, Breich, Woodwuir, Bents, Whitburn, Polkemmet Weighs, Bathgate, angour, Linlithgow, Philipstoun, Dalmeny, South Queensferry, Barnton for Cramond Brig, Granton, Leith.

Area (18). Scotland, North-Western Counties.—Wemyss Bay, Bridge of Weir, Houston (G. and S. W.), North Johnstone, Elderslie, Paisley West, Gleniffer Depot, Barrhead, etherton, Patterson, Whitecraig, Busby, Thorntonhall, airmyres, East Kilbride, Strathaven, Coalburn, Inches, ouglas West, Poneil Jct., Douglas, Ponfeigh, Sandands, Lanark, Cleghorn, Carstairs, Carnwath, Auchenny, Haywood, Mouldron, Fauldhouse and Crofthead, rmadale, Armadale Colliery, Westfield, Bowhouse, Causeyend, Lochmill, Manuel, Kinneil, Bo'ness, Bridgeness, rangemouth, Dalders, Falkirk, Larbert, Airth, South loo, Throsk, Pleau, Bannockburn, Gargunnoch, Doune,

Comrie, thence to a point south of Inverness (exclusive) to Kyle of Lochalsh (exclusive).

Area (19). Scotland, North-Eastern Area.—Burntisland, Aberdour, Inverkeithing, North Queensferry, Charlestown, Cairneyhill, Torryburn, Culross, Kincardine, Alloa, Cambus, Stirling, Bridge of Allan, Dunblane, Kinbuck, Crieff, Dalnaspidal, Dalwhinnie, Newtonmore, Tomstin, Mey, Daviet, Inverness, Bunchrew, Lentrane, Clunes, and all stations on Highland Railway north of a line drawn from Beaulay to Kyle of Lochalsh (inclusive).

Area (20). Scotland, South-Western Area.—Largs, Kilbarchan, Johnstone, Neilston, Ryeland, Glenbuck, Leadhills, Wanlockhead, Lochmaben, Annan, Dornock, Rigg, Gretna Green.

HOW THE SCHEME AFFECTS SOUTH WALES.

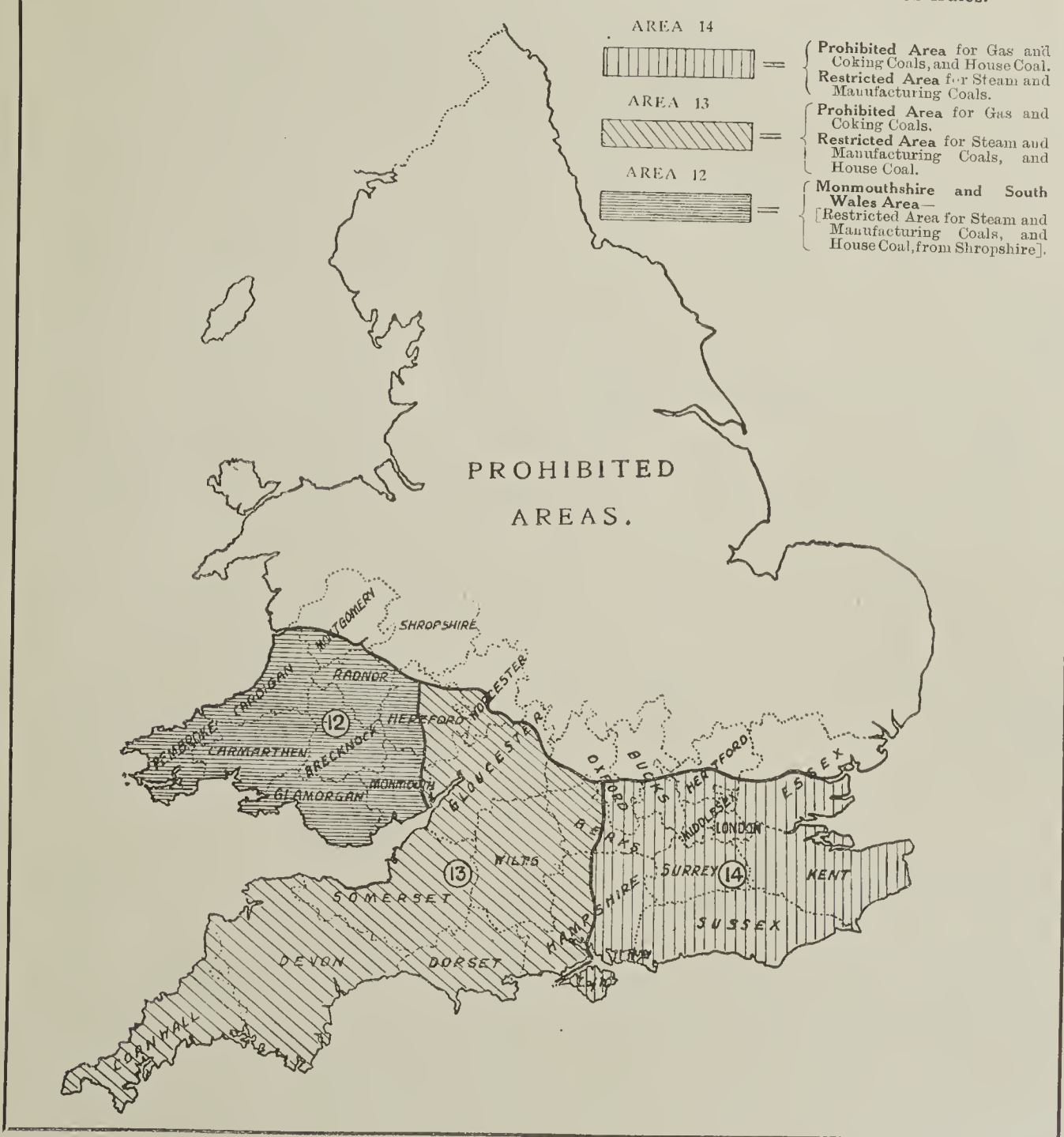
The following memorandum has been prepared by Mr. Finlay A. Gibson, secretary of the Coal and Coke Supplies Committee for South Wales and Monmouthshire, explaining the restrictions under which, by the issue of this Order, supplies of coal are to be sent from, or received into, the Monmouthshire and South Wales Area by rail for inland consumption:—

(1) The Order takes effect as and from September 10, 1917. (2) After September 8, 1917, coal produced at collieries in Monmouthshire and South Wales will be allowed to be sent by public railway for inland consumption only to the areas hereafter named. The requirements of all consumers in Monmouthshire and South Wales must in the first place be satisfied, and even then only certain descriptions of coal may be sold

(11) Factors, merchants, or direct consumers will be informed prior to September 8, 1917, to whom they shall apply for supplies in substitution for those previously obtained from other districts. (12) In the meantime, the factors, merchants, or direct consumers should not communicate with the committee, but wait instructions as to where they may obtain their supplies. (13) The Order does not affect waterborne coal (either export, coastwise, or for bunkers) or anthracite.

Coal Controller and Fuel Economy.—The Controller of Coal Mines has been advised that economy in use of coal can be effected, and much inconvenience avoided during the next and succeeding winter, by the giving effect as far as possible to suggestions relating to power, use of locally produced coke, public services, stocks, cooking and heating, emergency disconnection, and inter-connection. Factory owners who do not generate power are recommended to go to an outside source where a surplus may be available, so that the total consumption of coal would not be increased. Coal should be economised by curtailing early and late running of trams, the wasting of water, using gas or electricity for cooking, and so on. Emergency connection relates to disconnecting classes of non-essential consumers in cases of urgent necessity, in order to enable the supply to be continued to munition and other essential users; and inter-connection applies to the inter-connecting

MAP showing the Prohibited and Restricted Areas as regards the Distribution, by Public Railway for Inland Consumption, of Coals produced from Collieries in Monmouthshire and South Wales.



for consumption in the specified outside areas. (3) Steam and manufacturing coals may be sent to Area No. 13 (South-Western Counties), and to Area No. 14 (South-Eastern Counties). (4) Gas and coking coals cannot be supplied to any area except Monmouthshire and South Wales. (5) House coal may be supplied to Area No. 13 (South-Western Counties). (6) All other areas are prohibited areas, and no coal of any description can be sent from South Wales and Monmouthshire to them except under a certificate from the Controller of Coal Mines. (7) Areas Nos. 13 and 14 (South-Western and South-Eastern Counties) are restricted areas for the classes of coal from South Wales and Monmouthshire previously referred to. The committee will have the right to reduce the quantities of such classes of coal sent to consumers in those areas if they consider it necessary to do so. (8) No coal from other coal fields can be imported into Monmouthshire and South Wales other than steam and manufacturing coals and house coal from Shropshire, and then only under local restrictions. (9) Contracts for the sale of coal to consumers in the prohibited areas are abrogated as from 6 p.m. on September 8, 1917. (10) The committee will communicate immediately with the colliery companies, and, if necessary, with factors, merchants, and direct consumers, with the view of obtaining from them such information as may be necessary to enable them to arrange for supplies from Monmouthshire and South Wales collieries in substitution for coals hitherto brought into South Wales and Monmouthshire from those areas from which importation is now prohibited.

of electric distribution systems or generating plants by means of underground cables, or in suitable cases of temporary overhead wires over the intervening country, so as to enable one or two of the most economical power stations in each district to supply several towns at light loads, instead of each town having to run its own power station uneconomically at such times.

Mining Scholarships at Wigan College.—The governing body of the Wigan and District Mining and Technical College are enabled to offer, by the generosity of Mr. Geo. Bradshaw, the head of Messrs. George Bradshaw and Company Limited, metal merchants, of Manchester, an additional scholarship of £50 per annum for three years in connection with the mining diploma course. Mr. Bradshaw, the donor of the scholarship, was formerly associated with the firm of Messrs. Thompson and Company, metal merchants, of Wigan, and the scholarship which will now be associated with his name makes the fourth scholarship of the same value that has fallen to the mining diploma course at the Wigan College during the present year, the previous scholarships comprising the "Peace Memorial" scholarship, provided by the trustees of the "Maskell Peace Memorial Fund"; a second provided by Mr. Alfred Hewlett, J.P., of Haseley Manor, for more than a generation the managing director of the Wigan Coal and Iron Company Limited, as trustee to the "Peace Memorial Fund," to whose initiative the college has been indebted in the past; and a third, as announced in our columns, having within the last few weeks been established by Mr. Richard Christopher, of Haigh, near Wigan, who was formerly associated with the Wigan Coal and Iron Company Limited.

RUSSIAN COAL TRADE.

The Commercial Attaché of the American Legation at Moscow, in a translation of a memorandum relating to the coal trade in Russia for the year 1917, quotes various statistics, as given in Table A. Table A shows the imports of coal and coke in 1913, 1914, and 1915, the output of coal in the Dombrovo district (now occupied by the Germans), and the decrease in 1914 and 1915 from the supply available from these two sources in 1913. The shortage of coal indicated in Table A was compensated partly by the closing of many factories in Poland, and partly by the increased production of petroleum.

The main source of Russia's coal supply is the Donetz basin. Table B shows by half years from July 1, 1913, to July 1, 1916, the coal production in the Donetz basin, the number of persons employed, and the shipments from the Donetz basin to industrial centres of Russia for internal consumption.

The consumption of coal by the principal industries in 1913, 1914, and 1915 and during the first four months of 1916 and 1915 was as shown in Table C in short tons.

The congested condition of the Russian railways was an important obstacle in the coal industry. The railways were not always able to move the output of the mines, and as a result there were periods in the latter part of 1915 and beginning of 1916 when large stocks of coal were available at the sources of supply.

SUBSIDENCE RESULTING FROM MINING.*

By L. A. YOUNG and H. H. STOEK.

(Continued from page 20.)

LEGAL CONSIDERATIONS.

Right of Support.

The title to the minerals and the right to work them may be held separately from the surface. Under the common law, the owner of the surface is entitled to surface support, even though the owner of the minerals finds it impossible to remove them without disturbing the surface. Moreover, the owner of the surface is entitled not only to vertical support, but also to lateral support from his neighbours, even to the extent that minerals upon adjoining lands cannot be removed in such a manner or to such an extent that the surface of adjoining properties is disturbed.

Leases of coal rights often state distinctly that the lessee shall not be liable for damage to the surface, and where surface rights only are sold, the deed often states that the title to the surface does not include the right to surface support if the owner of the mineral rights mines out the mineral. In spite of such clauses in

right to, or release from responsibility for, reasonable support of the surface wherever such surface is actually devoted to community life.

The maintenance of the surface, upon which are located the communities that extract the coal, should be regarded as a necessary factor in the cost of mining, and should be paid for by the consumer. Such inclusion of the cost of the support of the surface in the general cost of production would be fairer than any fixed tax to be imposed by the State, and then paid out, say, to municipalities, to be expended in securing such support.

With these claims many eminent lawyers have taken issue; and opinions upon a number of the points under discussion are given in the following citations:—

"In the natural state of land, one part of it receives support from another, upper from lower strata, and soil from adjacent soil." (Per Lord Selborne, in *Dalton v. Angus*, 6 A. C. 791.)

"Where the surface belongs to one and the minerals to another, no evidence of title appearing to regulate or qualify their rights of enjoyment, the owner of the minerals cannot remove them without leaving sufficient support to maintain the surface in its natural state." (Wilms v. Jess, 94 Ill. 464, 1880.)

The same principles hold between the owners of different minerals lying in separate beds. If one bed lies above another, the owner of the lower bed must give support to the upper bed. (MacSwinney, p. 301.)

A coal mine operating beneath a clay mine is liable for injuries to the upper mine caused by failure to leave sufficient pillars in the coal mines. (Yandes v. Wright, 66 Ind. 319, 1879.)

The right of support is not affected by the nature of the strata, nor by the difficulty of propping up the surface. (MacSwinney, p. 292.)

The right of support is wholly independent of the comparative values of the substance receiving and the substance giving support. (Op. cit., p. 292.)

The right of lateral support is an absolute one. The obligation to respect it is in no way affected by the question of negligence. (50 Mo. App. 525.)

"Every owner of land in its natural state has a *prima facie* right to support, lateral as well as vertical; and the adjacent or subjacent owner has no right, *prima facie*, in order to win his minerals, to withdraw such support. The burden, both in pleading and in proof, is upon him who asserts that the position is different from that existing as of common right." (Op. cit., p. 299.)

Exemption from Liability for Damage to Surface.

A conveyance of the right to mine all the underlying minerals implies that in so mining such minerals the surface land shall be sufficiently supported, and that so much of such minerals may be mined as can be obtained without injury to the surface. A waiver of the obligation to support the surface must be made by the owner of the surface land by language clear and unequivocal. Such a waiver does not follow a conveyance of all such minerals, nor from the use of language in such a conveyance to the effect that the mining operations shall be "conducted with as little damage to the surface as conveniently may." (Seitz v. Coal Valley Mining Company, 149 Ill. App. 85, 1909.)

Where a land owner sells the surface, reserving to himself the minerals with power to get them, he must, if he intends to have power to get them in a way which will destroy the surface, frame the reservation in such a way as to show clearly that he is intended to have that power. (Wilms v. Jess, 94 Ill. 464, 1880.)

When an instrument excludes the right of the surface owner to support, the mine owner may be liable, if he works negligently, or contrary to the custom of the country. (MacSwinney, p. 311.)

The right of support by land in its natural state may also be excluded, wholly, or, in fact, by statute. Examples of this may be found in various English Acts. (See MacSwinney, p. 312.)

In an investigation of the surface damage in a section of Scranton, Pennsylvania, it was found that 48 per cent. of the titles contained a clause completely waiving surface support, in the following language:—"All the coal in, under, and upon said lot, together with the sole right and privilege to mine and remove all the coal under said lots without incurring in any event whatever any liability for injury or damage done to the surface of said lots or improvements thereon, or that may thereafter be put thereon, caused by mining or removal of said coal."

Fourteen per cent. of the titles contained waivers which are more or less conditional in their nature: "All the anthracite coal lying underneath, also half the width of streets adjoining. It being understood and agreed that at least one-fourth thereof, properly distributed, shall be left for surface support, and the coal shall be mined in a workmanlike and skilful manner, it being understood that all the coal is to be mined and paid for except so much left thereof as may be necessary to be left for pillars to support the surface thereof, and it being possible that there may be a difference of opinion relating to the fulfilment of this provision, it is agreed that the matter shall be submitted to a board of competent and skilful engineers, each party to select one, and, in case of failure to agree, said engineers are empowered to call in a third mining engineer, and the decision of the majority shall be final."

Ten per cent. of the titles contained the following clause:—"All the coal and minerals under said lot, together with the right to mine and remove all of said coal and minerals, provided also that in removing the coal the second party shall leave one-fourth thereof in place for the protection of the surface."

The remainder of the titles examined by the investigators contained the following clause:—"All right, title, etc., to all coal in and under said lots, also the coal under the surface in front of said lots to the centre of the street."

In the report of the Pennsylvania State Anthracite Mine Cave Commission excerpts of 42 deeds are given showing the various forms in which reservations have

TABLE A.

Years.	Imports.			Output, Dombrovo district.	Decrease from 1913 supply.
	Coal.	Coke.	Total.		
	Tons.	Tons.	Tons.	Tons.	Tons.
1913	8,547,600	1,072,600	9,530,200	7,697,400	—
1914	5,297,700	594,100	5,891,800	4,261,300	7,074,500
1915	624,800	5,400	630,200	—	16,597,400

TABLE B.

Production, employees, and shipments.	1913.	1914.		1915.		1916.
	Second half.	First half.	Second half.	First half.	Second half.	First half.
Anthracite:						
Output..... tons	2,881,600	3,097,800	2,562,600	2,441,600	3,073,600	3,196,000
Employees..... number	36,648	39,100	30,800	31,100	44,900	—
Bituminous:						
Output..... tons	11,318,800	13,381,100	11,891,000	11,809,200	11,985,500	11,515,300
Employees..... number	139,778	152,810	139,900	137,200	144,800	—
Total:						
Output..... tons	14,200,400	16,478,900	14,453,600	14,270,800	15,059,100	14,711,300
Employees..... number	176,426	191,910	170,700	171,300	189,700	217,670
Shipments:						
By rail..... tons	9,327,900	10,863,100	9,064,700	10,385,300	8,329,100	12,399,300
Other routes..... tons	1,289,200	1,342,300	1,271,900	1,209,100	1,171,100	914,400

TABLE C.

Industries.	1913.	1914.	1915.	Jan. 1-Apr. 30, 1914.	Jan. 1-Apr. 30, 1915.
	Tons.	Tons.	Tons.	Tons.	Tons.
Railways	5,782,000	7,269,500	8,669,200	2,565,400	3,572,600
Metallurgical works	4,818,900	4,999,300	4,674,800	1,830,900	1,563,300
Other metal working factories	650,000	739,900	685,800	235,100	576,400
Sugar factories	1,126,700	1,105,000	1,929,500	458,300	251,300
Other factories	2,464,700	2,705,200	2,357,400	1,003,200	810,400
Steamships	282,800	348,800	1,005,400	59,600	300,100
Other consumers	5,381,100	4,842,800	1,902,400	2,100,700	924,100
Total	20,506,200	22,011,000	21,224,500	8,253,200	7,748,200

These stocks, in December 1915, amounted to approximately 3,069,600 short tons, and in March 1916 to 3,846,000 tons, compared with 550,000 to 800,000 tons in normal times.

In general, the demand for coal was so great in 1915 and 1916 that the Donetz region was not in a position to satisfy it fully. The situation was somewhat relieved by the output of coal mined in the region adjoining Moscow. The output of this district reached 430,000 tons in 1915.

The fuel problems of the country necessitated the organisation of a special conference on the fuel question, a committee with full powers. On October 8 and 21, 1915, this conference published regulations fixing maximum prices on anthracite at 25 copecks per pood. To relieve the situation existing at the time, steps were taken to increase the use of wood and peat in various industries, especially since wood was used as fuel in only 15 per cent. of all the industries in the country.

The proportion of peat to the total fuel used in Russia was but one-third of 1 per cent. In this connection, mention should be made of a Moscow organisation recently established, with a working capital of 9,000,000 roubles, for producing and selling peat.

Control of United States Coal Shipments.—Cabled messages this week state that an official report to the American Government reveals the fact that enormous quantities of materials for the manufacture of munitions are being shipped to Germany from Sweden. Through the control of fuel, the Government intends to take a firm grasp of shipping. An arrangement is under negotiation which will give the American and British Governments control of all Allied and neutral tonnage. Ships on routes which are not regarded as necessary to the successful conduct of the war are to be diverted to more essential trades. Vessels now engaged in the transport of fuel oils, pig iron, steel billets, scrap iron and scrap steel, and

deeds and in leases, suits are of common occurrence when surface and mineral rights are owned by different parties.

Mining Under Municipalities.

The problem of the claims of municipalities in the coal districts has aroused considerable discussion. In many instances coal mines have been opened upon lands remote from towns, and upon which no buildings other than the mine structures were erected at the time. Later mining villages have grown up near the mines and residences and other buildings have been constructed upon the land which had previously been undermined. In many instances, owing to the importance of locating near an abundant fuel supply, industrial plants have been erected in these mining villages or in other towns in the coal district. Eventually large cities have grown up on the lands on which coal mining was the pioneer industry. Similarly, mines have been opened outside the limits of important cities and mining operations have been confined to the area which was outside the limits of the city when the mine was opened, but in the course of years the city has extended its limits to include the mine and the area undermined.

The claims of the municipality upon the mining interests, which may have a right by contract and under the law to mine all the coal, and to be exempt from liability for damages to the surface, were forcibly presented by B. Dimmick, Mayor of Scranton, before the Pennsylvania Anthracite Mine Cave Commission. He held the opinion that there is no constitutional barrier against the inclusion in the general police power of a State or a community of the specific power to declare as null and void and as against sound public morals any and all contracts that waive the right to a reasonable support of the surface which is to be occupied and used for community purposes. He recommended submitting to the Legislature an Act that would declare null and void and as being contrary to public policy any and all contracts that waive the

* From University of Illinois Engineering Experiment Station Bulletin No. 91.

been made when the title to the surface has been severed from the mining right.

In the bituminous fields, a customary form of exemption clause in deed for coal, separate from the surface, is as follows:—"All the coal underlying and within the described lands, together with the right to take the entire quantity, or a less quantity of said coal, without leaving any support for the overlying strata, and without liability for any injury or damage which may result from the breaking of said strata." Another type of exemption clause employed in Illinois is as follows:—"Releasing and surrendering any and all claims for damages, and all liability by reason of damages, either to person or property which may in any way be caused or occasioned at any time hereafter, directly or indirectly, by the mining or removing of coal or other minerals."

Protection of Surface by Grants and by Legislation.

The right of support for land in its non-natural state may be acquired by express or implied grant. Where land is severed from adjoining land for a particular purpose, and such purpose is known at the time the mineral right is severed from the surface, there is, *prima facie*, an implied grant of a reasonable degree of support for carrying out the particular purpose under consideration.

In order to protect railways, canals, waterworks, sewers, etc., the British Parliament has enacted legislation which guarantees that such structures shall not be undermined, if liable to be damaged, without notice. In accordance with these Acts, the mining company may be required to leave a pillar, but the mining company is compensated for the coal left in the ground and for any damage that may be sustained by the interruption with the system of mining. In the case of the Railway Act, it is specified that "the (railway) company shall from time to time pay to the owner, lessee, or occupier of any such mines, extending so as to lie on both sides of the railway, all such additional expenses and losses as shall be incurred by such owner, lessee, or occupier, by reason of the severance of the lands lying over such mines by the railway, or of the continuous working of such mines being interrupted, or by reason of the same being worked in such a manner and under such restrictions as not to prejudice or injure the railway, and for any minerals not purchased by the company which cannot be obtained by reason of making and maintaining the railway; and if any dispute or question shall arise between the company and such owner, lessee, or occupier, as aforesaid, touching the amount of such losses or expenses, the same shall be settled by arbitration."

Similar sections are included in the Wat. Cl. Const. Act, 1847; the Pub. Health Act, 1875 (Support of Sewers); Amendment Act, 1883; the Local Government Act, 1894; the Small Holdings and Allotments Act, 1908; and the Housing and Town Planning Act, 1909.

Under these Acts, as noted, the intention of a mining company to remove the mineral beneath any of the legally specified structure must be announced through a regular "notice of intention to work." This notice is given in most cases 30 days in advance of the intended working. If, after notice has been given, the owner of the structure does not agree to negotiate with the mining company, it is lawful for the mining company to proceed in the regular manner of working. If damage results, it shall be repaired by the mining company.

Gas works and gas mains are not within the British mining code, excepting in so far as they are vested in local authority. Private gas companies are not entitled to support if the mineral right has been severed, but the colliery company would be liable for damages to gas pipes and leakage of gas. In the absence of special provisions, owners, lessees, and occupiers of mines are not liable for damage caused to tramways by working mines or minerals in the usual and ordinary course. This mining code of Great Britain is not applicable to burial grounds, school sites, public highways, bridges, nor canals.

In several States of the United States there are statutes in regard to support, particularly in Western States, in which the lode mining law permits extra-lateral mining. The statutes of Colorado, for example, prescribe that "when the right to mine is in any case separate from the ownership or right of occupancy to the surface, the owner or rightful occupant of the surface may demand satisfactory security from the miner, and if it be refused, may enjoin such miner from working until such security is given." No person shall have the right to mine under any building or other improvement unless he shall first secure the parties owning the same against all damages, except by priority of right.

Other States, such as Idaho, North Dakota, South Dakota, and Wyoming, have similar laws. In commenting on this type of legislation, Lindley says: "We are not aware that this class of legislation has been the subject of judicial investigation. It seems to us that such legislation is not altogether free from constitutional objections."

Arkansas has a law (1907) forbidding the mining of coal or any other mineral substance from beneath a cemetery or burial place. No openings whatever may be driven under or through the mineral directly beneath the cemetery under penalty of a fine of 5,000 dols. or imprisonment of from one to five years.

In Pennsylvania, the Davis Mine Cave Act (1913) provides regulations governing the mining of coal and other minerals and the "support underlying and beneath the surface of the several streets, avenues, thoroughfares, courts, alleys, places, and public highways within the limits of the several municipal corporations, and authorising the creation of a Bureau of Mine Inspection and Surface Support," by any municipal corporation within the anthracite coal fields. Members of the Bureau of Mine Inspection and Surface Support have the right and power to enter, examine, and survey any mine within the limits of the municipality. Mining companies are required to furnish

accurate and complete maps of the workings, and to keep the same up to date.

The mining companies are required to "maintain, uphold, and preserve the stability of the surface" of the various streets, etc. The officers of mining companies are made responsible for the violation of the provisions of the Act, and for violation are subject to a fine of 1,000 dols., or imprisonment for 90 days, or both.

An ordinance was enacted by the borough of Plymouth, Luzerne County, Pennsylvania, forbidding mining within 200 ft. of the street lines, and as the borough is plotted in 400 ft. squares, this prohibited any mining whatever. The county courts in Borough of Plymouth v. Plymouth Coal Company restrained the coal company from mining under the streets.

Remedies.

In the event that the owner of the surface is entitled to surface support, and is sustaining damages by the mining operations beneath or adjacent to his land, he may recover damages, or if the damage is irreparable or immeasurable, he may apply for an injunction to restrain mining operations. If the mining operations are being conducted by parties whose financial resources are not adequate to insure the payment of damages in case such are assessed, an injunction may be issued.

The right of support is not infringed by excavation, but by subsidence, and damages do not exist until subsidence has actually occurred. (Catlin Coal Company v. Henry Lloyd, 109 Ill. App. Rep. 122, 1902.) The Pennsylvania Court now holds, however, that the cause of action accrues when the support is removed and is barred after the lapse of six years from such removal. It is said by the Pennsylvania Court that adoption of any more onerous rule "would encourage purchase of surface over coal mines for speculation in future law suits." (Noonan v. Pardee, 200 Pa. 474, 86 Am. St. Rep. 722, 55 L. R. A. 410.)

"The owner of the subsidence estate is not liable to the surface proprietor for a subsidence caused by excavations made by his predecessor in title, although damage does not occur until after such owner came into possession. This results from the fact that, while the subsidence gives the cause of action, the responsibility therefor attaches to him whose acts and omissions have brought about the mischief." (Lindley.)

If the owner of real estate which has been injuriously affected or damaged by a permanent structure has not brought an action to recover damages, and conveys the land to another, the cause of action does not pass with the title nor inure to the benefit of the depreciation in value in the price paid. (La Salle County Carbon Coal Company v. Sanitary District of Chicago, 260 Ill. 423, 1913.)

Depreciation in the value of the surface caused by the mere apprehension of future damage gives no cause of action. Only damage which has actually occurred may be considered by a court, but each fresh subsidence constitutes a basis for a new claim for damages. (Catlin Coal Company v. Henry Lloyd, 124 Ill. App. 394, 1906.)

"The right of support is not infringed unless the subsidence is substantial. There must be some real sensible interference with the land. The right of support in ordinary cases is infringed where the subsidence is substantial, but the damage is inappreciable; and it is now settled that an injunction may be obtained where the subsidence is substantial, although the damage is inappreciable. The right of support is analogous to a right of property, and is a right to have the surface kept securely at its ancient and natural level." (MacSwinney.)

A mine owner cannot avoid liability by showing that his workings have been proper and in the customary manner. "The act of removing all support from the superincumbent soil is, *prima facie*, the cause of its subsequently subsiding." (Wilms v. Jess, 94 Ill. 464, 1880.)

Where land has been artificially burdened by a building, and no contract or prescription is available to regulate its right to support, no right to support, lateral or vertical, exists for the building. In an action for removing support from land artificially burdened, the plaintiff has always been obliged, as a matter of pleading, to show that he is entitled to have the weight supported. (MacSwinney.)

Where the injury to the surface would have resulted from mining operations if no buildings existed upon the surface, the act creating the subsidence is wrongful and renders the owners of the mine liable for all damages that result from mining to the buildings, as well as to the land itself. (Wilms v. Jess, 94 Ill. 464, 1880.)

As a general rule, the measure of damages in actions for injuries to real property is the difference in market value before and after the injury to the premises. But to this rule there are exceptions, and it has been held that the cost of repair or of restoring the premises to their original condition is the true and better rule to apply. The valuation should be adopted which will be most beneficial to the injured party, for he is entitled to the benefit of the premises intact. (Donk Brothers Coal and Coke Company v. Slata, 133 Ill. App. 280; 135 Ill. App. 633.)

A bill in equity to restrain the mining of coal was dismissed, as there is a remedy at law in case damage is done to surface by subsidence. (Henry Lloyd v. Catlin Coal Company, 109 Ill. App. 37, 1902.)

What amount of coal may be safely mined, and what amount must be left for necessary support of the soil, are largely engineering questions, and it is only in rare cases, where the remedy at law is so inadequate as to render such course necessary, that a court of equity will direct the work of injunction. (Henry Lloyd v. Catlin Coal Company, 210 Ill. 460, 1904.)

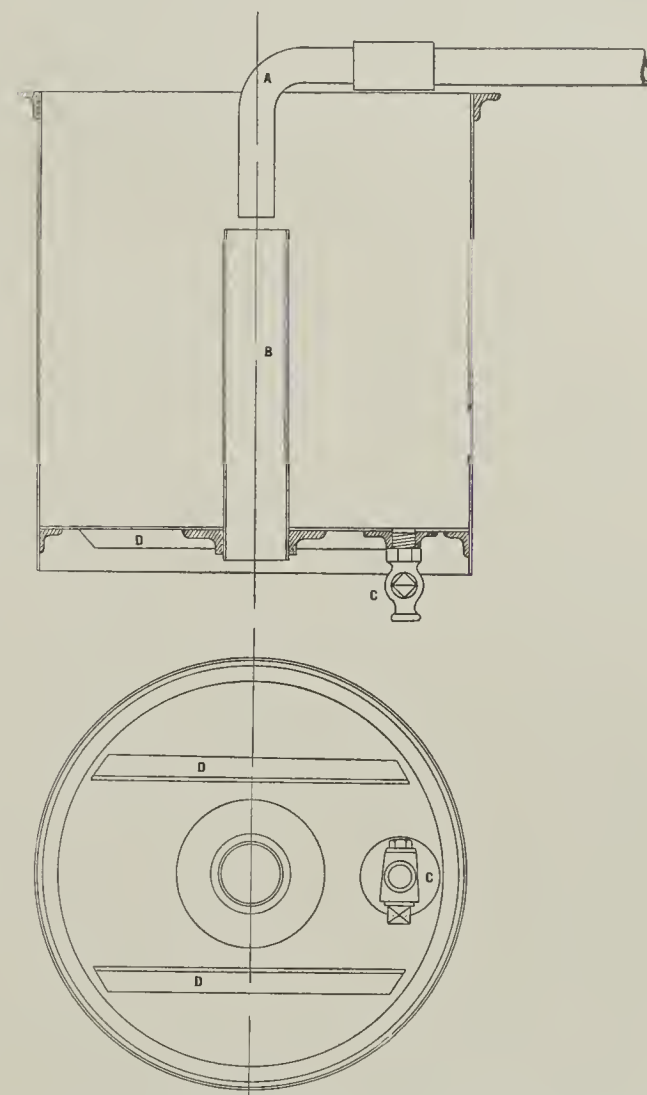
Considerable damage has resulted in England from the pumping of brine. Under the Brine Pumping Act of 1891 (54 and 55 Vict. c. 40), upon application, compensation districts may be formed within the pumping fields. For every compensation district, under the

Act, there is established a compensation board. The board is incorporated, and consists of representatives of the various interests concerned; one-third shall be persons not interested in the brine business and appointed by the county council; one-third elected by the brine pumpers; and one-third (not interested in brine pumping) appointed by the local sanitary authority. A compensation fund is maintained in each district; upon each pumper is levied a tax not exceeding 3d. per 1,000 gals. pumped for a twelve-month period. Out of this fund damages allowed by the compensation board are paid.

A MEASUREMENT TANK.

In refrigeration tests consisting in the elimination of British thermal units, two main factors are the determination of temperature difference and the quantity of cooled fluid passing. The other factors of power consumed, gained heat in the cooling water, and speed of the machine, are for the moment put aside. Comparison of the large-scale thermometers used is taken for granted, and the factor at issue is the timing of a volume of water. Dependent upon the size of the machine, the time taken for a measured quantity of water may be anything between 20 and 150 seconds by stop-watch. In the former case, the error of one second vitiates results by 5 per cent., and an error of this magnitude on a 100,000 British thermal units machine is serious.

To reduce the possibility of error to a minimum, the tank shown has many advantages. It permits actual



MEASURING TANK—(Section and Plan of Bottom).

A, delivery bend. B, vertical standpipe. C, emptying cock. D, angle-iron stiffeners for flat bottom plate.

visual determination without discomfort to the observer, it is cheap in character, and reduces the human observation error to a minimum. As will be seen by the illustration, the flat surface of the bottom is stiffened by angles, and, being circular, the body does not distort and needs no staying.

Its capacity before overflow is determined by the height of the central tube, the upper edge of which is thinned. This is adjusted by trial to give a volume determined by weight, which can be done very accurately. Once constructed, there is little chance of damage; the overflow, being central and small in area, can be timed to very close limits, while the quantity of water concerned is not inordinate.

Normally, and while tank is draining, the flow is through the central pipe, the tank may be located over any convenient drain, and no jointing up or special preparation for use is necessary.

The method of constant flow for constant temperature difference has obvious merits over cooling down by repeated passage through the evaporation of a body of water. The rate of heat elimination varies with the temperature employed, results of a test run are more consistent, and the heat elimination of the plant under test more readily compared with other machines.

The method of measurement was evolved for the purpose stated, and it is cheap, efficient, and should receive a wider application. Water meters usually have an error of ± 2 per cent., and there are few systems of water measurement not dependent upon mathematical formulae and empirical constant.

It is thought that the device lends itself to petrol measurement, of which there are several systems in the market, mostly dependent upon an inferior method of exact determination. The quantity is present when surplus overflows, and drawing the measured quantity off, and re-filling offers an opportunity of closed manipulation and freedom from mechanical and human error that present systems lack. Moreover, a self-registering device or counter could be easily applied.

CURRENT SCIENCE AND TECHNOLOGY.

The Naphthalene Difficulty in Benzol Recovery.

In the *Gas World* considers that the naphthalene difficulty could be overcome by applying the principle of carrying the gas to carry forward a predetermined quantity of solvent and heavy naphthas, simply by adding to, or leaving in, the debenzolised oil a sufficient quantity of these to cause the gas to retain or pick up (in slight excess) the quantity necessary to keep the naphthalene in solution should it come down in the district mains. A certain amount of naphthas should still be recoverable, as the quantity of naphthalene in the gas is usually reduced in the oil-washing process, and should therefore require less solvent.

On combined recovery and rectification plants it would appear to be a simple matter, but on plants where only crude benzol is recovered an efficient dephlegmator and small auxiliary still would be required. After distilling off the benzene, toluene and xylene from the condensate brought down by the dephlegmator, and subsequently crystallising out any naphthalene, the clear oil, containing the solvent and heavy naphthas, could be returned to the debenzolised oil. In this case, however, the rate of flow of this clear oil would be regulated to give the desired equilibrium between solvents in gas and oil.

The Colour Temperature of Illuminating Gas Flames.

In the *Journal* of the Franklin Institute, E. F. Kingsbury states that it is of considerable importance in the photometry of gas flames to know their colour temperature, because it determines the efficiency at which incandescent electric lamps must run to match them in colour. While the colour temperature of the ordinary illuminating gas flames has been known approximately for a long time, recently the question of its variability with the quality of gas and the flame size arose; so the following data may be of interest. Each flame was matched against a carbon lamp whose efficiency was accurately known at several voltages. Using the data on colour temperature, given by Hyde and Forsythe, these matching voltages have been evaluated in terms of temperatures:

COLOUR TEMPERATURES OF VARIOUS GAS FLAMES.

Source.	Lamp volt. (E.T.L. No. 4,621).	Colour temp. deg. K.
1. Coal gas, full flame	111.0	2075
2. Coal gas, half turned down	107.5	2075
3. Water gas, full flame	115.4	2118
4. Water gas, half turned down	105.5	2015
5. Water gas, full flame, edge on	111.5	2080
6. Mixed gas, full flame	113.5	2095
7. Coal gas, full flame	113.8	2100
8. Coal gas, candle-shaped flame, height of Hefner	97.0	1940
(Reference points.)		
9. Pentane lamp	93.5	1914
10. 4.85 w.p.m.s.c.p. carbon	110.4	2070
11. 3.73 w.p.m.s.c.p. carbon	118.8	2153
12. Hefner	88.0	1875

Nos. 1 to 6 inclusive were using an 8 ft. Von Schwarz excavated head lava tip; No. 7 was with an 8 ft. Bray union jet tip, and No. 8 was with an $\frac{1}{8}$ in. open tube; Nos. 9 to 12 were taken as references from the paper referred to. The coal gas was 3 to 9 candle-power and 575 B.T.U.; the water gas 27.5 candle-power and 690 B.T.U., and the mixed gas 25 candle-power and 665 B.T.U.

As is to be expected, the colour temperature of a flame is within certain limits dependent upon its shape, size, position, and composition of the gas. It will also vary in different parts of the flame, the values given above being integral over the entire surface. It will be noted the full flames are slightly whiter than the ordinary 4 w.p.m.s.c.p. carbon standards. The colour temperature of 1870 degs. for the mixed gas flame given by Hyde and Forsythe in the paper referred to is considerably lower than any of the above values, which represent extremes in illuminating gas characteristics.

Nitric Acid from Coal Gas.

The following description of the Häusser process for producing nitrogen from coal gas is given in *The Times Engineering Supplement*. The gas is exploded in steel vessels surrounded by a water jacket, and to which, in the original plant, air and gas were admitted under pressure through separate valves. Ignition of the charge then takes place by means of a high-tension spark derived from a magneto which is attached to one side of the vessel. This magneto is connected with and driven from the same mechanism as operates the valves.

The chemical reactions involved in the process are of a particularly simple nature. The nitrogen combines with oxygen to form nitric oxide: $\text{N}_2 + \text{O}_2 = 2\text{NO}$. The nitric oxide mixtures are then cooled and passed into a gasholder, where the necessary time is allowed for oxidation to take place on the following lines: $2\text{NO} + \text{O}_2 = 2\text{NO}_2$. The nitrogen peroxide formed by oxidation is finally sent forward to counter-absorption vessels, where, reacting with water, it gives rise to the formation of a mixture of nitric and nitrous acid as follows: $2\text{NO}_2 + \text{H}_2\text{O} = \text{HNO}_3 + \text{HNO}_2$. The nitrous acid is then oxidised to nitric acid by an excess of oxygen. In this way the acid obtained varies in strength from 30 to 50 per cent., and the weak product is in most cases evaporated and re-distilled in order to provide a concentrated solution. The waste gases from the plant, still containing some nitric oxide, are treated in special washing towers in order to recover the greatest possible quantity of the nitrous products. One method consists in treating the residual gases with a weak acid and finally with clean water. Another method is to circulate the gases through vessels containing weak alkaline solution when nitrite-nitrate salts are yielded. In general it will be found that from 2 to 3 per cent. of the gas is discharged with the waste

while the gas and air are being compressed separately. It is essential that a high temperature should be attained during explosion, and to this end the air, after compression, is passed through a special pre-heater operated by gas. For reasons of temperature, again, a small proportion of pure oxygen is regularly mixed with the air in the compressor. The container is fitted with four valves, driven by gearing from an electric motor, the speed of which determines the number of explosions per minute.

Rapid cooling of the waste products is essential, otherwise there is a tendency for the nitric oxide to undergo decomposition. The rapid reduction in temperature is now effected by utilising the principle of the well-known expansion laws of Thomson and Joule. Thus, the special exhaust valve is employed for the purpose of temperature drop. Immediately on the outlet of the bomb is attached a condenser coil submerged in water, and in this coil the water resulting from combustion is thrown down and drawn off. In general, it is customary to regulate the explosions so that they occur in each bomb at the rate of about 60 per minute, and Häusser states that, within limits, the greater the capacity of the bomb the larger will be the yield per unit of gas.

The process is, of course, applicable to producer-gas and all low-grade gases, and so far as the yield of nitric acid is concerned it has been shown that when employing coke-oven gas, about 6 $\frac{1}{2}$ lb. of acid per 1,000 cu. ft. of gas exploded must be looked upon as a maximum.

Hot Wire Anemometers.

The following note is from Research Division, Electrical Engineering Department, Massachusetts Institute of Technology, and is communicated by the director to the *Journal* of the Franklin Institute:—The electrical hot-wire anemometer is based on the principle, discovered experimentally in 1909, that a thin uniform wire, kept at constant resistance and temperature by an adjusted continuous electric current, and immersed in a uniform transverse wind, dissipates heat convectively in proportion to the temperature elevation of the wire above that of the passing air, and also in proportion to the square root of the wind velocity. Experimental measurements of wind velocity employing this principle have been made by Kennelly and Sanborn, by Morris, and by L. V. King. In these measurements the wind-measuring wire forms one branch of a Wheatstone or Kelvin electric bridge, and is kept at constant resistance, which means constant absolute temperature, while the electric power dissipated by the wire is observed. The total wind velocity (including the virtual velocity of free convection at rest) is then proportional to the square of the power per degree Centigrade temperature elevation, or

$$V = \frac{1}{k'p} \left(\frac{P_e}{\theta} \right)^2 \text{ cm./sec.} \quad (1)$$

where

- p' is the atmospheric pressure (bars)
- P_e is the linear dissipation (abwatts/cm.)
- θ is the temperature elevation (deg. C.)
- k' is a constant depending on the surface condition.

It is evident that if the temperature of the moving air changes during the test the apparent total wind velocity at constant resistance of the test wire will also be changed. If the working temperature of the test wire is kept high, changes in the ambient temperature will have relatively small effects; but if the test wire is operated at, say, 50 degs. Cent., while the ambient temperature of the air in the wind is at 20 degs. Cent., a small change in the ambient temperature will affect the deduced wind velocity V materially.

A compact form of Wheatstone bridge ABCD, used by Morris, had two arms, AB and CD, of platinum test-wire, and the other two, BC and AD, of Ia-Ia constant-resistance wire. Exposing all four wires to the wind, a Wheatstone bridge served to keep the tungsten wires at such temperature as made their resistances equal to those of the Ia-Ia wires.

Mr Richard D. Fay, in a thesis towards the S.B. degree at the Massachusetts Institute of Technology this year, shows that the Morris bridge is essentially uncompensated for changes in ambient temperature, and that the observations must be corrected for such changes in order to arrive, by formula (1), at the total wind velocity. This difficulty can be overcome and an automatic compensation arrived at by making all four arms of the bridge of either tungsten or nickel wire. The two arms previously of Ia-Ia wire are now each made of two parallel tungsten wires, so that a bridge ABCD will have one wire from A to B, two from A to D, one from B to C, and two from D to C. The doubled wires are longer than the single wires in a ratio a of, say, about 2.5.

Under these conditions it will be found that if the same wind velocity acts constantly upon all six wires, if the ambient temperature changes, the bridge balance will be affected in such a manner that when balance is restored the total velocity is again proportional to the square of the power. In other words, the linear dissipated power P_e in (1) keeps automatically in direct relation to the temperature elevation θ when the bridge is kept balanced. A given set of six wires in constant surface condition thus requires a definite and constant temperature elevation for resistance balance under all ambient temperatures.

The advantage of this plan is not only that the observed wind velocities require no correction for ambient temperature, but also that low temperature elevations may be used. The test-wire device, in the most satisfactory form tried, had six fine nickel wires (diameter 0.155 mm.) mounted insulated in a sort of cobweb across a light brass circular frame 15 cm. in diameter. This frame was fastened to a handle, with the bridge wires leading over it to the battery controlling rheostat, ammeter, and balance galvanometer. The nickel wire used had inferred absolute zero resistivity at -233.6 degs. Cent., and the length ratio $a = 2.083$. The temperature elevation θ was only about 15 degs.

Cent., and the wires did not become dangerously overheated if the bridge was balanced at a wind velocity of 18 metres per second (40 miles per hour) and then laid on table or removed from the wind. The wind velocities are proportional to the fourth powers of the total current supplied to the bridge for balance, this current varying from 0.74 ampère in still air to 2.18 ampères in air moving at 17.5 m./sec. (39 miles per hour). Calibration in a wind tunnel indicated a good straight-line law, on logarithm paper, between currents and actual wind velocities. This new automatic compensation principle promises to be useful in anemometry.

SPONTANEOUS COMBUSTION IN COAL MINES.*

By ROWLAND GASCOYNE.

The occurrence of fires underground has always been regarded as one of the greatest coal mining risks, especially in mines that are classed as fiery owing to the danger of explosions due to the accumulation of firedamp.

It was formerly considered that only those coal seams heavily charged with iron pyrites were liable to spontaneous combustion, but it is now generally recognised that spontaneous combustion in coal mines is due more to the oxidation of the coal itself than to the presence of brassy or iron pyrites in the coal. It is true that in shallow mines falls to the surface frequently cause spontaneous combustion to make its appearance, provided steps are not taken at once to stop the passage of air through the falls; but it may be taken as a rule that deep mines are more liable to the outbreak of fires from spontaneous combustion, through the oxidation of the coal, than shallow mines.

Spontaneous combustion seldom takes place in anthracite coal or coke, probably on account of the almost entire absence of volatile matter. The process of oxidation is always going on in bituminous mines, but it is rarely noticed until spontaneous combustion is close at hand, or has actually occurred. In a deep bituminous coal mine the temperature is probably materially increased by the oxidation of the coal which is constantly in progress. Even the face of a solid coal seam will show a higher temperature for the first foot than at a further depth of two or three feet.

Temperature Decreased with Depth in Seam.

The writer once tested the temperature of a bituminous coal seam at a depth of 1,400 ft. from the surface, and was surprised to find that a borehole 1 ft. in depth in the seam registered with the thermometer 84 degs. Fahr.; at 2 ft. in depth the temperature was 82 degs. Fahr.; and at a depth of 3 ft. 80 degs. Fahr.—a result which seems to show that oxidation was going on at the face of the coal. In small ribs of coal, and especially in fine coal, it is recognised that spontaneous combustion is far more easily set up than in pillars or in a solid face of coal, provided the necessary supply of air and moisture is present. A limited supply of air and moisture seems essential for this process of oxidation to take place, and once the spot is deprived of air the oxidation seems to cease. On the other hand, a plentiful supply of air has the same effect. Of moisture, there seems always an ample supply available, both in the coal seam and in the atmosphere of the mine. The longwall method of working is more conducive to spontaneous combustion than the pillar-and-stall system, especially where the goaf is not stowed solid behind the workings, and coal, either in the shape of fines or as a roof, is left behind.

Wastes with a bad roof and an abundance of cracks and fissures, provided the other necessary conditions are present, are also conducive to gob-fires. Then in longwall workings, fault lines allow air to find its way into the goaf, and set up oxidation that often results in spontaneous combustion. Another fruitful cause of spontaneous combustion in longwall mines is the leaving behind in the goaf of timber or small ribs of coal, to protect a bad roof or a newly recovered working place after a fall. Badly built or insufficient packs in a deep longwall mine will also be responsible for the appearance of spontaneous combustion underground. Difference of air pressure has also caused oxidation to set up in the goaf, and even sudden changes of the barometer have been known to start an underground fire.

Ventilate Idle Coal well or Exclude all Air.

Prevention in the case of underground fires is always better than the most radical cure. The most effective methods of prevention are either to freely ventilate the abandoned areas, or to shut off the air altogether. There are few longwall mines where these methods can be applied. In a deep longwall mine there is always a risk of spontaneous combustion starting immediately after the shaft pillar is left behind, as there is in fact close to any pillar left behind in the goaf. The leaving behind of pillars in longwall working should always be avoided as much as possible.

As shaft pillars are necessary and unavoidable, the best plan to avoid an underground fire is to stow the goaf solid for some distance from the pillar, and either well ventilate the edges of the shaft pillar or take such steps as will prevent air leaving the edges of the pillars. Solid coal, in the shape of large pillars, does not take fire readily, but the risk occurs where the roof above the pillar is broken, and contains thin laminations of coal. Great care must be taken to prevent leakage of air along fault lines or through badly built packs, and on no account should timber, ribs of coal, or anything liable to prevent the goaf closing up solidly be left behind.

During abnormal changes in the barometer, mine officials must not only be unusually alert for the discovery of firedamp, but also for signs of sweating in the goaf, or the presence of "fire stink," by which name the smell accompanying the earliest stages of a

* *Coal Age*.

gob-fire is known. It is worthy of notice that in a heating goaf, firedamp does not seem able to exist.

Explosions caused by firedamp coming in contact with gob-fires have not as a rule the same zest and explosive qualities as where there is ample fresh air to feed the explosions. The resulting atmosphere of firedamp coming in contact with a gob-fire is, however, exceedingly deadly, and many lives have been lost in consequence. For this reason, where such an explosion has occurred, the number of persons allowed below ground, even for rescuing purposes, should be kept as low as possible. The leaving of a thin seam of coal as a roof or over packs in the goaves of longwall workings is also a fruitful cause of spontaneous combustion, but this cannot always be avoided.

As stated before, the best method to prevent these underground fires is to stow the goaf solid with waste, while the throwing of small coal behind is often the cause of spontaneous combustion. A good method of working to prevent these underground fires is to work pillar-and-stall or the retreating longwall by the panel system. The entries to the panel must be kept down to the lowest number, and when the coal is worked out these must be made perfectly airtight by the building of good brick stoppings.

If the retreating longwall method of working in similar panels is adopted, an underground fire does not possess the same terror. It is always best to extinguish it if possible, but with this method of working the fire is at once smothered, and the face advanced or rather retired from the seat of the fire as rapidly as possible. Much will depend on the surrounding circumstances, but the fact that there exists an airproof barrier all round the seat of the fire reduces the risk to a minimum.

With close observation and practice it is not a difficult matter to discern the preliminary stages of spontaneous combustion. As soon as oxidation and heating begin, a peculiar odour is given off, but there are some mine officials who seem quite unable to detect it.

When Burning Odour is Observed, Act at Once.

The moment this odour is detected, some attempt must be made to discover its origin. If promptly traced, an outbreak of fire may be prevented, but once actual combustion breaks out the difficulty is immensely increased. Sometimes the admission of fresh air will put a stop to the sweating and oxidation, and thus prevent spontaneous combustion; at other times it may hasten the action.

There are several ways of dealing with underground fires once they have made their appearance, each method having its own particular advocates. Some will insist upon getting at the seat of the fire direct, and, by the aid of water if available, immediately commence to fill the fire out. Others, by surrounding the seat of the fire, will attempt to isolate it by the construction of stoppings, while still others will be satisfied to surround it by clay walls or sand banks. The best method of dealing with an underground fire must after all depend upon the surrounding conditions and circumstances.

Whatever method is decided upon, however, there must be promptitude of action, as any delay in decision may increase the difficulty of handling the fire, and possibly lead to ultimate disaster. When it is only possible to approach the seat of a fire on the return side, or such an approach is deemed advisable, the use of helmets may become absolutely necessary. Safety appliances have come into such extensive use of late years that no mine subject to spontaneous combustion should be without them; for when tackling underground fires their value cannot be too highly appreciated.

Never leave a fire until it is well under control. If it is found that it has got a firm footing, get it as much under control as possible by surrounding it or covering it with sand, clay, or similar impervious material, so as to keep as much air as possible from getting to the seat of the fire. If despite this attempt at control the fire shows signs of further extension, the next best course to adopt is to build a solid 3 ft. wall backed by sand in a solid manner, and so entirely isolate the fire from the surrounding workings. The fire will then probably die out for want of air. If conditions permit, water may be introduced behind the brick stopping, and so assist in extinguishing the fire. So long as the fire is allowed to exist, there is some risk and danger, and that is why wherever possible removal or total extinction is to be recommended.

In the case of panel working, many will be satisfied if they can keep the fire under control by smothering it with sand or walls of clay. This method generally succeeds if the method of working is retreating longwall, and after shutting all possible air off from the fire, the speed of the working face is accelerated as much as possible, and the goaf closed up as much as possible behind. If, however, it does not succeed, the results are frequently serious, as it may involve the complete loss of that panel. This system of leaving a fire to take care of itself would never answer in ordinary longwall working, as it is difficult to see where the trouble is going to end. Whole districts and mines have been lost through failure to tackle a fire in time, after incurring considerable expense in trying to control it after it had got too great a hold.

Many advocate the prompt isolation of the fire before attempting to fill it out. In longwall working this necessitates the building of a thick brick wall, well let in to the roof and floor, backed with sand all round the fire, and then leaving the fire to its fate. A travelling way must be kept open all round the wall for observation purposes. In a case like this, there is always the risk that air may get to the fire through a crevice in the roof or floor, and the fire may creep along such crevices, and set fire to the ground beyond the wall.

Difficult to Isolate a Fire in Longwall.

Sometimes underground fires caused by spontaneous combustion break out afresh after they have been

placed under control. The step necessary in such cases will depend upon circumstances. If the mine is worked by pillar-and-stall, it may be possible to isolate the fire by the erection of stoppings as close to the fire as possible, and thus suppress and eventually extinguish the fire by its own fumes. In longwall working, owing to the broken nature of the ground, it may not be possible to find solid ground close to the fire in which to erect the stoppings. In such a case, the erection of stoppings may throw a considerable area of the mine idle. Sometimes in fiery mines the stoppings are blown out, and their renewal is a matter of careful consideration and considerable danger. It may necessitate an entire change in the method of ventilation, which in itself may be attended with much risk to those engaged in the operation.

If it is found impossible to put in these stoppings with safety, the next point to consider is whether that particular part of the mine can be flooded with water, and thus isolated from the rest of the mine. The complete flooding of an underground fire with water is almost certain to extinguish the fire, but water cannot always be easily applied, and sometimes such a drastic cure may be worse than the disease. If the fire exists in dip workings, and especially anywhere near the lowest point of the workings, flooding may easily be resorted to; but if the fire exists in a high part of the workings, then flooding becomes a very difficult operation. The question then to be decided is whether it would not be better to seal up the mine. No one but those who have had actual experience of flooding a mine with the object of putting out a fire can imagine the damage it does, especially if the roof or floor is bad. The delay and cost of re-opening the mine is enormous. Flooding, therefore, should only be resorted to when all other measures have failed.

It must not be overlooked that frequently in flooding a mine, more especially the rise workings, airlocked chambers are frequently formed, and these may occupy considerable areas impossible to locate. In applying water on a comparatively small scale in the extinction of a fire, sometimes the water seems to drive fire into crevices, only to return when the application of the water has been suspended. Burnt material which has the appearance of having by the application of water become incombustible will frequently burn over again when the water has been withdrawn, thus showing how necessary it becomes to fill out a fire if possible.

Pumping gas into fires has also been tried with the object of extinguishing them, but the results are not always satisfactory, as the fire after being apparently extinguished by the gas will frequently burst into flame again when the stoppings are removed.

If sectional sealing off of the affected areas of the mine has not been successful in extinguishing the fire, or for some reason cannot be applied with any hope of success, then it becomes a question to decide whether in face of the damage always inflicted on the underground workings by flooding with water it would not be better to seal up both the shafts. In a deep mine with intact workings, and no possibility of any communication from the outcrop to the underground workings, this no doubt would be the best step to pursue; but in a shallow mine in communication with the outcrop, the complete sealing off of the underground workings becomes difficult and expensive.

SOME RECENT DECISIONS UNDER THE WORKMEN'S COMPENSATION ACT.

[SPECIALLY CONTRIBUTED.]

Workmen's Compensation Agreements.

Paragraph (9) of Schedule 2 of the Workmen's Compensation Act, 1906, provides that "where the amount of compensation . . . has been ascertained or any weekly payment varied or any other matter decided . . . either by a committee or by an arbitrator or by agreement, a memorandum thereof shall be sent, in manner prescribed by rules of court, by the committee or arbitrator or by any party interested, to the registrar of the county court, who shall, subject to such rules, on being satisfied as to its genuineness, record such memorandum in a special register . . . and thereupon the memorandum shall for all purposes be enforceable as a county court judgment." Under the Act, compensation payments can, of course, be arranged without the matter being the subject of arbitration in the county court or otherwise, but to secure registration of a memorandum of agreement, the terms of the agreement must be in accordance with the provisions of the Act. In the recent case of *Moakes v. Blackwell Colliery Company*, the Court of Appeal was called upon to deal with a difficulty that had arisen in connection with a memorandum of agreement, notwithstanding that it had been duly registered, and was therefore presumably in accordance with the Act.

So long as incapacity lasted, full compensation was paid to the workman, but when incapacity ceased he entered into an agreement by which the company undertook that they should, so far as they conveniently could do so, find and provide at their colliery employment suitable for the workman, and pay him the wages which he should earn at such employment, and in addition to such wages in each week pay to the workman as compensation under the Act half the difference between the wages which the workman could earn at such employment by working pit time, and the weekly sum he would probably have been earning if he had remained uninjured, but not in any case to exceed £1. The agreement then recited that "the workman agrees to accept such terms, such agreement to be subject to review at the request of either of the said parties." It will be seen that this agreement was intended to satisfy the requirements of paragraph (3) of Schedule 1, where it is provided that "in the case of partial incapacity, the weekly payment shall in no case exceed the difference between the amount of the average weekly earnings of the workman before the accident and the average weekly amount which he is earning or is able to earn in some suitable employment or business after the accident, but shall bear such relation to the amount of that difference as under the circumstances of the case may appear proper." Similarly, the provision as to review no doubt had reference to para-

graph (16) of Schedule 1, where it is provided that "the weekly payment may be reviewed at the request of either the employer or of the workman," with a view to its modification, if any, as circumstances may seem to require. It will be seen that in the case in question the agreement fixed "weekly payment" based on "average weekly earnings," the agreement providing that the compensation payment should be a variable one, determined week by week by the fluctuations in the varying factors of work and wages. Practically the question that arose was whether in those conditions there could be any "review" within the meaning of the Act, and if not, what procedure should be adopted.

Dissatisfied with the payments he had been receiving, the workman began proceedings, claiming from a specified date compensation of £1 a week, the maximum compensation under the Act as well as the agreement even in the case of total incapacity. The applicant admitted that he had received full benefits from the time of the accident to the date referred to, having been paid weekly sums duly calculated in accordance with the terms of the agreement; he did not object to those terms in themselves, but alleged that the weekly amounts had not been properly calculated. For the company, it was contended that as the agreement had been duly recorded and payments were still being made under it, the proper course was for the workman to apply for review, and that, in the circumstances, an arbitrator had no jurisdiction to hear the application. The county court judge took the view that he had no jurisdiction, and dismissed the application. On appeal, it was contended for the workman that as the amounts of the weekly payments were not determined by the agreement itself, the latter could not be enforced, and the arbitrator therefore had jurisdiction; that the workman could not make an application for review, as there were no fixed weekly payments to review; and that application could not be made for leave to issue execution under Rule 82 of the Workmen's Compensation Rules, 1913-1914, as it was not possible for the registrar or the judge to determine the two varying factors of work and wages on which the amounts of the weekly payments depended. The Court of Appeal upheld the contention of the employers that there was no jurisdiction to hear the application, but did not uphold their further contention that the proper course was to apply for review. Contrary to the view expressed on behalf of the workman, the court held that, under the provisions of Rule 82, the registrar or the judge had power to determine the factors on which the amounts of the weekly payments depended, and to give leave for execution thereon, and that the proper procedure was to apply for execution accordingly. It will be noted that the decision settles a point of legal procedure of considerable interest and importance.

Personal Responsibility for Accidents.

Compensation is payable only when an accident arises both "out of and in the course of the employment." Appeals on those points are decided practically on the ground that the question is one of fact for the county court judge, and that his finding should not be disturbed if there is evidence to justify it, but both the House of Lords and the Court of Appeal have laid down a clear direction that compensation should not be awarded when an accident obviously results from some purposeless or avoidable proceeding on the part of the workman. There may, however, be a difference of opinion as to whether those conditions are present, and recently, in *Lancashire and Yorkshire Railway Company v. Highley*, an addition has been made to the already numerous decisions on the point. Some of the company's workmen had occasion to go to a messroom, where the man in charge was accustomed to supply water to any of the company's workmen who applied for it. To shorten the route, they decided to cross a number of railway tracks, though they could have reached the messroom by a longer route without crossing any line of railway at all. On their way they came to a train which they assumed to be "dead," so that they could pass under the couplings of the carriages with safety. The train, however, suddenly moved off as one of the men was in the act of doing so, and he was killed on the spot. The Court of Appeal held that the accident arose "out of" the employment, but that decision was reversed in the House of Lords. In the course of his judgment, Lord Haldane said that the man could have obtained the hot water he wanted without taking the altogether unnecessary peril of passing between the trucks, and his lordship could discern no evidence that would justify a finding that this peril was other than an independent one which the man added quite superfluously and entirely on his own initiative.

SALE OF CREOSOTE AND OTHER COAL TAR OILS. NEW ORDER.

The Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Regulations and all other powers thereunto enabling him, hereby orders as follows:—

(1) For the purposes of this Order, the expression "creosote" shall mean creosote, green oil, sharp oil, and any oil produced from or containing an admixture of oil produced from the distillation of coal tar, or any of them.

(2) No person shall as from the date hereof until further notice except under and in accordance with the terms of a licence issued under the authority of the Ministry of Munitions, use any creosote (whether as a solvent or otherwise) for or in connection with:—

(i.) The waterproofing preservation or treatment of timber or wood of any kind or description.

(ii.) The manufacture, repair preservation or treatment of any road or path in the United Kingdom or any part of such road or path.

(3) No person shall as from the date hereof until further notice offer to sell, sell or (except for the purpose of carrying out a contract in writing existing prior to such date for the sale of creosote) enter into any transaction or negotiation in relation to the sale of creosote except under and in accordance with the terms of a licence issued under the authority of the Ministry of Munitions.

(4) All applications for licences under this Order shall be made to the Director-General of Munitions Supply, Ministry of Munitions, Whitehall-place, London, S.W. 1, and marked "Creosote Licence."

CONTENTS.

EDITORIAL ARTICLES:—	PAGE
Transport Re-organisation Scheme	63
Coal Trade	66
Losses Resulting from Mining	66
Measurement Tank	67
Spontaneous Combustion in Coal Mines	68
Sale of Creosote and other Coal Tar Oils	69
South Wales Mining Timber Trade	75
Mining Industry and Military Service	75
The American Coal Trade	76
Some Recent Decisions under the Workmen's Compensation Act	69
Rescue and Recovery Operations in Coal Mines	76
Labour and Wages	81
Obituary	82
The Freight Market	82
Open Contracts	82
Abstracts of Patent Specifications Recently Accepted	84
New Patents Connected with the Coal and Iron Trades	86
Publications Received	86
Catalogues and Price Lists Received	86
THE COAL AND IRON TRADES	72-75
The London Coal Trade	75
The By-Products Trade	75
The Tin-plate Trade	75
CURRENT SCIENCE AND TECHNOLOGY	68
INDIAN AND COLONIAL NOTES	76
PARLIAMENTARY INTELLIGENCE	76
NOTES FROM THE COAL FIELDS	80
COAL, IRON AND ENGINEERING COMPANIES	82
MISCELLANEA:—	
Coal Controller and Fuel Economy—Mining Scholarships at Wigan College	65
Control of United States Coal Shipments	66
Hull Coal Traffic	76
Heriot-Watt College, Edinburgh—University of Birmingham: School of Mining	74
Coal Sweepings on Vessels—Financing of French Coal Imports—Notification of Slag Dumps	75
Irish Coal Mining—Yorkshire Deputies' Association	82
Argentine Navy and Chilean Coal—Coal Production in Peru	86

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Tenders should be sent by Registered Post so as to reach the under-signed
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** For other Miscellaneous Advertisements see Last White Page.

The Colliery Guardian
AND
Journal of the Coal and Iron Trades.
Joint Editors—
J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
(At present on Active Service).
LONDON, FRIDAY, JULY 13, 1917.

The London coal trade continues brisk, but the shortage of carmen hampers delivery. Arrivals are reported favourable. Manufacturing qualities are scarce.

The market tone in Northumberland inclines to weakness, whereas Durham remains fairly firm. Reports of general activity in Lancashire and Yorkshire are varied in the case of the latter by a rather duller export movement. Scarcely any change of moment is reported in the Midlands. Uncertainty regarding the classification scheme hampered business of late in South Wales. Large anthracite has been freely offered. Business in Scotland is quiet, and collieries are not disposing of output readily.

The freight market has been very dull on account of the shortage of neutral tonnage. In South Wales the volume of business has fallen considerably, and French ports have had a virtual monopoly of the tonnage chartered.

The Controller of Coal Mines announced a scheme to come into operation on September 10 whereby it is estimated to save no less than 700,000,000 ton miles annually in the transport of coal by public railway. The scheme aims at the consumption in or near the area of production.

The annual meeting of the North of England Institute of Mining and Mechanical Engineers, Newcastle, will be held on August 4.

A proposal relating to the payment of higher wages throughout the British coal fields will be brought forward at the annual conference of the Miners' Federation.

According to statements in Parliament on Thursday, a final form has not yet been given to the financial arrangements for the State control of collieries.

At the annual meeting of the Society of Chemical Industry, which will be held in Birmingham on July 18, 19 and 20, the following papers will be read: "Refractory Materials," by Mr. W. C. Hancock; "Industrial Fuel from Gasworks," by Mr. E. W. Smith; "Calorific Value of Industrial Gaseous Fuel," by Mr. W. J. Pickering; "Some Sources of Benzol and Toluol for High Explosives," by Mr. T. F. E. Rhead; and "Sands used in Metallurgical Practice," by Prof. P. G. H. Boswell.

An official circular explanatory of means of coal economy on the part of power users and others has been issued. The object is to relieve pressure on coal supplies during the next two winters.

Inland Distribution of Coal.

The Coal Controller has issued an important Order respecting the transport of coal for inland consumption. The new scheme is to come into operation on September 10, and it

is estimated that a saving in transport of railborne coal in Great Britain, amounting to no less than 700 million ton-miles per annum, will be thus effected. We give elsewhere in this issue the text of an explanatory memorandum, together with a copy of the Order of the Board of Trade, dated July 4, 1917, made under the Defence of the Realm Regulations.

It is important to note that the scheme applies only to that portion of the total output of British coal, estimated at about 42,000,000 tons per annum, which is carried by rail for consumption in this country (excluding anthracite). It is concerned mainly with the saving of long-distance and cross-country journeys, which are particular sources of trouble under existing railway conditions, arising both from depleted staff and military needs in the matter of rolling stock. In the construction of the scheme the Coal Controller has kept in view certain elementary principles—viz., that the coal should be consumed as near as possible to its source of origin, that the movement of coal should follow as closely as possible the main trunk lines, which naturally possess the better facilities for traffic, that this movement should follow well-defined directions, and that areas producing less coal than suffices for its own needs should not send any portion of its output to other areas. It follows as a natural consequence that areas producing more coal than is required locally should distribute the balance to the most convenient areas consistent with the object of the scheme.

THE NEW AND OLD METHODS COMPARED.

For this purpose Great Britain has been divided into 20 areas, as shown in the map published elsewhere in these pages. A few words are necessary in explanation of this map. In the first place it will be recognised that with one exception each of these areas is both coal producing, as indicated by circles, and coal consuming, as shown by rectangles in all cases except districts 1, 5, 15, 19 and 20. The omission of the rectangles in these cases indicates that these areas produce enough coal for their own consumption, and do not, therefore, need to receive any supply from outside. The rectangles, it will be noted, are connected by lines radiating from those producing areas from which, under the new scheme, each will be allowed to draw a portion of its supply. The effect of this arrangement can only be fully realised by comparing the new scheme with the method hitherto prevailing. For this purpose the Coal Controller has prepared a map showing the sources of supply in December 1916, excluding amounts of less than 1,000 tons. We have endeavoured to illustrate the differences between the old and the new methods by the following table (A).

PRACTICAL WORKING OF THE SCHEME.

In order to grasp the simplification in transport effected by Mr. CALTHROP's plan, it is only necessary to compare the two columns of the above table. Let us take, for example, the South Wales district, No. 12. This coal field area was drawn upon for the supply of 13 of the above districts, and it received supplies from six other coal fields. Under the new

scheme it will supply only two other areas, and will receive supplies from only one. London and the south-eastern counties obtained its coal from 11 different coal fields, but will in future have to depend upon five.

TABLE A.		
District.	Sources of supply from without under existing method.	Sources of supply under new scheme.
	Districts.	Districts.
1. (Northumberland)	3, 17, 19 ...	1
2. (Cumberland).....	1, 3, 4, 5, 15, ... 17, 18, 20	1, 2, 3
3. (Durham)	1, 12, 5 ...	1, 3, 5
4. (Lancashire)	1, 5, 6, 7, 10, ... 12, 15, 16	4, 5, 15
5. (Yorkshire).....	1, 3, 4, 12, 15 ...	5
6. (N. Wales)	4, 5, 7, 10, 12, ... 15, 16	4, 6, 7, 15
7. (North Staffs.) ...	4, 5, 10, 12, ... 15, 16	5, 7, 15
8. (Eastern Counties)	5, 12, 15, 16 ...	5, 8, 15
9. (Salop).....	6, 7, 10, 12 ...	7, 9, 10
10. (Birmingham) ...	5, 6, 7, 9, 12, ... 15, 16	5, 7, 10, 15, 16
11. (N.Hants to Essex)	5, 7, 10, 15, 16 ...	5, 10, 11, 15, 16
12. (S. Wales & Mon.)	5, 6, 9, 10, ... 13, 16	9, 12
13. (S.W. Counties)...	3, 4, 5, 6, 7, 9, ... 10, 12, 15, 16	5, 9, 10, 12, 13, 15
14. (S.E. & London)...	3, 4, 5, 6, 7, 9, ... 10, 12, 13, 15, 16	5, 10, 12, 14, 15, 16
15. (Derby & Notts.)	1, 4, 5, 7, 16 ...	15
16. (Leicestershire) ...	5, 10, 15 ...	5, 15, 16
17. (S.E. Scotland) ...	1, 3, 12, 18, 19 ...	17, 19
18. (N.W. Scotland)...	12, 17, 19, 20 ...	18, 19, 20
19. (N. E. Scotland)...	12, 17, 18 ...	19
20. (S.W. Scotland)...	2, 17, 18, 19 ...	20

A distinction must be made also between prohibited and restricted areas, as shown in the table given elsewhere. In the case of South Wales, for example, while steam and manufacturing coals may be sent into areas 13 and 14, house coal can only be sent into area 13; and gas and coking coals cannot be supplied to any outside district. Thus, while area 14 is a prohibited area as regards both gas and coking coals and house coal, it is a restricted area for steam and manufacturing varieties. Area 13, on the other hand, which is prohibited as regards gas and coking coal, is restricted only with regard to the other sorts. Thus the map must be studied in conjunction with the different classes of coal set out in the above-mentioned table.

The question naturally arises as to what provision has been made for the supply of special kinds of fuel, such as that which is demanded for particular types of steam raisers, such as mechanical stokers, gas producers, etc. For this purpose consumers will be able to obtain certificates authorising the supply of the kind of coal required for these purposes. In many cases this problem will solve itself by the circumstances of the case. We have considered the question of South Wales coal. Let us take the case of Durham gas coal, which can justly claim to possess special qualities suitable for gas making. A large part of this coal is dealt with by seaborne traffic, and is unaffected by the new scheme. Neither are coal exports of any kind within the purview of the new Order. Durham, it will be seen by the above table, has been drawn upon by land transport in only six of the 20 districts. Under the new plan it is restricted to one only—viz., Cumberland. The London gas companies will be unaffected, owing to the fact that they obtain their supplies by coastwise shipment, but in certain other areas there may possibly arise some amount of inconvenience, if not of dissatisfaction. This is unavoidable in any scheme that can be devised for the purpose in view. Durham railborne coal has hitherto travelled far, especially towards the south. The drastic restriction now to be enforced can scarcely fail to arouse some amount of concern amongst those who have been accustomed to the use of this coal. But this is only a particular case out of many that must arise from cutting off certain sources of supply. The resulting inconvenience should be accepted in a patriotic spirit. We are all doing what we can to help in winning the war. It is not the consumer only who will have to meet new and unfamiliar conditions. The collieries also will be placed in the position of losing temporarily some of their markets, and of being obliged to seek new customers. It must be remembered that this is essentially a war measure. It is based rather upon expediency than upon economic considerations, and we do not imagine that the Coal Controller regards it as anything more than a method to secure the maintenance of supply under exceptionally difficult circumstances. Besides, there is always the promise that certificates will be issued where a satisfactory case can be established,

and this provision seems to meet all the essential requirements of the case.

METHOD OF PROCEDURE.

The purpose of carrying out the new plan, the proposes to make use of the District Coal Supplies Committees, which bodies will be empowered to conduct the necessary arrangements for putting the scheme into force. These committees, which have already been in active working under existing conditions, will be further strengthened for their new duties by the addition of members who are not coal owners, for the purpose of adequately representing the consumers' interests. It has been arranged that these committees are to be the connecting links between the collieries on the one hand, and factors, merchants and direct consumers on the other. Thus, there will be no necessity for those whose supplies are affected under the scheme to worry about finding either new customers or new collieries. The District Coal and Coke Supplies Committees will instruct each of the colliery owners in their area as to the tonnages to be diverted from that area, and will also specify the factors, merchants and direct consumers needing supplies, at the same time stating the descriptions and quantities of coal required to be diverted after September 8, when the scheme comes into operation. But should any factor, merchant or direct consumer not hear from a colliery by August 27, to the effect that it is authorised to send supplies, a communication should be sent at once to the District Coal and Coke Supplies Committee, giving full particulars of their requirements; upon which arrangements will be made for their supply.

All existing contracts for coal affected by the scheme will be cancelled at 6 p.m. on Saturday, September 8, and new contracts, to be arranged between now and that date, will come into operation on Monday, September 10. It will be seen that a great deal of work will fall upon the committees, who will be responsible for satisfying the requirements of various classes of consumers, and upon the degree of satisfaction they are able to give will depend, in a large measure, the smooth working of the scheme.

POINTS TO BE CONSIDERED.

It is important to recognise that in so far-reaching a plan there must be a certain amount of give and take, on the principle that a possibly inferior coal is better than no coal at all. There will be difficulties, of course; but these can be minimised by the goodwill of the parties concerned. It is not improbable, for example, that some relaxation will have to be made in by-laws respecting the factory chimney and the emission of black smoke in certain areas. With regard to domestic supplies, except in those cases where these are obtained direct from the collieries, consumers will have to be content with such coal as the merchants are able to provide, and there may be some need for revision in the schedule of prices for special kinds. What is ordinarily known as house coal falls into several classes, and it may be impossible to maintain so wide a range of selection as usual. There will also be some anxiety respecting existing contracts, which have been fixed in most cases for particular qualities, and at prices regulated by special circumstances. It will not always be possible under the new scheme to obtain coal of equal quality, and consumers must rely upon the Limitation of Prices Act for fair treatment in every case. There will probably be some difficulties to be overcome in this respect; but the Coal Controller will, we imagine, be able to smooth over any friction that may arise from this cause. There has been a free interchange of views between representatives of all parties concerned, and the scheme has not been adopted without due consideration from all points of view. To the colliery owner there should be great advantages from the shorter wagon journeys. Much time has been lost at collieries owing to the accumulation of coal arising from the shortage of rolling stock. This trouble should certainly be reduced under the new scheme, even if it does not entirely disappear.

Mr. CALTHROP has inaugurated a bold experiment in the reorganisation of so complex a business as that of coal distribution. It should be everywhere accepted with a helpful spirit as a war measure. It may be directed against any revolutionary practice. This scheme, however, is fully thought out in all its consequences, and we have every confidence in its success.

THE COAL AND IRON TRADES.

THURSDAY, JULY 12.

Scotland.—Western District.

COAL.

Little change has occurred in the position of the Scotch coal trade generally. It is not anticipated that the Price of Coal (Limitation) Act will make much difference in the volume of business, but quotations in most instances will be brought up to the maximum. Trade in the west of Scotland is quiet in all branches, and collieries are not disposing of their outputs readily. Shipments amounted to 115,862 tons against 108,696 in the preceding week and 119,309 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	23/6-25/	17/6-19/6	25/-28/
Ell	26/-28/	18/6-20/	27/-30/
Splint.....	28/-30/	21/-26/	33/-42/6
Treble nuts	23/	23/6	23/
Double do.	22/	22/	22/
Single do.	21/	20/	21/

IRON.

The pressure in the various branches of the Scotch iron trade is undiminished, and in view of the holidays a special effort is being made to make a substantial impression on accumulated arrears. Pig iron is still in heavy request, and hematite producers have little to spare, while foundry qualities are also scarce. Certain quantities have been shipped to the Allies, but otherwise the export trade is dormant. Quotations are firm and unchanged. Monkland and Carnbroe f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Malleable iron makers report no change. Practically everything now produced is for naval or military use, and ordinary consumers are getting next to nothing. The demand for black sheets is very active, but outputs are curtailed by irregular supplies of raw materials. Nothing is being done in galvanised products outside of Government requirements, owing partly to the prohibitive cost of the goods. All classes of engineers are busy, and further good progress is reported with the new shipbuilding on hand, both naval and mercantile.

Scotland.—Eastern District.

COAL.

Conditions in the Lothian coal trade continue dull and unpromising, and idle time is prevalent. Shipments were 17,497 tons against 18,094 tons in the preceding week, and 46,311 tons in the same week of last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	20/	37/6-40/
Secondary qualities.....	25/6	18/	36/-38/
Treble nuts	23/	22/	23/-25/
Double do.	22/	20/	22/-24/
Single do.	21/	19/	21/-23/

The situation in Fifeshire is still far from satisfactory. Collieries find it quite impossible to dispose of outputs locally, and employment is very irregular. Shipments were 27,827 tons against 23,880 in the preceding week, and 52,507 tons in the corresponding week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	27/	45/-50/
Unscreened do.....	24/-25/	23/	43/-45/
First-class steam coal.....	28/	23/	40/-45/
Third-class do.	24/	19/	32/-35/
Treble nuts	23/	24/	23/-26/
Double do.	22/	22/	22/-24/
Single do.	21/	20/	21/-23/

The aggregate shipments from Scottish ports during the past week amounted to 161,186 tons compared with 150,670 in the preceding week, and 218,127 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The local coal market has been exceedingly flat this week, the lack of tonnage on offer preventing the transaction of any considerable volume of business. Shipments on official account are well maintained, but individual exporters, although in receipt of a large number of enquiries, find it difficult to negotiate business in the absence of transport facilities. The better qualities of steams and of gas coals are well taken up, and are scarce for early loading, but practically every other description of fuel offers abundantly, and the tone of the market is very weak, with prices, indeed, only held in check from a downward movement by the fact that the Coal Controller's schedule establishes minimum figures. Coke of all makes is in larger supply than it has been for some time past—a fact particularly noticeable in the case of gas sorts. No forward business of any dimensions is reported. Under the circumstances, there has been no change in the selling values of fuel for consumption by countries other than France and Italy, for

such a change nowadays may only be in an upward direction, and the state of the market does not justify any advances at the present time.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	50/
Do. Tynes (Bowers, &c.)	29/6	29/6	50/
Secondary, Blyths	25/6	25/6	45/-47/6
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	45/-47/6
Unscreened	23/6-25/	23/6-25/	32/6-37/6
Small, Blyths	20/	20/	30/-31/
Do. Tynes.....	18/6	18/6	27/6
Do. specials.....	20/6	20/6	30/
Other sorts:—			
Smithies.....	25/	25/	35/-36/
Best gas coals (New Pelton or Holmside)	25/	25/	35/-36/
Secondary gas coals (Pelaw Mainorsimilar)	23/6	23/6	33/-34/
Special gas coals	26/6-30/	26/6-30/	37/6
Unscreened bunkers, Durhams	24/-25/	24/-25/	33/-36/
Do. do.			
Northumbrians	24/-25/	24/-25/	32/6-35/
Coking coals	24/-25/	24/-25/	33/-35/
Do. smalls	24/-25/	24/-25/	32/-33/
House coals	28/6-30/	28/6-30/	50/
Coke, foundry	42/6	42/6	43/6-47/6
Do. blast-furnace	42/6	42/6	42/6
Do. gas	30/-32/	30/-32/	32/6-33/

Sunderland.

COAL.

The market has not settled down to work under the new conditions, and business is only being done on meagre lines. Quotations remain steady at previous figures. Substantial quotations are held on contract, and possessors are eager to clear. Buyers with definite tonnage could undoubtedly bargain. Durham gas coals are firm, other qualities being freely offered. Coking and smithies find a ready outlet for the production in the home market. Bunkers are abundant and weakly held. Coke is in better supply, and is readily taken up.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6	30/6	40/
Secondary do.	23/6-25/	18/	32/6
House coals:—			
Best house coals	30/	30/	50/
Ordinary do.	28/6	22/	40/
Other sorts:—			
Lambton screened	30/	29/6	45/
South Hetton do.	30/	29/6	45/
Lambton unscreened ...	24/	17/6	35/
South Hetton do.	24/	17/6	35/
Do. treble nuts	20/	20/	34/6
Coking coals unscreened	25/	18/	34/6
Do. smalls	25/	17/	33/6
Smithies.....	25/	21/6	35/
Peas and nuts	24/6-26/	22/	37/6
Best bunkers.....	25/	18/	36/
Ordinary bunkers.....	24/	16/6	33/
Coke:—			
Foundry coke	42/6	42/	47/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	32/	31/	35/

Outward chartering is practically idle owing to the very limited amount of trade available. Christiania has been done at 195 kr. Coasting is dull, only 13s. being indicated for London.

Middlesbrough-on-Tees.

COAL.

Arrangements by the Coal Controller have left many points to be adjusted, but optimistic feeling rules, and the opinion prevails that so soon as neutrals thoroughly understand the situation, demand will improve. Meanwhile many collieries want trade. This is very largely due to adverse tonnage conditions. Of course, official quotations prevail all round for coal. Best Durham gas coal is 25s., second quality 23s. 6d., and Wear special 26s. 6d. Durham unscreened bunker coal is 24s. Coking coal continues to be well taken up, and coke was in good request. Both foundry and patent oven coke are now quoted 42s. 6d., and gas house product is in good request at 30s. to 31s. Local consumption of coke continues heavy, and descriptions needed for the blast furnaces still command fixed maximum prices, average kinds selling at 28s. at the ovens, and low phosphorus qualities remaining at 30s. 6d. at the ovens.

IRON.

Home business in Cleveland pig iron is only quiet. Requirements for the foundries under the July allocations have been practically all arranged. The month's supplies are thus assured, and few consumers are disposed to look further ahead. Demand on behalf of customers in Scotland is much smaller owing to the Glasgow holidays. Good enquiries continue to come to hand from abroad, and with iron plentiful and the tonnage situation likely to be better, shipments promise to improve. At present fairly good supplies are going forward to our Allies, but of course the embargo on export to neutral countries remains absolute. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge are all quoted 92s. 6d., and No. 1 is 96s. 6d.; whilst for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Not the slightest abatement of demand for east coast hematite iron for home and abroad is noticeable. Official organisation continues to assure adequate supplies to home consumers, and to have some surplus for export trade. A few further sales to customers reachable by rail are reported, but there are still difficulties in the way of new foreign business, which are by no means easily overcome, not the least obstacle being the uncertain feeling as to price in the near future, and export quotations may be said to be nominal. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France, and 142s. 6d. for export to Italy. No material change is noticeable in the various branches of the finished iron and steel industries. Prices are very strong, but little opportunity is afforded for the transaction of ordinary commercial business, as output is still practically absorbed by Government needs, and the demands of the shipyards.

Cumberland.**Maryport.****COAL.**

The coal and coke industries in West Cumberland remain in a fairly satisfactory condition. The clamour for fuel is probably not quite so keen as in May, and in some respects business is a shade easier, but requirements are still large enough to absorb output. The home market is very firm. Landsale is lifeless, but all the other branches are doing well. All varieties of fuel for the Irish market are eagerly sought. Irish customers are receiving bigger deliveries, but they could take almost twice as much. The imports this week included a good cargo of pit timber for the local collieries. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " " ..	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts " "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise)	25/	25/	25/
Do. (for foreign-going steamers)	30/	30/	30/
Bunkers (mixed nuts and steam coal) (coastwise)	21/6	21/6	21/6
Do. (foreign)	25/	25/	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

No change has occurred in the west coast hæmatite pig iron trade since last week. All the industries in West Cumberland and the Furness district are feverishly busy, and the clamour for metal is, if anything, keener than ever. Makers are inundated with orders, but at the moment they have enough to do to satisfy the claims of approved users engaged exclusively on work for the Government. There are 30 furnaces in full operation in the whole district, and the entire make of both special and ordinary iron is going into home consumption. Practically all the Bessemer iron that can be smelted is required for use locally at the steelworks, and all the output of special and semi-special iron is being absorbed by consumers in Scotland and the Midlands who are engaged on work of national importance. The pig iron in Cumberland store yards now only amounts to 430 tons. Prices are still at the maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with special iron at 140s. per ton, and semi-special iron at 135s. per ton, f.o.t. Cumberland hæmatite warrants are idle at 115s. per ton. The position of the ferro-manganese market is unchanged. Activity in the steel industry is undiminished, and the output of war work at both Workington and Barrow is very large. Ordinary commercial sorts are quiet, but both places have booked sufficient orders on Government account to keep them exceedingly well employed for months to come. Billets are in firm request at £12 per ton. The iron ore industry from Cleator Moor to Millom is tremendously brisk, and although all the mines are again in full swing, production is not so big as it was. Sufficient high grade ores are being mined for the furnaces in special iron, but the amount of ordinary sorts being raised is short of requirements, and smelters in ordinary Bessemer iron are still using large quantities of imported ore. Prices of all grades of native ore are at the maximum. The imports of foreign iron ore at Maryport dock last week amounted to 3,000 tons.

South-West Lancashire.**COAL.**

There was a good attendance on the Manchester Exchange on Tuesday. House coal continues to be in greater demand than can be supplied. Slack and engine fuel are a little easier momentarily, as is to be expected from the various town holidays that are now going on week by week.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/-22/	21/-22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	25/-25/6
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds

* In accordance with new Control list.

South Lancashire and Cheshire.**COAL.**

In household coals the demand keeps exceptional, and stocking is going on freely, mostly at customers' residences. The merchant's order book is still in arrear, and therefore he has no margin to stock. With regard to shipping, requirements this week for general bunkering and export are on the whole much as they have been recently. Coal is by no means over plentiful. Current f.o.b. prices are, of course, in accordance with the Coal Controller's circular of June 28 in regard to the sale of coal. The coastwise and cross-Channel demand for household coals keep up. The holidays at the manufacturing towns are putting the usual supplies of slack temporarily on the market, but it seems to find a sale in other directions as quickly as made. There are still fairly large tonnages of gas enquiries upon the market, either second attempts to purchase increased quantities or fairly late enquiries on the market.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/-23/	22/-23/	22/-23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/-18/6	18/-18/6	18/-18/6
Furnace coal	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	25/-26/	25/-26/	25/-26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

Yorkshire and Derbyshire.**Leeds.****COAL.**

The new scheme of distribution of coal appears to be well received in the Yorkshire coalfields. There was a very large attendance at the market, and considerable activity in the demand for coal. Every quality is in strong request. The production is well maintained, as the pits continue to work regularly, and there is little or no complaint concerning the attendance at work of the miners, while the wagon supply is satisfactory. Long-distance traffic is working better, and a large number of private wagons from all centres are coming to the collieries in West Yorkshire. Coastwise rather more coal is being shipped, chiefly contract coal, and of the medium Silkstone qualities, which sell readily at full limitation prices. In the West Riding merchants are practically dependent on hand-to-mouth supplies, which are chiefly in private trucks. Pit prices for the West Riding are more or less nominal. Haigh Moor selected, 21s. to 22s.; Silkstone best, 20s. to 21s.; Silkstone house, 18s. to 19s.; other qualities 17s. to 18s. Generally speaking the gas coal collieries are taxed to keep up contract deliveries, although there is a rather better supply being shipped for France at limitation figures. Supplies of gas nuts are increasingly difficult to secure, and gas authorities preferring unscreened coal find it almost impossible to purchase this quality, as there is such a demand for coking slacks that nearly all gas coal raised is being screened. Rather more steam slacks are being offered on the market, but with this exception supplies are exceedingly tight. Now that it is known that the terms of supply from Yorkshire pits to Yorkshire districts will not be interfered with, a number of additional contracts for from 3 to 12 months have been booked at full limitation values. Special brands of coking slacks are exceptionally difficult to secure, and the output of coke is suffering through the scarcity of smalls. Furnace coke is in specially active demand from Frodingham and the Midlands, but works in the Leeds districts seem to be fairly well supplied. The quotations in the annexed list are more or less nominal:—

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	20/-21/	20/-21/	20/-21/
Wallsend & London best	19/-20/	19/-20/	19/-20/
Silkstone best	19/-20/	19/-20/	19/-20/
Do. house	17/-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	23/-24/	23/-24/	23/-24/
Silkstone best	22/-23/	22/-23/	22/-23/
Do. house	20/-21/	20/-21/	20/-21/
Other qualities	19/-20/	19/-20/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	16/-17/	16/-17/	16/-17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/	15/-16/	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	17/-18/	17/-18/	17/-18/
Large double-screened engine nuts	16/-17/	16/-17/	16/-17/
Small nuts	15/-16/	15/-16/	15/-16/
Rough unscreened engine coal	15/-16/	15/-16/	15/-16/
Best rough slacks	14/-15/	14/-15/	14/-15/
Small do.	12/-13/	12/-13/	12/-13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/6-26/

Barnsley.**COAL.**

Generally speaking there is no alteration in the general trend of business, the demand being of such a character as to readily absorb the output, which is well maintained. The large tonnage of steam coal is especially well taken, though the export continues to be on rather quiet lines. The Admiralty and the railway companies continue to take a big bulk of fuel, and there is afforded little opportunity to lay in stocks to provide for extra demands on the railways. It is still impossible to procure an adequate tonnage of steam nuts for general purposes, owing to the continued heavy requests for the munition works for this class of fuel. The position is much the same with regard to all classes of small steam coal required by the various works, and particularly with respect to nuts. The quieter demand for ordinary slacks causes this class of fuel to be more freely obtainable, though the demand is less pressing. A good enquiry still prevails for gas coal, the contract deliveries

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	16/6-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/6	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

being insufficient to meet the present demands of the concerns, having regard to the prospective growth of the industry. More enquiry is felt for coking slack, the present supply of which remains difficult to maintain. It is also somewhat surprising to find the comparatively heavy tonnage of house coal so fully cleared, and on the collieries still continues for large supplies, particularly for London and the south. Nearer districts continue to show anxiety, as their present supplies do not admit of deliveries which will in any way satisfy the public desire to lay in stocks for the winter period. The revived demand for furnace coke is well sustained, and though the make is being augmented as far as possible, the supply is again hardly equal to the present needs. Values all round remain firm.

Hull.**COAL.**

The conditions operating of late in the market here are unchanged, with neutral business still delayed. Coal fortunately continues to come along from the collieries fairly well, and shipments to France are well maintained. Large steams are in big request by the Admiralty, and in almost every department there is comparatively little "free" coal on offer. Land prices are therefore firm, and export prices, in the absence of transactions, nominally on the basis of the new minima for neutrals. French and Italian prices, of course, are fixed. Hull is not likely to be prejudicially affected by the Controller's transport scheme.

Chesterfield.**COAL.**

A strong demand continues to be experienced for every class of coal, cobbles and nuts being in the most urgent request. Much interest has been aroused by the "Directions" of the Controller of Coal Mines with regard to the transport of coal for inland consumption. House coal orders are coming to hand very freely, and these are more likely to increase than otherwise. Fuel for the heavy steel trades of Sheffield is in pressing request, and it is almost impossible to fully satisfy consumers' requirements. Slack for boiler firing finds a ready sale. Locomotive coal continues in active demand, while gas companies are persistent in their claims for increased supplies of gas coal. The export trade so far as Derbyshire coal is concerned is at a standstill owing to its shipment being entirely prohibited. At the moment there is no prospect of the embargo being removed. The coke market is in a satisfactory condition in respect of demand, the whole output of the ovens being in constant requisition.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

The demand for pig iron is good, and the production is steadily increasing. All the other branches of the iron trade are in a state of great activity.

Nottingham.**COAL.**

A notable feature of the trade in this district, particularly at this time of the year, is the exceptionally brisk demand for all classes of domestic fuel. This is due to so many householders being impressed with the feeling that there will be a great shortage in the winter months, that they are purchasing as much coal as they can comfortably store to cover their needs during that period. Consequently merchants are having something like a rush of orders, but customers are in most cases having to wait their turn, as the supplies from the collieries, which under the abnormal circumstances may be regarded as satisfactory, are limited. With regard to the distribution of coal under the new scheme by the Controller of Coal Mines, it does not appear that it will make much difference in the present arrangements so far as this county is concerned, with the exception that it will prohibit tonnage going to Yorkshire and the Humber ports, but there has been little or no tonnage going there for some time. The steam coal trade continues active. Most qualities are in brisk request and the output is readily cleared at the collieries. Slacks of all descriptions are in good demand.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/-16/6
Best hard coals	16/-17/6	16/9-17/6	17/-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

Leicestershire.**COAL.**

Although the administration of collieries has been subjected to an unexampled strain since the outbreak of war, even more strenuous times are involved by the control of transport. The immediate effect, it is pointed out, has been a very marked increase in the urgent demands for supplies for those districts which will be excluded under the new scheme. This is due to the desire to be able to meet the technical effects involved in the change of fuel and the influence thereof on specific metals. The demand for fuel for Government purposes takes up a very large proportion of the output. There is a remarkably keen demand for all classes of household, main and deep cobbles and nuts as well as small nuts for mechanical stokers for London and district. The colliery sidings are crowded out with wagons belonging to coal merchants and doubtless output could be dealt with. Country coal merchants are pressing for further deliveries in order to overtake some of the heavy arrears; but this can only be done gradually. There are no surplus supplies of any kind either at country stations or at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Coal	15/6-18/	16/6-18/	16/6-18/
Sorted	15/6-16/6	15/6-16/6	15/6-16/
Cobbles	16/-17/	16/-17/	16/6-17/
.....	16/-16/6	16/-16/6	16/-16/6
.....	15/-15/6	15/-15/6	15/-15/6
Small	14/6-15/	14/6-15/	14/6-15/
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/	6/-7/	6/-7/
Main nuts for London:			
kitcheners	13/6-14/	13/6-14/	13/-13/6
Stearns, best hand picked	14/-14/6	14/-14/6	14/-14/6
Stearns, seconds	13/-13/6	13/-13/6	13/-13/6
Main cobbles for kitcheners	13/6-14/	13/6-14/	13/6-14/
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The scheme designed to effect economy in coal transport is receiving consideration in this district: people engaged in the industry cannot yet say what the ultimate effect will be, but no very great upheaval is looked for. Midland coal in the past has gone to southern and western districts, after local needs have been met. When the scheme comes into operation manufacturing and house coal produced in Birmingham and district will be diverted to Shropshire, Northants, Essex, south-western counties, south-eastern counties, and London, while North Staffordshire coal will only be sent to North Wales and Shropshire, and gas and coking coal to Shropshire and Birmingham district. Meantime the coal market continues quiet for lack of anything to sell. Inadequate supplies are reaching merchants, who are not in a position to meet all the orders on their books. There are no stocks, and every ton is going into consumption or being stored in cellars against winter. All sorts of industrial fuel are in strong request, and the better grades are scarce.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

The quarterly meeting, which fell this week, is a much more modest affair than it was in pre-war days. Attendance is now much more essential at the works than at the market. Marked bars remain at £15 10s. maximum, less 2½ per cent.; merchant bars realise the limit of £13 15s. net, at makers' works; nut and bolt iron, which is uncontrolled, runs from £14 5s. to £14 11s. 3d., delivered in the Black Country—a relatively high price compared with the limits placed upon marked bars and merchant qualities; such puddled bars as change hands realise £12 5s.; small rounds command £16 15s. and upwards, quoting on the three-eighths basis; and steel rounds make from £18 to £18 10s. In the uncontrolled branches generally prices show a certain amount of variation, with a perceptible tendency upwards. This is also the case in the scrap market. Very little wrought-iron scrap is heard of on the market. The controlled price for this material ranges from £6 5s. for plates and sectional material ¾ in. thick and over to £5 5s. for material ¼ in. thick and over, inclusive of country wrought iron scrap. Pressure is heavy for pig iron, foundry sorts being particularly in urgent request. There is no modification in the steel situation. Wire rods are coming from the States, at the phenomenal figure of from £28 to £29 Liverpool for open-hearth rods, with usual extras for material of special carbon. Open-hearth billets have a wider range of from £12 to £14, higher carbon qualities costing 10s. to 15s. extra.

Forest of Dean.

Lydney.

COAL.

With the continued scarcity of all qualities of household coals there is little alteration to record in the position of business. The demand absorbs the output at each of the collieries, all of which are hard pressed to keep up deliveries. In the shipping branch of the trade vessels are subjected to a couple of weeks delay in loading owing to long stems. The enquiry from the inland districts is still very active. Great pressure in regard to deliveries still prevails for steam qualities.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	16/6	16/6	15/
Steam coal —			
Large	20/-21/	20/-21/	18/-19/
Small	16/-17/	16/-17/	16/-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Controller has been given authority of fuel stocks on hand, and to distribution of the supply. Coal is being distributed, and an effort made to establish before water transportation closes

THE WELSH COAL AND IRON TRADES.

THURSDAY, JULY 12.

Monmouthshire, South Wales, &c.

Newport.

COAL.

The coal market for this district has been very uncertain for the past week, and business is very much interfered with from various causes. Tonnage is still scarce, and with stocks accumulating, work at the collieries has become very irregular. In some cases the pits are working at less than half time and there may be several stoppages unless conditions improve. Prices are more or less nominal. There has been a good deal of latitude allowed in quotations for prompt shipment. Sellers are holding off for future deliveries, as the conditions make the market so uncertain. Coke supplies are excessive, but patent fuel is quoted at 30s. to 32s. 6d. per ton.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	27/-29/	27/-29/	48/-49/
Western-valleys, ordin'y	24/6-26/	24/6-26/	46/-48/
Best Eastern-valleys ..	23/6-24/6	23/6-24/6	45/-47/
Secondary do.	19/6-21/	19/6-21/	39/-43/
Best small coals	14/6-16/	14/6-16/	26/-28/
Secondary do.	9/-12/	9/-12/	23/-24/
Inferior do.	6/-8/6	6/-8/6	20/-21/
Screenings	15/-17/6	15/-17/6	27/-28/
Through coals	19/-21/	19/-21/	25/-30/
Best washed nuts.....	—	—	30/-33/
Other sorts:—			
Best house coal, at pit ..	25/-26/	25/-26/	22/-24/
Secondary do. do.	22/-23/6	22/-23/6	20/-22/
Patent fuel	30/-32/6	27/6-30/	55/-60/
Furnace coke.....	—	—	50/-52/6
Foundry coke	—	—	61/-62/

* Nominal.

IRON.

There is still great activity in all departments of the iron and steel industry. Extensions of works are in progress or in preparation in many cases and new plant is being installed. The tin-plate trade is showing an improved outlook. Prices of pitwood have fallen during the past few weeks. Quotations this week were 65s. to 67s. 6d.

Cardiff.

COAL.

The market position has undergone very little change, and business has been almost at a standstill so far as new transactions are concerned. The committee dealing with the classification of the collieries has not completed their work, but it is anticipated that the results will be published by the end of the week. Sittings have continued almost daily, and Tuesday was devoted to hearing appeals against their decisions and to arrange various matters of detail. It is satisfactory to note that in the large majority of cases the committee's classification has been accepted, but in other instances an appeal has been made for reconsideration, and at the time of writing these points were being investigated. In cases where the decision of the committee has been accepted the collieries have intimated that they are prepared to do business, but buyers are still hanging back pending the publication of the complete schedule. It is stated that 14 collieries have been classified as producing best Admiralty coals, and a similar number turning out best seconds. Those working ordinary seconds and ordinary steams are 12 and 14 respectively. The great difficulty has been to satisfy these various interests, and it is anticipated that within a few days the market will assume practically normal conditions. The tonnage position has also been difficult, and for the last three days of the week there were no fixtures reported at all. The total for the week was 20,250 tons, compared with 22,910 tons in the preceding six days, an amount which, of course, is totally inadequate to meet the requirements of the port. Vessels arrived rather more freely over the week-end, but stocks are excessive, and the shortage of empty wagons in a number of instances caused stoppages at certain collieries. All business is being transacted in accordance with the Government scale of prices, but pending the completion of the classification scheme, the rates at which the coals have been sold are subject to revision.

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	—
Ordinary	30/	30/	48/-50/
Best bunker smalls	23/	23/	29/-30/
Best ordinaries.....	21/6	21/6	26/-28/
Cargo qualities.....	20/	20/	20/-25/
Inferior smalls	18/	18/	19/-23/
Best dry coals	30/	30/	46/-48/
Ordinary drys	28/6	28/6	45/-47/
Best washed nuts	30/	30/	—*
Seconds	28/6	28/6	—*
Best washed peas.....	27/6	27/6	—*
Seconds	26/6	26/6	—*
Dock screenings	—	—	—*
Monmouthshire:—			
Black Veins	30/	30/	47/6-48/
Western-valleys	29/	29/	47/-47/6
Eastern-valleys	29/	29/	44/-45/
Inferior do.	28/	28/	43/-44/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	23/-24/
Second qualities (at pit)	30/9	30/9	22/-23/
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	47/-48/
Through-and-through ..	—	—	38/-40/
Small	26/	26/	32/-34/
No. 2 Rhondda—			
Large	27/	27/	35/-37/6
Through-and-through ..	25/	25/	30/-33/
Small	20/	20/	23/-25/
Best patent fuel	30/-32/6	30/-32/6*	50/-55/
Seconds	28/-30/	—	48/-50/
Special foundry coke	47/6	47/6	62/6-65/
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	67/6-70/	70/-72/6	39/-41/

* Nominal.

There has been a glut of small coal, and in some cases banking is again being resorted to in order to clear wagons. It is announced that coal owners selling direct to ship owners for bunkering purposes are entitled to charge 5 per cent. for exporters' services, and this will be in addition to the fixed schedule. Patent fuel is in moderate demand at 30s. to 32s. 6d. The scarcity of trucks has had the effect of reducing pitwood prices, and quotations are now on the basis of 67s. 6d. to 70s. per ton.

IRON.

The firmness of the tinplate trade is well maintained, the only drawback being the difficulty in obtaining raw material. The demand for bars for munition purposes is so great that the tinplate manufacturers cannot get a sufficient supply to keep the mills running regularly, and temporary stoppages are reported in most districts. Receipts from works last week amounted to 34,644 boxes, and shipments were again heavy, chiefly on French account, amounting to 55,723 boxes, leaving 90,495 boxes in stock in the dock warehouses and vans, compared with 111,554 boxes the previous week, and 229,360 boxes a year ago. For certificate work makers are obtaining 36s. to 37s. for Bessemer standard cokes, 14 × 20, but for stock plates for uncertificated orders there was no difficulty in realising as much as 42s. to 43s. per box. Tinplate bars are nominal. All the blast furnaces and steel works are operating at high pressure, and outputs are well maintained. Rail mills are busy, especially in light sections. In the galvanised sheet trade there is no change, the works being chiefly engaged in the production of black plate, painted sheets, and French plates for Government purposes. Quotations are nominal. Iron ore imports continue to be satisfactory, prices being in accordance with the regulations. The same applies to dealings in scrap metals.

Swansea.

COAL.

The trade of the port last week was less active, owing to the limited supply of tonnage available; the shipments of coal and patent fuel amounted to 60,565 tons. The market remains quiet, the tonnage situation being still unfavourable. Anthracite nuts and other machine-made sizes were firm and difficult to obtain, but all other classes were plentiful. Steam coals were quiet. There was a good demand for bituminous coals for inland consumption.

Llanelli.

COAL.

There is little change to report as to the state of the local market. Collieries are having many idle days through shortage of wagons. Anthracite large kinds are very easy and stocks heavy. Machine-made qualities are in good request, and sellers find it impossible to guarantee early delivery. Steam coals are irregular owing to the tonnage position, and large kinds are offering more freely. Throughs are not very firm, and supplies of small grades are very plentiful. House coals are scarce, and merchants booking all available supplies.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Anthracite:—			
Best malting large	30/	24/-25/6	31/6-33/6
Secondary do.	29/	21/6-23/	28/6-29/6
Big Vein large	—	19/-20/	27/-29/6
Red Vein do.	25/6	18/-19/	25/6-27/6
Machine-made cobbles...	42/6	32/6-35/6	36/-38/6
Stove nuts.....	—	32/6-35/	35/6-39/
French do.	—	34/-36/	36/6-37/6
Paris do.	—	34/-36/	35/6-38/6
Machine-made beans ...	35/	28/6-30/	32/6-34/6
Do. peas	26/	20/6-22/	22/-23/
Culm	13/	10/6-11/6	13/-13/6
Duff.....	6/6	5/3-5/6	5/-5/6
Other sorts:—			
Large steam coal	30/	25/6-26/6	37/6-39/6
Through-and-through...	25/	20/9-22/3	28/6-32/6
Small	19/	9/6-13/	20/-22/
Bituminous small coal...	24/	17/6-19/	27/6-29/6

Heriot-Watt College, Edinburgh.—Complete courses of training for mechanical, electrical, and mining engineers are announced. The diploma course in engineering lasts for three years, and arrangements exist for shortened apprenticeships with local mechanical and electrical engineering firms. The course in mining extends over three years, and is recognised by the Home Office as equivalent to two of the five years' underground training required of candidates for the colliery manager's certificate. The training in mining is also recognised by the University of London for the purpose of the B.Sc. (Lond.) degree in mining. An entrance bursary of £25 per annum is offered for competition on September 25. Schedules can be obtained on application at the college, or to the clerk, Heriot Trust Offices, 20, York-place, Edinburgh. For full particulars, apply to the principal at the college. Information relating to the new scheme for engineering degrees in civil, mechanical, and electrical engineering, arranged with the University of Edinburgh, appears in the calendar of the university and the calendar of the Heriot-Watt College.

University of Birmingham: School of Mining.—The session commences on October 2. The School of Mining meets the requirements of those who intend to become practising and consultative mining engineers, petroleum technologists, colliery managers, managers of metal mines, teachers of mining, mine surveyors, land and estate agents, land owners, owners of collieries, and those generally interested in mines and quarries. The degree course includes instruction in mathematics, physics, chemistry, geology and mineralogy, mechanical engineering, electrical engineering, civil engineering, mining (coal, petroleum and metal), and metallurgy, assaying, and petroleum refining. In connection with the mining classes, there will be frequent visits of inspection to mines in the neighbourhood of Birmingham, and a summer mining school will also be held in the long vacation in some mining district either at home or abroad. The mining courses are so arranged as to provide for degree course, three years; diploma course, three years; occasional mining students, a complete course in one year. A complete course of petroleum mining engineering is given in the University. The course of study extends over three years, and leads to the degree of B.Sc. Full particulars may be obtained from the secretary of the university.

SOUTH WALES MINING TIMBER TRADE.

The imports of foreign mining timber into South Wales ports for the week ending July 6 amounted to 9,919 loads, a total much below the usual. The following were the actual cargoes:—

Cardiff (Barry and Penarth):—

Date.	To—	Loads.
July 2—	Franklyn Thomas	700
.. 2—	Lysberg Limited	600
.. 3—	Lysberg Limited	780
.. 3—	Grant Hayward	168
.. 5—	Lysberg Limited	840
.. 5—	Morgan and Cadogan	1,020
.. 5—	Lysberg Limited	3,120
.. 5—	Morgan and Cadogan	180
.. 6—	Morgan and Cadogan	240
.. 6—	Budd and Company	158

Total..... 7,806

Newport:—

July 5—	Powell Duffryn Coal Company ..	1,052
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Swansea:—

June 30—	Morgan and Cadogan	163
July 2—	Morgan and Cadogan	118
.. 2—	W. Davies and Company	150

Total..... 431

These imports came from France, and of the total the agents for the Admiralty collieries received 5,340 loads, a colliery company which prefers to import direct 1,682 loads, while the balance, 2,897 loads, was received by other importers. There was an exceptional demand for mining timber throughout the district, but despite this, and the poor imports, market quotations were weakly held. Fir price cutting ensued by importers who were faced with heavy demurrage costs. The shortage in the supply of vessels in South Wales ports has been accentuated of late, and empty wagons were most difficult to procure. In order to secure wagons quickly, and so save demurrage costs, concessions in prices were extended to collieries. Quotations ranged from 70s. to 72s. 6d., but in places lower levels were put forward. Thus, at a time when the demand for wood is urgent, and the supply small, the anomaly of weak prices has been displayed.

The Imports for June.

The total imports of foreign timber for the past month were as follow:—

Consignees.	Cardiff.	Newport.	Swansea.	Port Talbot.	Totals.
	Loads.	Loads.	Loads.	Loads.	Loads.
Budd and Co.	720	—	—	—	720
Grant Hayward and Co.....	444	—	168	—	612
Lysberg Ltd.	45,410	—	170	—	47,205
T. P. Thomas & Co. —	—	960	—	—	960
Blane, Wright and Martinez	3,000	—	—	—	3,000
James & Emanuel ..	3,000	—	—	—	3,000
Powell Duffryn Co. 5,185	—	3,132	—	—	8,317
Morgan & Cadogan 6,382	—	—	263	—	6,645
E. Marcesche & Co. 2,580	—	—	—	—	2,580
Vyvyan Kelly	1,330	—	—	—	1,330
Tredegear Iron and Coal Co.	1,008	—	—	—	1,008
Franklyn Thomas ..	1,250	3,000	—	—	4,250
Mitchell and Co....	100	—	—	—	100
Evans and Reid ...	—	660	—	—	660
Pitwood Growers Ltd.	—	1,980	—	—	1,980
Wm. Davies & Co. —	—	—	112	—	112
S. Williams	—	—	125	—	125
E. W. Cook and Co. —	—	—	—	100	100
Totals	70,409	9,732	838	1,725	82,704

This is much below previous months, and a greater demand for home-grown wood naturally arose. Grave difficulties are ahead. Pitwood merchants, a number of whom are themselves owners of forests in this country, have declared that the next few months will witness a probable shortage in the supply of mining timber, which may prove serious for the collieries. Each month will necessitate going further afield for supplies, until a point will be reached in which transport and other charges will make the proposition a most uneconomical one. It is to be hoped in the interests of the community that the submarine menace will have been overcome before this point is reached.

THE IRISH COAL TRADE.

THURSDAY, JULY 12.

Dublin.

Stocking for future use is the principal feature. As supplies are cut off from Yorkshire, Derbyshire, Staffordshire, and Nottinghamshire, there is a largely increased demand upon Scotch coal, which has hitherto principally been used in Dublin for steam purposes. Routes from Scottish ports being longer, and tonnage scarce, freights have advanced considerably since the Coal Controller's Order was issued, and coal prices are now very high. Quotations are as follow: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; slack, 35s.—all less 1s. per ton discount. Irish coals at the Castlecomer Collieries, co. Kilkenny, are: Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d.—all at the pithead. Coals from the Wolfhill Collieries, Queen's County, are: Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.r. Athy, on the Great Southern and Western line. A demand has been made by the dockers for 1s. 6d. per ton overtime after 6 p.m. Some time ago an agreement was reached by which 9d. per ton was paid for continuous work until cargoes were cleared, but the dockers now demand a tonnage rate of 9d. to apply from 6 to 6, and for work done from 6 to 10 p.m. 1s. 6d. an hour overtime, in addition to the tonnage of 9d. It is stated that some substantial concessions have already been made to the coal labourers.

Belfast.

Large consignments of Scotch coal are arriving in the port to replace English coal, which is now almost unobtainable, and considerable quantities are being conveyed inland where there is generally a good demand for Scotch coal. Prices all remain unchanged, viz.: Best Arley, 43s. 6d. per ton; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Scotch, 39s. 6d.; Orrell slack, 39s. 6d.; coke, from about 40s. to 48s. per ton. Irish coal at the Craigahulliar pits, Portrush,

co. Antrim, is 14s. per ton, and 30s. per ton delivered in Belfast. From June 17 to 30, the total number of coal laden vessels arriving in the port was 134. Turf cutting is proceeding briskly in the bog districts, in order to cope with any possible shortage of coal in the winter, all available labour being engaged in the industry.

THE LONDON COAL TRADE.

THURSDAY, JULY 12.

Traders are keenly interested in the new regulations issued by the Controller for traffic after September 9. During the week a better supply of house coals has been brought forward, and both the north and the southern districts of the Metropolis are now fairly supplied. Buying is still eagerly progressing, for the unusual number of orders from householders, as well as from large consumers, keeps the delivery trade exceptionally busy. So far very little increase of stock can be observed at the various wharves and depots, but it is not at all surprising that very little coal can be put on the ground when it is considered how heavy the orders have been for getting a fair winter's supply for the general public. Steam coals and small nuts are very scarce, but kitcheners' cobbles and bakers' nuts have had a good demand, and are moving freely. Whilst so little free coal has been offered by the colliery representatives, the bulk of the transactions have been between the factors and merchants, who are fortunate enough to have a fair monthly quantity coming forward. The Limitation Act frequently prevents any wide circulation of trade from factors to other factors, but a good deal of accommodation business has been done between merchants and merchants at the same depot or railway station. The railway companies are undoubtedly bringing the loaded wagons forward with greater regularity and promptitude, and for the most part empties are running more freely now. The withdrawal of so many locomotives to the war area has not affected the summer trade much at present, but the busy time when the perishable goods will utilise so much of the railway traffic, is yet to come. It has proved itself already an inestimable boon that the Coal Controller has urged householders to lay in a good stock as early as possible. The freight market is still slow on account of the short supply of vessels, and chartering is in consequence very dull. Freight rates are high, but have lowered from 20s. to 18s. for London. The coke trade is reported firm. Thirty-eight vessels were reported as entering the River Thames for Monday's market and nine for Wednesday. All were contract cargoes. No vessels have arrived for the open market. On Monday last the ringing of the bell during the middle of the market denoted something unusual. The chairman of the Coal Merchants' Society, Mr. Geo. Warren introduced Col. Illingworth and another Army friend, who very feelingly introduced the claims of the French Red Cross Society. It was decided to make up a subscription list on the Coal Market. The question of the area mentioned in the Coal Controller's latest intimation is already giving rise to a good deal of uneasiness on the London market. The London district covers such an enormous multitude of houses and factories that supplies are invariably sought from every possible coal field. To limit or prevent any one of them from sending to the Metropolis may lay a very heavy burden upon the nearest coal fields.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, JULY 6.—The demand for seaborne house coal continued good, but in consequence of the scarcity of supplies no sales took place. Cargoes, 27.

MONDAY, JULY 9.—The demand for seaborne house coal continued. No supplies were available. Arrivals, 38.

WEDNESDAY, JULY 11.—There was no fresh supply of seaborne house coal cargoes on offer. No sales reported. Cargoes, 9.

THE BY-PRODUCTS TRADE.

Tar Products.—No alteration in London and provincial quotations is to be noted, and beyond a few forward enquiries for pitch, there is little to report. Average provincial prices are as follow:—Tar (gas works), 20s. 6d. to 24s. 6d. Pitch, east coast, 16s. 6d. to 17s. 6d. per ton; ditto, Manchester, 15s. 6d. to 16s. 6d.; ditto, Liverpool, 16s. 6d. to 17s. 6d.; ditto, Clyde, 17s. to 18s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 1s. 8d. to 1s. 9d. Heavy naphtha, north, 1s. 2d. to 1s. 3d. Creosote, in bulk, north, 3½d. to 3¾d. Heavy oils, in bulk, north, 3¾d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia. — A good demand prevails, at official quotations.

Coal Sweepings on Vessels.—The Chamber of Shipping has been enquiring in respect of the removal and sale of coal sweepings on British vessels at foreign ports. The Board of Trade had been given to understand that such sweepings were regarded as the perquisite of the mate of a ship. From opinions collated throughout the country, such sweepings can in no wise be regarded as a perquisite of any member of a ship.

Financing of French Coal Imports.—With a view to facilitating payment for coal imported from Great Britain, the Minister of Finance, M. Thierry, in co-operation with the Bank of France, has issued the following regulations:—Henceforward importers will pay into the Bank of France, either directly or through their bankers, and on the basis of the average official rate of exchange for the day, francs equivalent to the amount in pounds sterling necessary for the discharge of their obligations. The Bank of France will then transmit an order for payment to the Financial Agency of the Treasury in London, which will thereupon make the payment in pounds sterling. Along with their payments, importers are required to furnish, in addition to the commercial documents showing their indebtedness, a copy of their import licence. These documents will be endorsed with a note showing the sums paid, and the corresponding coal tonnage.

MINING INDUSTRY AND MILITARY SERVICE.

A satisfactory arrangement has been arrived at between the military representatives and the mining industry. Snowdown and Tilmanstone collieries, Kent, have been the recruiting of men employed at these mines. The position would have been serious had the large proportion of the employees been taken who had received notification that their exemptions were to be withdrawn. Special colliery tribunal meetings have taken place, and as the result of the explanations of the position, the mines are to be left with a reasonable amount of labour.

The recruiting tribunal sitting at Swansea dealt with the cases of 11 Class A men, most of them married and employed at a local fuel works. The employer's representative stated that they were loaders, and their work was of national importance. Formerly the firm had 81 men, but at the present time only 56, which meant a daily loss of 750 tons. The works were now supplying 350,000 tons of fuel to the Allies, and they could not get substitutes who would stick to the work. The tribunal refused the application, referring the firm to the munitions area dilution officer.

At Seaham Harbour, the South Hetton Coal Company Limited applied for conditional exemption for two wagon riders, a coal teemer, a coal trimmer, and a wagon shunter. It was stated that, prior to the war, 44 men were employed on the coal staiths, and there were now only 23 left. It would be impossible to carry on the work of coal shipment if more men were taken. One man, passed A, was ordered to join up in 14 days, and another, B1, was given a month. The three others were exempted.

At Tanfield, the position of a chief bill clerk, classed A, aged 34, married, with five young children, was considered. It was stated that he had been bill clerk and cashier for 18 years. The colliery manager said that three clerks had already been released, and the whole of the output was required by the Government. The Controller had since issued so many new forms that, so far from being able to do without that clerk, he would really need an extra one. The Controller evidently thought so too, for he was trying to get such clerks exempt. The speaker handed the chairman a letter as to the recruiting of colliery clerks, showing that the matter was under consideration. The Controller himself thought that colliery clerks should be exempt. Could not the tribunal see its way clear to await the decision of the War Office? The tribunal decided to grant exemption till July 31, with leave to appeal, pending the decision of the War Office as to the position of colliery clerks.

The Hebburn tribunal protests against the manner in which the higher military authorities have prevented the recruiting officer carrying out the instructions of the tribunal in the cases of three men employed at Hebburn Colliery. In one instance, the man, a cartman, had been ordered to join up, but the War Office had cancelled the calling-up notice, it being argued that the man was a timber haulier. In that instance, the matter is still unsettled. In the two other cases, the men were conscientious objectors, who had been dismissed from the colliery. They appealed to the tribunal, and were granted non-combatant service. They were called up for May 30, but, on that day, Mr. Robson, of the Durham Miners' Association, asked the military representative to suspend the calling-up notices for 48 hours, as there was to be a meeting of the miners next day, at which he wanted the two men to be present. Therefore the calling up was postponed until June 1. On that day, Mr. Robson communicated with the military representative, stating that it would be advantageous to everyone concerned if the matter were dropped, and the men allowed to remain where they were. The military representative refused to act on this suggestion, but next day received a telegram from the War Office suspending the notices, and asking for a report on the two cases. He forwarded the report and received instructions that the notices were to be suspended until further orders, as there was to be a trade union council meeting on June 30. He has not yet received further instructions. The Tribunal has passed a resolution of protest against the War Office's action.

The Abertillery tribunal received a letter from Mr. George Barker, miners' agent, on the subject of the recruiting of miners. Mr. Barker pointing out that the Federation had urged that discretion should be exercised in sending away men who were indispensable. He suggested that the cases should be referred to the colliery recruiting court. Mr. Boots, chairman of the authority, however, could not agree with the suggestion. He remarked that a boy of 17 years and 10 months might go to work in the mines on purpose to escape military service, and this tribunal would, under such a suggestion, be supposed not to touch him.

THE TIN-PLATE TRADE.

Liverpool.

There has been a good demand for released sizes, and as much as 42s. 6d. basis has been paid. Values of these plates will probably go still higher, as no relief in restrictions can be expected. Consumers will do their best to keep going at all costs. The tone of the market generally is firm, but it is difficult to get makers to quote at all at present; they are all so fully booked up, and behind in deliveries. For class A, 35s. has been accepted for IC 14 x 20 cokes, and 35s. to 36s. may be taken as about to-day's figures, f.o.b. Wales, but early delivery is impossible. Squares and odd sizes are hard to place. 36s. 6d. to 37s. basis at least would be asked for an approved specification in coke finish, f.o.b. Wales, delivery towards end of the year. Restricted sizes in wasters are quoted at about 33s. basis, f.o.b. Wales, but the supply is very limited. "Free" sizes are worth anything from 7s. 6d. to 10s. more money. All f.o.b. Wales, less 4 per cent.

The business of the French Coal Committee and of Maritime Transport has been transferred from Canada House, Kingsway, to the new offices of the High Commissioner of the French Republic, 4, Buckingham-gate, London, S.W. 1.

Notification of Slag Dumps.—The Secretary of the War Office makes the following announcement: The attention of quarry owners, managers, or other persons concerned in the quarrying or output of road materials in quantities of 100 tons or more, is drawn to the notification in the London Gazette of June 26, 1917, whereby they are required to furnish full details of their output and labour to the Secretary of the Road Stone Control Committee, No. 35, Crown-gate, London, S.W. 7, on forms to be obtained from him.

THE AMERICAN COAL TRADE.

The American market continues very unsettled, *Coal Age* (June 16), though with an undecidability downward. A great deal hinges on Government requisitions. There is a bearish tone to the market at Hampton. Though prices are unchanged. So far there is no light increase in shipments from the mines, but labour difficulties seem to be lessening and the railroads are making consistent efforts to increase car supply and improve movement. Prices for Pocahontas and New River run-of-mine for coastwise and export shipment are about 7-50 dols. gross ton. Philadelphia experiences very little change in demand. Prices per gross ton, f.o.b. cars at mines, are as follow: Georges Creek Big Vein, 6 to 6-25 dols.; South Fork Miller Vein, 6 to 6-25 dols.; Clearfield (ordinary), 5-50 to 5-75 dols.; Somerset (ordinary), 5-50 to 5-75 dols.; West Va. Freeport, 5-25 to 5-50 dols.; Fairmont gas lump, 5-50 to 5-75 dols.; Fairmont gas, mine-run, 5-25 to 5-50 dols.; Fairmont gas, slack, 5-25 to 5-50 dols.; Fairmont lump, ordinary, 5-25 to 5-50 dols.; Fairmont mine-run, 5-25 to 5-50 dols.; Fairmont slack, 5-25 to 5-50 dols.

Spot prices in Baltimore have stiffened. Prices to the trade at the mines are about as follows, the gross ton: Georges Creek Tyson, 5-25 dols.; Somerset, 5 dols.; Quenahoning, 5 to 5-25 dols.; Clearfield, 5 dols.; Freeport, 4-75 dols.; Fairmont gas, three-quarter, 5 dols.; run-of-mine, 5 dols.; slack, 4-75 dols.

In the anthracite market the slowly tightening grip of the Federal Trade Commission is the dominant feature. The prices per gross ton, f.o.b. cars at mines for line shipment, are as follow: Broken, 5 dols.; egg, 4-15 dols.; stove, 4-40 dols.; nut, 4-50 dols.; pea, 3-10 dols.; buck, 2-90 dols.; rice, 2-40 dols.; boiler, 2-20 dols.; barley, 1-90 dols.

Freight rates on coal by steamer to Europe remain unchanged: West Coast Italy and Marseilles, 100 dols. about; Spain (Atlantic), 30 dols. to 36 dols.

INDIAN AND COLONIAL NOTES.

India.

Production and Consumption of Coal in India.—The report issued by the Department of Statistics states that, whilst in 1878-1880 the average annual output of the Indian collieries was less than a million tons, in 1915 the total was more than seventeen times that figure. Within the past ten years in expansion has been most marked, the output of 17,104,000 tons in 1915 comparing with a production of 8,417,000 tons in 1905. India has now to rely entirely on her own coal resources, the imports having fallen from 445,000 tons for the first nine months of the year preceding the war to 23,525 tons last year, of which 1,199 tons only were drawn from the United Kingdom, the balance being imported from Natal, Australia, and Portuguese East Africa. The coal exports from India during the nine months ending December 1916, were 661,031 tons, of which 386,692 tons went to Ceylon and 128,000 tons to the Straits Settlements.

With the extension of railways and the development of industries, there has been an enormous increase in the consumption of coal in India, the estimated total for 1915 being 16,541,000 tons, of which the railways absorbed 5,187,000 tons. The estimate for the railways, however, relates to the official year 1915-16. The consumption by jute mills in 1915 is estimated at 886,000 tons, by cotton mills at 1,121,000 tons, by iron and brass foundries at 1,332,000 tons, and by brick and tile manufactures at 1,197,000 tons, while bunker coal is stated at 868,000 tons. Inland steamships took 619,000 tons, and tea gardens consumed 165,000 tons. Consumption at the collieries and wastage are computed to have accounted for a further 1,710,000 tons, leaving a balance of 3,296,000 tons for other forms of industrial enterprise and for domestic purposes.

No less than 85.5 per cent. of the entire coal output of India is now raised in the Raniganj and Jherria fields, the production of the former in 1915 being 5,485,000 tons and of the latter 9,141,000 tons. Of the total mining population, moreover, numbering 160,086, over 137,000 were employed in the collieries of Bihar and Bengal. The question of the labour supply presents difficulties which are not encountered in countries where mining is a special calling, and with the increase in the depth of working the need for a skilled mining class will become accentuated, whilst if the price of coal remains at a sufficiently high level, further development in the introduction of coal-cutting plants may take place.

Africa.

Transvaal Mining.—Expectations of an increased local consumption and export trade after the war have led to considerable activity in the Transvaal coal area. Among the latest areas to lay claim to consideration as sources of coal supply is that lying between the Springs and Bethal districts, within comparatively easy reach of the Witwatersrand. The existence of coal measures there has been a matter of common knowledge for many years, but the former inaccessibility of the field and the somewhat indifferent results obtained in shallow boreholes, even after the railway had encouraged the commencement of exploratory work, combined to retard the opening up of an area which was otherwise well situated. More recently, however, some of these boreholes have been deepened, with results that are very gratifying. Near Leslie Station, on the Johannesburg-Bethal-Breyten line, two boreholes have been put down to depths between 300 and 400 ft. One of these has struck an upper seam of coal at a depth of 315 ft., with a thickness of 3 ft. On continuing this bore, a second seam, 6 ft. thick, was found at a depth of about 391 ft. The hole was continued for another 8 ft. 3 in., and remained in coal measures, and it is considered not unlikely that a third seam may be discovered in depth. In a second borehole, a mile or more distant from the first, the upper 3 ft. seam was met at a depth of 236 ft. 10 in., while the lower seam, 8 ft. in thickness, was encountered at 311 ft. 6 in., together with a seam of carbonaceous shale 3 ft. 3 in. thick. The main coal is of excellent quality, with few impurities, and the bands, so that the operation of working is reduced to a minimum, while the thickness of the seam allows of very economical working. The coal is of a high grade, and sandstones which overlie the coal are not found in the Witbank working districts, and for this reason the boreholes are located in a

higher horizon of the coal measures than that which prevails generally in the Transvaal coal field. Several farms have been taken up for exploratory purposes in this neighbourhood, which is about 60 miles due east of Johannesburg and midway between the Pretoria-Delagoa Bay and Johannesburg-Durban main lines of railway.

Australia.

Coal Mining in 1915.—The report of the Department of Mines for 1915 states (relative to Western Australia) that six coal mines were working on the Collie field, and the output for the year was 286,666 tons, value £137,859, being 32,544 tons less than in 1914, when the output was valued at £148,684. This was largely attributable to a reduction in operations on the Scottish Collieries mine, difficulties with an inflow of water having been experienced. There was also a falling-off in the bunkering trade. The number of men employed, 498, was less by 27 than in 1914, and the output per man in 1914 was 608 tons, and 575 tons in 1915. There was steady development in most of the mines, and several of them were in a position to keep up their present output for several years. The industry suffered from the war, and a large number of the miners had enlisted and gone to the front. The outlook, however, was good. Two men were killed by mine accidents (both underground) in 1915.

Queensland Coal Production in 1916.—The annual report of the Queensland Under-Secretary for Mines gives the total output in 1916 from the collieries working in the various districts of the State as 907,121 tons, valued at £389,348. These figures, compared with the figures for 1915, when the output was 1,024,273 tons, valued at £409,342, indicate a decrease in quantity of 116,546 tons and in value of £19,994. The average value of the coal at the pits' mouth—viz., 8s. 6-9d.—was 7d. per ton higher. About one-third of the Ipswich output of coal was shipped for bunker, cargo, and other purposes, the actual quantities being—Shipped from the South Brisbane Railway wharf 205,511 tons; from the Adelaide wharf, 10,413 tons and from the Maryborough wharf, 5,661 tons; total, 221,585 tons. These figures show a decrease in the quantity shipped when compared with those of 1915 of 74,456 tons. Twenty-nine collieries were working in the Ipswich district during the year—seven in the Darling Downs district, four in the Wide Bay and Maryborough, four at Blair Athol, and one each in the Rockhampton and Chillagoe (Mount Mulligan) districts. The average value at the pit month throughout the year works out: For the Ipswich district at 7s. 11d. per ton, for the Darling Downs district at 9s. 9-7d., and for the Maryborough or Burrum district at 12s. 2d., the corresponding figures for 1915 being 7s. 3-15d., 8s. 10-6d., and 11s. 10-4d. For the Clermont or Blair Athol district the average was 7s. 9-3d., compared with 7s. 7-95d. per ton in the previous year. The average value per ton at Mount Mulligan was 13s. 4-3d., that of the previous year being 12s. 6-95d., while the average value in the Central district (Bluff) was 9s. 6d. per ton, compared with 8s. 5-9d. in the previous year. Further prospecting and development work has been carried out in the Ipswich district. Two more collieries were contributing to the output at the end of last year than was the case at the end of 1915, and the New Aberdare shaft was completed, and also the Eclipse tunnel, from which coal is now being produced. A considerable amount of development work was carried out by the Government at the Warra State Coal Mine, and the sinking of a new and larger working shaft is in progress. Extensive boring operations for coal were also carried out by the Government at Bowen, and bores also put down at Burrum, at Styx River (Central district), and on the Bowen River coal field. The production in the Darling Downs district shows an increase compared with that of the previous twelve months of 2,100 tons. In the Maryborough and Burrum districts the coal trade was adversely affected by unsettled conditions regarding the selling price to the Railway Department, and this had the effect of reducing the number of working days per week. The output was also affected by the industrial dispute during the month of November. The matter of the selling price was subsequently agreed upon, and at the close of the year work was proceeding under more normal conditions. In the Central district Bluff Colliery worked continuously on tribute without any development of importance taking place, and the output continued to decrease. No further work was done in the Mammoth coal areas. At the end of the year operations were commenced at the Dawson River coal areas by the Mount Morgan Company with the object of mining 300 tons for further tests of the coal, but operations were temporarily suspended owing to the heavy floods which occurred at the end of the year. At Blair Athol, in the Clermont district, operations were vigorously carried out during the year, the number of pits in operation having been increased by two, and in the Chillagoe district further development was carried out at the Mount Mulligan Coal Mine, where the year's operations show an increase of trade amounting to 5,740 tons, the total output of coal from the mine being 15,281 tons during the year.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—July 10.

Coal Supply (London).

Mr. GILBERT asked the President of the Board of Trade whether the scheme of the Coal Controller for dealing with the coal supply of London during the winter months had been circulated to the Metropolitan local authorities who attended the conference on the matter called by the Local Government Board; and, if not, when would it be issued.

Mr. GEORGE ROBERTS stated, in reply, that a draft scheme for dealing with the coal supply of London during the winter months had been completed by the Controller of Coal Mines, and circulated among all local authorities within the Metropolitan Police area.

The Ministry of Munitions announces that no new or second-hand machinery can be purchased, hired, or transferred without its sanction.

The estate of the late Mr. J. Roberts, formerly manager for Messrs. Cory, Yeo and Company, and for Sir J. T. D. Llewellyn's mining properties, has been valued at £10,780.

Hull Coal Traffic.—The coal traffic through the port of Hull during June decreased by 33,065 tons compared with June of last year. The official monthly returns show that 250,126 tons were imported to Hull last month, compared with 283,191 tons in April last year. For the six months just ended, the imports totalled 1,432,841 tons, against 1,617,052 tons for the corresponding period last year—a decrease of 184,211 tons on the half-year's business.

RESCUE AND RECOVERY OPERATIONS IN COAL MINES.*

By JAMES W. PAUL.

GENERAL ESSENTIALS OF PREPARATION FOR A MINE DISASTER.

Explosions and fires frequently happen in mines that the owners and officials and the general mining public think are immune from such dangers. Many safeguards may have been adopted for the purpose of preventing explosions and fires, but practices tolerated within a mine without a full knowledge of their danger may exact a large toll of life and destroy much property.

Explosions occur more often in mines in which open-flame lamps and black powder are used. So many explosions have occurred in well-equipped coal mines that preparation for emergencies should be made at all mines, especially those where all the known accident-preventive measures are not in use.

The need of preparing for explosions is most evident to one who arrives at the scene of a disaster and finds a total absence of material, tools, and equipment for quick recovery of the men entombed or for quick entry into the mine. Lack of such preparation no doubt has often resulted in unnecessary loss of life among the imprisoned miners, and also among the rescue force.

Instructing Officials.

All the local officials at the mine should from time to time be instructed in what they should do either collectively or singly in case of a mine explosion or of a fire within or without the mine that might endanger the men underground. Especially should all the officials and men in authority over work above ground be instructed as to their duties following such a disaster or accident. To this end, they should be shown where material and tools may be quickly obtained at the mine or supply stations, or from adjoining mines, and from the nearest jobbers, sawmills, planing mills, and wholesale houses. The officials should be so instructed that in the absence of superior authority, they will be able to attend promptly to those things that are of the first importance. They should be instructed to consult a list of persons posted in the various offices, shops, and power or engine houses, who should be immediately notified, giving particular attention to the summoning of the State mine inspector, rescue crews, and doctors.

Importance of Prompt Action.

Failure to act promptly after an explosion or mine fire has often resulted in the needless loss of many lives, especially in the case of fires that at first did not seem to be dangerous. Also, after an explosion unnecessary delay in exploring the near-by entrances to the mine has resulted in the death of miners.

Giving Alarm and Summoning Assistance.

As soon as word of a mine fire or an explosion is received, an alarm should be given and assistance summoned by an official or employee of the mine. In case of fire within the mine or in the entrances, the alarm should be sent immediately to all parts of the mine in order that the men may escape, and efforts be made at once to put out or control the fire. In case of an explosion, aid will necessarily be needed. All employees not engaged within the mine should be hastily summoned to appear near the mine entrance, and help should be asked from near-by mines. The call for assistance should be for mine foremen, fire bosses, electricians, mechanics, hoisting engineers, and timber and brattice men. Reliable men should be stationed at once at all entrances to prevent any but safety or electric lamps being taken into the mine, and to make a written list of all who enter.

Telephone.

In many mines are telephone stations with connections to the surface, and many mines have also telephone communication with adjoining, near-by, and distant mines. Such telephones should not be overlooked after a fire or an explosion. The alarm for a mine fire can probably be given by telephoning to different parts of the mine, and even after an explosion the telephone system may not be destroyed in all parts of the mine; hence effort should be made to call up the inside stations and to ascertain whether any men are alive and able to respond to the call. The telephone should be used promptly for summoning assistance from the nearest mines as well as for informing the State mine inspector and any near rescue station or trained rescue men that can be reached by it.

Assuming Charge.

In many mine explosions the local officials have either been lost or imprisoned within the mine, leaving no official outside with authority to direct affairs. The senior official in authority outside the mine, or in his absence some employee who has previously been instructed as to the proper procedure in case of disaster, should assume charge in order to effect a preliminary organisation for the rescue work.

Organisation.

One of the most important things to be done is to organise and to assign certain duties. The person who has taken charge should hastily confer with all those of practical mining experience whom he has been able to assemble, and should outline a method of procedure, assigning duties as agreed.

Some important directions to be observed after an explosion are as follows:—Keep all air compressors working; if they are not working, start them, so that fresh air can be forced into the mine workings. Shut off all electric power entering the mine, unless this power is on a separate circuit entering a shaft or borehole to drive a ventilating fan. Do this, in order to prevent any live men in the mine who may come in contact with the electric wire from being electrocuted.

* From hand-book issued by the United States Bureau of Mines.

and to prevent a fire or explosion through the short-circuiting of any wires that may have been blown down.

At all mine entrances place responsible guards who will permit no person to enter until orders have been given to explore the mine. During the progress of the rescue and recovery work all entrances should be guarded, and no unauthorised person should be admitted.

Protection of Spectators.

To protect the many spectators who visit the scene of the disaster and to prevent interference in the work of exploring the mine, the shaft and all entrances should be roped off, and guards placed to prevent the curious from gaining admission and crowding the space needed by the rescue men.

Call for Assistance.

A messenger should be sent or a telephone should be used to call the assistance of persons at points distant from the mine. The character of the aid needed is of much importance; men who are experienced in mining and who have had training or experience in mine-rescue or mine-recovery work being most needed. The following persons should always be notified promptly: State mine inspectors and the coroner of the county in which the mine is situated; the local mine-rescue station, and any trained crews of rescue men; the rescue car or station nearest the mine; and the surgeons and doctors in the vicinity of the mine.

To facilitate calling assistance, there should be kept posted near the telephone stations at the mine and office the names and addresses of all of the officials mentioned, so that they may be reached without delay.

Minor Details.

Some of the most important equipment units requiring immediate attention following an explosion are as follows: Ventilating appliances, hoisting appliances, signalling appliances, brattice boards and canvas, props and ties, tools, nails and spikes, and miners' safety and portable electric lamps. An experienced man who has some qualifications as a leader should be detailed to look after each of the units mentioned, and should be furnished such volunteer assistance as will constitute an efficient working force. Each of these foremen should then immediately proceed to perform the duties assigned him, and organise his force into shifts of six or eight hours.

An experienced mechanic should at all times during the recovery work be stationed at the fan, prepared to make any necessary repairs following a breakdown.

A messenger familiar with the plan of the mine should be constantly on duty to carry word into the mine in case the fan stops. If a telephone line has been installed, a man should be on duty constantly at each telephone.

Executive Headquarters.

Some room or building near the entrance of the mine should be designated and used as executive headquarters and placed in charge of some local official or employee who knows where materials, tools, and supplies are available in order that there may be as little delay as possible in supplying volunteers who come from other mines. The foremen of the different gangs of workmen should keep the executive headquarters notified of the progress of their work, so that officials and inspectors on arrival may know just what has been accomplished.

Information Bureau.

The relatives and friends of men imprisoned in a mine are most vitally concerned in the recovery work, and the public in general is much interested in the probable loss of life and the efforts made for promptly exploring the mine in order to rescue the living and to recover the dead.

A local official of the mine should be designated by the manager or the superintendent to take charge of an information bureau in a building somewhat removed from the mine entrance. This official from time to time should give out, for the benefit of the entombed men's families and the public, definite information concerning the progress of the rescue and recovery work.

Such a bureau relieves the grief and anxiety of the relatives and prevents much injurious criticism by outsiders and by the Press.

Commissary and Mess.

After a mine explosion many miners and officials from other mines offer their services. The number of such volunteers is generally so large during the first four or five days following a disaster that the services of all the men cannot be profitably utilised, but they, as well as those whose services have been accepted, must necessarily be fed. For this purpose a commissary and mess should be established. The commissary should be placed in charge of the manager or superintendent of the store, and the mess in charge of an experienced cook, who should be furnished from the commissary the necessary stoves, utensils, dishes, etc., to enable him to supply wholesome food for the men doing the rescue and recovery work. The mess should be assigned to some unused building or part of a building or to a tent. The kitchen should be kept separate from the mess room, and all persons except those engaged in preparing and serving the food should be excluded from it.

To prevent misuse of the mess, the workmen entitled to receive food should be furnished by their foreman with a check or card for each meal served. The check or card should be surrendered during the meal.

Rest Rooms and Sleeping Quarters.

In order that the men engaged in the work may render most efficient service, they must have a comfortable place for rest and sleep. While men are sleeping they should not be disturbed by those who are off duty and awaiting their shift. Hence sleeping quarters should be provided to accommodate half of the total number of men employed in rescue and recovery operations, as at no time will more than half

the men be off duty. The rest room should be separate and apart from the sleeping quarters so that men who are sleeping will not be disturbed.

Morgue and Hospital.

Provision must necessarily be made for receiving the bodies of those killed in the mine disaster, and for preparing the bodies for burial. The improvised morgue should be within a building that is well ventilated and has good drainage facilities. Men may be found alive within the mines, severely burned or so injured as to require hospital treatment, and a building should be selected that can be readily used as a hospital. In the selection of the morgue and the hospital the advice of the local surgeon or physician and undertaker should be sought.

Relief of Dependents.

The shock, grief, and worry caused by mine explosions are such that visiting nurses, physicians, ministers, and priests can do much to relieve and comfort the relatives of those entombed, and the management of the mine should arrange for their presence.

PROCEDURE IN RESCUE AND RECOVERY OPERATIONS.

Temporary Organisation.

In order to get things started and under way with a view to entering the mine as quickly as possible, a temporary organisation is necessary until the officials and the State inspector arrive. It then becomes the duty of the official in charge of the mine or the State inspector, if such authority is delegated to him by the mine management or by law, to effect a permanent organisation. The temporary organisation has been outlined in preceding paragraphs.

Permanent Organisation.

The official or officer in charge should effect a permanent organisation of the force engaged in the rescue and recovery work. There should be one person with supreme authority, and while this person is off duty or is absent from the mine he should delegate his authority to another, so that at all times there will be available a man whom the foremen and workmen recognise as a competent director.

Rescue Organisation.

No feature of the work connected with the exploration of a mine after a disaster is more important than the rescue of persons who may still be alive. This work calls for mature and deliberate judgment on the part of the person in charge. Men who have had experience in exploring exploded mines and men who have been trained in recovery operations and in the use of rescue breathing apparatus should be asked to confer on plans and method of procedure.

In this organisation supply foremen, brattice foremen, and shift bosses are necessary. The supply foremen should be given a sufficient number of workmen to enable them to furnish the brattice men enough material for constructing brattices and stoppings, so that no time may be lost in waiting. The brattice foremen should devote their time to directing the construction of brattices and stoppings for the establishment of ventilation.

Stretchers will be needed for removing the injured and the dead. Carpenters should be set to work constructing stretchers, which may be made of brattice cloth or canvas nailed to boards 7 ft. 6 in. long by 4 in. wide by 1 in. thick. Each stretcher should be not less than 22 in. wide. The handles should be cut to 2½ in. wide, with smooth edges. For carrying the injured, the stretchers should have spacers at each end of the canvas to hold the sides apart.

Trained rescue crews wearing apparatus, as soon as they arrive and have made necessary preparations, should immediately begin to explore the mine in advance of the recovery crews. The details of this organisation are discussed in a subsequent section.

Use of Mine Map.

For quick and efficient work, a map of the mine is indispensable. Blue-print copies of the mine map should be furnished the captains of the rescue crews, the shift bosses, and the official in charge of the recovery work. If a supply of maps is not available one map should be posted near the mine entrance for the convenience of all concerned. A line sketch of a map can be quickly made by an engineer, and will be of much advantage to the rescue and recovery crews. Experience has proved that at least a dozen blue prints of the mine map should be kept at all times in close proximity to the mine.

Locating Men in the Mine.

With the object of recovering living men within a mine after a disaster the first effort should be to ascertain, from a reliable source, in what parts of the mine men were working, and to locate those parts of the mine to which the men might go to get the best air. The rise and dip and the location of pillar work and wet places would be clearly shown on the mine map, as would the position of pumps. Any pumps driven by compressed air may make available a supply of fresh air. Presumably, entombed men will go to those parts that are naturally damp or wet or where compressed-air machinery may be in use, and the first efforts of rescue should be directed to those districts of the mine in which there seems to be the greatest likelihood of finding men alive. If any parts of the mine have been liberating explosive gas, it may be presumed that the explosion originated in one of those. The report of the fire boss should be examined to ascertain in what sections of the mine he has previously found explosive gas. In the absence of such information, the exploration should be made first along those entries of the mine that show indications of least violence and heat. If men got out of the mine immediately or shortly after the explosion, an effort should be made to reach that part of the mine from which they escaped.

Establishing Ventilation.

If the violence of the explosion has not destroyed the ventilating fan or appliances, they should be kept

in operation. The matter of the advantage of reversing the ventilating current is of great importance, and requires a knowledge of the conditions within the mine and of the course of the ventilating currents prior to the explosion. The ventilating current should not be reversed without good reason and the desirability of reversing the current depends entirely on local conditions, the plan of ventilation, and the direction of the current on the main haulage roads and manways. Most of the men alive within a mine after an explosion attempt to escape by their usual road of travel, irrespective of the intake or return currents of air. However, if an underground official or superintendent is within the mine at the time of the explosion he may assemble the men and divert them to a road or manway that he knows is normally on the intake air current. Prompt reversal of the ventilating current has doubtless saved the lives of many men, generally, however, in mines where the fan prior to and at the time of the explosion was forcing the air, and the main haulage roads and manways were on the return current. Reversal of the ventilating current furnished fresh air to the travelling way, making possible the escape of the men. On the other hand, reversing the current has sometimes resulted in an explosion, owing to the explosive gases liberated by the mine or by a fire being moved back over a fire.

There is on record an instance in which the reversal of the ventilating current caused the death of men who were on their way out of a mine, travelling in an entry, which, prior to the explosion, was on the intake current. In general, arbitrary reversing of the air current in a mine ventilated by an exhaust fan is not wise, especially when the main travelling roads are on the intake current.

In the event of the ventilating fan or appliances having been injured, wrecked, or destroyed by the force of an explosion, immediate attention should be given to the repairs necessary for re-establishing the ventilating current. In a drift or slope mine, advantage should be taken of any natural ventilation that has become established. In a shaft mine advantage should be taken of any natural ventilation in exploring on the intake current, especially on ladders and stairways in any shaft through which such natural ventilation is supplying fresh air. Men may be found alive on the stairways. To aid natural ventilation or to establish a current of air in the absence of such ventilation, a spray of water may be directed down one of the shafts to cool the air and cause the shaft to become an intake. On the upcast air compartment a steam jet may be installed to heat the air. The jet should always be placed in the compartment of the shaft in which there are steam pipes, as the heat from the pipes will assist in warming the air and help to make an uptake current.

Procuring and Utilising Brattice Material.

After many a mine disaster no progress can be made in recovery work without re-establishing the ventilation. For this purpose much material may be needed. Some authority at the mine should at once arrange for the quick delivery of a supply of brattice cloth or canvas and 1 in. planks. Near-by mines and saw-mills should be notified to send as quickly as possible such material as may be available. Mine supply stores should be reached by telephone and asked to forward at once by the quickest available method a supply of canvas or brattice cloth. The necessary timber for the support of stoppings is usually on hand at all mines; it may consist of props, ties, and wooden rails. Saws, nails, hatchets, and hammers should be provided in abundance.

Preliminary Examination in Mine.

Before explorations begin a preliminary examination should be made of all openings and escape ways, as men overcome by gases may be found a short distance inside some opening, and observations should be taken to ascertain which, if any, of these openings are acting as intakes for air.

The cage, signalling devices, headframe tower, or derrick may have been wrecked or disabled. Immediate preparations should be made to descend the shaft. To determine whether men are alive at the bottom, signals should be given by pounding on any pipes extending down shafts. Lack of response may be due to the pipes being broken. To make sure, get a ¼ in. rope, fasten to its end a lighted electric hand or flash lamp, a lighted safety lamp, and a small cage containing a canary, and lower them to the bottom of each shaft. If men are alive at the bottom they may see the lights and give some signal or attach a message. The lower end of the rope should remain down five minutes, it should then be withdrawn, and the safety lamp and the canary examined. If the safety lamp is still lighted and the canary alive or not disabled, men may safely descend the shaft, provided no change of ventilation in the meantime would cause the air in the shaft to change from still or intake to an upcast current. The return of the lighted safety lamp and the live canary will indicate that the oxygen content of the air is more than 17 per cent. (pure air contains about 21 per cent.), and that the carbon monoxide content, if any, less than 0.20 per cent.

Descending the Shaft.

The compartment of the shaft that can be quickest used for descent should be chosen, but the choice of a compartment will be governed by the facilities at hand for lowering and hoisting. If an auxiliary hoisting engine is in place, much time may be saved by employing it. A crown pulley or sheave wheel may have to be placed above the shaft. The pulley should have a diameter at least 30 times that of the rope or cable used.

The main hoisting engine may be used, but its use may necessitate the removal of a badly wrecked cage or skip. If the cage is anchored in the headframe, the cable may be passed through the cage and a bucket or float attached. Little progress can be made

bucket except in the early stages. If no bucket on hand, a temporary cage or float should be constructed.

Relief of Hoisting Engineer.

Who is on duty at the time of an explosion should be relieved of his duties as soon as it is possible to procure another qualified engineer. The absence of an experienced engineer usually render the engineer on duty unfit to operate the engine safely.

Signalling.

The code of hoisting signals in general use should be followed. Copies of this code should be posted at the top of the shaft, and be furnished the men who descend the shaft. If the regular signal devices have been destroyed, other methods of signalling must be improvised. It is not safe to rely on any pipe running down the shaft, as it may be broken or entirely absent a short distance down. Hammers may be used for striking the bucket, or a triangle or short piece of T rail may be suspended over the bucket or on the cage or float and be struck with a hammer. Two or more hammers should be taken, as one may be accidentally dropped into the shaft. Automobile horns may be heard in shallow shafts 200 ft. deep. A No. 8 wire may be used to advantage for signalling. The wire should be cut 10 ft. longer than the depth of the shaft, and the upper end should be attached to a counterweighted bar of iron that will strike a suspended plate or circular saw when pulled.

To prevent interruption of the work and to keep unauthorised persons from entering the mine or shaft, guards should be stationed at each opening, as has been stated, and each opening should be roped off. It should be the duty of the guards to see that no person enters any opening with an open-flame lamp or without an official pass in the form of a check bearing a number. Records of these checks should be kept by clerks stationed near the mine entrance.

Use of Portable Telephone.

A portable telephone suitable for rescue and recovery crews is an important adjunct to a recovery outfit, especially for a crew that is descending a shaft and combatting a mine fire. In recovery work an ordinary mine-telephone set and the necessary wires should be installed and be kept well up to the recovery crews. Such a telephone installation is of great advantage in case the ventilating fan stops and facilitates the sending of material where most needed.

In the absence of a telephone, the main entries of the mine should be divided into sections of 500 to 1,000 ft., and competent and reliable men should be detailed to patrol each section to give alarm on the occurrence of danger.

Rescue and Recovery Crews.

Rescue crews are composed of men who are specially trained in methods of rescuing living men from mines. Recovery crews are composed of men who are specially trained in the recovery of a mine and in bringing out the bodies of the dead.

The rescue crews work in close co-operation with the recovery crews, and make explorations in advance of the ventilation for purpose of finding live men, locating bodies, testing the mine air, and looking for fire. In the conduct of the work the members of the recovery crews should not allow themselves to get ahead of the air, so that they breathe the afterdamp, as it will have a bad effect on them and reduce their efficiency. Especially should the foremen of the recovery crews guard against unnecessary breathing of the afterdamp, in order to prevent their usefulness and judgment in directing the crews being impaired and the work delayed. The rescue crews should act in accordance with their previous training and instruction, at all times having regard for their own personal safety. Common sense and good judgment, coupled with experience at mine disasters, are prerequisites for the efficient conduct of rescue operations.

Men wearing the heavy breathing apparatus should not be called on to transport dead bodies except in special emergency, and then for short distances only. Their work is to seek living miners, locate fires, and rescue the recovery crews should they venture too far.

Rescue and Recovery Organisation.

Some recognised authority must be in charge of the rescue and recovery operations. This power should be vested in a man of good judgment, a cool head, and mild temperament. Such a person will confer freely with the men who have tendered their services and will not hesitate to ask for and receive suggestions. Executive charge will automatically go to the senior official of a mine, or to the State mine inspector, if the latter has arrived. The local officials are generally so much disturbed by the horror of the accident that they are glad to turn over the direction of the rescue and recovery work to the State inspector or to other qualified persons. In the early stages it may be necessary for the outside officials and employees to select one of their number to assume charge until the arrival of some more experienced man, such as the State mine inspector.

To make the work efficient, there must be co-operation and harmonious relations between all forces, and there must be an organisation that will push to quick completion the work of exploring the mine. A satisfactory organisation may be outlined as follows: The general manager or superintendent assumes full charge of obtaining all necessary materials and men for the prosecution of the work; the State inspector assumes or accepts authority for the rescue and recovery procedure; the general manager or superintendent and the mine inspector select the foremen of shifts and other foremen, who report to them or their representatives at the close of the shift, stating the progress of the work. The rescue crews should be organised as a part of the rescue organisation, to report to the chief of the rescue organisation, and to report to the mine inspector in charge of the underground

work. When sufficient men are available, the recovery crews should be arranged in six-hour or eight-hour shifts; that is, they should work for six or eight hours. The change of shifts should be made within the mine so that no time will be lost in the changing. In the absence of sufficient men the shifts may be prolonged to eight or ten hours.

The transportation of material into the mine is often made difficult by falls of roof, wrecked mine cars, or other obstructions, the cars and track being temporarily useless, so that the material must be carried or dragged by the workmen. Gangs of workmen should be assigned certain distances over which they must convey the material. In this manner the men become accustomed to the travel over their section, and, as the work advances, they may be moved farther into the mine, and a new crew added on the outside to deliver material at the first station at the mine or shaft entrance.

Checking In and Out.

All men who enter the mine should be given a check with a number, and a record of checks and names should be made, with the date and the hour at which each man enters and returns.

Near the entrance to the mine should be a check room or cabin, out of the line of the drift or slope, and not nearer than 20 ft. to any shaft. At all times there should be a man in charge who records the name and check number of each man who enters and comes out of the mine.

Use of Safety Lamps.

None but safety and approved portable electric lamps should be permitted in the mine during the rescue and recovery operations. Immediately after an explosion the store manager or supply clerk should arrange to obtain 100 safety and 100 miners' electric lamps. If such lamps are not already on hand, requests should be made to near-by mines, and the agents of the lamp firms should be immediately reached by telegraph or telephone. Most lamp agencies keep large quantities of safety and electric lamps ready for immediate shipment.

A safety-lamp room should be established as soon as possible, and be placed in charge of men experienced in the care, cleaning, assembling, and filling of the lamps. Too much thought cannot be given to the selection of men for this important work. After the safety lamps have been delivered to the workmen at the lamp house, and before they are taken into the mine, they should be examined by an experienced and competent lamp man to see that they are complete and properly assembled, and that they have no defective parts. The upkeep, charging, and assembling of the electric lamps should be placed in charge of men who are familiar with the type of lamp used.

Organisation of Rescue Crews.

All men who take part in wearing rescue apparatus should have been trained in the use of the apparatus, should possess a certificate of training issued by some competent authority, and should have passed a medical examination within 10 hours prior to entering the mine. The physical examination may be made by a physician at the mine.

The rescue crews should establish headquarters in some building near the mine. In this building all the apparatus and its accessories should be kept while not in use, unless circumstances are such that headquarters may be safely established at some place within the mine. Rest and sleeping quarters should be provided near the mine and near the outside headquarters. Men engaged in the use of breathing apparatus should keep themselves in the best physical condition, by observing strict regularity in their hours of work, rest, and sleep, and in their diet.

Immediately on the arrival of the rescue men, the chief of the crews should confer with the official in charge and the mine inspector, obtain a map of the mine, and ascertain what has been accomplished. In the meantime the crews should be organised and a captain selected for each crew of five men. The captains should assist the members of their crews in a careful inspection of the apparatus, testing each apparatus and rejecting any that may be defective. A smoke room should be provided or improvised, in which the apparatus may be tested for leakage.

Before entering the smoke room each man wearing apparatus should walk for five minutes at the rate of $3\frac{1}{2}$ miles per hour (cover 88 ft. $3\frac{1}{2}$ times in one minute). The crews should be so organised that one crew will always be in the mine exploring in advance, and a second crew held in reserve at the fresh air base to assist the advance crew if necessary. These crews should work in shifts of four hours, two hours as advance, and two hours as reserve. The crew acting as reserve should remain at the fresh-air base from which the advance crew is working. While acting as reserve, the crew should have their apparatus fully charged and ready for immediate use. The crew that has completed its advance work, upon returning from the mine, should immediately recharge the apparatus, and the crew that is to act next as advance should not proceed until its reserve crew is in readiness for immediate action.

Inspection and Test of Breathing Apparatus.

Men wearing breathing apparatus sometimes have to descend shafts that have been badly damaged, and in doing so may damage their apparatus in climbing in or out of the cage and over debris at the bottom of the shaft; hence it is necessary that a further careful examination of the apparatus be made at the bottom of the shaft before the crew proceeds farther.

Before a crew leaves the fresh air base for exploration work, each apparatus should be carefully examined for the detection of any defect and to make sure that the oxygen is turned on and that the breathing bags are properly inflated.

The bags of all apparatus should be filled with oxygen before the apparatus is worn in noxious gases. To accomplish this the bags should be pressed flat and allowed to fill with oxygen before breathing from the apparatus is begun. About five minutes will be

required for filling with oxygen the bags of apparatus that are not provided with by-pass valves.

Schedule of Operations of Rescue Crew.

To continue the work without interruption, each crew will be on duty for four hours and off duty six hours, or after the first eight hours each crew will go on duty at intervals of 10 hours. This plan of procedure will require five crews, a total of 25 men, and at least 15 sets of apparatus.

If it be assumed that the rescue crews have arrived and are ready to enter the mine at 2 o'clock in the afternoon, their order of shifts would be as follows:—

- Crew A will enter and do advance work from 2 to 4.
- Crew B will act as reserve crew from 2 to 4.
- Crew B will enter and do advance work from 4 to 6.
- Crew C will act as reserve crew from 4 to 6.
- Crew C will enter and do advance work from 6 to 8.
- Crew D will act as reserve crew from 6 to 8.
- Crew D will enter and do advance work from 8 to 10.
- Crew E will act as reserve crew from 8 to 10.
- Crew E will enter and do advance work from 10 to 12.
- Crew A will act as reserve crew from 10 to 12.
- Crew A will re-enter and do advance work from 12 to 2.
- Crew B will act as reserve crew from 12 to 2.
- Crew B will re-enter and do advance work from 2 to 4.

The ideal method of procedure would be to have so many crews that each could be engaged for periods of two hours, and be supported by a crew in reserve at the fresh air base, each crew having a rest of six hours after the completion of its task.

Such a plan would necessitate a fresh crew going on duty every two hours. However, delays and interruptions often do not allow the reserve crews adhering to their schedule of operation, and during their stay in the mine the members of a crew may have opportunity to use only one-fourth or one-half of their oxygen charges. Under such circumstances, the crew should retire and permit the reserve crew to take up the advance work, otherwise the reserve crew will be burdened with the apparatus, which weighs 30 to 40 lb. If an average man wears the apparatus for four hours, whether breathing its oxygen or not, he will have had a sufficient task, and he should be required to rest; otherwise he will impair his efficiency for prolonged effort. However, exception to the rule may be necessary if lives are clearly at stake, and occasions may arise when all the rescue crews will be called into service at the same time.

With a less number of crews the shifts will necessarily have to be arranged to suit the convenience of the crews, consideration being had for the physical endurance of the men. After having worn the apparatus for four hours, and acted as advance and reserve crews, the members should have six hours for rest and sleep before again wearing the apparatus. When a crew comes off shift, the apparatus should be re-charged and put in condition for emergency use. Each member of a crew should then be given as much wholesome food as he desires. After the period of rest and sleep, the members should not eat solid food before resuming their shift, but should partake only of broth, strained soup, milk, tea, chocolate, or coffee.

Rescue crews will often find that their trips into the mine will be governed by the change of shift of recovery and brattice crews, and that necessary changes in the ventilation or delay in advancing the ventilation to the points already explored by the rescue crews will delay exploration. Under such conditions, the chief of the rescue crews should confer with the inspector or official in charge to determine any change desired in the plan of procedure, in order that the greatest good may be accomplished.

Value of Rescue Crews.

Rescue crews often penetrate mines with little assurance of finding men alive, and to the layman their work may appear to be of no advantage; but even if there is no hope of finding living men, the rescue crews will have important work to do in giving assistance to members of recovery crews who venture too far beyond the ventilation, and are overcome by afterdamp. The lives of many members of recovery crews have been saved by the prompt work of the rescue crews.

The rescue crews should observe every known precaution for their own safety while travelling in afterdamp or other noxious gases. Each crew should be composed of at least five men, including the captain, and the members of the crew should not become separated. If any one member complains of feeling unwell, or is observed to be staggering or breathing unnaturally, the entire crew should immediately return to fresh air. In view of the liability of a member receiving some injury, or his apparatus being damaged, a crew should never advance such a distance nor travel over such falls or wrecks as would prevent the crew from carrying one of its members back to fresh air. With the types of breathing apparatus now in service the maximum straightaway, unobstructed course should not exceed 2,000 ft., with a reserve crew at the fresh air base. In mines with low roof, where travelling must be in a stooping position, the distance should be much less, and in parts of mines in which the rescue men have to crawl, the distance should be not more than 300 to 400 ft.

Handling Injured Rescuers.

Should an accident befall one of the rescuers, or should his apparatus go wrong, the remainder of the crew should endeavour to convey him to fresh air. For this purpose, a stretcher is most desirable. The disabled rescuer should be placed on the stretcher, resting on his side, so as to leave the breathing bag free and the valve of the oxygen bottle on top, where it may be easily reached by one of the attendants. If the man is laid on his face, the bag will be pressed flat, and he will not get enough air from the apparatus. The apparatus will, of course, practically prevent laying him on his back.

The rescuers and those in charge of the rescue and recovery operations should keep in mind the main purpose of using breathing apparatus—to rescue the living rather than to recover the dead. When the conditions

in any section of a mine are such as to indicate much violence and heat, and bodies are found mutilated or badly burned, it may be safe to conclude that there is little probability of finding men alive, and rescue and recovery operations should be shifted to other and more promising sections, where men are known to have been working.

It must be borne in mind that a person who is overcome in afterdamp containing a small percentage of carbon monoxide cannot be revived after he has remained therein for 30 minutes to an hour, so all explorations must be made accordingly.

The weight of a 40 lb. apparatus, combined with the general effect of using the apparatus, tends to exhaust the wearer, so that when he proceeds far into a mine filled with a deadly atmosphere he takes his life in his hands.

Limitations of Breathing Apparatus.

In numerous tests conducted by the United States Bureau of Mines, it has been conclusively shown that all the foreign makes of breathing apparatus have well-defined limitations; that is, they are not capable of furnishing breathable air in sufficient quantity and purity to permit a man to exert himself to his physical capacity. The present foreign types are suitable for doing work that demands energy equivalent to that used in walking not faster than $3\frac{1}{2}$ miles an hour. With apparatus now in use, the wearer should not attempt to walk or trot as fast as five miles an hour unless wearing a type fitted with a by-pass valve, which should be used often, and the bags be deflated as frequently.

The Bureau is developing an apparatus that gives promise of meeting the requirements of a man exerting himself to his full physical capacity.

Removal of Living Men.

Each rescue crew should carry a stretcher and a light breathing apparatus suitable for half an hour's service, for use in bringing to fresh air any person found alive or any member of the crew whose apparatus may become injured or prove defective. If men are found alive in any part of a mine that has not been ventilated, the character of the air between that place and the recovery crew should be tested to determine whether the men may safely be taken out before ventilation is established. The test should be made by using a canary and a safety lamp. If the safety burns and the canary lives, the air is sufficiently pure to support the life of a man. Should the bird be overcome and the safety lamp fail to burn, the men should be prevented from attempting to make their escape except by the use of breathing apparatus until the fresh air has been conducted to them.

Handling Injured and Dead.

Some men found in mines may have no injuries, whereas others may have burns and injuries, or may be too weak to walk because of long exposure and lack of food and rest. A doctor or surgeon should be taken into the mine to render attention and furnish medical treatment. A stimulant such as spirits of ammonia will often be found useful, and should be carried by the rescue crews. Blankets, quilts, and stretchers should be taken to the live men, who should be wrapped with the blankets or quilts before they are taken outside. Those unable to walk should be placed on stretchers and carried out. The injured should be given first-aid treatment at the most convenient place before their removal from the mine. All men taken from the mine should be carried to the rest room or emergency hospital for further observation and treatment.

Dead bodies may be found in various parts of the mine. Some bodies may have no injuries or mutilation, and others may be badly mutilated, dismembered, or much decomposed. The recovery crews should wrap all bodies in canvas, place them in litters or stretchers, and transport them to the morgue. In some low and restricted places an ordinary stretcher cannot be used, and it will be necessary to improvise a stretcher from canvas or brattice cloth by cutting the required length and making holes for handholds.

To the bodies as found should be attached a tag stating the location and bearing a serial number, and this number within a circle should be chalked on the roof or rib at the place of finding the body. The foreman or engineer present should make a record, stating the position of the body and its check number. Nothing should be removed from a body while it is in the mine.

The disposition and care of bodies after their removal from the mine are governed by the rules and regulations of the State board of health. The nearest local representative of the board of health should be requested by the official to be present, and to specify the proper action.

Disposal of the Dead.

Bodies received at the morgue are to be identified. The official in charge of the morgue should assign a morgue number to each body, and make a record of the number on the tag attached by the recovery crews, also the check number, if checks are found on the body. A record should also be made of clothing, shoes, boots, money, jewellery, watches, and trinkets, as well as a description of the features, colour of hair and eyes, height, weight, teeth, probable age, and old scars or fractures. All articles taken from the body should be wrapped in cloth or canvas and tied securely with a tag inside and the morgue number outside for future identification and delivery to the coroner or the relatives of the deceased.

Examination for Fires.

After an explosion smouldering fires may be found in the mine. Doors, brattice cloth, timbers, gob, and the coal are liable to be set on fire by the heat and flame of the explosion. In a gaseous mine, such fires are a source of imminent danger through their liability to ignite bodies of gas and air that may reach the fire. In establishing ventilation in such a mine, much care should be taken to test for the presence of fire. As the ventilation is advanced the return current should be frequently inspected for smoke or heated air.

The rescue crews, if present, should explore in advance of the air current and extinguish such small fires as may be found. A small smouldering fire in the gob or coal will produce copious volumes of smoke, whereas a fire in dry timber may produce little smoke but an odour (characteristic of burning of wood), which may be detected by men not wearing breathing apparatus.

Building Fire Stoppings.

Rescue crews may go into poisonous atmospheres and construct wooden and brick or plaster stoppings for sealing off fire areas. Many such stoppings have been so built by men wearing rescue apparatus, and a large number of mines in this country have been recovered by such work.

Testing for Gas.

The advance, rescue, and recovery crews should make frequent tests of the mine air to determine the presence of firedamp and carbon monoxide or a deficiency of oxygen. For testing for firedamp (methane) and deficiency of oxygen, a miner's safety lamp should be used. Firedamp will give the characteristic gas cap on the flame of the lamp under normal atmospheric conditions, but with a deficiency of oxygen and a surplus of blackdamp and methane, the flame of the lamp will be almost or entirely extinguished. Carbon monoxide, the so-called whitedamp, can never be detected by a miner from the appearance of the flame of a safety lamp. A proportion sufficient to cause any change in the flame of a safety lamp would be fatal if breathed. To test for carbon monoxide, a small animal, preferably a canary, is most serviceable. Only 0.2 per cent. of carbon monoxide will affect a canary within two to six minutes and cause it to collapse in about five to ten minutes. Men without breathing apparatus should not remain in air in which a canary shows distress or dies or in which the safety lamp will not burn.

Use of Animals for Testing Mine Atmosphere.

Recovery crews often have to explore parts of a mine that were abandoned before the explosion or fire. These parts may contain afterdamp, and there will be danger in examining them prior to their ventilation. To explore safely unventilated parts of an exploded mine without the use of breathing apparatus, the explorer should adopt methods that ensure his safety. From many trials and underground tests it has been found that a man can live in comfort in an atmosphere in which a flame safety lamp will burn and in which a mouse or canary is not overcome.

Whole exploration parties have lost their lives while proceeding with their safety lamps burning, whereas their lives could have been saved for the price of a canary or mouse.

Larger animals, such as dogs, cats, rabbits, and chickens, are not so good for detecting the condition of the air. Chickens will live for many hours in an atmosphere that is fatal to man in less than half an hour.

Analysing Gases.

Oftentimes it is of great advantage in planning rescue and recovery work after a mine fire to know the composition of the air within the mine. Much may be determined from the oxygen content of the mine air within a fire area. For the quick determination of oxygen, carbon dioxide, carbon monoxide, and methane an Orsat gas-analysis apparatus is most convenient.

Control of Ventilation.

The ventilation throughout the mine must be re-established for the recovery of all men and bodies and for the removal of all afterdamp. The currents of air should be so conducted that the ventilation may be at all times under the control of the man or official in charge. In ventilating any part of a mine the afterdamp should be returned to the outside by the shortest possible route. To conduct afterdamp from one part of a mine through other parts not affected by the explosion, would endanger the safety of any living men in those sections.

When recovery crews are working in more than one section of a mine at the same time, great care should be taken not to conduct afterdamp into the section or entry where another crew is at work. Lack of such precaution has resulted in entire crews being overcome.

In a non-gaseous mine abandoned or worked-out sections that are full of afterdamp may be bratticed off temporarily and made air-tight. In a gaseous mine abandoned parts should be cleaned of the afterdamp to obviate danger incident to the possible presence of fire. To prevent the return air from being conducted into other working sections of the mine, it may be necessary to open doors or regulators or to tear down some stoppings. Rescue crews are especially suited for doing such work provided that the distance to be travelled is not too great.

Construction of Stoppings.

Explosions in mines frequently destroy all stoppings, overcasts, regulators, and doors used for the control of the ventilation. To re-establish the ventilation, many air stoppings have to be constructed out of material that is taken into the mine. Such stoppings as are made along the main and the room entries must be made air-tight and of sufficient strength to withstand the pressure of the air and be protected from dangerous or weak roof. A quick method of making stoppings is to nail up canvas in the break-throughs or crosscuts. For this purpose two props are wedged in place and across the top and the bottom are nailed 1 in. boards, to which the canvas is nailed. The ends of the canvas are then nailed to the coal rib or held in place by boards. As soon as the canvas is hung from the top board the air will advance to the next inbye cross-cut, and workmen should proceed there and construct a similar stopping. These canvas stoppings should be set at least 2 or 3 ft. inside the cross-cut, leaving room for the later construction of a more permanent wooden stopping.

In the absence of regular mine canvas or brattice cloth, other material may be used to advantage, such as burlap, muslin, or bed ticking procurable from local

stores, and such material should be used prior to the arrival of regular brattice cloth or canvas.

In the ventilation of the faces of entries, gobs, or breasts, or in splitting the current in entries, it will be necessary to construct a line brattice. A line brattice may be quickly made by placing props 8 or 10 ft. in the centre or on one side of the track about 8 or 12 ft. apart, and by nailing on the props near the roof an inch board, on which the canvas or brattice cloth is nailed. The lower end of the canvas may be similarly secured, or the canvas may be cut an extra foot long and held in place by weights laid on it, lumps of coal and pieces of slate, shale, or rock being suitable.

Wooden stoppings should be constructed with greater care, and the building of them should begin immediately after the first four or five temporary stoppings are in place. They should be built by placing two or three props securely wedged in each cross-cut, inch boards being nailed to the props and made to fit the irregularities of the coal rib, or the coal ribs may be trimmed to receive the ends of the boards. After the wooden stoppings have been advanced some distance, air leakages caused by the increased air pressure will be manifest at those stoppings that have not been made air-tight. To prevent this leakage, a force of men should follow the construction crew, and nail on cleats and stop up the holes and cracks with clay, cement, plaster, or lime and sand plaster.

Use of Doors and Manholes.

At each lateral entry, overcast, pump, and manway, a door should be constructed, or a manhole 3 ft. high by $2\frac{1}{2}$ ft. wide should be made in the wooden stopping, with a hinged or sliding door. Such a door should have a handhold nailed on each side to facilitate opening. These doors or manholes will later facilitate the examination of the mine and the changing of ventilation.

Handling and Disposal of Dead Animals.

In a mine where mules or horses were used for haulage their carcasses will be found along the haulage roads and in the stables. These carcasses soon give off offensive and sickening odours, and should be given early treatment. The following treatment is recommended: To a barrel of water add 3 lb. of chloride of lime and $1\frac{1}{2}$ lb. of crude carbolic acid, and stir well. Add half a pint of ammonia to furnish an odour that will prevent persons drinking from the barrel. With chalk mark the barrel "Poison." Carry this liquid into the mine in buckets or a sprinkling can, and sprinkle the carcasses completely. With a sharp-pointed instrument make an incision in the abdomen of each animal to allow the escape of gases, and cover the carcass completely with a piece of canvas, then saturate the canvas with the liquid. If loose coal is near at hand, the edges of the canvas should be covered with the coal.

The removal of the carcasses should be made as soon as the work of rescue and recovery of the men has been completed. A low truck, skid boards, and block and tackle will facilitate loading. If the hoofs and legs offer obstruction to haulage, they should be amputated with an axe or cleaver. If roof falls and wreckages prevent transportation by truck, each carcass may be cut up with a cleaver and put in specially made covered boxes having handles suitable for two men to carry. After removal to the outside, the carcass should be either buried or completely burned.

Timbering and Cleaning Roadways.

As a protection to the recovery crews and others who have to travel the roadways, manways, and entries, timber crews should be set to removing all dangerous roof and making it secure by necessary timbering. The work of recovery will be much hastened if the haulage tracks are made available for use. The surplus of men who volunteer should be utilised in cleaning up falls of roof and removing wrecked cars from the main haulage roads.

Preparation for Re-Working the Mine.

As soon as the bodies have been removed from the mine and the inspectors and mine officials have concluded their investigations, workmen should be set to cleaning up and making such permanent repairs as will place the mine in condition for safe operation. The advice of the inspector should be sought to ascertain in detail what he deems essential to place the mine in a safe condition. When all repairs and changes have been made, and before regular work is resumed, the inspector should make an inspection of the mine, and authorise operation under the provisions of the State law, if in his judgment the mine is in a safe condition.

IMPORTANT THINGS TO DO AFTER A COAL MINE DISASTER.

- (1) Summon assistance from the nearest mines.
- (2) Notify the State inspector and rescue crews.
- (3) Organise your forces and assign duties.
- (4) Look after the fan and repair it immediately if it has been damaged.
- (5) Place guards at all entrances to keep a record of all happenings.
- (6) Ascertain whether natural ventilation is established at any openings.
- (7) Procure permissible safety lamps and electric hand lamps for persons who are to explore the mine.
- (8) Shut off electric power on the trolley, power, and light wires entering the mine except those used for operating the fan.
- (9) Procure brattice material or order it for immediate delivery.
- (10) Have a crew of men enter openings that have intake currents of air and look for men who may be injured or overcome near the entrance.
- (11) Call as many doctors as are available.
- (12) Procure portable fire extinguishers and have them ready for immediate use in case a fire is covered.
- (13) After a disaster in a shaft mine, get the lighting appliances in the downcast compartment in condition for use by the explorers.
- (14) Keep on hand at all times a dozen safety lamps in good condition for emergency use.

Notes from the Coal Fields.

LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Conciliation Board - Swansea's Trade Earnings of Colliers - Assessment of Shares.

The Industrial Unrest Commission held its final meeting in Cardiff on Friday of last week, when evidence was given by Mr. T. E. Watson, president of the Cardiff Chamber of Commerce, by Mr. Evan Williams (for the South Wales Coal Owners' Association), and by representatives of the North Wales coal owners and the North Wales miners. One of the points brought out is the great value of Conciliation Boards, and the fact that where such joint authorities do not exist, there is on both sides a clearly expressed wish for their establishment. One or two witnesses from the employers' side regarded it as beneficial that membership of a trade union should become compulsory, so as to facilitate the working of Conciliation Boards. From the miners, as well as other trade unions, evidence has been given as to their wish to escape income-tax by a reversion to the old limit figure of £160 per annum. Emphasis was laid upon the fact that delays in settling disputes has to a great extent been responsible for the unrest which exists.

The Swansea returns for June shows another unfavourable month of working. As compared with June of last year, the reduction was 84,000 tons, the total for the month being 385,775. The export of coal and coke was less by 42,000 tons, and patent fuel by 10,000 tons. Taking the six months of this year, as compared with the first half of last year, reduction in trade has been to the extent of no less than 826,000 tons, of which over 600,000 tons is the loss in coal, 27,000 tons in patent fuel, and 78,000 tons in tinplates.

Mr. B. Nicholas and Mr. Evan Williams, with the coal owners' secretary (Mr. Gibson), had an interview with the Coal Controller, particularly with regard to the difficulties of the supply of pitwood to the collieries, and it is stated that changes in the method of supply will be made in order to meet the difficulties that were then explained.

The decision in the case heard in the King's Bench Division last week, when surface men at the Tytrist Colliery washery unsuccessfully claimed to be paid under the Conciliation Board agreement, has evoked interest throughout the district. The claimants are members of the South Wales Federation, and they asked, as against the Tredegar Company, that their wages should be regulated by the agreement; whereas the company contended that they were not so entitled; it was stated that the men had been paid only at the same rate as before a new standard was established on July 15, 1915. The company held that the men were not surface workmen of the colliery within the meaning of the agreement; that no evidence could be produced showing that the workmen's representatives had negotiated the agreement on behalf of the men employed at the washery; further, that men at the washery were never paid on the same basis as those at the colliery. Mr. Justice Rowlatt took the view that the agreement was intended primarily to regulate wages in the coal trade proper, and he considered that the case of the plaintiffs was not made out; he gave judgment for the defendant company, with costs.

The separate assessment of coal washeries at the collieries of Messrs. Burnyeat, Brown and Company, Locket's Merthyr Coal Company, and the Ocean Coal Company led to appeals in London. In the past the collieries were dealt with by the Assessment Committee of the Pontypridd Union on the tonnage output. The respondents argued that under the old agreement of 1904 the collieries were under-rated. The assessment of Messrs. Burnyeat, Brown and Company's washery was reduced by the court from £750 to £250, and a similar assessment of the washery at Locket's Merthyr Collieries was reduced to £200, the appellants in each case being allowed their costs. It was suggested that the appeal by the Ocean Coal Company should be settled by the parties concerned.

The appeal of the Great Western Colliery Company was then opened. It was submitted, on behalf of the appellants, that the case of this colliery was quite different, although it involved a washery. The previous assessment was £2,792 gross and £1,396 net, and the new assessment appealed against was £10,500 gross, and £5,400 net. At the Maritime pits there was a coking plant and also a by-product plant; and the ratable value of extra works, other than the by-product plant at the Maritime, was £350, with £650 for the by-product plant. The appellants desired that their works at the Maritime and at the Cyfeillon Collieries should be assessed separately. This matter was adjourned until July 19 in order that a new working agreement should be discussed.

A valuable gift is being made to Merthyr by Mr. H. Seymour Berry, chairman of the Cynon Colliery Company and of the Celtic Collieries. He purposes to present to Merthyr a technical school at the cost of about £10,000, as a memorial to his late father, who was an alderman of that borough, and occupied for many years a leading position in its public life. The school will be devoted to mining and engineering.

As was indicated previously, the practical union of the three mineral lines centring at Cardiff has been accomplished by agreement for a working arrangement under the sole management of Mr. E. A. Prosser, who was originally manager of the Rhymney Railway, and subsequently of the Cardiff Docks as well. At a meeting of directors, held on Friday last, he was appointed to take charge also of the Taff Vale Railway and Penarth Docks. A joint committee of the three companies is sitting which will, in association with Mr. Prosser, work out a scheme for closer co-operation of the three concerns. It has for a long time been evident that the endeavour which has been made more than once during years gone by, is once again to be attempted; and that unity of control, even though actual amalgamation be not practicable, is to be established.

The matter has been the subject of continual discussion on Cardiff Exchange, because of the promise which is held out of more rapid despatch in the shipment of coal; also, because the Cardiff Railway will now, it is expected, be brought into use for colliery traffic, and will, at any rate, make material addition to the siding accommodation. It is not improbable, too, that the scheme for increasing siding accommodation at Cardiff Docks will now be carried out, and that means, as well as the inter-connection of the railways, becomes practicable, a very important addition both on the railways and

an omission all the more remarkable seeing the special circumstances which apply here in regard to special qualities of coal whether brought in or sent out from the district.

Mr. Finlay Gibson, secretary of the Coal and Coke Supplies Committee, has issued a circular explaining the regulations under which supplies of coal are to be sent from, or received into, the South Wales area (which includes Monmouthshire) by railway for inland consumption; and he states that the committee will communicate with colliery companies, also with merchants and consumers, in order to obtain from them such information as may be necessary for arranging supplies from local collieries in substitution for coal hitherto brought into this district from those areas to which prohibition now applies. He states that factors, merchants, or direct consumers will be informed by September 8 to whom they should apply for supplies in substitution, and that meanwhile they should not communicate with the committee, but should await instructions. The order, of course, does not affect waterborne coal.

The gold medal of the Treforest School of Mines has been won by Mr. J. H. Jones, of Cwmparc, now engaged in the Ocean Colliery. For four years in succession he has attained high distinction in the school, having headed the list of results, and won the silver medal in the engineering course.

A statement indicative of widespread feeling was made by the sub-agent (Mr. Thomas) at a meeting of the Rhymney Valley miners on Saturday. The question of industrial unrest was discussed; and the sub-agent remarked that undoubtedly the cause was the high cost of living. Wages had not kept pace with the increase in prices; and, despite higher rates of wages, masses of workers found it difficult to maintain the standard of living. Traders generally had taken advantage of the war to increase prices beyond what was necessary to cover increased cost. There was also an awakening sense among the wage-earners that they were as important as the privileged classes, if not more so; and, consequently, there was an ever-increasing demand for full rights as citizens and wealth-producers. Further, the country was beginning to realise that private ownership and control were detrimental to the welfare of the State.

The executive committee of Swansea Harbour Trust met on Monday, when Mr. Roger Beck commented upon the shrinkage during June in the coal and tinplate shipments. The members present, however, expressed confident hopes of the future development of trade; and Sir Griffith Thomas referred to the inspection which had taken place by gentlemen associated with large undertakings who came to enquire into the shipping facilities. He added that negotiations with one large undertaking were drawing to a satisfactory conclusion, so that they expected at an early date to lease some of their estate and secure much more traffic for the docks.

Northumberland and Durham.

Miners' Club—Imprisonment Threatened for Negligence—Dearth of Coke Tonnage—Questions of Transport Economy.

Neasam Hall, formerly the residence of the late Sir George Elliot, and later of Sir Thomas Wrightson, has been acquired as a miners' club, and was opened in its new capacity on Saturday last by Mr. James Stokoe, managing director of Messrs. Robinson Brothers, Houghton-le-Spring. The membership of the club is nearly 700.

At Newcastle it is proposed to utilise the tramway sand cars during next winter for the purpose of distributing coal to householders.

Mr. James Laverick, who, after being under-manager at Carterthorne Colliery for 18 years, has left to take up a similar position at the New Morley Colliery.

At Castle Eden, David Waugh, 26, onsetter, was charged with having neglected to give a signal for men to ride in a cage at Horden Colliery, and having signalled a cage away when the gates were not in position. The case was not pressed against the defendant, who was stated to be a good workman, and he was therefore bound over to come up for judgment if called upon. Hugh Emery, 28, deputy-overman at Easington Colliery, was similarly dealt with on a charge of having failed to inspect part of the mine. It was stated that he was called away for the purpose of putting up a fence, and did not complete his inspection. The error was stated to have been due to an oversight. At the same court, James Nicholson, 48, charged with having been drunk in Shotton Colliery; evidence was given that the man refused to go away when told by the manager, and endeavoured to get other men to cease work, an allegation defendant denied. Fined £3. In fining John Reed, 24, putter at Ryhope Colliery, £5 for having hewed coal from the wall side, the Sunderland county magistrates announced last Saturday that they had decided to impose no more fines for that practice. Future offenders would be sent to prison.

So great is the dearth of coke tonnage on offer for North French ports, particularly for Rouen, that the Local Export Committee has intimated that it is now permissible to pay 1s. per ton more, whether for neutral or Allied vessels, for Rouen discharge. Thus, the neutral rate to Rouen is now 74s. 3d., with, of course, 5s. extra for steamers under 300 tons, whilst the rate for other French ports remains at 72s. 3d. The Allied rate to Rouen is now 48s., with a like increment in the case of vessels of under 300 tons, but with no change in the case of other Northern French ports.

The market has as yet hardly grasped the full significance of the somewhat wordy and involved order of the Coal Controller, with reference to the re-organisation of the transport of coal by rail for inland consumption. It is difficult to understand precisely how the Controller proposes to effect his saving in railway transport of 700 million ton-miles annually, but it would appear to be quite obvious that any such saving cannot but be accompanied by some serious falling off in the volume of trade of the collieries. On the face of it, the Order makes provision for the continuance to consumers of adequate supplies of coal required for special purposes, such, for example, as the manufacture of gas. No coals, however, are nowadays purchased for the fun of the thing; consumers at considerable distances from the collieries whence they draw their supplies, do not pay the higher figure involved by the circumstances of transit, merely in order to secure, to the admiration and envy of their neighbours, a quantity of rare minerals. It is difficult, indeed, these things being true, to understand how, if the legitimate needs of the different industries of the country are to be fully satisfied, the Controller will effect anything like the saving in railway transport that he estimates. Mr. W. Straker, corresponding secretary of the Northumberland Miners' Association, expresses the fear that the coal trade of Northumberland will be adversely affected thereby. Owing to the export trade being so much handicapped by

the war, the county must necessarily do a much larger home trade to keep the pits going, and, if it is to be cut off the market outside its own area, he is afraid the industry will be very badly affected. Mr. Straker agrees that what the Coal Controller is doing is in the interests of the whole country, but he thinks that the workmen have a complaint against the Government.

The Blaydon Council have decided to proceed with certain local improvements in order to find employment for miners at Rowlands Gill, who are now working short time.

Yorkshire.

Mr. H. Smith presided at a meeting of the council of the Yorkshire Miners' Association at Barnsley. A report regarding the work done by the convoy of motor-ambulances provided by the members of the association was given by a deputation consisting of Capt. D. Bayley and his assistant, Mr. Staniland, who were accompanied by the Duc of Clermont Tonnerre, who is also a voluntary worker on the French front. The miners are subscribing £400 per week voluntarily for the upkeep of the convoy. The duke thanked the miners for the valuable help they had given to the French Army by providing the convoys. Sympathy was expressed with the relatives of 96 more members of the association who had fallen in the Army and Naval Services since the last meeting, making a total of 2,708 members who had been killed.

The 18th annual meeting of the Bradford Coal Merchants' and Consumers' Association Limited was held on Monday at the Midland Hotel, Bradford, the chair being occupied by Mr. Joshua Smith, chairman of the directors. The annual report showed a profit of £18,628, and the directors recommended that a dividend should be paid of 3 per cent. for the last half-year, making up the dividend for the year to 5 per cent., that £1,000 should be added to the reserve fund, and £3,818 should be carried forward. The chairman commented on the increased demand for coal during the year ending March 31, both for domestic and industrial purposes, and observed that owing to the Price of Coal (Limitation) Act, 1915, the prices of this commodity had made less advance since the commencement of the war than those of any other commodity. During last year the prices had remained practically stationary, notwithstanding the increased cost of haulage, through the extra costs of carters' wages and provender. It was expected that the difficulties of transport would get worse, and customers were laying in winter supplies now as far as was at all possible. The reserve fund of the association now stood at £22,000, and £15,000 had been put into War Loan.

Lancashire and Cheshire.

Mr. T. H. Elliott, manager of the Langwith Colliery, who has been appointed manager of the A and B Winning collieries and the by-product works of the Blackwell Collieries Limited, is being succeeded at Langwith by Mr. T. Wharton, formerly manager of the Dimmington Colliery, and a son of Mr. Wharton, manager of the Glapwell Colliery of the Sheepbridge Coal and Iron Co.

An important development in the Burnley coal industry is marked by the completion of the sinking of three pit shafts by the Executors of J. Hargreaves Limited. These have reached what is called the Mountain seam, and a supply of good coal is assured for very many years. Coal-getting has begun, and the seam goes all under the Burnley district and towards the famous Pendle Hill.

The Midlands.

The South Staffordshire Mines Drainage Commissioners have decided, in accordance with the arbitrator's award, to levy a rate payable in two half-yearly instalments, upon all occupiers of mines in the Tipton district, with the exception of those exempted or graduated, of 3d. per ton on fireclay and limestone and 9d. per ton on ironstone, coal, slack, and other mineral. A resolution has also been adopted, requiring occupiers of mines in the drainage area to make a return of the number of acres of mines occupied by them and of the number of tons of mineral raised by them during the half-year ended June 30.

Colliery owners in the Cannock Chase coal field are peculiarly gratified that their district should have been selected as the official centre for carrying out the new scheme of the Government for the saving of coal transport for the important joint areas of North and South Staffordshire, Shropshire, and "Birmingham and district." Major J. Selby Gardner has received the appointment of representative for the new scheme. He will be assisted at Cannock by a committee of the coal owners and others of the district, empowered by the Controller to conduct the necessary arrangements for putting the new scheme into force in this area, and it is considered that a minimum of inconvenience will thus be caused to the collieries and coal merchants.

Kent.

The output of coal at the Tilmanstone and Snowdown collieries continues at about 5,500 tons weekly.

Tilmanstone miners have raised £20 for the Red Cross Fund by collection.

Scotland.

Mine Breathing Apparatus—Shipments of Scotch Coal—New Seam at Avonbridge—Miners and Food Prices—Meeting of Colliery Managers.

Research is to be carried out in connection with new mine rescue breathing apparatus at the Heriot-Watt College, Edinburgh. Dr. Briggs is director, and the approval of the coal owners associated with the rescue station has been obtained.

The shipments of Scotch coal for week ending July 9 amounted to 151,543 tons, a decrease of 12,797 tons as compared with the previous week, and a decrease of 68,702 tons as compared with the corresponding week last year. For the year the shipments aggregate 3,493,145 tons, a decrease of 1,534,428 tons as compared with 1916.

At East Roughrigg Colliery, Avonbridge, the owners have been opening up a good seam of gas coal in Nos. 2 and 3 pits. This seam is found much nearer the surface than the seams at present worked, and it is expected that when developed it will give employment to a considerable number of miners.

Bargeddie Colliery, in the Airdrie district, which was recently opened, is now developing quickly.

Miners in several of the districts throughout Scotland have arranged for a general holiday to protest against the increased cost of living. This course has been followed by a resolution from several of the branches of the Miners' Union demanding that the miners should take drastic steps to stop profiteering.

In connection with the proposed research into mine rescue breathing apparatus, the minutes of Heriot-Watt College Committee, Edinburgh, state that a letter was read from the secretary from the Department of Scientific and Industrial Research, explaining that it was proposed that Dr. A. H. Briggs, of the Heriot-Watt College, should

be appointed director of the research. It was further suggested in the letter that Dr. Briggs should, with the sanction of the governors, carry out his research in the Heriot-Watt College and the mine rescue station there. There was also submitted a report by Dr. Briggs, outlining the scheme proposed by him for carrying out part of his research. The committee resolved that, with the approval of the coal owners associated with the rescue station, permission be granted to have the research carried out at the college and the rescue station on certain conditions, one of these being that neither the governors of George Heriot's Trust, Edinburgh, nor the coal owners connected with the rescue station, are to be liable for any of the expenses of the research.

A largely attended meeting of the Scottish branch of the National Association of Colliery Managers was held on Saturday in the Christian Institute, Glasgow, Mr. N. A. Wilkie, the president, in the chair. Mr. James Morton, Fordell Colliery, Fifeshire, was presented with a bronze medal, awarded by the prize committee of the association, for a paper read by him on "The Handling of Colliery Stores." The branch decided to arrange for a visit to the Dalmarock Electrical Power Station, Glasgow with a view to noting the system of steel piling for excavating purposes employed there, the suggestion being that useful hints in relation to pit sinking might be observed. Discussion was resumed on the paper by Mr. Charles B. Sneddon, Franklin Colliery, Shettleston, on "Steel Piling for Excavating Purposes," and was taken part in by the following:—The president and Messrs. W. Williamson, J. Baird, J. Allardice, R. Wilson, and J. Gilchrist.

The month's shipment of coal at Burntisland for June was 38,643 tons, against 69,694 in the corresponding month of last year. The whole was consigned coastwise. For the week 6,350 tons were sent outward.

The Court of Session (Second Division), in a test action relative to the Larkhall coal workings, has decided in favour of the Raploch Coal Company Limited and others, and against the pursuer, D. Williamson. The latter claimed £400 for damage to his buildings in Wellgate-street and Percy-street, caused by defendants working a thin seam underneath. He had leased the buildings for 99 years. The minerals were reserved to the proprietors, who were not to be liable to the tenant of the ground in any damage caused in working the coal, but were bound only to observe the usual precautions adopted in mining under houses. They followed the longwall system, and the court held that ordinary precautions had been taken. The claimant had knowingly taken the risk when he entered into the lease, and could not recover damages.

LABOUR AND WAGES.

South Wales and Monmouthshire.

At a meeting of the executive council of the South Wales Association of Colliery Enginemen and Stokers on Friday in Cardiff, it was stated that the Chief Industrial Commissioner had appointed Mr. W. H. Stoker, K.C., to be arbitrator in a dispute at Pentre Collieries, Swansea. It was also reported that communication had come from the Coal Mines Department of the Board of Trade as to the ruling that blacksmiths' strikers are to be regarded in future as amongst the barred classes, but the arrangement is not to be retrospective. Masons employed partly underground and partly on the surface are in a peculiar position; the masons as a body are not in the barred classes; but if employed chiefly underground they will be regarded as underground workers.

Subsequently a joint meeting was held with the Employers' Enginemen Wages Committee, and certain disputes were brought forward and referred for investigation. Applications for advances in the rates of several sections of workmen were made; but the employers were not willing to arrange a fixed standard rate, their intention being to deal with each case on its merits.

The dispute which has prevailed at Caerbryn Colliery, Ammanford, lasting for some time, has at length been ended, and the men have resumed work.

Acting without direct demand from tinplate employees, the executive of the Welsh Plate and Sheet Manufacturers' Association have granted an additional bonus of 5 per cent. to those who earn between 20s. and 40s. The steel workers obtained this additional war bonus after approach to the Committee on Production. The tinplate manufacturers have granted a similar bonus to their employees.

The miners' agents of the anthracite area have submitted to the Federation a list of the idle days of the various collieries in their district, this being supplied in order to support their claim that the men should have out-of-work allowance. The period covered is April, May, and June; and taking the whole list the idle days range from one to 27, the great majority being below 20.

The 1,200 workmen employed at the Blaenserchan Colliery, Monmouthshire (Messrs. Partridge, Jones and Company) were able to resume their duties on Saturday after an idleness of three days, attributed to a mishap, which occurred on the previous Tuesday. It is stated that an old cable near the pit bottom fused on Tuesday morning, and the current had to be disconnected on the surface. The men employed on the day shift were told about noon that it was "a three-quarter day," which signified that they were expected to leave the colliery by 12.30 p.m. The new pit, which was recently completed, is intended to be used as a downcast shaft for the Blaenserchan workings.

The Tirpentwys Colliery, Pontypool, where 1,300 miners are ordinarily employed, was idle from Thursday evening until Tuesday morning owing to a shortage of clearance.

The Monmouthshire Eastern Valley miners district is opposing the prevalence of sub-contracting in local collieries. A set of questions has been sent to each lodge secretary, enquiring: "(1) Method of sub-contracting, i.e., whether at the coal face, repairing roadways, or on the surface; and (2) state your definition of sub-contracting."

The latest development in connection with the enquiry which is proceeding into the grievance of colliers' helpers employed at the Cwmbran Colliery, Monmouthshire, is that at least 68 collier boys have given satisfactory evidence that their "butties" do not pay them the minimum rates of wages. Acting on instructions from the delegates to the Eastern Valley miners district, the officers have issued "to the boys employed in and about the Cwmbran Colliery" a circular setting forth the classes or grades of workmen specified in the Minimum Wage Act as applied to boys; and showing the 1915 standard minimum rates, plus 55-83 per cent., which each boy under 21 years of age ought to receive in wages per day and per week. The district officers report that a successful meeting of the boys has been held, the president (Mr. John Martin,

Abersychan) declaring that he has had an eye-opener. He added that each of the 68 boys was prepared to do anything the district delegates may advise in order to bring about a desirable state of affairs. A meeting of the men is to be convened to discuss the matter from their point of view.

North of England.

Mr. Wm. Weir, president of the Northumberland Miners' Association, has been interviewed with reference to the movement, supported by the Northumberland men, for higher wages throughout the British coalfields, a proposal with reference to which will be brought before the annual conference of the Miners' Federation. He explains that, although wages in the county had advanced by 70 per cent. on the basis of 1879 since war commenced, that brings them up from 7s. 9d. per day to 11s. 4½d., a real increase of less than 50 per cent., whilst living costs have increased by fully 100 per cent. Thus, the miners are worse off than before the war, besides which there is a good deal of lost time in some districts nowadays. Should the proposal be endorsed by the Federation, it will be placed before the Coal Controller and the Advisory Board.

The newly formed Northumberland Mine Workers' Federation—an organisation comprising the County Miners', Colliery Enginemen's, and Colliery Mechanics' associations—has elected Mr. J. M. Gillians as president, Mr. Wm. Straker as secretary, and Mr. Wm. Hogg as treasurer. The executive committee will consist of the members of the executive committee of the Miners' Association, Messrs. John Humphrey, T. Wheatley, and W. Bird, representing the enginemen, and Messrs. J. Batey, and M. H. Lowery, representing the mechanics. It has been decided to submit the constitution to the Miners' Federation of Great Britain for approval, and it is understood that all the sections of the local Federation will become members of the Miners' Federation.

The Elled Colliery men have been on strike because of a dispute as to a price list for one of the seams, and at a meeting which they held on Tuesday evening, Mr. James Winstone, their agent, acting president of the Federation, stated that he had been in communication with the Chief Industrial Commissioner, and expected a meeting of the parties to take place during the current week. Mr. Winstone spoke also on the subject of soldiers permanently discharged from the Army, and argued that when they returned to the mines they should be paid the rate of wages current in their grade. Some cases, he said, had been already dealt with by the Emergency Committee of the Conciliation Board, and the coal owners' representatives on that committee had given a pledge that the arrangements between the two sides for such workmen, made at the earlier stage of the war, would be carried out. Another important point raised by Mr. Winstone had relation to workmen who were receiving compensation. He stated that many of them were in distress because of the greater cost of living, and that unless the matter were dealt with immediately at the miners' national council, he was ready to go as a representative of the South Wales miners, and tell the Government that they must remedy the grievance or drastic action would be taken. The men were getting desperate. As they were members of the Federation they were entitled to full support. The time had come also when the national leaders of the miners should make application for an increase in the general wage-rate.

About 11,000 steel and tinplate workers are said to have been represented in a private meeting held in Cardiff on Saturday, it being the first gathering connected with the Iron and Steel Trades Confederation, and was composed of delegates as well as executive council members of the societies, which formed the Confederation. Representatives of the different branches of the several societies were present to the number of nearly a hundred. It is understood that amongst the proposals submitted to the meeting was one relating to the Compensation Act, with regard to which it was resolved to ask the Government to increase compensation by one-half. Further, a proposal was discussed for raising the standard (upon which the percentage is based) from £2 to £3 10s., and to make a demand on South Wales employers for an advance of 25 per cent. The meeting also passed a resolution favouring abolition of the twelve hours shift and substitution of an eight hours shift—the branches being recommended to make this one of the chief items of their policy.

The men at the Cynon Colliery, Avon Valley, stopped work a second time on Saturday because of an allegation that full wage-rate was not being paid to one or two discharged soldiers at the colliery; and there was a demonstration, in which men at a neighbouring colliery joined. Some hundreds assembled at Pontrhydyfen and marched towards Aberavon, being met by reinforcements and a brass band, and a meeting of about 2,000 assembled on the sands. Originally, the Cynon men struck, but had resumed work on the advice of their agent, it being understood that the matter in dispute would be dealt with by the Emergency Committee of the Conciliation Board. This committee, however, was not to meet until Tuesday of this week. Mr. Percy Jacob, manager of the Cynon Colliery, said that the trouble arose as to the employment of a discharged soldier, who, it was alleged, was paid only 6s. a day as a hatcher, instead of the union rate of 7s. The man was originally employed as a labourer, but he had been transferred to the work of a hatcher, which increased his pay from 6s. to 7s. a day, and through an error his name had not been transferred from one class to another, and he was given therefore a pay ticket at the lower rate. The mistake was purely accidental. He, Mr. Jacob, had explained the position to the men, and considered that the assurance that the discharged soldier would have the full rate should have ended the matter. The men, however, make retort that more than one discharged soldier is concerned.

The Cardiff district coal trimmers held their half-yearly meeting on Sunday in the Cory Hall, Cardiff, and sat for four hours in private. A report was issued by them which stated that they had discussed the question of improved methods of working, and fairer distribution of work, the executive committee having made various recommendations to that end. A resolution was passed to make a penny contribution per member per week towards the local hospital and other charitable institutions; and an appeal was made by Major J. A. Jones, commandant of the Volunteer Battalion, with Adjutant Pearson, who desired to increase the strength of the battalion from 9,000 to 10,000, and invited the co-operation of the Coal Trimmers' Union.

It was reported to the Rhymney Valley miners at their monthly meeting on Saturday that the agent had had an interview with the chief officials of the Powell Duffryn Company as to the price list at the Britannia Colliery, and that, having failed to agree, the matter was referred to the Conciliation Board with a view of settlement by

arbitration. The meeting was informed that the unrest prevailed at the Croesfaen Colliery, owing to reluctance on the part of the management to grant employment to injured workmen. A resolution was passed instructing the agents to take up the matter with the Rhymney Iron Company's general manager.

A special meeting of the council of the Cumberland Miners' Association was held at Workington last week, presided over by Mr. J. Dickinson, to consider a sub-committee's report with reference to a proposed application for an advance of wages for surface workers. The report was accepted, and the application is to come before the Conciliation Board to-day (Friday). Reports were also submitted with regard to several local disputes.

Federated Area.

At a meeting of the council of the Yorkshire Miners' Association at Barnsley, it was recommended that notices be tendered at the Thornhill and Wrenthorpe collieries owing to a dispute relative to the supply of house coal to employees other than miners. Mr. Smith said that the West Yorkshire Coal Owners' Association had declined to make any recommendation on the matter. It was reported that disputes at West Sharlston and Lofthouse collieries had been settled. It was decided, owing to the continual increase in the cost of living and the failure to find any remedy, to ask the Miners' Federation of Great Britain to at once negotiate with the coal owners for a 25 per cent. advance on present wages of all underground workers. They also asked that surface workers should be granted a substantial advance.

In the dispute between Blackwell Colliery Company, Notts, and their deputies and examiners, the arbitrator awarded a basis rate of 8s. 3d. per shift for deputies and 7s. for examiners, and in addition the present percentages, these latter to be varied in accordance with the decisions of the Conciliation Board; the present relative difference between the rates of head deputies and deputies to continue.

Scotland.

In view of the short working time prevalent at the collieries in Fifeshire, the executive of the Mine Workers' Union decided that where a member has only worked three days per week he shall only be required to pay half-contributions to the union.

In connection with a dispute about tonnage rates in a section of places at Parkhead Colliery, Bellshill, Lanarkshire, Messrs. Hunter and Joseph Sullivan, of the Lanarkshire Miners' Union, have been authorised to carry through an inspection on behalf of the men.

After protracted negotiations, the question of the men drawing their own material in the Annbank pits, Ayrshire, has been disposed of. Fourpence per ton is to be added to existing rates for drawing, with an additional penny per ton after the first 50 fathoms, and one penny more for each succeeding 25 fathoms.

Work is still irregular at some of the collieries in West Lothian, although the position has been rather better during the past two weeks.

At Ormiston Colliery in East Lothian complaint has been made that in a machine-cut section the men are not capable of earning the county wage.

For a considerable time past there has been friction over the dirt question at Carnock Colliery, Stirlingshire. The owners claimed that they were not getting an equivalent to the amount of dirt found in the hutches, while the workmen held that the tare was not operating in their favour. As the outcome of a meeting between the representatives of both sides a satisfactory adjustment of rates has been reached.

At Loganlea Colliery and Barbanclan Mine, West Lothian, complaint has been made that the men in the machine wall section are incapable, owing to the conditions, of earning standard wages. The union agents have the matters in hand with a view to approaching the respective managements.

At Milnwood Colliery, Bellshill, Lanarkshire, representations have been made by the workmen that the manager has failed to implement an agreement arrived at some time ago in regard to the drawing and gumming of places. Arrangements are being made for the reopening of the whole question in dispute.

At the monthly meeting of the Fife, Kinross, and Clackmannan Miners' Board, considerable dissatisfaction was expressed at the attitude of the management of the Lochgelly Iron and Coal Company in not carrying out the arrangement come to some time ago in regard to the elimination of non-unionism at that colliery. The executive decided to grant permission to Lochgelly miners to lodge notices and come out on strike to put an end to the grievance. In the event of a strike 3,000 men will be idle.

It is stated that the two collieries in Dunfermline district, owned by Messrs. J. Nimmo and Sons, which have been closed, have had to be abandoned owing to the increased cost for pumping and diminished output. This water question in Dunfermline area is a sore one. There are so many different owners and so much water covering large tracts of valuable coal.

Several cases of partial reductions are reported from Fife. This has resulted in great resentment by the workers, owing to the irregular employment obtaining at several of the collieries.

More regular employment is reported from some of the districts, as compared with a few weeks ago.

At a meeting of the Scottish shale miners, it was reported that the owners had refused the claim for a war bonus to underground workers. Delegates expressed resentment at the delay on the part of the owners in meeting the representatives of the workers.

Some time ago the miners at Bridgeness Colliery approached the management with the view to securing a better class of safety lamp. The management have now decided to apply certain tests, and if these are successful they intend to introduce electric lamps throughout the pit.

As a protest against the enormous cost of foodstuffs, the secretary of the Lanarkshire Miners' Union has been asked to call the attention of the members to the subject, and ask them to vote on a proposal to lay all the collieries in the county idle on some day, to be fixed in the near future.

Iron, Steel and Engineering Trades.

The quarterly ascertainment under the sliding scale operation in Cumberland and the Furness district shows that the price of Cumberland hæmatite iron warrants stand at 115s. per ton, and the wages of blastfurnace men in Cumberland and North Lancashire are unchanged at 99½ per cent. above the 1889 standard.

Enginemmen and boilermen of the Lancashire, and North Wales area have decided to press for a special war bonus. At a meeting of the District at Wigan, a resolution has been unanimously passed by the National Federation to at once apply for a bonus of at least 20 per cent. for all colliery and boilermen, and offering to co-operate with the Federation so that such war bonus should be secured for all workmen employed in and about collieries.

North-east coast blastfurnacemen have received, in accordance with the sliding scale, an immediate wages advance of 6 per cent., making wages 78 per cent. above the standard, the average net selling price of No. 3 Cleveland pig iron during the past quarter having been ascertained to have been 94s. 4-91d. per ton, an increase of 1s. 8-15d. on the quarter. The ascertainment with reference to the selling price of steel plates at Consett has resulted in steel millmen's wages remaining unaltered at 67½ per cent. above the basis.

On Thursday of last week, Sir George Askwith, the Government's Chief Labour Commissioner, sat at the County Hotel, Carlisle, for the purpose of taking evidence from the representatives of the blastfurnacemen and their employers in Cumberland and the Furness area with reference to the men's demand for additional war bonuses to be submitted to the Ministry of Munitions. Originally the National Federation of Blastfurnacemen asked for an advance of 1s. per shift in all districts. In the Cleveland district an agreement was arrived at, and sanctioned by the Minister of Munitions, giving a bonus varying according to the base rate per shift, as from April 1, youths with under 3s. receiving 5d. net per shift; men with 3s. to 3s. 6d., 9d.; 3s. 7d. to 4s., 8d.; 4s. 1d. to 4s. 6d., 7d.; 4s. 7d. to 5s., 6d.; 5s. 1d. and upwards, 6d. In the Lincolnshire district a settlement was effected on June 29, with the approval of the Minister of Munitions, for a flat rate of 8d. per shift. The blastfurnacemen of the Cumberland and Furness district have claimed the same bonus as have been granted in the Cleveland district, but they are willing to forego that claim and the war bonus of 4d. per shift, granted in October last, on condition that the fixed selling price of iron (127s. 6d. per ton), and not, as at present, the fixed price of warrants (115s. per ton) is allowed to determine wage percentages under the sliding scale operating in Cumberland. At a meeting at Whitehaven on April 29, the employers offered a flat rate of 4d. per shift, which was refused. Since April 1, 1916, the blastfurnacemen in Cumberland have had 99½ per cent. on the 1889 standard. When the war began they had 25 per cent., and they have got 68½ per cent. since.

OBITUARY.

The death is announced of Mr. M. H. Matthews, aged 70, at one time engaged in the coal export business of Cardiff. Earlier in his business life he was connected with the Phoenix Merthyr Colliery Company, and has been engaged in business locally for nearly 50 years.

Mr. T. Glynn Price, the oldest member of Swansea Harbour Trust, in which he was for 14 years chairman of the committee, died on Monday. For 40 years he was the Duke of Beaufort's estate agent at Swansea.

Capt. Thomas Kelly, of the Royal West Surrey Regiment, who was killed in action in France on June 26, was formerly a putter at Elswick Colliery. He enlisted in the Durham Light Infantry, and served 20 years in India. He retired on pension about 12 years ago, and subsequently became a surveyor at Chopwell Colliery. Re-joining the Army during the present war, he rose to the rank of captain.

The death is announced of Mr. O. H. Thomas, colliery proprietor, Elyone, Neath, who underwent an operation a few weeks ago, and did not recover from the shock. He has been prominent in local business circles not only as a colliery proprietor, but also on account of his interests in steel and tin-plate works of South Wales.

Mr. George Peel, who has died at The Villas, Thornley, retired in 1908, after holding the position of under-manager at Thornley Colliery for 23 years. He commenced work about 52 years ago as a trapper boy at Moorsley Colliery.

Maj. Chalkley Vivian Gould, of the R.F.A., who was killed in France on June 9 at the age of 37 years, had been a student of mining at the Durham College of Science, Newcastle, obtaining the degree of B.Sc. of Durham University in 1902. Subsequently, he followed the profession of mining engineer in the United States, returning to England in 1914 to join the Army.

Irish Coal Mining.—In a letter to the Press, with reference to railway facilities for the Castlecomer coal fields, Mr. J. B. Sample, of the Mining Office, Castlecomer, states that for upwards of 200 years coal has been worked in this area, and at present about 250 tons per day are raised. The coal is of the Jarrow seam. Efforts are restricted by the most primitive transport arrangements, and up to recently the main portion of the output was consumed within carting radius from the mines. Apart, however, from the coal of the Jarrow seam, there are large and proved deposits of Skehana coal, suitable for gas in suction plants. Considerable sums of money have been spent by the proprietor, Mr. R. H. Prior-Wandesforde, in prospecting the minerals of the locality, and, as a result, Mr. Wandesforde has been able to assure the Chief Secretary that, given a railway, the amount of coal raised daily can be increased to 750 tons. The authorities should take cognisance of the fact that 75 per cent. of the anthracite mined in Ireland is raised within the limits of Mr. Wandesforde's royalties, and that the four largest and best equipped collieries in the country are to be found at Castlecomer. Provision has been made for the opening up of the Skehana district, where large coal deposits were definitely located prior to the war. Mr. Wandesforde has intimated to the Irish Office that he is prepared to find a large sum of money for the development and extension of his collieries, but such an expenditure would not be justified unless the railway facilities were forthcoming. The Castlecomer railway would be adequately developed by a railway series towards the port of Waterford. Mr. Sample draws attention to one huge pit, the opening of which would enable the collieries to supply the coal between the collieries and the port, which at the present time is

THE FREIGHT MARKET.

Exceedingly little outward chartering is to be recorded this week, the shortage of neutral tonnage seriously restricting business. On the north-east coast, fixtures have been almost wholly confined to coke business for French Atlantic ports, and even in this direction boats are offering so sparingly that it has been found advisable to increase the maximum rate for Rouen by 1s. per ton, whether for Allied or neutral vessels. A fixture to Christiania is reported at the high figure of 195 kr. London has been done twice during the week—once at 14s., and once at 17s. The former figure now rules. There is a keen enquiry for vessels for Scandinavia, Portuguese, Spanish, and Mediterranean destinations, but very few vessels are on offer. Proffered rates rule at about 85s. to Lisbon, 95s. to Oporto, 150s. to Port Said, and 175s. to Barcelona. At South Wales, the volume of business done shows a considerable falling-off when compared with immediately preceding weeks, and French ports have had a virtual monopoly of the tonnage chartered. The enquiry for vessels for limitation ports is not now pressing, but there is no lack of orders for neutral directions, for which, however, the cargo space available is practically nil.

The homeward market finds the River Plate dull, at 145s. from up-river and 140s. from down-river ports to the United Kingdom or to St. Vincent for orders. At the United States, coal freights are quoted at 125s. from Virginia to Buenos Ayres, with Rio discharge at about 30 dols. On net charter, the Northern Range to United Kingdom is steady, at 180s., with 200s. quoted for French destinations, the latter being an easier rate than prevailed a week ago. On heavy grain basis, the Gulf to Marseilles is quoted at 32s. 6d., with 35s. to West Italy. The Range to the United Kingdom is unaltered at 30s. At the Far East, rice ports are firm, on the basis of 500s. from Saigon to France, and 400s. Burmah loading. Madras Coast to the French Atlantic with kernels is steady, at 500s. Calcutta to Genoa with jute shows no change from 285s. Kurrachee to the United Kingdom is still based on 250s., with Bombay to United Kingdom at 320s., and 275s. to the Mediterranean. There is a fair enquiry for cargo space for ore and phosphates from the Mediterranean to the United Kingdom.

Tyne to Boulogne, 800 and 900, 45s., coke; Calais or Dunkirk, 300, 44s., coke; 300, 350, 1,000, 500, and 200, 45s., coke; Calais or Boulogne, 200, 50s., coke; 900, 45s., coke; Christiania, 1,100, 195 kr.; Dunkirk, 350, 45s., coke; London, 600, 14s.; 750, 17s.; North French Range, 300, 80s., coke, sail; 350, 500, and 1,000, 45s., coke; Rouen, 700, 47s., coke; and Treport, 800, 46s., coke.

Cardiff to Caen, 700 and 500, 48s., neutral; Nantes, 3,500, 3,800, and 3,600, 61s. 6d., neutral; Oran, 3,100, 48s. 6d.; Rouen, 2,200 and 1,700, 48s. 9d., neutral; 600, 50s. 3d., neutral; and St. Nazaire, 3,500, 61s. 6d., neutral.

Swansea to Caen, 850 and 800, 48s., neutral; Rouen, 3,000, 24s. 6d.; 3,200 and 3,000, 48s. 9d., neutral; 700, 50s. 3d., neutral; 1,500 and 1,800, 25s. 3d., patent fuel; and Honfleur, 900 and 850, 24s.

Hartlepool to Calais or Dunkirk, 200, 50s., coke.

Newport to Rouen, 500, 50s. 3d., neutral; Nantes, 3,700, 61s. 6d., neutral; and Caen, 500, 48s., neutral.

Glasgow to Gibraltar, 87s. 6d., July.

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

Avery (W. and T.) Limited.—The report for the year states that after making provision for depreciation, excess profits duty, etc., and including the amount brought forward from last year, the balance of revenue account is £53,740. From this amount has to be deducted interest on debentures, interim dividends, amounting in all to £13,661, leaving a disposable surplus of £40,079. The directors recommend on the ordinary shares a further dividend of 10 per cent., less tax, making with the interim dividend 12½ per cent. for the year, to place to reserve, which will then stand at £90,000, £13,000, and to carry forward £12,564.

Bessemer (Henry) and Company Limited.—The directors have decided to pay an interim dividend of 5s. per share, less tax, on the preference shares, and 6d. per share, less tax, on the ordinary shares.

Broomhill Collieries Company Limited.—Interim dividend of 5 per cent.

Canadian Explosives Company Limited.—Dividend of 1½ per cent. on the preferred shares for the quarter ended June 30.

Celtic Collieries Limited.—An interim dividend for the half-year ended June 30 on ordinary shares at the rate of 10 per cent. per annum, and on preference shares at the rate of 7 per cent. per annum.

Dundee Coal Company Limited.—A dividend of 10 per cent. to all shareholders registered on 14th inst.

Everitt (Allen) and Sons Limited.—The report for year to March 30 last states that an undivided profit of £24,579 was carried forward pending negotiation with the Government regarding excess and controlled profits, in respect of which no settlement has yet been reached. Net profit, after allocating the sum of £15,277 to depreciation of premises and machinery, £31,887, making the total credit of profit and loss account £56,466. From this is deducted £3,970 for debenture interest for the year, and a further sum of £16,500 for arrears of preference share dividend paid within the year, leaving a balance of £35,997, which is subject to disposal by agreement with the Government for excess and controlled profits, and adjustment of ordinary income tax.

General Electric Company Limited.—The net profits for year ended March 31 amount to £265,220, to which has to be added £48,053, balance brought forward from last account, giving a total of £313,273. After deducting debenture interest, together with normal and special depreciation, amounting to £38,541, there is an available balance of £274,732. A dividend at the rate of 10 per cent. per annum, free of income tax, on ordinary shares, and to repay to the preference shareholders the income tax already deducted, is proposed, carrying forward £89,786. The reserve account has been increased by £100,000, transferred from pre-war suspense accounts of provision for contingencies which have not arisen, and with the further addition of £40,000 recommended the total amount at the credit of this account will be £400,000.

Gloucester Railway Carriage and Wagon Company Limited.—A dividend of 10 per cent. per annum, less income tax, and a bonus of 7s. 6d. on the "A" shares and 3s. 10d. on the "B" shares, free of income tax.

Hadfields Limited.—The directors announce an interim dividend of 1s. per share, free of tax, on the ordinary

shares, payable on the 28th inst. This is at the same rate as a year ago.

Tinsley Park Colliery Company Limited.—An interim dividend of 1s. per share on the ordinary shares, free of tax.

NEW COMPANIES.

Atwell Foundries Limited.—Private company. Registered office, 52, Gracechurch-street, London, E.C. 3. Registered July 2. To carry on businesses of iron, aluminium, steel foundries, etc. Capital, £5,000. Directors: S. W. Oakley and E. H. Sollas. Qualification, £100.

Croasdale (Henry) Limited.—Private company. Registered June 30. To purchase the business of coal and coke merchant and colliery agent, etc. Capital, £3,000. Directors: H. and J. Croasdale. Qualification, 10 shares.

Harworth Main Colliery Company Limited.—Private company. Registered July 2. The nature of the business indicated by the title. Capital, £100. Directors: R. Barber and F. W. Capron. Qualification, one share.

Marine Metal Company Limited.—Private company. Registered June 30. Nature of business indicated by title. Capital, £10,000. Directors shall be appointed by the subscribers. Qualification, £1. Subscribers: H. S. Holt and T. C. Ashcroft.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

ATHLONE, JULY 25.—The Urban District Council of Athlone invite tenders for the supply of about 1,500 tons of best gas coal, delivered and stored at their works at Athlone in good and dry condition in such quantities as may be required during the period of one year from the date of contract. The lowest or any tender not necessarily accepted. Tenders should reach the clerk, Town Hall, Athlone, by July 25.

KEIGHLEY, AUGUST 3.—The Electricity Committee are open to receive prices for the supply of best slack and small slack of good quality, free from dirt, the best slack to be about 1½ in., and the small slack from ½ in. to ¾ in. The total contract will be for about 12,000 tons, which will be split up between several collieries, and prices are to be submitted based on a six-monthly or twelve-monthly period. It is proposed to try sample trucks of the coal offered. The latest date for receiving offers and prices will be August 3. It is proposed to commence the new contracts about the middle of September. Any further particulars may be obtained on written application to the borough electrical engineer and tramways manager, Power Station, Coney-lane, Keighley.

OLDHAM, JULY 17.—The Gas Works Committee invite tenders for the supply of about 20,000 tons of gas coals, commencing as early as possible, and the whole quantity to be delivered by June 30, 1918. Conditions and forms of tender may be obtained on application to Mr. Isaac H. Massey, Gas Offices, Oldham, to whom tenders are to be delivered not later than Tuesday, July 17.

Abstracts of Contracts Open.

ASHFORD (KENT), JULY 18.—Coal and coke for County Industrial School. Forms from the clerk to the Committee, at the School.

ASHTON-UNDER-LYNE.—Coal for the Corporation. Tenders from local merchants and colliery proprietors as early as possible to borough treasurer, Town Hall, Ashton.

BRIDLINGTON, JULY 27.—100 tons South Yorkshire coal for the Guardians, delivered at Union Institution. Sealed tenders to the clerk to the Guardians, Union Offices, Longham, Bridlington.

DOWNPATRICK, JULY 20.—Coal for the Down District Asylum. Particulars and form of tender from the clerk to the Committee of Management, Down District Asylum, Downpatrick.

EDINBURGH, JULY 23.—Coal for the Governors of George Heriot's Trust. Particulars and forms from Mr. P. Macnaughton, Heriot Trust Offices, 20, York-place, Edinburgh.

JARROW, JULY 24.—Coal for the Education Committee. Forms and particulars from the secretary to the Committee, Education Office, Town Hall, Jarrow.

KEYNSHAM, JULY 17.—100 tons good house coal for the Workhouse. Forms from the clerk, Union Offices, Keynsham.

LONDONDERRY, JULY 20.—400 tons English house coal and 600 tons Scotch steam coal for the Asylum. Forms from the clerk of the Asylum, Londonderry.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport, Isle of Wight.

STRATFORD-ON-AVON, JULY 19.—400 tons coal suitable for steam and household purposes for the Guardians. Forms from the clerk, Union Offices.

WEYMOUTH, JULY 20.—Coal and coke for the Borough of Weymouth and Melcombe Regis Education Committee. Sealed tenders to the clerk to the Education Committee, East-street, Weymouth.

The date given is the latest upon which tenders can be received.

Yorkshire Deputies' Association.—A special conference of this association was held in the Arcade Hall, Barnsley, last Saturday, to consider the South Yorkshire Coal Trade Association's scheme of forming a Colliery Officials' Mutual Benefit Society. Mr. H. Clarney presided over 100-delegates, representing an equal number of collieries. The proceedings occupied seven hours. A resolution which was passed strongly opposed a scheme formulated by the owners, who were said to desire enrolment of the project under the Friendly Societies Acts. The resolution was moved by Mr. B. Hough (Hoyland), seconded by Mr. T. Wass, and supported by Mr. F. Keen-Smith (general secretary), Mr. W. Johnson (President of the Federation of Deputies of Great Britain), and Mr. W. Frowen (South Wales). A strongly-worded circular relating to the matter, issued by the Yorkshire Deputies' Association, advises all members to refuse any participation in the owners' scheme.

Directions of the Controller of Coal Mines,
Dated 4th July, 1917,
FOR THE PURPOSE OF RE-ORGANISING THE
TRANSPORT OF COAL BY PUBLIC RAILWAY
FOR INLAND CONSUMPTION.

Issued under Section 3 of the Coal Transport Order, 1917, made by the Board of Trade under Regulations 2 F. to 2 J.J. and 9 G. of the DEFENCE OF THE REALM REGULATIONS.

(1) No person shall, after September 8, 1917, without the consent of the Controller of Coal Mines, buy or sell, or offer to buy or sell, coal to be forwarded by public railway for inland consumption to any area other than those to which the coal in question may be so forwarded under the Coal Transport Reorganisation Scheme, as set out in these directions.

(2) For the purposes of the aforementioned scheme, Great Britain has been divided into areas numbered from 1 to 20 on two maps* of England and Wales and of Scotland respectively, and the following table shows the areas to which coal produced in each of the areas specified in the first column may be forwarded by public railway for inland consumption for the purposes indicated in the second, third, and fourth columns:—

Area of Production.		Areas to which the forwarding of coal by public railway for inland consumption is confined by these directions.		
No.	Area No.	Steam and Manufacturing.	Gas and Coking.	House.
1. Northumberland	1, 2, 3.			
2. Cumberland	2.			
3. Durham	2, 3.			
4. Lancashire	4, 6.			
5. Yorkshire	3, 4, 5, 7, 8, 10, 11, 14, 16.			
6. North Wales	6.			
7. North Stafford	6, 7, 9.			
8. Eastern Counties				
9. Shropshire	9, 12, 13.			
10. Birmingham and District	9, 10, 11, 13, 14.			
11. Northants to Essex				
12. South Wales & Monmouthshire	12, 13, 14.			
13. South-Western Counties	13.			
14. North-Eastern Counties & London	14.			
15. Derby and Nottingham	4, 6, 7, 8, 10, 11, 13, 14, 15, 16.			
16. Leicester	10, 11, 14, 16.			
SCOTLAND.				
17. South-Eastern	17.			
18. North-Western	18.			
19. North-Eastern	17, 18, 19.			
20. South-Western	18, 20.			

* Copies of these maps, also a diagram illustrating the effect of the Scheme on the Area interchanges have been prepared by the Railway Clearing House, and may be obtained, with a pamphlet embodying full instructions, by all concerned, post free, on application to the Secretary, Railway Clearing House, 123, Seymour-street, London, N.W. 1.

(3) In accordance with the provisions of Sections 2 and 3 of the Coal Transport Order, 1917, every contract for the sale of coal is hereby abrogated as from 6 p.m. on September 8, 1917, in every case in which this is necessary, in order that the re-allocation of the supplies of coal, as provided for in clause 6 of these directions, may be effected.

[On and from September 10, new contracts for the sale of coal affected by the scheme will come into operation, and all necessary arrangements to this end must be completed not later than September 8, but it is obviously desirable that completion should be reached as much in advance of that date as possible.]

(4) Every Colliery Owner shall, on receipt of instructions from the District Coal and Coke Supplies Committee in whose area the Colliery is situated, furnish the Committee with returns giving the following information as respects forwardings by public railway, for inland consumption during June 1917, of each description of coal produced at the Colliery:

(a) In the case of coal sold direct to consumers or retail merchants, the name and address of the consumer or retail merchant, and the tonnage of each description forwarded by rail to each in the area specified by the Committee, for each of the following purposes: (a) Steam-raising and Manufacturing, (b) Gas-making, (c) Coke ovens, (d) Household use.

(b) In the case of coal sold to factors and wholesale merchants, the name and address of the factor or wholesale merchant and the tonnage of each description forwarded by rail to each in the areas specified by the Committee, for each of the following purposes: (a) Steam-raising and Manufacturing, (b) Gas-making, (c) Coke ovens, (d) Household use.

(c) In the case of every consignment of coal during June, the destination of which was unknown to the Colliery Owner, the name, address, and business of the purchaser and the weight and description of each consignment.

(d) Such information as to the provision of wagons as the Committee may require.

Every Colliery Owner shall furnish the above returns to the District Coal and Coke Supplies Committee, so as to be in the hands of the Committee within seven days of the date of the despatch of the instructions by the Committee to the Collieries in their area.

(5) In every case in which the area of consumption of coal sold to a factor or merchant is unknown to the Colliery Owner, the District Coal and Coke Supplies Committees will apply to every such factor or merchant for a statement giving, as respects such coal, the tonnage of each description forwarded by rail for consumption in each of the areas as referred to in clause 4 of these directions, for each of the purposes named therein (a) Steam-raising and Manufacturing, (b) Gas-making, (c) Coke ovens, (d) Household use, and every such factor or merchant shall furnish such return to the Committee so as to be in their hands within three days of the date of application.

In cases where coal is sold by one factor or merchant to another, and the area of consumption of the coal is unknown to the seller, the seller shall state on the above-mentioned return the name and address of the purchaser and the weight and description of coal in each case.

(6) On receipt of the returns specified in clause 4, the District Coal and Coke Supplies Committees will arrange for meeting the requirements of purchasers whose supplies have been affected by the Scheme, out of the tonnage of coal which will be available and sufficient for the purpose, by diversion from other areas under the operation of the scheme. This tonnage will consist of the following:

(a) The tonnage of coal hitherto forwarded by public railway from the areas specified in the first column of the table shown in clause 2 of these directions, to areas other than those specified in the second, third, and fourth columns as permissible areas for the coal in question.

(b) Such portion of the tonnage hitherto forwarded to other areas as it may be necessary for the Committee to divert under detailed instructions from the Controller of Coal Mines.

The District Coal and Coke Supplies Committees will inform each of the Colliery Owners in their area of the tonnages (if any) to be diverted from these areas, and will specify the factors, merchants, and direct consumers, whose supplies are to be reduced or discontinued, with the descriptions and quantities of coal to be diverted from each.

(7) The whole tonnage of coal diverted under the operation of the scheme as mentioned in clause 6 shall be reserved by the Collieries for disposal in accordance with instructions to be given by the District Coal and Coke Supplies Committee, who will notify each Colliery Owner in their area of the factors, merchants, and direct consumers to whom the coal is to be supplied after the 8th of September, 1917, and of the descriptions and quantities to be supplied to each.

August 27th, a communication shall at once be sent to the District Committee controlling the area, responsible for supplying such factor, merchant, or direct consumer, furnishing details of the quantities and description of coal required, together with the names of Collieries from whom such supplies were actually drawn, and would continue to be drawn up to 6 p.m. on September 8th, 1917. Also that if a Colliery has not, by August 20th, 1917, received particulars of the allocation of its coal which is being displaced under the scheme it shall, on that date, communicate with the District Coal and Coke Supplies Committee concerned.

(11) The Controller of Coal Mines will furnish the District Coal and Coke Supplies Committees with information regarding the present distribution of certain special descriptions and qualities of coal which are required for certain purposes, such as for coke ovens, gas producers, and automatic stokers, and the names of firms who are entitled to priority in respect of their requirements of such fuel. Such firms will receive certificates issued by the Controller of Coal Mines entitling them to receive specified supplies of the special fuels mentioned in the certificate, and the Committees will take steps to provide the fuel in question, by diversion, where necessary, from firms who have not received certificates.

Every person shall comply with the instructions of the District Coal and Coke Supplies Committees with regard to the distribution of descriptions and qualities of coal, which it may be necessary to deal with, as special fuels under this clause.

(12) These directions do not affect:

(a) Coal conveyed to a port for shipment, whether for export, coastwise, or bunkers.

(b) Coal conveyed otherwise than by public railway from the Colliery.

(c) Anthracite.

In the case of rail-borne coal transhipped for delivery by barge or to be delivered by road vehicle, the point to which the traffic is forwarded by public railway is to be regarded as the destination for the purpose of complying with these directions.

(13) These directions may be revoked or varied by the Controller of Coal Mines as occasion arises.

GUY CALTHROP, Controller of Coal Mines.

EXPLANATORY NOTES.

The Scheme outlined in the foregoing Directions will, it is estimated, effect a saving in railway transport of not less than 700 million ton miles annually.

A.—Coal already being produced and consumed within the one area is ignored, and therefore it will not be necessary, as a rule, to interfere with existing contracts or sales affecting such coal.

B.—The District Coal and Coke Supplies Committees will deal with all coal affected by the scheme. There will be no need for factors, merchants, and direct consumers to take any steps under the scheme. They will simply wait until they are communicated with on the subject, except so far as the position is governed by clause 10 of the Directions.

C.—The District Committees, acting for the Controller of Coal Mines, have full powers to deal with the scheme as a whole, and are to be the medium for clearing up any doubtful points which may arise.

D.—As an organisation designed to relieve transport, the scheme has been based on four main issues:

- (1) That consumption of coal should take place as near the producing point as possible.
- (2) That in view of the superior facilities afforded by the main Trunk Lines, the movement of traffic should follow these routes wherever possible.
- (3) That the movement of coal should, as far as possible, be in well-defined directions, viz.: North to South, North to South-East, North to South-West, East to West.
- (4) That an area producing less coal than sulices for its own needs should not send any portion of its output to other areas. That an area producing more coal than it requires for consumption within the area itself, should only distribute the balance to adjacent or convenient areas.

E.—The only limitation in regard to the foregoing clause (4) is the need for providing coal of a special type for certain purposes (this need has been determined by getting in touch with consumers direct), and is referred to in clause 11 of the Directions.

F.—All concerned are strongly advised to secure a map, diagram and pamphlet as indicated in the footnote to Clause 2 of the Directions, as these documents will be found to be of material assistance.

G.—It is emphasised that this scheme does not affect waterborne coal, either export, coastwise, or bunkers, anthracite or coke of any description.

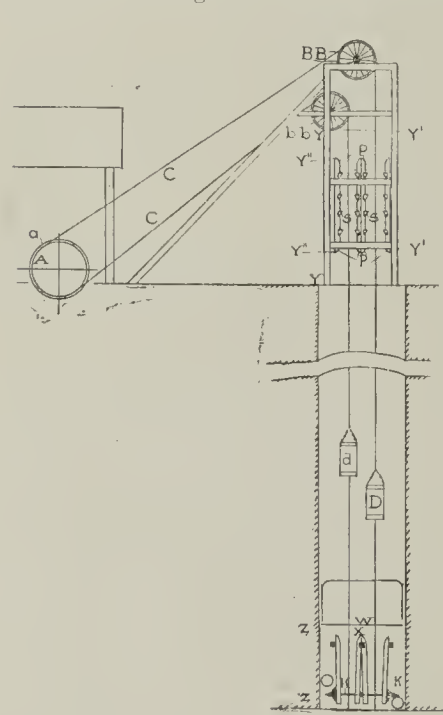
H.—A List of the District Committees governing the various areas, together with the names and addresses of Secretaries, is appended:—

No.	Area.	Secretary of District Coal and Coke Supplies Committees.
1.	(Northumberland)	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
2.	(Cumberland)	T. P. Martin, Esq., 19, Falcon-street, Workington.
3.	(Durham)	R. Guthrie, Esq., Coal Trade Office, Newcastle-on-Tyne.
4.	(Lancashire)	Sir T. R. Ratcliffe-Ellis, 18, King-street, Wigan.
5.	(Yorkshire)	Messrs. Parker, Rhodes, and Co., 14, Moorgate-street, Rotherham.
	South Yorks Collieries	A. B. Smith, Esq., Central Bank-chambers, Leeds.
	West Yorks Collieries	W. H. Haswell, Esq., Elwy House, King-street, Wrexham.
6.	(North Wales)	Major J. Selby Gardner, Cannock, Stafford.
7.	(North Stafford)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
8.	(Eastern Counties)	Major J. Selby Gardner, Cannock, Stafford.
9.	(Shropshire)	Major J. Selby Gardner, Cannock, Stafford.
10.	(Birmingham and District)	Major J. Selby Gardner, Cannock, Stafford.
11.	(Northants to Essex)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
12.	(South Wales)	Finlay A. Gibson, Esq., Park-place, Cardiff.
13.	(South-Western Counties)	J. G. Dennehy, Esq., Albion-chambers, Bristol.
14.	(South Eastern Counties and London)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
15.	(Notts. and Derby)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
16.	(Leicester)	W. Saunders, Esq., Bank-chambers, London-road, Derby.
SCOTLAND.		
17.	(South-Eastern Counties)	R. Baird, Esq., 105, St. Vincent-street, Glasgow.
18.	(North-Western Counties)	
19.	(North-Eastern Counties)	
20.	(South-Western Counties)	

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

A New Safety Cartridge for Mines. W. J. Jackson, of the firm of Haseltine, Lake and Company, registered patent agents, for E. Lemaire, Boulevard de la Woluwe, No. 116, Mons, Belgium.—This invention comprises providing a cartridge having in combination two features, viz., first, a flame extinguishing substance composed of one or more mineral salts which are volatile, fusible, or decomposable at a high temperature, and second, the arrangement of such flame extinguishing material in juxtaposition with the explosive material throughout the whole length thereof, so as to be effective throughout the entire length of the latter, but in such a manner that the ends of the cartridge are not covered thereby. No claim is made to either of these features *per se*. The juxtaposition may be carried out in any suitable manner as, for example, by filling one longitudinal half of the cartridge with the explosive, and the other with the flame extinguishing material. Concentric cartridges may also be employed, in which the extinguishing material may be either in the inside or on the outside, but it is essential that the ends of the cartridge be not covered thereby, and that the flame extinguishing material extends in juxtaposition with the explosive material throughout the entire length of the latter. The extinguishing materials employed should be in a pulverulent form, but if desired may be lightly agglomerated to facilitate moulding or otherwise forming into shape. All kinds in general of materials in fine powder when used as above described would prevent the flame from igniting the firedamp, but with any inert substance it would be necessary to employ a very large quantity with dangerous explosives, and the diameter of the cartridge would become much too great. It is regarded as an essential, therefore, as above indicated, to use only mineral bodies which are volatile, fusible, or decomposable by heat or mixtures of these bodies, such as:—(a) A mixture of calcium fluoride and sodium chloride, for instance, in the following proportions: Calcium fluoride, 50 per cent.; sodium chloride, 50 per cent. These salts may also be used alone, but their mixture produces much better results and effects than either of them used separately. Instead of calcium fluoride, another calcium salt, such as the carbonate or sulphate thereof, may be mixed with the sodium chloride, which itself can be replaced by potassium chloride or ammonia chloride. (b) The simple chlorides or the double chlorides of metals or of ammonia, the simple fluorides and the double fluorides of metals or of ammonia, the fluosilicates of metals or of ammonia, anhydrous sodium carbonate or anhydrous potassium carbonate, potassium or sodium nitrate either alone or in mixture with one another or with the substances mentioned under (a). It should be noted that each explosive substance has a predilection for some one extinguishing substance, hence the impossibility of setting forth the best formula in a general way. (Five claims.)

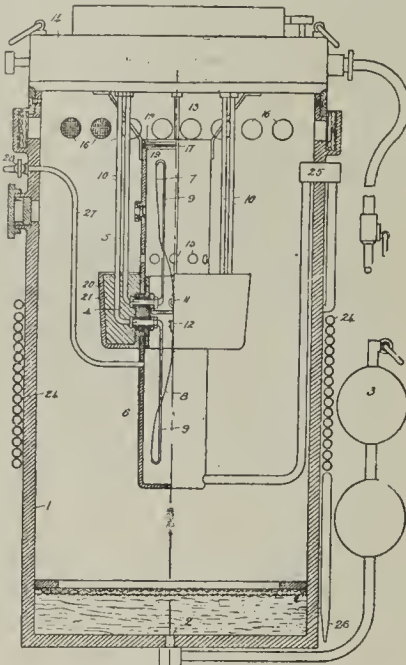
106347. Improvements in Arrangements for Ensuring Safety in Winding Mine Cages. R. Morgans, 3, Clevedon-road, Newport, Mon.—The invention comprises improvements in the method of raising or lowering persons or minerals in perpendicular mine shafts where two cages are used—one ascending and the other descending simultaneously—the object being to prevent either cage from falling into the shaft in the event of the breaking of a winding rope, with means for preventing shock to occupants of descending cage at bottom of shaft in the event of an overwind. In the accompanying drawing, the existing drum is supplanted by two single-grooved winding pulleys or one double-grooved winding pulley, keyed firmly to the main crank shaft of the winding engine, and fitted with adequate and efficient brakes capable of being effectively operated, as in the case of a winding drum. In cases where it is deemed inconvenient or unnecessary to remove existing drum, two grooves may be constructed and fixed around the drum; these grooves will then form substitutes for the grooves of the winding pulleys A and a.



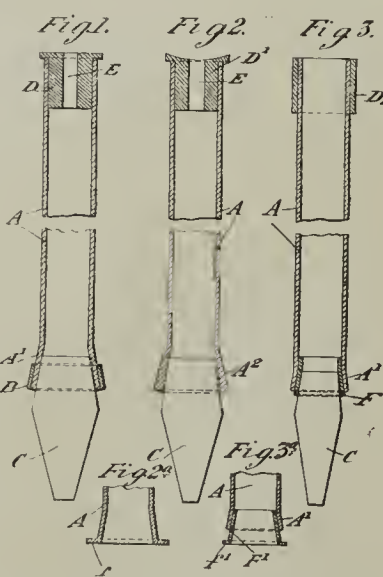
The two single-grooved headgear pulleys are replaced by two double-grooved headgear pulleys, or four single-grooved headgear pulleys BB and bb. Two winding ropes, each of a length equal to depth of shaft plus twice the distance from winding pulleys to cage at surface, are used. The two ropes C and c are passed around the winding pulleys A and a—one rope to each groove. The "over" ends of ropes C and c are passed over one of the double-grooved headgear pulleys BB, and attached to cage D on one side of the shaft; the "under" ends of ropes C and c are similarly passed over the other double-grooved headgear pulley bb, and attached to cage d on the other side of the shaft. By means of the arrangements already described, each cage will be suspended by two separate ropes, and when actuated by reason of the winding pulleys A and a, being made to revolve, the cages will move simultaneously but in opposite directions. In the event of one of these ropes breaking at any point during the wind, both cages will remain suspended by the other rope, and they will also be under the complete control of the engineman, so that the wind can be arrested gradually without further damage. A balance rope, extending from the underside of one cage, around bottom of "sump" to the underside of the other cage, should be used. The whole method now described can be applied to any other suitable arrangement. (Two claims.)

Improvements in Apparatus for Detecting the Gases. A. Philip and L. J. Steele, registered patent agents, for J. H. Steele, Portsmouth.—In the accompanying drawing is a vertical section with the half in elevation. As in the prior

specification referred to, the apparatus is mounted within an outer container 1, into which the air to be tested is pumped through the opening at 2, by a simple form of pump shown at 3. The internal portion of the apparatus consists of three main sections; a central union member 4, an upper chamber 5 screwed thereon, and a lower chamber 6 similarly attached to the union member 4. Four catalytic wires are employed in the apparatus; the two wires 7 in the upper chamber 5, of which only one appears, are intended to be catalytically active, while the two wires 8 in the lower chamber 6 are prevented from becoming catalytically active. The wires 7, 8, are all supported upon stout conducting supports 9, by means of which the wires are jointed to the conducting leads 10. The other ends of the wires 7, 8, end in terminals 11, 12, which extend at right angles to the leads 10 through the sides of the central union member 4, which is made octagonal in shape at this portion, although this does not appear from the drawing. The catalytically active and inactive wires are arranged as before as the alternate arms of a Wheatstone bridge, in other words, the two wires 7 in the upper chamber 5 form the opposite arms of the bridge and the wires 8 in the lower chamber 6 form the other pair of opposite arms. The arms of the bridge are connected by the four wires 10, and the two wires 13, to an indicating instrument in the box 14, and to a source of electric supply such as a battery. The gases to be tested have access to the upper chamber 5 through a ring of holes 15 near the base of this chamber. The heat of the upper wires 7 causes a circulation of the gas under test through this chamber from the sample of gas which has been pumped into the container 1. Further samples of gas for test can be pumped through the opening 2 when desired, and escape through the openings 16 near the top of the container 1. The top of the upper chamber 5 is provided with a layer of gauze 17 retained in position by two spring wire rings 19. It follows, therefore, that the upper wires 7 are immersed in the gas to be tested, and if any combustible constituent is present in this, catalytic action takes place on the surface of the wire in a well-known manner, causing a change in their resistances due to the increase in temperature. The lower wires 8 are kept out of contact with the gases to be tested by means of the following arrangement: The terminals from which the conductive supports 9 proceed, and the joint between the union member 4 and the chambers 5, 6, are sealed from the external atmosphere by means of a trough 20, which is filled with a sealing compound, for example, of some resinous material 21. By this means the whole of the lower chamber 6 is completely disconnected from the external atmosphere except by the small bore tube 24, which is shown coiled around the outer surface of the outer container 1. The top of this tube is led through a union 25 into the vessel 1, and thence into the lower portion of the chamber 6. The lower portion of the coiled tube 24 is in communication with the surrounding atmosphere, where it may conveniently have a constricted nozzle 26. (Two claims.)

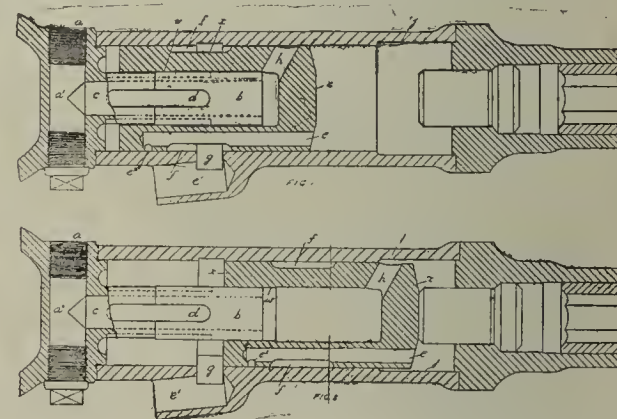


106429. Improvements Relating to Pit Props and the like. J. E. Slack, 343, Holloway-road, London, N.; and C. A. Williams, 5, Broadfield-road, Hither Green, S.E.—The invention relates to composite props, comprising metal and wooden parts, for supporting roofs on mine workings or for other similar purposes, and more particularly to the type of prop in which a tapered wooden plug is inserted in the correspondingly shaped upper or lower end of a metal tube. In fig. 1, a welded steel tube A is formed with the lower end A' expanded or tapered outwards and strengthened at the base by a collar or ring B shrunk on the tube. The wooden plug C is tapered at the upper end, which is inserted in the tube, so that there is no tendency for the plug to creep further into the tube, while on the other hand, the taper allows it to be easily removed by a bar inserted in the hole E provided in the cap D. Alternatively, the tapered end of the tube may be split to facilitate the removal of the plug, and in this case the collar would be a tight fit, but not shrunk on. The lower end of the plug C is tapered to facilitate the shortening of the plug under heavy loads. Fig. 2 shows a construction similar to fig. 1, except that the lower end of the tube A is strengthened as shown at A' by swaging, or other means, so as to provide the necessary strength without the provision of a collar. The cap D' is shown in this construction with a concave instead of a flat top. In fig. 2a the expanded end of the tube is strengthened by a flange f. In the example shown in fig. 3, the lower end of the tube is strengthened by an internal tapered ferrule or ring, conforming to the taper of the tube and plug. This ferrule or ring is preferably expanded conjointly with the tube, so that it cannot be easily detached therefrom and lost. The cap in this figure is replaced by a ring D2, which provides sufficient stiffness and bearing surface. This ring is shrunk on to the tube. In fig. 3a, the internal ring or ferrule F1 is provided with an enlarged or flanged end f1, in order to prevent the ferrule from creep-



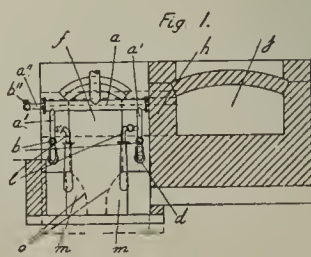
ing into the tube under heavy loads. The caps not only strengthen the upper ends of the tubes, but indicate to the miners the parts to be struck, when knocking the props into position; without this indication, the tubes are very liable to be damaged in this operation. Wedges may be driven between the caps and the roof in the usual manner when it is necessary to pack up the props. Although it has been assumed in the above description that the wooden plugs rest on the floor, and the caps are in contact with the roof, the props may be inverted so that the plugs are at the upper and caps at the lower end. It will be seen that the construction according to the invention provides a strong and rigid prop of comparatively small weight, with the least number of detachable parts, preferably one only, and in which the wooden plugs are readily removed and replaced. (Three claims.)

106451. Improvements in Percussive Rock Drills. G. H. T. Rayner, Grange Farm House, Carter Knowle-road, Abbeydale-road, Sheffield.—This invention relates to percussive rock drills, and has as its object the simplification of construction of such tools by dispensing with a special distributing valve and valve chest, and also the shortening and lightening of the machine by reason of such simplification of construction and the arrangement of the parts and ports. Fig. 1 is a sectional elevation of the improved tool showing the striking piston at the commencement of its stroke; and fig. 2 is a similar view showing the piston at the end of its stroke. The same letters refer to similar parts in both views. Air is admitted at a, and passes by passage a' to port c, running centrally through the fixed piston b, and operates on the interior face of the main piston x. The air also passes around the fixed piston b, and by means of the grooves d to the left-hand face of the main piston x (see fig. 1), whereby the whole area of the main piston is under pressure. The right-hand face of the main piston x is open to exhaust by ports e and e', which are placed in connection with one another by the annular grooves f and g, situate in the main piston and the wall of the machine respectively. The piston x is thus free to travel forward to strike a blow, with the full area of the left-hand side and the interior face under full pressure, until such time as the grooves d are shut off by the shoulder w (formed on the interior of the piston x), from direct communication with the main inlet port c. The air on the left-hand face of the piston x then acts expansively until it exhausts through groove g, and port e', whilst the interior face of the piston remains under full pressure until the blow is struck (see fig. 2). In order to reduce cushioning after the main exhaust through grooves f and g, and port e' is closed on the outward stroke, the exhaust port e in the main piston x is prolonged to the left past the annular groove f, and communicates by a small port e2 with the main exhaust e' through groove g, for a portion of the stroke after groove f has ceased to be in connection with groove g and port e'. The port e2 in turn is shut off from exhaust by the further movement of

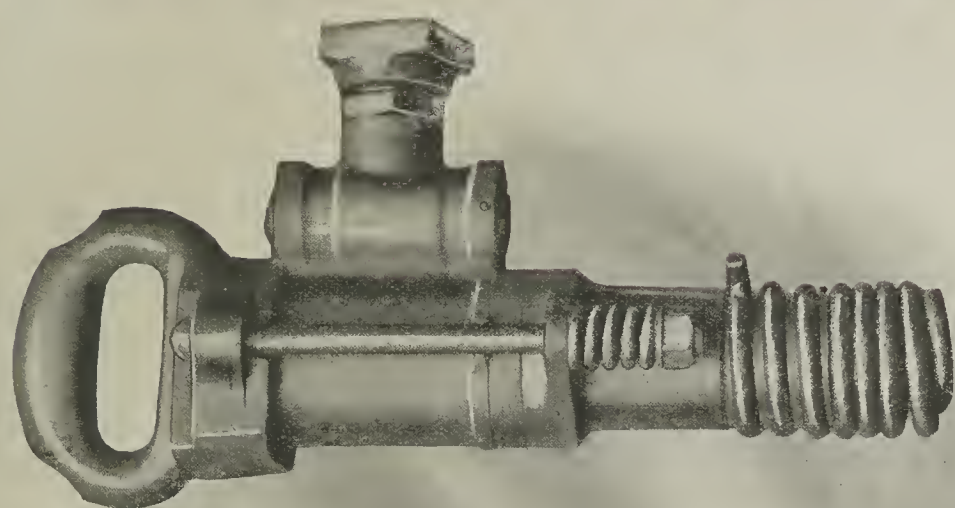


the piston x to the right, as shown in fig. 2. In fig. 2 is shown the position of the parts after the blow has been struck, and it will be seen that the whole of the right-hand area of main piston x is open to pressure through ports a, a', and c and port h, which communicates with the recess j formed at the right-hand end of the cylinder. The left-hand surface of the piston x (but not the interior surface) is open to exhaust. The piston is thus driven backwards, thereby shutting off the left-hand face of the piston from the exhaust by the closing of the annular groove g and port e'; also the grooves d again communicate live air from port c to the left-hand end of piston x, and the said piston is brought to rest and again driven forward. On the backward stroke exhaust first takes place by the small port e2, and then later by port e, as previously described. (Six claims.)

106513. Improvements in Combined Furnaces and Gas Producers. R. F. Hislop, Greenhill House, Paisley, Renfrewshire.—This invention appertains to gas producers of square or rectangular design, as shown, with fixed grates at bottom built or fixed at incline to side walls attached to, built in proximity with, or forming part of heating furnace or chamber, such as plate and frame furnaces, drying and annealing ovens or stoves, galvanising baths, enamelling muffles, steam boilers, melting furnaces, etc., and of the type in which the air for the primary combustion of the fuel and air for secondary combustion of the gas is taken in by means of chimney draught, or of the type in which the air for primary combustion only is induced by means of steam or air jet, in conjunction with a trumpet or other suitably formed pipe, as is generally employed for that purpose. Fig. 1 is a front elevation, showing the type of gas producer referred to and the arrangement of the pipe connections and valves in the front of producer for supplying air under pressure for the secondary combustion of the gas also showing the disposition of the said producer relative to the furnace or heating chamber as referred to. The main secondary air supply pipe a is made up to, say, 6 in. diameter, and of suitable length, and is provided with branch or off-takes a' a' at each end up to 3 in. diameter, having suitable valves b b for connecting up with the inlet of the pipe or pipes, passage or passages c c formed in wall or walls d d of producer-f and the other part or parts g g of the brickwork h of the heating furnace or chamber j attached to or in proximity with the producer as shown. These pipes or passages are made preferably rectangular and of suitable area, the one end being carried to front of producer and the other end connected



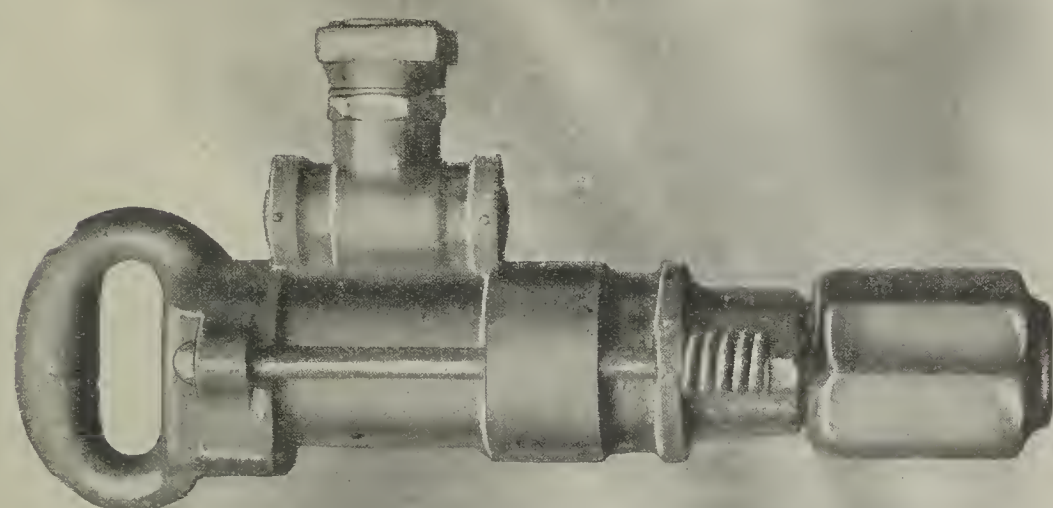
SUPREME !



HARDY "SIMPLEX"

Type B5.

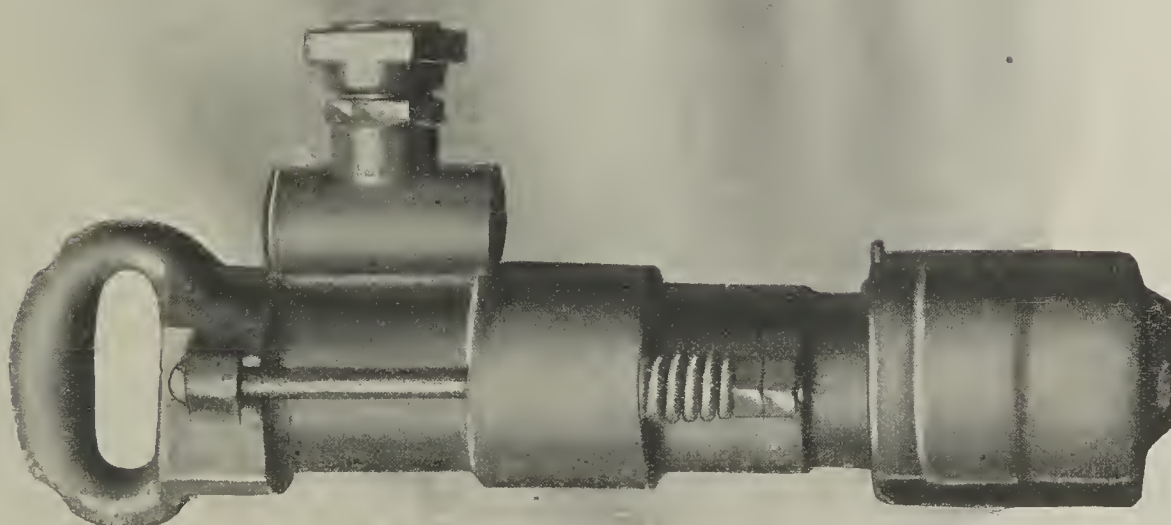
Extra light, for
ripping & brushing.



HARDY "SIMPLEX"

Type B6.

Medium, for
drifting, etc.



HARDY "SIMPLEX"

Type B7.

Heavy, for sinking.

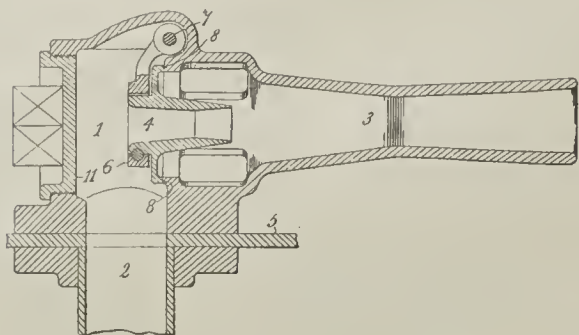
These machines are in use to the number of many thousands all over the world. They have utterly defeated all competition, and stand supreme as examples of fast-boring rock drills of immense durability and superb engineering finish.

TRIALS ARRANGED.

THE HARDY PATENT PICK CO. LD.
SHEFFIELD.

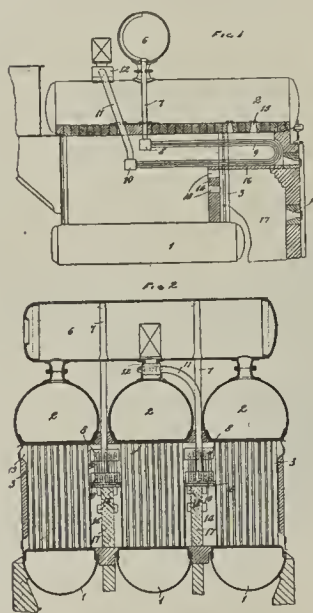
with the chamber at back or connected with furnace adjacent. Whereas the drawing shows a single pipe or passage wall of producer two or more runs arranged one on each side wall and connected at the ends may be connected in each side wall so as to give a longer travel for the water to ensure its being well heated before meeting the steam cone. (Six claims.)

Improvements in Apparatus for the Heating of Water. R. G. Brooke, Upton Grange, Macclesfield. —Where, as on locomotives, an injector is made use of to supply water from a tank or other reservoir to a steam generator, it is a known expedient, when the feed is not required, to use superfluous steam to heat the water in the tank. This is done by closing the overflow of the injector and opening the injector steam valve, whereby the steam can blow back along the injector water pipe into the water tank. This procedure results in much noise and vibration consequent upon the abrupt manner in which the steam and water are brought into contact. The object of the present invention is to overcome this objection, and it is achieved by arranging for an automatic restriction of the passageway between the injector and water tank when steam is to be blown back into the latter, and the non-restriction or return to normal condition of such passageway when water is to be drawn from the tank by the injector, whereby the steam cone of the circulator is at one time brought into play, and at another time prevented from



being the sole source of supply of water to the injector, and so of interfering with its working. The invention can be carried into effect in various ways, making use of some form of non-return valve. The circulator embodies a chamber 1 that at one time receives steam and at another time water, whereby a single pipe 2 can be used to effectually supply water to the injector and alternatively to supply steam to the circulator 3. In the construction illustrated in the drawing, the steam cone 4 of the circulator 3, immersed in the water to be heated in the tank 5, extends centrally through a valve 6 carried by a hinge pin 7, so that when steam is being supplied to the cone this valve will advance towards and be held against a companion seating 8 by steam, and conversely, when water is required to be fed to the injector from the tank, the valve will automatically leave its seating owing to such flow of water. The chamber 1 may in some instances be provided with a hand hole 10 normally closed by a screw plug 11, as shown in fig. 1, or by a cap or cover. (Seven claims.)

106582. Improvements in Steam Generators Fitted with Superheaters. James Howden and Company Limited, 195, Scotland-street, Glasgow; and J. H. Hume, of the same address.—This invention relates to improvements in steam generators, more particularly multi-sectional steam generators of the type comprising water drums connected by upright water tubes to steam and water drums extending rearwardly of the water drums above a combustion chamber situated rearwardly of said tubes, as described, for example in the specifications of Letters Patent Nos. 26330/08, 27449/10, and 5383/12. Figs. 1 and 2 of the accompanying drawing are vertical sections at right angles to one another, showing a generator and superheaters. As shown, the generator proper comprises lower water drums 1 connected to upper water and steam drums 2 by upright water tubes 3 fitted into tube plates connected to the drums 1 and 2. The lower drums 1 are mounted above and extend rearwardly of the grates, the upper drums extending rearwardly of the lower drums above combustion chambers situated rearwardly of the upright tubes 3. 6 denotes a steam collecting drum coupled to and disposed transversely of the drums 2. Led from the upper part of the steam collecting drum 6 are pipes 7 coupled to headers 8 receiving the upper ends of preferably U-shaped superheating tubes 9, of which the opposite ends are connected to headers 10, from which are led pipes 11 to a valve casing or casings 12 fitted or each fitted with a steam stop valve. As shown, the superheater tubes 9 are partly contained in flues intermediate the stacks of upright tubes



and partly in spaces between the combustion chambers, being shielded from the hottest products of combustion by firebrick shelves 16 sustained by partition walls 17. Obstructing the passage of hot combustion products from the combustion chambers to the flues are partitions 14 of chequer brickwork, openings 18 in which may be closed at will by the insertion of loose bricks. Orifices indicated at 15 permit access of soot cleaning devices for cleaning the exterior surfaces of the superheater tubes. It is evident that the superheater tubes may be so disposed that their rearward ends do not project beyond the flues. (Three claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Armangué, J. M. Pulleys for transmission of movement at variable speed. (9734)
 Armangué, J. M. Variable transmission mechanism applicable to motor vehicles. (9735)
 Balfour, I. H. Treatment of iron ores, etc., for use as catalysts. (9578)
 Bennett, F. H. Cable wheel adjuster. (9496)
 Benson, T. J. Speed indicating apparatus. (9670)
 Berry, H. H. Electric switches. (9801)
 Bicknell, R. H. Tunnelling machines. (9802)
 Birkbeck, H. (Green). Attachment of railway rails, etc., to chairs and tie-bars, and locking tie-bars in position. (9648)
 Bowen, R. Means for securing railway rails in their chairs. (9679)
 Bray, S. W. Treatment of iron ores, etc., for use as catalysts. (9578)
 Breeze, V. Power transmission mechanism. (9589)
 British Oxygen Company. Treatment of iron ores, etc., for use as catalysts. (9578)
 British Thomson-Houston Company (General Electric Company). Voltage regulators. (9724)
 Challis, G. E. Clonometer. (9681)
 Copisarow, M. Treatment of crude anthracene to isolate main constituents therefrom. (9559)
 Cornthwaite, H. and S. Treatment of pig iron. (9686)
 Crittall Manufacturing Company. Electric furnaces, and method of working same. (9584)
 (General Electric Company). Voltage regulators. (9724)
 Goodwin, A. Traveller cranes for overhead runways. (9751)
 Gröndal, G. Concentrating ores by flotation. (9852)
 Henery, A. Cranes, etc. (9642)
 Holmes, T. E. Rolling mills. (9660)
 Hughes, J. E. Fuel from waste materials, and apparatus for making and utilising same. (9701)
 Huntingford, E. S. Traveller cranes for overhead runways. (9751)
 Inshaw, J. Portable hand cranes. (9637)
 Lancey, H. T. Crucible furnaces. (9756)
 Markham, W. J. Electric switches. (9801)
 Merz and McLellan, and Michie, A. C. Use of solid fuel for large scale power production. (9817)
 Miles, R. W. Process of de-tinning tin-plate waste cans, etc. (9765)
 Nettleton, S. Reciprocating trough conveyors. (9739)
 Primrose, H. S. Electric furnaces, and method of working same. (9584)
 Queneau, A. L. J. Process for separating metals from their ores. (9674)
 Ridder, R. de. Production of combustible substances or coal substitutes. (9791)
 Siemens-Schuckertwerke. Winding or hauling machinery. (9571)
 Watson, T. D. Warning signal apparatus for winding, etc., machinery. (9682)
 Weeks, E. G. Use of solid fuel for large scale power production. (9817)
 Wüst, F. Method of improving the Thomas process. (9736)
 Zweigbergk, T. von. Gear changing devices. (9820)

Complete Specifications Accepted.

To be published on July 26.

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 4790. Robinson, J. G., and Superheater Corporation Limited. Steam superheaters of the multiple smoke or fire tube type. (107394)
 7468. Edser, E., Sulman, H. L., and Minerals Separation Limited. Concentration of ores. (107401)
 9356. Sickman, D. V. Hydraulic appliances for breaking down coal in mines and for like purposes. (107429)
 9544. Davis, H. N., and Twigg, W. R. Furnaces. (107433)

10403. Semmler, C. Method for utilisation of waste heat of gas engines, incandescent slag, coke, and the like. (107443)
 10462. Ostwald, W. Utilisation of mine waste by means of heat of waste fields. (107446)
 11238. Best, W. Miners' safety lamps. (107459)
 11664. Stahlwerke R. Lindenberg Akt.-Ges. Steel alloy. (104670)
 11828. Aitken, T. W. Crucible furnaces for use in melting metals. (107468)
 13456. Best, W. Miners' safety lamps. (107484)
 15028. Conway, J. L. Miners' hand lamps. (107506)
 16745. Woosnam, A. (Lowe, E. A.). Thermally-controlled releasing apparatus for fire doors and the like. (107522)
 18475. Bache, W. Melting and re-heating furnaces. (107532)
 18596. Eicheler, H. Centrifugal pumps. (107533)

1917.

3705. Hudson, E., and Hudson, W. S. Fastening of railway rails to sleepers. (107554)
 5650. Weir, G. and J., and Lang, C. R. Duplex pumps. (107564)
 5885. Ashby, E. W. Construction of hollow metal dericks. (107565)
 6788. Shillito, B. J., and Wallwork and Company, H. Rolling mills. (107570)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.

4505. Ransome Concrete Machinery Company. Concrete mixers. (107575)
 9326, 9327. Ludwigsbergs Werkstads Aktiebolag. Rotary pumps or engines. (107595, 107596)

PUBLICATIONS RECEIVED.

United States Bureau of Mines, Department of the Interior: (Technical Paper 135), "Bibliography of Recent Literature on Flotation of Ores (January to June 1916)," compiled by D. A. Lyon, O. C. Ralston, F. B. Laney, and R. S. Lewis; (Technical Paper 165), "Quarry Accidents in the United States during the Calendar Year 1915," compiled by A. H. Fay; (Bulletin 143), "Abstracts of Current Decisions on Mines and Mining, reported from May to August 1916," by J. W. Thompson.

"University of Illinois Bulletin," (Vol. 14, No. 18), January 1, 1917, "The Embrittling Action of Sodium Hydroxide on Soft Steel," by S. W. Parr (Bulletin No. 94), price 70c.; (Vol. 14, No. 22), January 29, 1917, "Magnetic and Other Properties of Iron-Aluminium Alloys Melted in Vacuo," by T. D. Yensen and W. A. Gatward (Bulletin No. 95), price 70c.

CATALOGUES AND PRICE LISTS RECEIVED.

Ateliers de Construction Oerlikon (Switzerland).—The London agent, Mr. G. Wuthrich, of Oswaldestre House, Norfolk-street, Strand, W.C.2, has forwarded a small 64 pp. brochure illustrating some of the principal Oerlikon engineering products, and incidentally giving also a few exterior and interior views of the company's works. In an accompanying circular, it is pointed out that the firm is run and managed by Swiss, and all labour is Swiss to the extent of 98 per cent. The raw materials used are imported mainly from America and Great Britain.

Argentine Navy and Chilean Coal.—According to information received from the office of the commercial attaché in Buenos Ayres, the Government of Argentina is to import a trial cargo of 5,000 tons of Chilean coal, to be used on vessels of the Navy. The coal is much softer than English and American coal, and it is considered doubtful whether it will prove to be a satisfactory substitute.

Coal Production in Peru.—The *Boletín del Cuerpo de Ingenieros de Minas* states that the production of coal in Peru in the year 1915 amounted to 290,743 tons (of which 282,863 tons were from the department of Junin, and 6,400 tons from Ancachs), an increase of 6,883 tons as compared with the previous year. As heretofore, the only important coal industry is in the department of Junin, where coal mining is intimately connected with the copper industry. The two chief mines are Goyllarisquiza and Quishuarcancha, belonging to the Cerro de Pasco Mining Company. The first-named mine (or rather, group of mines) produced 204,397 tons of coal, an increase of 22,008 tons over 1914, being at the rate 1.44 tons per head of workers employed (141,507 underground workers and 82,139 at surface) per diem. The Quishuarcancha mine produced 61,745 tons, and employed 31,683 workers. In the same year, 55,662 tons of coal were imported, 23,988 tons from Great Britain, 22,122 tons from the United States, 6,122 tons from Australia, and 2,706 tons from Chile, the bulk of these coals—47,704 tons—entering at Callao. The considerable reduction of imports as compared with the figures for 1914—139,312 tons—was attributable to the large stocks held by the copper works, and to the increased use of oil fuel owing to the high price to which coal had risen in consequence of the war.

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THE COLLIERY GUARDIAN

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VOL. CXIV.

FRIDAY, JULY 20, 1917.

No. 2951.

Mechanical Stokers at Collieries.

(SPECIALLY CONTRIBUTED.)

The use of mechanical stokers in colliery power plants is becoming a matter of importance, particularly in American mining practice. In the bituminous fields there are more than 400 machines, of one make alone, used by the mines for generating power for their own use. The anthracite fields, on the other hand, do not seem as yet to have been invaded to any great extent by the stoker. This is due largely, no doubt, to the difficulty of furnishing a stoker competent to meet the anthracite requirements efficiently and economically; or, possibly, it may be attributable to some failure on the part of certain stoker manufacturers, busy in other fields, to seize the opportunity which is open. At any rate, the American situation is this: The bituminous mines are awakening to the possibilities of economy and efficiency, and are considerably advanced in the work of installation; whereas the anthracite mines are behindhand in this respect. The present article will accordingly deal almost exclusively with what is being done at the bituminous mines.

It will be of interest to present some actual instances illustrative of the tendency in the bituminous regions. The Rochester and Pittsburg Coal and Iron Company, a considerable operator in the Pennsylvania district, has installed 36 stokers of one variety, which serve 12 boilers of 500 horse-power each. The units are Sterling

trouble, regardless of what we have put into them," and expressed himself as fully convinced that stokers will steam a plant better with a very inferior grade of fuel than would be the case with good coal with hand firing. He also stated that they do not dump any coal into the boilers that they consider of a merchantable quality.

The experience of the Allegheny River Mining Company, operating in the Pennsylvania region, may also be cited. At the Conifer plant the figures for two consecutive years—the one year being the last year of hand firing and the other being the first of mechanical firing—show that for each 1,000 tons of coal produced, the hand-fired boilers consumed 27.4 tons of coal whereas for each 1,000 tons of coal produced, the mechanically stoked boilers consumed only 19.1 tons of coal. Not only was less coal used with the stokers, but a very much inferior grade; in fact, "a mixture of about 33½ per cent. bony." In comparative tests made at the Conifer plant of this concern, the hand-firing test was carried out on two 150 horse-power return-tube boilers for nine consecutive hours. The mechanical stoker test was likewise carried out on two 150 horse-power return-tube boilers, but the test was concluded in six hours. "Slack" coal was burnt when hand-firing was employed, and "machine cuttings"

improvement Company at Roslyn and the Denny-Renton Coal and Clay Company have installed six and two stokers respectively. The Spring Valley Coal Company, at Spring Valley, Illinois; the Pond Creek Coal Company, at Stone, Kentucky; and the Bliss Coal Company, at Swan Creek, Michigan, are further instances of the spread of the idea of using mechanical stokers at colliery power plants.

The type of stoker which seems to be particularly well suited to service at the coal mine's power plant is the underfeed machine. The very earliest device embodying the underfeed idea is, perhaps, the British invention of a special type of shovel, patented many years ago. This shovel was provided with a cover, so that it was in effect a flat box, open at one end and provided with a handle at the other. A kind of piston was arranged so as to be movable backward and forward in the box portion of the shovel. The piston rod ran through the handle, and when the appliance was thrust into a pile of coal, the piston was forced back and the box-like compartment filled with coal. The rod was naturally forced out, for some distance, from the back end of the hollow handle. This shovel, with its load of coal, was then pushed into the bed of the fire, it being easily possible to force the shovel *beneath* the live coals and not into them. It was then only necessary to hold the shovel in place and at the same time force the coal out with the piston; or, the shovel could be withdrawn as the coal was forced out. At its best, this device does not do all that the modern British and American underfeed stokers do, but it seems to perform one of the leading functions—the feeding of the fire from underneath.

One advantage of underfeed stoking is that the fresh coal does not at once come into contact with the fire. One of the most serious methods of retarding, not to say preventing, combustion is the chilling of the fire already in existence. This is one of the fundamental reasons why boiler settings, in which boiler surface and fire are close together, may very properly be condemned. An essential of combustion is ignition. To get ignition it is necessary to attain the ignition temperature proper to the particular element or combination that is to be burned. Oxygen and fuel gases travelling towards the boiler surface may strike that surface before they have become properly mixed. The result is a chilling effect, the boiler surface having a temperature of only a few hundreds of degrees, and therefore ignition is beyond reasonable expectation. Now, in the underfeed stoker, the cold fuel is gradually heated up before it gets into the region where ignition is to take place. Furthermore, with coal containing a heavy percentage of volatile matter, the hydrocarbons are more or less perfectly expelled from the coal before the fixed carbon gets into the fire. A portion of the total of hydrocarbon gases finds its way upward through the bed of coals, and is thus heated before it arrives in the open space of the fire chamber. So far as this portion of the volatile matter is concerned, there is considerable opportunity for ignition, especially where there is a forced draught upward through the fire bed. No doubt a considerable percentage of the total of hydrocarbon matter is driven off in a region where there is no opportunity to pass through the actual fire; and there is, perhaps, no special advantage with underfeed stokers in so far as these volatiles are concerned.

The underfeed idea, embodied in an actual workable appliance, seems, as already pointed out, to have originated in Great Britain. Nevertheless, an underfeed stoker appears to have been independently invented in the United States. At one place in the Far West, the problem of steam generation in an economical manner became rather acute, for whilst there was plenty of wood obtainable, it contained so much water that it could not be used to advantage. Apparently, too, the water could not be economically got rid of by the ordinary drying process. An inventive and practical mind took hold of this situation and produced (in 1889) a wood-burning underfeed stoker, in which the wood was dried as it approached the fire. A piston cylinder or box was located outside the firebox in such way as to enable a hand lever to control the valves of the piston box. The manipulation of the valves caused a horizontal plunger to produce a reciprocating motion when desired. The compartment in which the plunger operated had an opening in its cover, through which lengths of wood could be dropped. The plunger device was operated to force wood into the lower part of the firebox, the wood entering from one side and coming on to a curved surface, guiding it upwards, and thus feeding the fire from underneath. The floor of the firebox next to the plunger consisted of grate bars, the further portion being a "dead" surface of firebrick. The head of the plunger was protected by the same material. In a later device, the same inventor made a different disposition of the dead-plate section of the furnace floor. He cut down the width, arranged it next the entrance, and made it practically horizontal, thus (inter alia) increasing the open surface through which draught entered.

The foregoing were the beginnings of certain practical devices which are to-day operating in a highly successful manner with low-grade bituminous coal. It

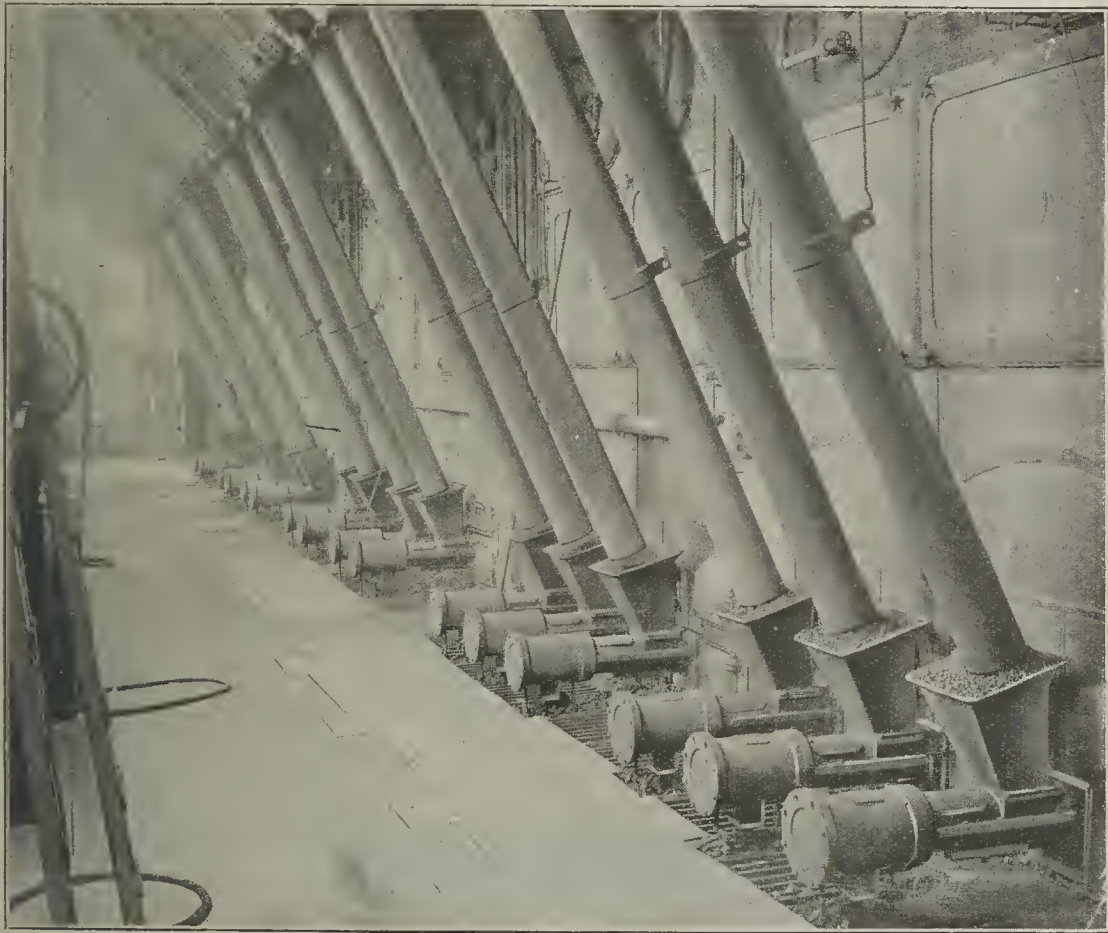


FIG. 1.—UNDERFEED STOKERS AT THE BOILER PLANT OF THE DAVIS COAL AND COKE COMPANY, THOMAS (W. VA.).

watertube boilers. Before the full amount of this equipment was put in, but after considerable experience, the president of the company stated that they were burning the very smallest and poorest coal they had. This is the real incentive for the innovation. With a suitable mechanical stoker, the mine can burn its refuse, and so consume fuel which it can sell only at a very low figure, if at all. The Berwind-White Coal Mining Company, another large concern, has installed 68 stokers in three large works at Windber, Pa. These 68 machines serve boilers with a total horse-power of 9,300—an average of one stoker per 137 horse-power. In fact, two stokers are installed for each of the smaller boilers of 250 or 300-horse-power each, whilst each of the four 600-horse-power boilers has four stokers. The general superintendent of this mine, in reply to an enquiry as to the kind of coal that was being burnt with the aid of the stokers, recently stated that it would be difficult to furnish an analysis, because the coal used varied continually. They were burning nondescript, refuse coal, such as the coal gathered up from cleaning the roadways and that loaded out from fault places in the mines. The coal from the roadways contains a percentage of sand, for the reason that a good deal of sand has to be used when hauling by motors over excessive grades. Spillings of rock and fireclay are necessarily part of the material gathered up from the roads. He said: "I sometimes feel that we are putting stuff into the boilers that really ought to be taken to the dirt dump, yet with these stokers we have experienced very little

for the mechanical firing, the following results being obtained:

Steam gauge (lb.)	103.2	...	112.0
Blast gauge (in.)	—	...	2.9
Furnace draught (in.)	0.29	...	0.24
Feed temperature (degs. Fahr.)	63.8	...	54.8
Uptake temperature (degs. Fahr.)	474.0	...	488.0
Total coal consumed (lb.)	8,000	...	6,200
Coal per hour (lb.)	888.9	...	1,033.3
Total refuse (lb.)	1,612	...	1,490
Refuse percentage	20.2	...	22.2
Total water, actual (lb.)	49,325	...	51,156
Factor of evaporation	1.1947	...	1.2073
Total water from and at 212 degs. Fahr. (lb.)	58,928.6	...	61,760.6
Actual evaporation (per lb. of coal)	6.16	...	8.25
Evaporation from and at 212 degs. (per lb. of coal)	7.36	...	9.96
Horse-power developed	189.8	...	298.3
Per cent. of horse-power rating actually developed	63.0	...	99.4
Gain in evaporation (per cent.)	—	...	35.0
Savings in fuel (per cent.)	—	...	26.1

Stoker installations are not confined to the Pennsylvania section. Thus the Davis Coal and Coke Company have installed at Thomas, West Virginia, 26 stokers, serving 12 boilers with a total horse-power of 5,000. (See fig. 1.) At Worthington, West Virginia, the Four States Coal Company have had set up a total of 21 stokers, the total horse-power being 3,500. The United States Coal and Coke Company, at Gary, West Virginia, have put in 23 stokers. In the far north-west in the State of Washington the North-Western

doubtful whether a simple ram would successfully travel through the considerable path necessary in order to provide a spacious fire. An improvement was made in 1897 which added to the plunger a rod with a plurality of small ram heads. This rod was placed in the narrowed but long bottom of a steep-trough. The trough underlay the fire and constituted a prolongation of the dead plate. In the present-day type, this stoker retains the main ram, the auxiliary ram heads, and the trough-like prolongation of the dead plate. (See figs. 1 and 2.) The bottom of the fire chamber is, however, much wider than the trough, and is provided with openings suitably arranged, through which a forced draught enters. The upward slope of the original trough bottom is still retained. The fire is accordingly fed from the trough, the fresh coal, by its action underneath the fire along a centre line, causing the fire to spread to both sides of the trough on to the horizontal portions of the fire-chamber floor, where it is supplied with air. The question of the air feed has been a troublesome one. In one early design, a tuyere was run

operation "consists almost entirely of bone coal or refuse that has been separated from the good coal on the picking tables. A cheap fuel is thus provided, and the volume of refuse for disposal is reduced. The fuel used in the stokers at this plant is clear gain." The battery of 12 stokers, each serving a 500 horse-power boiler, is in turn served by an overhead concrete bin placed above and between the two parallel lines of stokers. The ashes are discharged on to gondola cars, which pass in and out of a tunnel arranged underneath the boiler room. The refuse coal used in this plant is derived from the pickings from lump and nut coal. The lump coal is separated by means of a shaking screen, from which it goes at once to the picking table. The nut and slack coal is also separated out by the shaking screen, and delivered to a rotating screen which divides the nut from the slack. The nut coal goes to a picking table. The pickings from the lump and nut coals are sent by conveyor to a refuse picking table. Here the more or less evident slate is picked out, the remainder being turned over to a crusher which breaks it up to the size desired for the boiler

only partially coked. This is a very important matter, since if an active fire were in contact with the tuyere plates and boxes much trouble would arise from burnt and warped iron. This characteristic of the underfeed stoker is thought to give it a marked advantage over the overfeed type.

Another feature to be set down as characteristic of the underfeed stoker is the fact that no arches are required. On the other hand, the underfeed stoker would appear to produce a large percentage of cohesive clinker, probably the result of high temperature, and, to some extent, to the coal itself. Whether an underfeed stoker will produce more clinker than any other type, is difficult to say definitely, though it does seem to produce a good deal. One user after several years' experience with the underfeed type reports clinkers as having formed on the tuyere plates, but his difficulties seem to relate to the side walls and tuyere boxes in this region. He found a measure of relief by using oyster shells in the fire chamber. The object in view was to create a flux from the lime contained in the shells, and thus prevent sticking. The shells were introduced after cleaning the fires, and were put next to the two side walls, with good effect, the sticking being more or less obviated, and the clinkers apparently more brittle than before. It is quite possible that other cheap forms of lime—chalk, for example—would answer quite as well. If the coal is of such a constitution as not to give much trouble from clinkering, then there is substantially no difficulty to surmount. The user in question seems to have had considerable trouble, with one sort of coal at least, as he reports having had to use a 12 ft. 1½ in. steel bar, provided with a chisel edge, which was operated by striking it with a 12 lb. sledge hammer. In fact, the removal of the clinkers from the side wall region so damaged the wall that in a short time it had to be rebuilt.

A working improvement that has proved valuable is to utilise the heat of the boilers to preheat the air used for construction. In one instance, the idea was carried into effect in a very simple manner, the fan being surrounded by a wall in such a way that the only permanent opening was next to the air space over the boilers. The air here being warmer than ordinary normal air, reduced the thermal work required of the fire in the fire chamber, and also made the atmosphere in the boiler house more comfortable. Doors were arranged so as to make the fan and engine accessible.

Trouble may be expected in banking fires unless proper attention is paid to the conditions. Where the fire is to be banked for only a single day, the procedure seems to be a simple one. The first thing to do is to clean the fire, and then shut off the air supply. The stoker is then allowed to run on, putting in coal until a sufficient blanket has accumulated. The stoker is now stopped and the stack damper partially shut off. Such a fire will remain fairly stationary, or only feebly burning, for a period, say, of one day. After awhile, however, the fire is apt to work its way downward and reach the tuyere plates, which is undesirable, as these plates may warp or crack under the heat.

Mr. J. C. Hawkins has given some recommendations as to quenching a fire in an emergency when the fire is controlled by an underfeed stoker having a dumping arrangement which discharges into the ashpit. The fire being on top of a lot of coal that has not yet reached ignition, the problem is to get this top stratum into the ashpit. It is recommended to open the dump plate, shut off the forced draught, and leave the stack

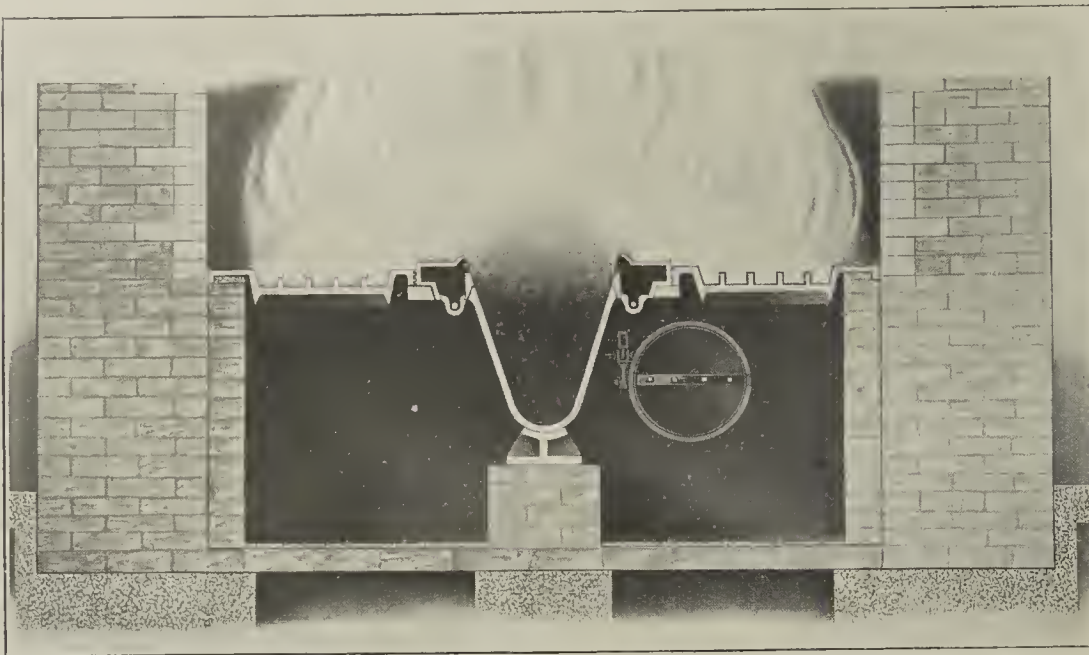


FIG. 2.—CROSS-SECTION OF AMERICAN UNDERFEED STOKER. ASHBOX UNDER AIR PRESSURE.

along the two sides and the far end of the trough, which last was in effect a fuel magazine. The air was delivered along the inner side—that is, so as to flow on to the coal at the upper part of the trough. Though trouble was expected with this tuyere, it being thought that the close proximity of the fire would soon burn it out, and that a tendency to clog the side openings would develop, no premature burning out was experienced, the cooling effect of the air forced through it being no doubt responsible. The first effort to widen the fire bottom seems to have taken the form of merely adding grate bars at the sides. This was found ineffectual for the reason that the ash compartment containing air at normal pressure provided an easy exit for the air under pressure issuing from the tuyere openings. The perfected stoker has an ash pit filled with pressure air.

It will be understood from the foregoing brief account that the development of a really successful underfeed stoker was not an easy matter. Another factor is the inclination of the bottom of the fuel magazine, for which a fairly gentle slope is desirable. Another important feature of development is the regulating valve through which the control of the feed is regulated or modified. It is very necessary, of course, with the modern mechanical stoker, power driven, and largely automatic, that the forced draught should be precisely adapted to the rate at which the coal is being burned. A natural method of dealing with this is to connect the operating control of the air blower with the fuel-feeding mechanism in such way that the one activity advances and recedes with the other. Then the combination may be connected with the steam supply, so that a falling off in steam pressure will result in a stronger operation of blower and fuel feed, and an advance in steam pressure will result in slowing down blower and feed. This general arrangement seems to be satisfactory for the normal operation of the boiler plant; but when it is necessary to drive the plant hard for some time or to drive it light for a period, then unsatisfactory conditions tend to occur. A special regulating valve, devised to deal with such cases, has nine adjustments, and, when at any one of these, provides for a certain more or less definite rate of coal feed. Not long ago Mr. W. D. Lewis expressed himself in *Power*, in connection with a plant fitted with this special regulating device: "The fan engine driving the stokers was relieved of considerable load, the operator had the fires under control at all times and the proper coal feed was maintained. A banked fire could be quickly burned through, and when cleaning fires they were burned down so that little coke was lost in the ashpit. High CO₂ was at once apparent, the results showing between 12 and 14 per cent. on peak loads. All these advantages naturally increased the capacity of the boilers, and also effected a large saving of coal."

The Rochester and Pittsburg Coal and Iron Company, already mentioned as having installed 36 stokers, have located a large central plant, containing 12 stokers, at Lucerne, Pennsylvania. Steam is generated at the pumping machinery at the bottom of the plant, and for the hoisting plant of the tippie, the total capacity of the power plant being, however, 3,000 kw., 25-cycle, 6,600-hp. generator. The plant is supplied with electric current for distribution to a radius of 10 miles. The dynamo is driven by steam turbines. The coal for normal

plant. An electric lorry transports this boiler coal from a storage bin to the boiler.

The largest concerns are sometimes the most difficult to convince and get started when the matter in hand is a new departure. Nevertheless, the very largest coal mining company in the United States has made a beginning in respect to the use of the mechanical stoker. At Scott Haven, Pennsylvania, the Pittsburg Coal Company has a considerable power plant which furnishes direct current for seven separate and distinct mines. The total generator capacity is 1,350 kw. This current is furnished by two 500 kw. units, one 150 kw., and two 100 kw. All generators are direct connected to the steam engines which effect the drives. The boiler plant consists of three 250 horse-power, one 500 horse-power, two 150 horse-power, and two 100 horse-power boilers. The three 250 horse-power units



FIG. 3.—LONGITUDINAL SECTION OF AMERICAN UNDERFEED STOKER.

are equipped with underfeed stokers. Slack coal is being used and deals with increased load at a marked saving in fuel cost. Prior to the installation of the mechanical stokers, the Pittsburg Coal Company had been forced to use run-of-mine coal.

In the United States, there are various kinds of stokers on the market—chain-grate, overfeed, front-feed, sidefeed, underfeed. Of the underfeed alone there are five or six varieties—perhaps more. Naturally, there are differences; so that what one underfeed stoker is able to accomplish may be no guide as to what another may do. Two varieties provide ordinarily but a single fuel magazine per fire chamber, though with one of them the number can be increased. Three varieties of underfeed stokers ordinarily use a plurality of magazines or retorts. With these, the fire is arranged on a downward slope, this arrangement making it possible to utilise the weight of the ash and clinker to effect an onward movement. This slope may have an angle as large as 20 or 25 degs. to the horizontal. The fresh coal is forced in from beneath by the aid of rams, and spreads over the tuyeres, the volatile matter and the fixed carbon being normally burnt above these latter.

In fact, it is a general characteristic of underfeed stokers that, in normal operation, the tuyeres are covered either with fresh, unburnt coal or coal that is

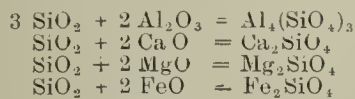
damper open. Water is then played on to the fire with a hose, and a long-handled hoe is used to push the burning coal into the ashpit, where it will not be difficult to quench. A hand chemical fire extinguisher is said to have been used upon one occasion, instead of the water hose. It is recognised that water is not a good thing to introduce into the first chamber; but what is in view is a real emergency, where the quenching of the fire quickly is imperative, and small resulting damages are not to be taken into account. Even in an emergency, one may profitably avoid playing water on to heated firebrick, and so minimise damage.

It may, perhaps, be well to add a few words on clinkering, since a coal or a mixture of coals that produces a considerable percentage of clinkers is likely to prove troublesome with underfeed stokers. By clinker is meant a combination of acid and basic substances that fuses at ordinary furnace temperatures. These substances occur in the coal or coke, and in the refuse that may be mixed with them. The acid substance is, ordinarily, silica—that is, common sand. The basic substances are, usually, clay, alumina, lime, magnesia, and iron oxide. Some coals do not clinker, because there is a decided excess of either the basic over the acid substances or *vice versa*, so that the mixtures does not fuse at the maximum temperature of the firebox. If this view of the matter be correct,

two practical ways are open. In the first place, the possibility of clinkering trouble may be determined in advance by ascertaining what amount of silica is necessary to combine with clay, the lime, the magnesia, and the ferrous oxide present. If there is a decided excess or deficit of silica, the probabilities are against clinker trouble. The compounds in question and their chemical formulæ are as follow:

Aluminum monosilicate.....	$\text{Al}_2(\text{SiO}_4)_3$
Calcium monosilicate.....	Ca_2SiO_4
Magnesium monosilicate.....	Mg_2SiO_4
Iron monosilicate.....	Fe_2SiO_4

By using the chemical equations,



it can readily be calculated that, of the four different compounds formed, silica or sand would constitute 0.47, 0.35, 0.43, and 0.30 of the respective compounds when the slag forms. The ash of the coal should be analysed to show the relative proportions of silica (SiO_2), alumina (Al_2O_3), lime (CaO), magnesia (MgO), and ferrous oxide (FeO). If each percentage, except the first, be multiplied by the fraction which gives the relative amount of silica required, the result gives the percentage (based on the weight of the ash) of silica required for each chemical combination—that is, for each individual slag. Thus, if alumina constitutes 23 per cent. of the ash, one must have $0.23 \times 0.47 = 11$ per cent. of the weight of the ash in silica in order to form aluminum monosilicate; and so on with the others. Assuming the various silicates total 21 per cent. of ash weight, and the silica in the ash amounts to 32 per cent. of its weight, then there will be already present about 50 per cent. more silica than is required; that is to say, a very decided excess of the acid substance, and it is therefore probable that no serious clinkering will occur. Again, assuming the silica to form only 13 per cent. of the ash; then the basic material would be very decidedly in excess, indicating that clinkering was not to be especially feared. The second practical result of the principle that clinkering is not to be feared there is a pronounced excess of either acid or basic substances, that when the coal and refuse possess an ash in which there is no excess either way, one may presumably correct the condition by adding acid material (sand) or basic material (oyster shells, chalk, or the like).

The general problem of clinkering has, perhaps, not yet been sufficiently studied to warrant one in doing more than make suggestions. There are so many varieties of coal, so many variations in the materials which may be found mixed with it when ready for the stoker, that the user will probably have to experiment a little himself or else call in a combustion expert to do the experimenting. In view of this, suggestions must be received tentatively, and tried, with variations that may be advisable in order to get better results, because of local conditions. It does seem wise, though, if clinker troubles are to be feared, to have an analysis made of the mixture of coal and refuse which it is proposed to burn with the aid of the underfeed stoker. This mixture can be tried out before installing the stoker equipment. If there is slag trouble, the analysis will, perhaps, serve to show what needs to be added. When making this addition, it would seem advisable to mix the materials before burning.

In conclusion, it may be of interest to quote the words of a prominent engineer in the Pittsburg district, Mr. W. A. Weldin, as to the usefulness of stokers in colliery power plants:

"In the matter of efficiency, the mine generating station must always lag behind the best practice, because of the relative cheapness of fuel at the mine. In the United States, merchantable bituminous coal has an exceedingly small value at the mine. The average of West Virginia coal is about 1.10 dols. per long ton. It is coming to be realised, however, that coal costs money, even at the mine, that there is a great difference in the amount required to generate power depending on the equipment and management, and that this difference results in more coal for sale. It is now customary to instal water-tube boilers in large units, fired by mechanical stokers, which are fed by conveying systems and overhead bunkers. Exhaust-steam feed-water heaters are employed. Individual steel stacks are frequently used, although the large corporations are installing brick stacks common to all the boilers. Forced draught is usually used only in connection with underfeed stokers. The latter are often preferred on account of the feature of automatic regulation of the feed and draught, enabling them to respond quickly to the great variations in load. Another popular line of attack is in burning refuse and low-grade coal. Two or three per cent. of the entire output of our mines have been used in operating the plants. If this is first-class coal, it represents a loss of so much revenue, while if it is product that is unmarketable, that is not the case. While utilisation of waste has sometimes been carried to extremes, it is certainly good practice to burn the fine coal in the stoker, and to mix with it as much of the low-grade coal or bituminous shale as it can economically carry, regard being had to the increased cost of ash handling, possible clinker troubles, effect on the life and service of the boilers, as well as to the fact that the material must be disposed of in any event."

SAFETY RULES FOR ELECTRICAL EQUIPMENT IN COAL MINES.†

By H. H. CLARK and C. M. MEANS.

The rules given below are recommended by the United States Bureau of Mines for the installation and use of electrical equipment in bituminous coal mines, the object of publishing them being to bring about conditions that will be helpful in reducing the number of accidents from electricity and to urge the use of well-chosen equipment and the adoption of uniform and efficient methods of construction, installation, and maintenance. They should be regarded as constructive and not as restrictive, as intended to assist and not to hinder, and should be considered as a suggested guide to the accomplishment of satisfactory results.

Basis of the Rules.

Five basic measures for safeguarding the use of electricity in mines are as follow:—

1. Remove the contributory causes.
2. Remove from the vicinity of electrical apparatus all elements susceptible to the influence of electricity.
3. Keep the electric current where it belongs, if possible. If not, limit the area of its activity by protective devices.
4. Use a large factor of safety in the selection, installation, and inspection of equipment.
5. Have full control of the movements of electrically driven machines.

Each rule that is given in this report is proposed as necessary or helpful to the accomplishment of one or more of these measures.

Definitions of the Rules.

The meanings of some of the terms and expressions as used in this paper are defined below in order to avoid confusion. The terms so defined are designated with an asterisk (*) in the text.

Alive.—See definition of "live."

Approved.—The term "approved" means accepted as suitable by a competent committee, board, or organisation designated by those adopting the rules.

Authorised Person.—The term "authorised person" means a person appointed or permitted by the official designated by the State mining laws as the one in charge of the operation of the mine to carry out certain duties incident to the generation, transformation, and distribution or use of electric energy in the mine, such person being one who is competent within the purpose of the rule in which the term is used.

Electric System.—The term "electric system" means all electric apparatus pertaining to the operation of the mine and under the control of the mine officials that is connected electrically to a common source of potential or that is installed so that it can be thus connected.

Explosion-proof.—The term "explosion-proof casing or enclosure" means an enclosure that is so constructed and maintained as to prevent the ignition of gas surrounding it by any sparks, flashes, or explosions of gas that may occur within such inclosure.

Gaseous Place.—The term "gaseous place" means a place that is likely to be dangerous from the presence of inflammable gas.

Grounded Circuit.—The term "grounded circuit" means a circuit that is permanently grounded at one or more points.

Grounding.—The term "grounding" as applied to any object used in connection with a permanently grounded electric system means connecting such object to the earth in such a way that a path of low resistance is provided between the object and the permanently grounded point of the system. A connection to a thoroughly bonded rail is an example of a good ground connection.

The term "grounding" as applied to any object used in connection with an electric system that is not provided with a permanent ground means making a connection to the general mass of earth in such a manner as will ensure at all times an immediate discharge of electrical energy without danger.

Ground Return.—The term "ground return" means that part of a circuit which is the earth, or metallic conductors intimately associated with the earth, and which is practically at earth potential* at all points.

Live.—The word "live" means "charged with electricity" to such a potential as to be in a condition to give a dangerous electric shock.

Portable Electric Lamps.—Portable electric lamps are electric lamps that while lighted may be carried about. This general term includes lamps operated by batteries and lamps connected to a source of power by a flexible conductor whose length limits the range over which the lamp may be used.

Self-Contained Portable Electric Lamps.—Self-contained portable electric lamps are electric lamps that are operated by an electric battery that is designed to be carried about by the user of the lamp.

Portable Motors.—The term "portable motors" means motors that are intended for service here and there as occasion requires and that are so constructed or mounted as to facilitate moving them from place to place.

Stationary Motors.—The term "stationary motors" means motors installed in a permanent manner.

Potential.—The words "potential" and "voltage" are synonymous, and mean electrical pressure.

Difference of Potential.—The expression "difference of potential" means the difference in electrical pressure existing between any two points in an electrical system or between any point of such a system and the earth, as determined by a voltmeter.

Potential of a Circuit.—The potential or voltage of a circuit, machine, or any piece of electrical apparatus

† From United States Bureau of Mines *Technical Paper* 138.

* The word "place" is used here in its broadest sense, and refers to any excavated space anywhere within a mine. It should not be confused with "working place" or "working face."

means the potential normally existing between the conductors of such circuit or the terminals of such machine or apparatus.

(a) Any potential less than 301 volts shall be deemed a low potential.

(b) Any potential greater than 301 volts but less than 651 volts shall be deemed a medium potential.

(c) Any potential in excess of 651 volts shall be deemed a high potential.

Protected.—The word "protected" as applied to the current-carrying parts of an electric system* is taken to mean that accidental contact with such parts is prevented by approved* guards.

Shock-proof.—The term "shock-proof" as applied to the current-carrying parts of an electric system* (excepting trolley wires) is taken to mean that contact with such parts is prevented by the use of grounded metallic coverings or sheaths.

Generating Station.—The term "generating station" means a station in which electric generators are operated by prime movers.

Substation.—The term "substation" means a station in which the current is changed in character, or potential.

Underground Station.—The term "underground station" means an underground place in which there are installed transformers, switchboards,* or electrical machines other than portable motors,* or any one of them.

Switchboard.—The term "switchboard" means the essential mounting common to several pieces of switch gear or controlling appliances.

Voltage.—See definition of "potential."

DIVISION 1.—GENERAL RULES.

Man in Charge of Electrical Equipment.—1. At each mine where electricity is used underground there shall be in charge of the electrical equipment a man fitted for his position by ability, training, and experience. The character of the equipment will determine the qualifications of the mine electrician, and he shall be thoroughly familiar with the operation and maintenance of the equipment under his charge.

Persons Working on Electrical Equipment.—2. No person shall be allowed to work on or with electrical equipment of any kind unless he has been previously instructed by an authorised person* in the performance of his duties.

Construction and Rating of Apparatus and Relation of Capacity to Duty.—3. The electrical equipment used in connection with the underground electric system* shall be designed to meet successfully the conditions under which it will be required to operate.

4. All electrical equipment shall be rated in accordance with the current-standardisation rules of the American Institute of Electrical Engineers.

5. The rating of each piece of electrical equipment shall be stamped on it or inscribed on a metal plate suitably mounted and maintained upon the equipment. The inscription on the plate shall indicate whether the rating is for continuous or intermittent service, and shall be in accordance with the name-plate requirements of the American Institute of Electrical Engineers.

6. The capacity of equipment shall be so related to the work that it has to do that the performance of its duties shall not cause undue heating, straining, or wear and tear.

7. Equipment designed for intermittent service shall not be used for continuous service except at suitably reduced loads.

Permissible Voltages.—8. For transmission purposes underground a potential* in excess of medium voltage* may be used, provided that such circuits are carried inside metallic sheaths or coverings with the sheath or covering permanently grounded.* This current may be applied only to transformers or to motors in which the high potential* windings are a part of the stationary element. Medium or low voltage* may be directly applied to all electrical equipment.†

Mechanical Construction of Installations.—9. Care shall be taken to ensure good mechanical construction and neat workmanship in connection with all wiring and the installation of equipment.

Prevention of Accidental Contact.—10. Enough space shall be provided for free movement where regular passing is required or permitted around all unprotected* parts of the electric system,* and places where persons must pass close to or adjust permanently installed electrical machinery shall be sufficiently lighted.

11. The standing room around all electrical equipment shall be kept as dry as practicable. At any place where it is necessary to manipulate or adjust medium or high voltage live equipment, including switches, motor starters, and other controlling appliances, excepting locomotives and machines that are moved so frequently that they are provided with trailing cables, there shall be provided and available an insulated platform or mat which may be of a form and character most in keeping with the circumstances of its use, and which shall be not less effective than a dry board 3 ft. by 15 in. by $\frac{3}{4}$ in.

12. All metallic frames, casings, and coverings, except those of mining machines and drills, that may become alive* shall be permanently grounded.*‡

13. Where danger exists of accidental contact with wires carrying electric current the wiring shall be protected.* In haulage roads used as travelling ways the wires need not be protected* if a travelling way of approved* dimensions is provided on the side of the entry opposite from the wires. Where wires are run in an entry in which no one but authorised persons* are allowed to travel, or where no hazard from contact exists, the wires need not be protected.*

† It is earnestly recommended that no voltage of low voltage* be applied directly to locomotives, mining machines, or other apparatus of a portable character.

‡ It is assumed that the ordinary conditions of operation of locomotives fulfil the requirements of this rule.

Certifying Surgeons Appointed.—The *London Gazette* notifies that the Chief Inspector of Factories has appointed the following gentlemen to be certifying surgeons under the Factory and Workshop Acts: Dr. F. P. Walsh for the Rossbarry district of the county of Cork, Dr. B. W. McKinney for the Lisnaskea district of the county of Fermanagh, and Dr. A. McInnes for the Raunds district of the county of Northampton. Vacancies under the Act are notified at Hendon, Middlesex, and at Castleford, Yorks.

14. Weatherproof varnished cloth, rubber, or similar insulation, unless enclosed in a metallic sheath, when used underground will not be considered as a protection against shock.

Untravelling places where the roof is likely to fall, electrical conductors shall be especially protected from injury by falling roof.

Carrying Capacity of Conductors.—16. The carrying capacity of insulated conductors of distributing circuits shall be determined by reference to the table of carrying capacities laid down in the National Electric Code.

The carrying capacity of bare conductors shall be determined by reference to the following table:

CURRENT-CARRYING CAPACITY OF BARE COPPER CONDUCTORS USED IN MINES.

Size of conductor.	Current capacity.	Size of conductor.	Current capacity.	Size of conductor.	Current capacity.
B. & S. gauge.	Amps.	Circular mils.	Amps.	Circular mils.	Amps.
10	80	250,000	690	750,000	1,520
8	105	300,000	790	800,000	1,590
6	145	350,000	880	850,000	1,660
4	210	400,000	965	900,000	1,730
2	280	450,000	1,050	950,000	1,800
1	320	500,000	1,140	1,000,000	1,870
0	375	550,000	1,215	—	—
00	435	600,000	1,285	—	—
000	525	650,000	1,370	—	—
0000	615	700,000	1,450	—	—

Electrical Equipment in Gaseous Places.—17. Only explosion-proof* equipment and wire insulated not less effectively than with three approved* weatherproof braids shall be used in gaseous places* in a mine.

See also Rules 56, 69, 75, 105, 111, 123, 128 to 136, 140, 142, 144, 145, 148, and 168.

Inspection and Maintenance.—18. At each mine where electricity is used underground a systematic inspection of all wiring and equipment shall be made at regular intervals, at least once every month. A report of each inspection shall be made by the mine electrician or inspector, and a copy of this report shall be furnished to the mine foreman and kept on file at the mine. The report shall definitely state the condition of each underground station,* of the conductors and controlling appliances of each main and branch, power, and lighting circuit, and of the motors and controlling appliances of each locomotive, mining machine, pump, hoist, or other piece of electrical apparatus connected to the electrical system* of the mine.

Notices and Warnings.—19. Caution notices shall be posted at points where such warnings will be most effective in reducing the likelihood of contact, and prohibitory notices shall be posted wherever electrical apparatus that should not be manipulated by unauthorised persons* is installed.

Instruction for Resuscitation.—20. There shall be posted prominently in every surface and underground station* and at the entrance to the mine, instructions for the restoration of persons suffering from electric shock.

All employees who work with or on electrical apparatus must know how to carry out these instructions without delay.

Plan Map of Electrical System.—21. A plan shall be kept at the mine showing the location of all permanently installed electrical machinery and apparatus in connection with the mine electrical system,* including cables, conductors, lights, motors, switches, trolley lines, and transformers. The plan shall be of sufficient size to show clearly the location of such apparatus, and the scale shall be not less than 200 ft. per inch. There shall be stated on the plan the capacity in horse-power or kilowatts of each motor and transformer, and the nature of its duty. Such plan shall be corrected as often as may be necessary to keep it up to date at intervals not exceeding six months.

Fire Protection.—22. Buckets filled with clean, dry sand shall be kept in all underground stations* for immediate use in extinguishing fires. The minimum amount of sand thus stored in any one station shall be not less than 2 cu. ft. No sand will be required if two or more approved* fire extinguishers are kept in each station.*

DIVISION 2.

SURFACE AND UNDERGROUND STATIONS.

Generating Stations and Surface Sub-Stations.

General Rules of Safety.—See Rules 10 to 13, inclusive.

Generators.—23. Generators shall be installed upon adequate foundations in a dry place free from explosive vapours or inflammable material.

24. Machines generating a potential* in excess of low voltage* shall not have exposed terminals.

Switchboards and Controlling Appliances.—See Rules 40 to 46, inclusive.

Protection of Circuits Leading Underground.—See Rules 77 and 78.

Lightning Arresters.—25. Each outgoing circuit that leads underground and extends over the surface of the ground 500 ft. or more from the generating station* or sub-station* shall be equipped with lightning arresters of approved* type, with proper ground connection, at the generating station or sub-station, and also at the point where the circuit enters the mine.

26. Lightning arresters shall be connected on the secondary side of all transformers that feed underground circuits unless there is provided other suitable means for discharging abnormal voltages.

Electrically-Driven Ventilating Fan—Housing, Power Supply, and Attendant.

Housings.—27. All electrically-driven fans, together with the housing of the fan, shall be built of fireproof materials.

For 77, United States Bureau of Mines; for 23, United States Bureau of Mines.

Underground electric fans shall not be used where the air current is rated as gaseous, and when used in non-gaseous places the surroundings shall be fireproofed within a radius of 15 ft. from the motor unless this has a permissible explosion-proof casing.

Power Supply.—28. If the line supplying the power is exposed to the influence of lightning, lightning arresters shall be placed near the point where the wires enter the fan house.

29. Where stopping the fan would place in jeopardy the lives of men underground, a duplicate connection from the fan to the power supply shall be provided on a separate line of poles if the regular line is so exposed as to be liable to failure, except at mines where a reserve source of mechanical power is installed for operating the fan. If the regular source of power is from a station where there is but one generator a connection to another source of electric power shall be provided, unless there is a source of mechanical power in reserve.

Attendant.—30. The responsibility for the operation of electrically-driven mine-ventilating fans shall devolve upon an authorised* person.

Electrical Equipment on Tipples and other Surface Structures.—31. All electrical equipment on tipples and other surface structures shall be installed in accordance with the rules of the National Board of Fire Underwriters.

32. Starters of motors on tipples shall be provided with a no-voltage release, and if practicable shall be located within sight of the motors that they control or the machines that they operate. A switch or other means for disconnecting the motor from the power supply shall be installed near the machinery.

Underground Stations.*

General Rules of Safety.—See also Rules 10 to 13, inclusive, and Rule 22.

33. All underground stations* shall be fireproof and well ventilated with fresh air, and shall be wired in accordance with the requirements of the National Board of Underwriters.

34. Ventilation may be accomplished through openings in the walls, but, with the exception of underground stations* in which only switches are installed, the openings shall be provided with non-combustible doors, that will either close automatically in case of fire, or can be closed easily from outside the room by the attendant. Underground transformer stations* need not be provided with fire doors if the transformer casings will withstand red heat without their seams opening, and are equipped with explosion doors that will relieve the pressure of an explosion within the casing, and automatically close again and exclude air from the casing.

Transformer Stations.—See also "Underground Transformers," and Rules 34, 40 to 46, inclusive, 80, and 81.

35. Transformer stations shall be so arranged that if a transformer explodes, the oil will not flow outside the room.

36. Wires shall be carried on non-combustible supporting framework, and the use of wood shall be entirely eliminated. The supporting framework shall be grounded.*

37. All transformers in excess of 50 kw. capacity shall be equipped with suitable ammeters in either the primary or secondary circuits, or have provision for connecting portable instruments into such circuits.

Pump Stations.—See also Rules 54 to 68, inclusive.

38. Pump motors operating at potentials* exceeding the limits of low voltage shall be wired inside the pump station with approved* wires carried in conduit sealed to exclude moisture or sheathed with lead and so placed or protected as to avoid mechanical injury. The metallic covering shall be permanently grounded.*

Battery-Charging Station.—See also Rules 33 and 34.

39. Battery-charging stations shall be provided with approved* means for the immediate removal of the gases generated during the process of charging the batteries.

Hoist Stations.—See "General Rules of Safety for Underground Stations," Rule 38, and Rules 54 to 68.

(To be continued.)

Brazil's Fuel Imports.—Of the 33,228 metric tons of coal imported at Rio de Janeiro, Brazil, during March 1917, 27,952 tons were American fuel and 5,276 tons British. These figures compare as follows with the corresponding month of the two preceding years: March 1916, total imports, 67,158 tons; American coal, 34,135 tons; British coal, 33,023 tons. March 1915, total imports, 58,998 tons; American coal, 11,865 tons; British coal, 47,133 tons.

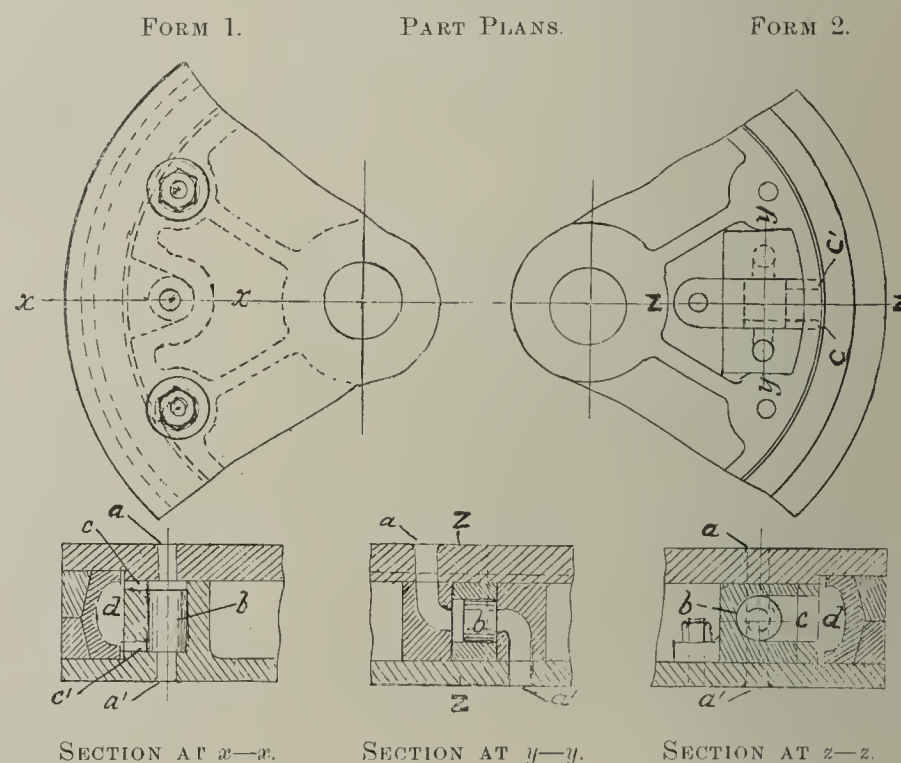
Chinese Coal Output.—According to the "Report on the Foreign Trade of China, and Abstract of Statistics for 1916," recently published by order of the Inspector-General of the Chinese Maritime Customs, the Penkiu Coal and Iron Mining Company largely increased its capital, with a view to doubling output, and is taking steps to increase its smelting capacity. The exports of coal for the year were 1,314,822 tons, against 1,315,542 tons in 1915. The output of the Kaihan mines was 2,853,256 tons. The Honan anthracite output was doubled. The Fushun collieries produced 2,200,000 tons, employing about 22,000 men—chiefly Chinese. Important sulphate of ammonia, nitro-lime, and calcium carbide works have been erected. Electricity is generated from the coal by means of a Mond gas plant.

MARTIN'S STEAM TIGHTENING PISTON.

This piston belongs to a type in which the packing rings are expanded against the cylinder walls by the working steam pressure in the cylinder, this being admitted into the piston by means of a small cylindrical plug valve, marked *b* in form 1, alternately from either side; this plug valve works to and fro in a chamber with holes *a* and *a'* opening out to the outer surfaces of the piston, so that the passage through from one side of the piston to the other is only intercepted by the valve. At the ends of the valve chamber there are also provided two narrow ports *c* and *c'*, which communicate with the interior annular space *d* behind the packing rings. It will be seen that the steam on entering either of the holes *a* or *a'*, immediately forces the plug or piston valve *b* against its further seat, and at the same time uncovers the nearer port *c* or *c'*, as the case may be, and thus opens up the space *d* to the cylinder pressure. Thus the inner packing ring is forced to expand against the two outer ones, and, in consequence of their bevelled sides, these are pressed not only outwards against the cylinder walls, but also apart against the junk ring and piston flange, so as to effectually prevent any leakage of steam past the piston.

It will be seen that the stroke of the valve is very little, so that the wear on same may be considered negligible, and also its form eliminates all risk of fracture and consequent damage through parts getting out between the piston and cylinder covers in the ordinary course of working. The valve chamber in new pistons might form part of the casting of the piston block itself, but in applying the principle to old pistons—to many of which it might be easily adapted—the chamber would be separate.

In the foregoing instance, as shown in form 1, the valve works in the same direction as the piston itself, but in some cases it might be found desirable to have the valve work at right angles to the piston motion;



and in a modification, shown by form 2, the valve chamber consists of a small separate block, which is fixed in one of the piston compartments up against the piston rim, through which the two small ports are continued from the chamber to the annular space *d*. This form 2 may be found preferable by some for fast-running engines, as the valve would better withstand any influence caused by the rapid reversals of the piston motion.

Of the bevelled rings which are used with this system, the inner ring is provided with ribs *e* and *e'* on its top and bottom sides. These are made parallel all round, and are thus concentric with the cylinder walls and piston body, but the intermediate part between the ribs is made eccentric, so as to come out thinner at the joint where the ring is split. This form combines strength with lightness, and at the same time can be made to provide great stiffness in cases where excessive steam pressures are carried. The wide faces of the two outer rings are ground steam-tight with the faces of the junk ring and piston flange respectively; and tongue pieces are provided for the splits of these two rings, thus further preventing possible leakage. By means of a small pin, the three packing rings are all fixed relatively to one another. The three splits or joints are kept, say, at 120 degs. apart, but the whole set, not being attached to the piston body in any way, is free to rotate slowly in the piston, and thus accommodate itself to the cylinder, the advantage of this "floating" condition being to bring about a more uniform state of wear.

When an early form of this piston was brought out years ago, a large number were set to work with highly satisfactory results. Their remarkable durability was proved after years of working, and tests showed perfect steam-tightness and great economy of fuel and expense over the old spring pistons that they replaced.

The patentee of the improved piston is Mr. H. J. Martin, 49, Walter-road, Swansea.

Mr. John Charles Cuninghame, chairman of Merry and Cuninghame Limited, the Becares Iron Ore Mines Limited, and the Glengarnock Iron and Steel Company Limited, and a director of the Denaby and Cadeby Main Collieries, the Glasgow and South-Western Railway Company, and other companies, who died on January 30, aged 65, has left personal estate of the value of £817,517.

SANDS USED IN METALLURGICAL PRACTICE.*

By Prof. P. G. H. BOSWELL, D.Sc., A.R.C.Sc., D.I.C., F.G.S.

In metallurgical practice, the sands required may be classified into those used (a) in moulding, (b) in lining hearths and furnace bottoms, and (c) in silica brick-making. Moulding sands may be subdivided into these used (i.) with a natural bond, and (ii.) with an artificial one. Sands used in good glassmaking are in most cases precisely the same as those used in classes a (ii.), b, and in part c, above. The resources may in this respect be treated together.

We are not yet in a position to discuss refractory sands exhaustively; the requirements differ according to the kind of metal made, the ores used, the type of furnaces, and the craft and prejudices of the user. If ever there was a case made out for the accumulation of a large number of facts, it is in the matter of refractory materials. The generalisations will follow later; at present the work must run on two lines—(a) analyses must be made of successful and likely supplies, (b) we must have the carefully recorded results of their trial in the works on a commercial scale. In the latter direction, as in many others, where it is knowledge we are seeking, the next best thing to success is failure.

Information which Analyses may Supply.

This society is one which concerns itself more particularly with chemical questions, but it is manifestly impossible, in the case of natural deposits used in such industries as glass manufacture and metal production, to divorce the considerations of chemical composition from those of texture, constituent minerals, etc. We need, therefore, three types of analyses of sediments like sands, clays, and crushed rock materials used in commerce—chemical, mechanical, and mineralogical. For example, the value of a natural moulding sand depends upon the texture—that is, the mechanical composition, as well as the chemical constitution. Probably it is the chemical composition of each separate "grade" (see below) which counts. Again, the fritting of high silica sands used for glassmaking, furnace lining, etc., depends on the grade size and angularity of the sand, as well as upon the silica content. It is axiomatic to say that fine-grained sands melt more readily than coarse ones.

Chemical Analyses of Sands.

Chemical analysis should be carried out in the usual manner, but by a chemist familiar with the methods and precautions to be adopted in making analyses of silicate rocks.† Care should be taken by repeated precipitation that too high a result is not obtained for the silica. It is not sufficient to estimate it by difference. Alumina should be estimated (as Al_2O_3). In the case of glass sands, it is frequently of value for special glasses (certain optical glasses, thermometer and resistant glasses, etc.) or for its toughening and strengthening properties (bottle glass). In high silica sands for refractory purposes it tends to cause fritting at a lower temperature; its presence in small quantity is thus desirable in sands used for furnace hearths.

The total iron may, for glassmaking purposes, be recorded as Fe_2O_3 , and since in the case of good glass sands there is a very low percentage (0.02 or less, to 0.06), it is estimated on large and separate samples by colorimetric methods. Many excellent high silica sands contain up to 0.2 per cent. of iron oxide—an amount too great for the making of better class glass, but quite low enough for the highest refractory demands. Most of the laboratory determinations of iron, like those of silica, appear to be too high. In any case, iron oxide should not rise over 3 per cent., and if the sands are to be used under reducing conditions, it should be much less, or the result will be the production of the easily fusible ferrous silicate from combination with some of the quartz present.

In glass sands which contain more than 0.5 per cent. of alumina, it is desirable to look for and estimate titanium. In the form of the mineral rutile (TiO_2) or less commonly, its isomers anatase and brookite, it is frequently plentiful in sands and quartzose rocks. Exactly what rôle it plays, we do not know, but it is clear that in quantity it is decidedly inimical in glass-making. The precise part played by small quantities of so-called impurities in sands, whether in glass manufacture or in industries using refractory materials, is not well known, and indicates the need for experimental work and exact analyses. These "impurities" may behave as catalytic agents in facilitating conversions. It is a remarkable fact that titanium is always high in fireclays, most of which are exceedingly refractory, whether they are found in this country, on the Continent, or in America.‡ A search does not yield rutile or its isomers, and we are therefore led to think that the substance is scattered throughout the clay, possibly in a colloidal or clay-like form.

For glass sands, other impurities such as lime, magnesia, alkalies, etc., are best absent, or, if present, should be as "a trace" only. When required, they may be added quantitatively to the "batch," or mixture of raw materials. The alkalies and alkaline earths form, of course, essential constituents of glass, so that their presence in a glass sand is not inimical. The very reason which requires their presence to make a glass renders them forbidden constituents in any

sand which is to be of value for resisting high temperatures. It is a well-known phenomenon that a certain mixture of substances mutually soluble in one another has a lower melting point (the "eutectic" point) than that of any of the individual substances, and for each pair, triplet, or quadruplet, etc., of substances a definite percentage mixture (the "eutectic composition") always possesses the lowest melting point.

The addition of potash and soda, or even of lime, to a sand, therefore, so far reduces the melting point of the mixture as to enable a glass to be formed. Mere refractory glasses which are required to possess a higher melting point and to withstand subsequently a greater heat without softening or devitrifying, are produced by the use of alumina, magnesia, boron, etc. For example, the Thuringian sand used so successfully for thermometer glass contained 3.66 per cent. of Al_2O_3 , the remainder being silica.

It is clear, on the other hand, that sands to be used for refractory purposes should be as highly siliceous as possible, or, failing that, should contain silica and alumina only. Most sands are quartzose—that is, are wholly or almost wholly composed of quartz (SiO_2). As examples of the best of these, we may quote:—

	Per cent. SiO_2 .
British—	
Aylesbury	99.80
Lynn	99.23
Leighton Buzzard	99.59
French—	
Fontainebleau	99.80
Belgian	99.38
Dutch	99.63
U.S.A.—	
Wedron, Silica Co., Illinois ..	99.58
Ottawa Silica Co., Illinois ..	99.48
Berkeley Springs, W. Va.	99.65
Germany—	
Lippe	99.88

The next most commonly occurring mineral in sands is felspar. The felspar group of minerals consists of orthosilicates of potash and soda and polysilicates of soda and lime, in combination with alumina. The presence of the alkalies, even in small quantity, has the effect which would be expected, namely, that of lowering the refractoriness. Muscovite mica is a related hydrous compound of potash and alumina, and has a similar effect. Generally speaking, therefore, felspathic and micaceous sands and rocks must be avoided in refractory work. Felspar, however, is not a stable mineral; it decomposes to micas, and then to clayey aggregates (china clay) by the leaching out of its alkalies as a result of the atmospheric agencies or chemically active gases and solutions. In this way is produced the refractory china clay of Devon and Cornwall, and the highly aluminous, but lime- and alkali-free sands of Derbyshire, so valuable for the manufacture of silica bricks. For such purposes as fettling Siemens furnace hearths, lining re-heating furnaces, etc., it is not desirable to use the exceedingly refractory quartzose sands mentioned above. Better results are obtained when advantage is taken of a sand containing a small quantity of alumina, iron, or even alkalies sufficient to make the sand grains frit and bind together at their angle of rest on the banks of the hearth. Mr. Cosmo Johns, M.I.Mech. E., F.G.S., of Messrs. Vickers Limited, who has specially studied this question, considers that the melting point of quartz, as distinct from that of another form of silica—cristobalite—may be achieved in the presence of small amounts of impurities in the sand. He would suggest the following permissible range of impurities:† Al_2O_3 up to 2 per cent. or more; Fe_2O_3 up to 0.5 per cent.; CaO , 0.5 per cent.; MgO , 0.5 per cent.; Na_2O , 0.15 per cent.; K_2O , 0.15 per cent.; if only one impurity were present. If more than one were present, the amounts would be reduced proportionately.

For the detection of small quantities of "impurities" in sands, spectroscopic analysis has already proved of great value qualitatively. The presence and relative abundance of the constituents can be estimated in a much shorter time than it takes to make a chemical analysis. For glassmaking purposes, inimical elements, such as iron, titanium, and zirconium, can be determined at once.

The following table includes analyses of sands which have proved very suitable for lining Siemens furnace hearths, for the beds of re-heating furnaces, etc.:—

	Leighton Buzzard.	Lynn.*	Belgian.*
SiO_2	99.59	99.90	99.10
Al_2O_3	0.25	0.58	0.36
Fe_2O_3	0.21	0.18	0.24
CaO	n.d.	nil	nil
MgO	n.d.	nil	0.07
Alkalies	nil	nil	nil
Loss on ignition	0.27	0.35	0.24
Total	100.32	100.01	100.01

* Quoted from Cosmo Johns, *Trans. Faraday Soc.*, vol. xii. 1917.

In the making of silica bricks, sands of the following composition have been successfully utilised:—

	Derbyshire 1.	Derbyshire 2.	East Anglia.
SiO_2	74.54	90.40	94.57
Al_2O_3	18.04	6.56	1.99
Fe_2O_3	0.05	0.18	1.40
CaO	0.19	0.16	nil
MgO	none	trace	0.22
Alkalies	n.d.	n.d.	0.72
Loss on ignition	7.24	2.48	0.91
Total	100.06	99.78	100.00*

* Including 0.19 SO_3 .

Connection Between Chemical and Mechanical Constitution.

In the above two tables, the chemical composition yields definite information as to the properties of the sands, and their likely behaviour when used in furnaces. Similarly, in the case of high silica sands used with an artificial "bond" for steel casting, we can determine their probable value from their chemical

† *Trans. Faraday Soc.*, vol. xii., 1917, "Silica as a Refractory Material."

composition. When, however, we endeavour to interpret the chemical analyses of such moulding sands—those with a natural bond, particularly the Aylesbury value to the steel industry, we obtain little information which is of practical utility. It is true we learn that lime, magnesia, potash, and soda, if present at all, should be in small quantity, but we gain little information as to what compounds in the sands are responsible for their success.

Steel founders have long said that bulk analyses of such sands are practically useless. If, however, a chemical analysis be made of each grade in a sand, we obtain much valuable information. In high-class moulding sands (with natural bonds), certain grades such as coarse sand and clay are strongly in evidence; others, like fine sand and silt, are subordinate. Usually, the coarse sand is one of the highly refractory silica sands like those discussed earlier in the paper. It is almost entirely composed of quartz grains, sometimes bearing thin pellicles of ferric oxide. Felspar grains are occasionally seen, but are usually uncommon. Other minerals are so rare as to be practically absent.

Except for certain iron casting work and for brass moulding where smooth surfaces are required, fine sand and silt are practically absent. The clay grade is, however, of the utmost importance. Coarse high silica sand has no bond in it, and would not stand up as a face. The clay yields, with the water it adsorbs, the "glue" which holds the coarse quartz grains together even at high temperatures. A chemical analysis of the clay grade is therefore very desirable. The clay must be as refractory as possible. Ideally, it would be merely silicate of alumina (kaolin), but unfortunately kaolin has no great binding properties. Fire-clay itself is occasionally added to silica sands as a binder.

As indicating the importance of grading in the matter of size and proportion of grains, the following tables are of interest. The most useful classification into grades is as follows:—

Diam. Mm.	Diam. Mm.	
> 2	< 2	Gravel
> 1 and < 2	< 1	Very coarse sand
> 0.5	< 0.5	Coarse sand
> 0.25	< 0.25	Medium sand
> 0.1	< 0.1	Fine sand
> 0.05	< 0.05	Superfine sand or coarse silt
> 0.01	< 0.01	Silt
	< 0.01	Clay or mud grade

TABLE I.—SOME NATURAL MOULDING SANDS FOR STEEL CASTING. Mechanical Analyses obtained by Elutriation: Percentage Weights.

	Belgian.	French.	Cornish Red.	Huttons Ambo.	South African.
> 0.5 and < 1 mm.	7.5	0.6	0.6	4.5	0.5
> 0.25	64.9	18.0	37.3	57.7	3.4
> 0.1	12.0	62.7	42.7	18.0	70.5
> 0.05	3.3	3.1	5.7	1.8	1.0
> 0.01	12.3	15.6	13.7	20.0	6.3
Total sand grains > 0.1 mm.	84.4	81.3	80.6	78.2	74.4

TABLE II.—MECHANICAL ANALYSES OF "MIXTURES" USED FOR STEEL CASTING.

	Core "Strong" sand.	Small greensand work.	For very large work.
> 1 mm.	6.5	0.4	2.7
> 0.5 and < 1 mm.	2.5	0.8	2.2
> 0.25	10.4	15.8	16.8
> 0.1	57.8	64.7	61.9
> 0.05	0.3	0.1	0.1
> 0.01	4.9	2.4	2.3
Total sand grains > 0.1 mm.	77.2	81.7	83.6

* Contains much clinker.

In each of these it will be observed that the coarse and medium sand grade is high, and the clay grade comparatively high, but that the percentage of fine sand and silt is very low. This is an important characteristic of all good moulding sands. The predominant coarse sand ensures that the mould shall be open, containing adequate pore space for the free passage of air, vapours, and gases. The clay grade provides the refractory bond which, with water, unites the large grains together, but the quantity of clay is, of course, not sufficient to fill the interstices between the grains (the pore space is probably about 40 per cent. of the whole). Fine sand and silt, which would tend to pack up and fill all the pore space, are practically missing. Good sands for greensand moulding are therefore non-graded materials, i.e., they are made up of a mixture of grades and of such different materials as clay and sand. Glass sands, on the other hand, should be exceedingly well graded, as the following analysis of Lynn sand indicates:—

> 0.5, nil; > 0.25 and < 0.5, 94.8; > 0.1 and < 0.25, 4.9; > 0.01 and < 0.1, 0.2; < 0.01, 0.1; total sand-grade > 0.1 mm., 99.7 per cent.

This perfection of grading is sought in order that the melting of the batch containing the sand may be even, rapid, and regular, producing a homogeneous glass. If fine siliceous material is present, it tends to "blow out," thereby not only altering the composition of the glass, but also helping to choke the flues. Silica sands used for furnace hearths should not be too fine in grain, or they frit too easily, and lose their refractory character. Aylesbury and Aylesford sand, though highly quartzose and refractory, as the following chemical analyses show—

	Aylesbury.	Aylesford.
SiO_2	99.80	99.06
Al_2O_3	0.32	0.6
Fe_2O_3	0.03	0.04
CaO	n.d.	0.17
Loss on ignition	0.22	0.22
Total	100.37	100.05

* Abstract of a paper read before the Society of Chemical Industry at Birmingham, July 18-20, 1917.

† Washington, H. S., "Chem. Analyses of Rocks," 1906. New York. Hillebrand, W. F., *Bull. United States Geol. Survey*, No. 176, 1900.

‡ See, e.g., Ries; "Clays, their Occurrence, Properties, and Uses," 1908, 2nd edition; New York.

is rather too fine in grain. The mechanical analyses are as follow:—

	Aylesbury.	Aylesford.
and Δ 1 mm.	0.2	—
" Δ 0.5 "	17.9	1.2
" Δ 0.25 "	91.8	98.5
" Δ 0.1 "	0.1	0.3
" Δ 0.01 "	0.2	—
Total sand grade ≥ 0.1 mm.	99.7	99.7

Leighton and Lynn sands which, though less pure, are coarser, prove to be much more suitable. Sands with an aluminous bond (kaolin) like that from Huttons Ambo, of value for fettling purposes, are obviously not well graded. The chemical and mechanical analyses of such a sand are as follow:—

	Per cent.
SiO ₂	94.36
Al ₂ O ₃	3.68
Fe ₂ O ₃	1.28
CaO	0.52

Total 99.84

≥ 0.5 and Δ 1 mm., 1.4 per cent.; ≥ 0.25 and Δ 0.5, 84.9; ≥ 0.1 and Δ 0.25, 7.5; ≥ 0.01 and Δ 0.1, 4.1; ≥ 0.01 , 2.1; total sand grade ≥ 0.1 , 93.8 per cent.

In the case of the red sands of triassic (bunter) age, of which Birmingham sand is a well-known example, the clay or mud grade which serves as a bond is not hydrated aluminium silicate, but ferric oxide. The same character is observed no matter where the sands are found—Birmingham, Stourbridge, Kidderminster, Wolverhampton, Runcorn, Ormskirk, Worksop, Hensall, Heck, Doncaster, Mansfield, Belfast, etc. In each case there is a thin pellicle of iron oxide around each of the grains of quartz. This iron oxide possesses to a remarkable degree the power of holding a film of water by surface tension, and so making a strong bond between the grains. A characteristic property of all good moulding sands is their water carrying capacity. Many will hold as much as 10 or 12 per cent. of water without being really wet. Some mechanical analyses of these bunter sands are as follow:—

	Δ 0.5 and Δ 1 mm.	Δ 0.25 and Δ 0.5.	Δ 0.1 and Δ 0.25.	Δ 0.05 and Δ 0.1.	Δ 0.01 and Δ 0.05.	Δ 0.01.	Total sand grade ≥ 0.1 mm.
Mansfield	4.0	30.0	43.75	16.25	—	6.0	77.75
Birmingham (close)	1.8	40.6	46.0	6.5	—	5.1	88.4
Compton, near Wolverhampton	0.2	6.5	77.9	7.1	3.2	6.3	84.4
Kidderminster, tr.	33.5	51.8	7.8	4.0	—	2.9	85.3
Ormskirk	0.4	4.3	77.8	12.6	—	5.3	82.1
Belfast	0.4	3.0	30.9	50.2	—	15.5	34.3

and a bulk chemical analysis of that from Belfast is:

	Per cent.
SiO ₂	81.47
Al ₂ O ₃	8.84
TiO ₂	0.35
Fe ₂ O ₃	1.84
CaO	0.86
MgO	0.81
K ₂ O	2.78
Na ₂ O	1.50
Loss on ignition	2.24

Total 100.69

Such sands are used very largely for the casting of iron and brass, and for steel where the conditions are not very exacting, nor the temperature attained very high. There is no danger either of the setting in of reducing conditions which would yield the easily fluxed ferrous silicate if the temperature were sufficiently high.

Mineral Composition.

Little need be said at this stage as to the bearing of the mineral composition of sands used in glass-making or metallurgical practice. It has been evident throughout the foregoing remarks that not merely are the chemical elements present of significance, but their state of combination, *i.e.*, the minerals present, is also important. Zircon (ZrSiO₄), rutile (TiO₂), limonite (2Fe₂O₃·3H₂O), and ilmenite (FeTiO₃), among others, are, for example, very harmful in glassmaking. The presence of feldspar may be a distinct advantage. On the other hand, in sands to be used as refractory bodies feldspar is inimical. Similarly, dolomitic and calcareous sands (containing dolomite [Mg,Ca]CO₃ and calcite, CaCO₃) are known to be very objectionable. Chemical analysis is a long and tedious process. The geologist, making a mineral analysis by separating the various minerals of different densities by means of a heavy liquid, such as bromoform, and examining them under the microscope,* can determine at once the suitable or harmful minerals present, and obtain an idea of the qualitative and relative quantitative chemical composition of the sand. Further, if he should know the mineral composition of British sands and the chief of foreign supplies, he will be able to identify any sample referred to him, or to say whether successive consignments of sand come from the same quarry or bed.

Silica itself exists in sands in several different mineral forms, as quartz, opal, chalcedony, etc., and after the sand has been subjected to high temperatures for considerable time, as tridymite and cristobalite. It is a fact which is the outcome of experience that crushed siliceous rocks such as vein quartz, quartzites, and certain sandstones, do not make as satisfactory glass as ordinary pure sands. The batch containing crushed rocks requires greater heat to bring it into the molten state. Whether this is because of the presence of two allotropic low temperature forms of quartz differing crystallographically and physically, one possibly as a cement, of the different hydration of the silica acting as matrix, or of the presence of certain quartz, is not known.

The "allogenic" minerals in sands are the breaking down of older rocks, there are "syngenetic" minerals, formed when the sand is at some subsequent time. Of particular interest in this connection may be the

* Memoir, p. 18.

colloidal minerals such as gelatinous silica, glauconite (iron potassium aluminium silicate), etc. Much of the ferric oxide in sands has been derived from the decomposition of ferruginous minerals, and it is noteworthy that some of the most successful steel moulding sands—with the strongest bond and velvety grip—such as the "Belgian Red" and "Yellow" (Diestian) and "Cornish Red" (pliocene deposits, St. Erth), owe their colour to iron oxide, and are associated with glauconite-bearing deposits. Other important high silicate sands used in casting work, such as those from Leighton Buzzard and Lynn (lower greensand) contain bands in which glauconite occurs. Colloidal silica may be in itself an important bond. As we have seen, china clay or kaolin is also a decomposition product, usually being formed from felspar. The question is one upon which we have very little information, and which will repay the investigator who follows it up. The presence of small quantities of certain minerals may influence to a marked extent physical changes and mineral conversions in sands.

In speaking of sands required for metallurgical practice and glass manufacture, those used as abrasives should not fail to receive attention. Usually, fairly coarse sands are employed; the rougher the work, the coarser the sand used. The sand should be made of a tough mineral, such as quartz, with a very poor cleavage, and while the grains need not be angular, they should not be highly rounded. The sand should be dry and well graded, so as to slip freely through the feeding funnel and jet. Aylesbury, Lynn, Leighton, and river sands, besides those from Belgium and Fontainebleau, have been successfully used. Road grit from roads made of flint is a valuable and effective abrasive—a fact fully recognised by the motorist and cyclist! Almost any "sharp" sand (*i.e.*, well graded and containing no silty or clayey matter) used in the works for any other purpose is likely to be of value as an abrasive. In the United States of America a garnet sand has been similarly used. The mineral garnet is hard, tough, and possesses a poor cleavage. Artificial products such as carborundum have in certain directions largely replaced natural products like emery (corundum) and quartz. Natural minerals, such as quartz, which are not too hard, have, however, advantages, as in the grinding of plate glass.

General Observations.

The glass sands of the United Kingdom—their properties, composition, and location—have now, under the auspices of the Ministry of Munitions, been dealt with fairly thoroughly. It is clear that the country can be entirely self-supporting, even in the matter of optical glass. The importance of the enquiry into the resources of such sands, and of the publication of the results, has been testified to by those interested in the industry all over the country. The question of British supplies of refractory sands, especially those used in the steel industry, is, if anything, even more urgent.* Much preliminary research work into the properties of such sands is, however, required before all the suitable supplies can be located. The requirements must first be well known, and an idea obtained of the reasons for the suitability of the good materials.

British resources of high silica sands for steel moulding, furnace fettling, crucible making, etc., may be dealt with without much further work—most of the best have already been described as glass sands. The supplies suitable for making silica and sand lime bricks need investigation. Recent developments have shown that large supplies of sands exist suitable for the former purpose, the successful standard of composition being lower than was expected previously. A complete statement of British resources of moulding sands with natural bonds is very desirable, especially those of value in such a key industry as steel founding. It is only in this direction, if any at all, that the importation of foreign supplies is justifiable.

* Since this was written, the systematic investigation of British resources of such sands has been undertaken by the writer at the request of the Ministry of Munitions of War.

MINERS' WAGES: WAR BONUS.

At the special conference of the Federated mining districts in England and North Wales this week, it was decided to take united action with the other mining districts in Great Britain to secure a further general increase in the war bonus to meet the increased cost of living. It was stated that a good deal of dissatisfaction existed among the workmen at the inadequacy of the present war bonus to meet the increased cost of living. It was said that the workmen found that the increases in wages were more than swallowed up, and that they would welcome a return to pre-war wages and prices.

It was agreed to press the Government to deal with the housing problem in mining districts by making it imperative for the local authorities to prepare and carry out suitable housing schemes to meet the needs of their areas. It was considered that these schemes should be at once carried out, and not wait until the termination of the war.

The conference also decided in favour of the extension of the Mines (Eight Hours) Act to workmen employed on the surface. At present the legal restriction of hours applies only to underground workmen.

The coaling of vessels calling at Portuguese ports (whether on the Continent or adjacent islands), unless they load or unload goods or embark or disembark passengers, is now prohibited.

Coaling at United States Ports.—It is reported that the United States Bureau of Foreign and Domestic Commerce has placed an embargo on bunker coals. It will be necessary with each supply to secure a permit, and in order to avoid serious delay, all captains calling at American ports should report immediately on arrival to their coal suppliers, giving the quantity required, the destination of the steamer, and the consignees, with request for permits to be obtained as quickly as possible.

MINING EMPLOYMENT STATISTICS.

According to the Board of Trade *Labour Gazette* for July, employment in coal mining during June was slack in Fife, fairly good in West Scotland, Northumberland, and Durham, and very good in every other principal district; it showed little or no change on the whole as compared with either a month ago or a year ago. Difficulties of transport were again reported. There was a decrease of 3,361 (or 0.6 per cent.) in the number of workpeople employed at collieries making returns compared with the previous month, and an increase of 23,617 (or 4.7 per cent.) on a year ago.

Of the 528,985 workpeople included in the returns for June, 243,195 (or 46.0 per cent.) were employed at pits working twelve days during the fortnight to which the returns relate, while a further 163,844 (or 31.0 per cent.) were employed at pits working eleven but less than twelve days.

Districts.	Work-people employed in June 1917.*	Average No. of days worked per week by the collieries in fortnight ended				Inc. (+) or dec. (−) in June 1917, on a	
		June 23, 1917.	May 26, 1917.	June 24, 1916.	Month ago.	Year ago.	
		Days.	Days.	Days.	Days.	Days.	
<i>England & Wales.</i>							
Northumberland	36,653	5.10	4.90	5.50	+0.20	−0.40	
Durham	92,788	5.04	5.05	5.60	−0.01	−0.56	
Cumberland	5,978	5.98	5.89	5.50	+0.09	+0.48	
South Yorkshire	58,972	5.89	5.90	5.80	−0.01	+0.09	
West Yorkshire	25,871	5.85	5.82	5.78	+0.03	+0.07	
Lancs. & Cheshire	51,261	5.88	5.92	5.63	−0.04	+0.25	
Derbyshire	31,118	5.77	5.81	5.45	−0.07	+0.32	
Notts and Leicester	32,854	5.67	5.68	5.55	−0.01	+0.12	
Staffordshire	23,712	5.92	5.86	5.75	+0.06	+0.17	
Warwick, Worcester and Salop	8,390	5.85	5.85	5.86	—	−0.01	
Gloster & Somerset	4,548	5.92	5.84	5.71	+0.08	+0.21	
North Wales	10,130	6.00	5.81	5.85	+0.19	+0.15	
South Wales & Mon.	90,301	5.73	5.79	5.49	−0.06	+0.24	
Total	480,576	5.61	5.61	5.61	—	—	
<i>Scotland.</i>							
West Scotland	20,620	4.92	4.94	5.48	−0.02	−0.56	
The Lothians	1,930	5.24	5.33	5.59	−0.09	−0.35	
Fife	25,403	4.42	4.32	5.56	+0.10	−1.14	
Total	47,953	4.67	4.63	5.52	+0.04	−0.85	
<i>Ireland</i>	456	5.50	4.85	5.67	+0.65	−0.17	
Total, U.K.	528,985	5.53	5.53	5.60	—	−0.07	

* At the collieries included in the table.

The following table shows the number employed and the average number of days worked distributed according to the principal kind of coal raised at pits at which the workpeople were engaged:

Description of coal.	Work-people employed in June 1917.*	Average No. of days worked per week by the pits in fortnight ended				Inc. (+) or dec. (−) in June 1917, on a	
		June 23, 1917.	May 26, 1917.	June 24, 1916.	Month ago.	Year ago.	
		Days.	Days.	Days.	Days.	Days.	
Anthracite	6,597	5.21	4.67	5.57	+0.54	−0.36	
Coking	26,194	5.56	5.72	5.83	−0.16	−0.27	
Gas	36,804	4.96	4.82	5.43	+0.14	−0.52	
House	52,512	5.68	5.71	5.55	−0.03	+0.13	
Steam	174,182	5.63	5.63	5.58	—	+0.05	
Mixed	232,696	5.51	5.52	5.63	−0.01	−0.12	
All descriptions	528,985	5.53	5.53	5.60	—	−0.07	

* At the collieries included in the table.

Iron Mining.—Employment was very good in iron and shale mines. There was again a shortage of labour in several districts. Returns received for each of the three periods named below, relating to the same mines and open works in each case, show that 14,544 workpeople were employed at mines included in these returns in June 1917, an increase of 251 (or 1.8 per cent.), compared with May, and of 959 (or 7.1 per cent.), compared with a year ago.

Districts.	Work-people employed in June 1917.*	Average No. of days worked per week by min-s in fortnight ended				Inc. (+) or dec. (−) in June 1917, on a	
		June 23, 1917.	May 26, 1917.	June 24, 1916.	Month ago.	Year ago.	
		Days.	Days.	Days.	Days.	Days.	
Cleveland	6,363	5.95	5.94	5.63	+0.01	+0.32	
Cumberland and Lancashire	4,928	5.50	5.85	5.93	−0.35	−0.43	
Scotland	716	5.55	5.59	5.59	−0.04	−0.44	
Other districts	2,537	5.87	5.96	5.96	−0.09	−0.09	
All districts	14,514	5.76	5.89	5.82	−0.13	−0.06	

* At mines included in the returns.

Pig Iron Industry.—Employment continued good; it showed a slight decline on the whole compared with a month ago and a marked improvement on a year ago. Shortage of materials and scarcity of labour were reported from several districts. Returns received show that 297 furnaces were in blast at the end of June, compared with 298 in the previous month, and with 274 at the end of June 1916. During the month three furnaces were re-lit (two in Derbyshire and one in Monmouthshire), while four in Lanarkshire were damped down.

Iron and Steel Works.—Employment at iron and steel works continued very good; it showed an improvement on the previous month and a marked improvement on a year ago. From every district a shortage of labour was reported. According to returns relating to 116,320 workpeople, the number of shifts worked during the week ended June 23, 1917, was 668,996, showing an increase of 9,410 (or 1.4 per cent.) on a month ago, and of 46,620 (or 7.5 per cent.) on a year ago.

Engineering Trades.—These trades continued to be extremely busy during June, and a great amount of overtime was worked. Trade unions with 283,307

members (mostly in skilled occupations) reported 0.1 per cent. unemployed at the end of June, compared with 0.1 per cent. in each of the previous four months, and with 0.3 per cent. a year ago.

Tinplate.—The number of mills working at the end of June showed a decrease of 30 compared with the previous month, and of 170 on a year ago. The decline in the number of mills working was due chiefly to the restriction in the supply of steel bars. Employment was also affected by a strike of fitters, etc.

Steel and Galvanised Sheets.—The number of mills working at the end of June showed a decrease of three on a month ago, and of 16 on a year ago.

Tubes.—Employment was very good at Birmingham, and good at Wednesbury and Newport, Mon.

Chains, Anchors, etc.—At Cradley Heath employment was good with anchor and block chain makers, and fairly good with cable chain makers. Employment was good with anchor smiths on the Tyne and Wear, with anvil, etc., makers at Dudley, and with axle and spring makers at Wednesbury.

Sheet Metal Workers.—Employment continued good generally, with overtime in most centres.

Wire.—Employment was fairly good, but was hindered in some districts by a shortage of materials.

Disputes.—During the month two new disputes in coal mining occurred, affecting directly 2,591 persons.

Fatal Accidents.—The total number of fatal accidents in mines (underground and surface) was 120, a decrease of three compared with last month, and an increase of 22 on a year ago.

Changes in Wages.—No changes in miners' wages are recorded as taking effect in June, but it is noted that in the period January to June 1917, the increases granted have amounted to £28,000 per week, affecting 471,000 persons.

SOUTH WALES MINING TIMBER TRADE.

Foreign Wood Easier.

There has been a pronounced scarcity of wagons in South Wales, following upon the lessened amount of shipping tonnage visiting the various ports. Pitwood importers, faced with heavy demurrage charges, therefore have cut prices in order to secure a quick release to vessels. French fir was quoted at 60s. to 65s. per ton ex ship Cardiff or Newport, which figures limit importers' profits to a very sharp extent. The outlook in respect to wagons is anything but bright. The question of the Government limiting the price of foreign mining timber has been discussed during the past two or three weeks, but so far no official intimation has been received with respect to this matter.

Imports Heavier.

For the week ending July 13 the imports of foreign mining timber were heavier than previous weeks, a total of 19,481 loads being received. The following shows the actual imports recorded:—

Cardiff (Barry and Penarth):—

Date.	To—	Loads.
July.	9—A. Bromage	2,040
"	9—Lysberg Limited	2,040
"	9—Pyman Watson	420
"	9—A. Bromage	1,340
"	9—E. Marcesche	1,020
"	9—Grant Hayward	60
"	9—Marcesche	192
"	9—Lysberg Limited	2,400
"	9—Morgan and Cadogan	720
"	10—Morgan and Cadogan	144
"	10—Morgan and Cadogan	156
"	10—Grant Hayward	474
"	11—Grant Hayward	300
"	11—Marcesche	132
"	11—Morgan and Cadogan	528
"	11—Morgan and Cadogan	120
"	11—Lysberg Limited	960
"	12—Morgan and Cadogan	156
"	12—Marcesche	1,200
"	12—Budd and Company	144
"	13—Lysberg Limited	2,400
"	13—Marcesche	960
"	13—Morgan and Cadogan	180
"	13—Young Limited	480
Total.....		18,566

Newport:—

No imports received.

Swansea:—

July	10—E. W. Cook and Company	157
"	10—Morgan and Cadogan	62
"	10—Morgan and Cadogan	152
"	10—W. Davies and Company	200
"	10—Budd and Company	218
"	11—Marcesche	48
"	11—J. O. Sullivan	78
Total.....		915

Port Talbot:—

No imports received.

Home-Grown Pitwood.

France is herself short of timber, owing to the difficulties of labour and transport, while it is stated that a number of pitwood dealers are selling their wood for fuel, owing to the scarcity and high price of coal. The demand for home-grown timber in South Wales and the West of England has grown apace, the general demand for home wood of all classes having greatly increased, with the result that there is a tendency to limit the quantity available for mining timber. Great efforts are being concentrated on meeting the demand for home-grown mining timber, but the great drawback is the difficulty of procuring labour. Wood-cutting calls for skill and strength, and men fitted for such arduous labour are disinclined to take the jobs offering whilst more lucrative and lighter employment can be procured elsewhere. Wood-cutting demands comparatively young men, and these are all in the services. Foremen must be vigilant with the inexperienced labour, otherwise the wastefulness causes considerable loss. Labour must be increased to speed up the increased deliveries of home-grown mining timber required to offset the decreasing monthly quantity of foreign timber allowed to be imported. There is a general belief that the curtailment of foreign imports is too heavy and will not be offset by the anticipated increase in the amount of home-grown wood.

MINERS AND HOUSING.

Mr. Stephen Walsh, M.P., Parliamentary Secretary to the Local Government Board, presided at a special conference of the miners of the Federated area in England and North Wales, held in the Central Hall, Westminster, on Tuesday, and dealt with the industrial housing problem, more particularly as it affects the mining districts of Great Britain.

Mr. Walsh, after reviewing the situation previous to the war and emphasizing the difficulties of carrying out building operations under present conditions, said he could inform the delegates that a Special Committee was sitting under the President of the Board considering the steps to be taken for dealing with the problem of housing after the war. It would be premature to state exactly what would be done, but both Mr. Hayes Fisher and himself were fully alive to the extent and seriousness of the problem which had to be solved, and were convinced that national requirements could only be met by co-ordinated and indefatigable effort on the part of the central authority acting with the local authorities. Mr. Hayes Fisher recently stated, while holding the post which he (Mr. Walsh) now held, that the end of the war would find the country with a deficiency of 500,000 houses, apart from those which ought to be demolished and replaced.

Turning to that aspect of the housing problem which concerns the coal mining industry, Mr. Walsh said that in many of the mining areas they had over one-fifth of the population crowded into dwellings with more than two persons to each room. In one urban district in Durham the proportion was as high as 41.4 per cent. of the population. The effect of bad housing and overcrowding was seen in the excessively high death rate among children. In the mining districts of Durham the mortality among children under one year of age varied from 124 to 166 per thousand. In the mining areas the housing condition could be described as bad in Durham, Lancashire, Staffordshire, South Wales, and Scotland. In Lancashire the infantile mortality per thousand children born was: At Haydock 151, Hindley 159, Ince 167, Wigan Rural 160, Tyldesley 113, Standish 144, Skelmersdale 149. In the Black Country mining areas the infantile death rate was: Brierley Hill 74, Coseley 147, Quarry Bank 149, Rowley Regis 135, and Halesowen (Worcester) 102. These terribly high infantile death rates in mining districts were in no sense due to lack of humane feeling, or even care on the part of parents, because, as a matter of fact, in every department of social life the miners had shown themselves capable of ranking with the best the country possessed. They were as keen in safeguarding the health of their offspring as any other class in the community; but their environment, the conditions in which they found themselves so far as housing was concerned, was the chief contributory cause of the terribly high death rate. It was clear that the nation could not afford to allow such a deplorable condition of affairs to continue. Whatever the cost entailed, the State must insist upon the provision of proper housing accommodation, so as to secure the upbringing of a healthy and virile race. Our future as an Empire depended upon the full realisation of this essential condition.

LAW INTELLIGENCE.

HIGH COURT OF JUSTICE.
KING'S BENCH DIVISION.—July 16.

Before Mr. Justice LUSH.

Excess Mineral Rights Duty.

Inland Revenue v. Trustees of Earl of Lonsdale.—Judgment was given in an appeal by the Commissioners of Inland Revenue, affirming a decision of Mr. Thomas Jones, as referee, on a question which had arisen between themselves and the trustees of the settled estates of the Earl of Lonsdale, touching assessment to excess mineral rights duty in connection with certain collieries in Cumberland. The question before the referee resolved itself into what is the legal construction and effect of section 43 of the Finance (No. 2) Act, 1915, and its sub-sections, Nos. 1, 2, and 2a, in its bearing upon the method by which the excess of mineral rights duty during the accounting years 1914 and 1915 is to be arrived at. The trustees claimed that it must be on the basis of the actual pre-war standard of rent value per ton as received for the years 1912 and 1913, which were the two pre-war years selected by them under the Act, while the Commissioners contended that it must be on the basis of the actual standard of rent value per ton paid in the accounting years 1914 and 1915. The circumstances were exceptional in this case in that under a lease the trustees agreed to allow to the colliery company (the St. Helens Colliery and Brickworks Company Limited), as from January 1, 1914, a reduction of one-tenth of a shilling per ton in the royalties by raising the basis selling price of the coal from 6s. 6d. to 7s. 6d. per ton. The royalties for 1912 and 1913—the selected pre-war years—were therefore paid on the basis of the 6s. 6d. per ton, while the royalties for 1914 and 1915 were paid on the basis of 7s. 6d. per ton. The trustees applied their actual royalty standard of 1912 and 1913 to the tonnages of 1914 and 1915 to find the excess, while the Commissioners applied the royalty standard of 1914 and 1915 to find the pre-war standard of 1912 and 1913. The trustees claimed, after deduction of the tax, that there was no excess duty payable for the year 1914, and only £553 5s. 8d. for 1915; while the Commissioners claimed on £103 13s. 8d. for 1914, and £1,795 19s. 3d. for 1915, the difference being a total of £1,899 12s. 11d., 50 per cent. of which, amounting to £949 16s. 5d., was claimed by the Commissioners. Of this the trustees admitted their liability for £553 5s. 8d., leaving a difference of £396 10s. 9d. The referee said the difference between the parties referred to the bearing and effect of the three words "in the year" contained in a sub-section dealing with pre-war rent value, and he decided that the actual pre-war tonnage rent or royalty for 1912 and 1913, as paid to the trustees, was the correct standard to apply to the tonnages of 1914 and 1915 to arrive at the royalty value for comparison with the actual royalty value received by the trustees in the two accounting years, and that 50 per cent. of the surplus (if any) thus arrived at was the sum to be paid, less tax, to the

Commissioners of Inland Revenue, as excess duty for the accounting years 1914 and 1915.

Mr. Justice Lush said he was of opinion that the trustees' contention was right, and that the decision of the referee should be affirmed. If the contention of the Crown was right, excess duty might be payable on the royalties in post-war years were less than those in the pre-war years, and the lessor had made a loss. The appeal failed, and must be dismissed with costs.

NEW PIG IRON REGULATIONS AND PRICES.

Modification of General Permit as Regards Dealings in Pig Iron.

With reference to the Order made by the Minister of Munitions on July 7, 1916, applying Regulation 30A of the Defence of the Realm Regulations to war material consisting of certain classes and descriptions of metallurgical metal, coke, pig iron, and steel, and to the general permit for dealing in such war material issued by the Minister of Munitions on November 1, 1916, the Minister of Munitions gives notice (under date July 17)—

(1) That the said general permit is modified by the insertion in the schedule thereto of the following prices for the articles hereunder specified in addition to or, where such articles are already specified in such schedule, in substitution for the prices contained in such schedule.

Maximum Prices.

HÆMATITE PIG IRON—MALLEABLE.

Refined:—	£	s.	d.
Refined cupola cast	8	0	0
Refined cupola cast to guaranteed analysis	8	5	0
Cast Direct from Blastfurnaces:—			
Small pig iron—all grades	7	10	0
Medium pig iron, white to grey mottled	7	5	0
Medium pig iron, all other qualities	6	17	6
Large pig iron—all grades	6	17	6

All the above prices include agents' commission or merchants' profit, which is not to exceed 5s. per ton.

Applications for licences to sell special grades of extra quality at special prices will be separately considered by the Director of Steel Production.

CLEVELAND PIG IRON.

Basic	£4 17 6
-------------	---------

SOUTH STAFFORDSHIRE, SHROPSHIRE, AND WORCESTERSHIRE PIG IRON.

Basic	£4 17 6
-------------	---------

All the above additions to the schedule of the general permit shall take effect from the date of this notice, and none of such additions shall be deemed to prejudice or interfere with the carrying out of any contract in writing for sale or purchase of the above-mentioned war material entered into prior to such date at prices lawful at the date of such contract.

Substituted Price.

CLEVELAND PIG IRON.

No. 1	£4 16 6
Other grades	£4 12 6

SOUTH STAFFORDSHIRE, SHROPSHIRE, AND WORCESTERSHIRE PIG IRON.

"Part mine" forge	£5 0 0
"Part mine" foundry	£5 2 6

The above substituted prices shall take effect from April 2, 1917.

(All the above prices are per ton net f.o.t. makers' works.)

(2) That in further modification of the said general permit, in all districts an extra charge of 1s. per ton may be charged over the fixed maximum price for basic pig iron cast in hills.

Imports and Exports of Coal Products.—In June, the imports of coal products, not dyestuffs, amounted to 4,910 cwt., of the value of £65,436, compared with 2,450 cwt., value £31,953, a year ago. The total imports in the six months just ended was 24,271 cwt., value £291,663, compared with 12,549 cwt., value £67,938, in the first half of last year. The value of coal products, not dyestuffs, exported during June was £276,519, thus bringing the value of such exports during the half-year ending June 30 to £1,465,351.

Coal Transport Re-Organisation Scheme.—In connection with the above scheme, the Controller of Coal Mines is considering the requirements of steam raisers in regard to supplies of special coal fuel. Forms have been sent out to steam raisers throughout the country, asking for information in regard to the class of coal used, consumption, etc. A considerable number of the forms sent out have not been returned, and steam raisers who have received such forms should note that their requirements in the way of special fuels cannot be considered in the absence of information called for by the forms, which should be filled in and despatched to the Controller of Coal Mines immediately. In cases where steam raisers have not received forms, it is desirable that they should apply at once to the Controller of Coal Mines, 8, Richmond-terrace, Whitehall, London, S.W. 1.

Edward Medal Awards.—The *London Gazette* announces that the King has been pleased to award the Edward Medal of the 1st Class to George Shearer Christie, James Erskine, David Baird, Andrew Scott, Edward McCafferty, and John Boyle. On January 20, 1917, at about 10 a.m., while operations were being conducted for the widening of a shaft at the Cowdenbeath Colliery, Fife, a portion of the side of the shaft collapsed, throwing a workman named Newton down the mine to a scaffold about 90 ft. below. Scott, McCafferty, and Baird at once descended in a large bucket to attempt a rescue. The whole of the shaft below the point at which the fall had occurred was in a highly dangerous condition, and there was constant danger of a further collapse. Newton was found alive and conscious, buried beneath about 12 ft. of debris, and pinned by some fallen timber. The men worked continuously from 10.45 a.m. until 7 p.m. They were joined at 11 a.m. by Christie, who remained at work with the others until 7 p.m. At 12.45 Boyle descended with two other men. While descending a fall occurred, killing one of the companions and injuring another. Boyle drew the bucket to the side of the shaft until the fall was over and then took the kettle again to the surface. He subsequently remained in charge of the kettle, exposed to constant danger, until 7 p.m., when after nine hours continuous and highly dangerous labour, the rescue party was relieved by other men. Unfortunately, Newton died at 8.30 p.m.

CONTENTS.

ARTICLES:—	PAGE
Machinery Applied to Fuel Practice	117
Principles in the Law of Subsidence	117
Mechanical Stokers at Collieries	109
Safety Rules for Electrical Equipment in Coal Mines	111
Martin's Steam Tightening Piston	112
Sands Used in Metallurgical Practice	113
Miners' Wages: War Bonus	114
Mining Employment Statistics	114
South Wales Mining Timber Trade	115
Miners and Housing	115
New Pig Iron Regulations and Prices	115
Obituary	118
Labour and Wages	121
Open Contracts	124
The Freight Market	126
Publications Received	126
Abstracts of Patent Specifications Recently Accepted	126
New Patents Connected with the Coal and Iron Trades	128
Catalogues and Price Lists Received	128
THE COAL AND IRON TRADES	118-121
The By-Products Trade	120
The Tin-plate Trade	120
The London Coal Trade	121
LAW INTELLIGENCE	115
PARLIAMENTARY INTELLIGENCE	122
NOTES FROM THE COAL FIELDS	122
COAL, IRON AND ENGINEERING COMPANIES	124
MISCELLANEA:—	
Certifying Surgeons Appointed	111
Brazil's Fuel Imports—Chinese Coal Output	112
Coaling at United States Ports	114
Imports and Exports of Coal Products—Coal Transport Re-organisation Scheme—Edward Medal Awards	115
Imports of Pit Props	122
Exports and Imports of Mining Machinery	124
Gas and Coal Economy	128

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Wanted, at an extensive Colliery in the
 Midlands, a well-educated young man with first class certificate
 as ASSISTANT to the Manager. Must have had good practical under-
 ground experience, preferably in inclined seams.—Apply, giving age,
 experience, &c., to **Box 6783, Colliery Guardian Office, 30 & 31, Farnival-**
street, Holborn, London, E.C. 4.

Wanted, First-class Certificated Colliery
MANAGER, for large developing Midland Collieries: with
 experience of inclined seams, coal-cutting, and haulage.—Apply, stating
 age, reference, experience, and salary required, to **Box 6792, Colliery**
Guardian Office, 30 & 31, Farnival-street, Holborn, London, E.C. 4.

Practical Electrician Wanted for Staf-
fordshire Colliery, for 250-kw. turbine plant. State experience and
 wages required.—**Box 6794, Colliery Guardian Office, 30 & 31, Farnival-**
street, Holborn, London, E.C. 4.

First-class Certified Manager desires
RE-ENGAGEMENT. First-class references and testimonials re
 previous managements and practical mining ability.—**Box 6795, Colliery**
Guardian Office, 30 & 31, Farnival-street, Holborn, London, E.C. 4.

Wanted.—Colliery Manager, to take
 full charge of the Ffaldau Steam and House Coal Collieries and
 Coke Ovens in the Garw Valley.
 Apply, with fullest particulars of experience, etc., to the
FFALDAU COLLIERIES CO. LTD., Merthyr House, Cardiff.

Wanted, for Large Midland Collieries,
COMPETENT SURVEYOR.—State age, experience, reference,
 salary required, and when at liberty, to **Box 6793, Colliery Guardian**
Office, 30 & 31, Farnival-street, Holborn, London, E.C. 4.

COUNTY BOROUGH OF BLACKBURN.

ELECTRICITY DEPARTMENT.

The Electricity Committee is prepared
 to receive TENDERS for the supply and delivery of STEAM COAL
 for the twelve months ending August 31st, 1918.

Specifications and Forms of Tender may be obtained on application at
 the Electricity Works, Jubilee-street, on and after Saturday, July 21st, 1917.
 Sealed Tenders, endorsed "Steam Coal," and addressed to the Chairman
 of the Electricity Committee, will be received at the Town Hall up to
 mid-day Saturday, August 4th, 1917.

Corporation Electricity Works, **P. P. WHEELWRIGHT, M.I.E.E.,**
 Jubilee street, July 20th, 1917. Engineer and Manager.

BOROUGH OF FOLKESTONE.

The Folkestone Corporation invite
 TENDERS for the supply of 500-1,000 tons of COAL, to be delivered
 to Folkestone Junction Station before the 31st December, 1917.

Tenders to be sent to the undersigned by 30th July, 1917.
 Town Clerk's Office, Folkestone. (By order) **A. F. KIDSON,**
 17th July, 1917. Town Clerk.

Geo. N. Dixon & Co.,

43, Castle Street, Liverpool,

Auctioneers and Valuers,

COLLIERIES, Brickworks & Mining Plant.

HERIOT-WATT COLLEGE, EDINBURGH.

Principal—A. P. LAURIE, M.A., D.Sc.

COMPLETE COURSES OF TRAINING FOR MECHANICAL,
 ELECTRICAL, AND MINING ENGINEERS.

The Diploma Course in Engineering

Lasts for three years, and arrangements exist for Shortened Appren-
 ticeships with Local Mechanical and Electrical Engineering Firms.
 The Course in Mining extends over three years, and is recognised by the
 Home Office as equivalent to two of the five years' underground training
 required of candidates for the Colliery Manager's Certificate. The training
 in Mining is also recognised by the University of London for the purposes
 of the B.Sc. (London) Degree in Mining.
 An Entrance Bursary of £25 per annum is offered for competition on the
 25th September. Schedules can be obtained on application at the College,
 or to the undersigned.
 For full particulars, apply to the Principal at the College.
 For the New Scheme for Engineering Degrees in Civil, Mechanical, and
 Electrical Engineering, arranged with the University of Edinburgh, see the
 Calendar of the University or the Calendar of the Heriot-Watt College.
 Heriot Trust Offices, **PETER MACNAUGHTON, S.S.C.,**
 20, York place, Edinburgh. Clerk.
 10th July, 1917.

THE UNIVERSITY OF SHEFFIELD.

MINING DEPARTMENT.

The Matriculation Examination for the

DEGREE in MINING will be held on September 10th, 1917.
 For information, apply to the Registrar before August 25th.
 The Mining Diploma (Day) Course commences on October 3rd, 1917.
 The Certificate (Saturday Afternoon) Course commences on Septem-
 ber 22nd; and the Mining Teachers' Course on September 29th.
 The Courses in Electricity Applied to Mining commence on September 22nd
W. M. GIBBONS, Registrar.

COUNTY BOROUGH OF WARRINGTON.

ELECTRICITY DEPARTMENT.

The Electricity and Tramways Com-

mittee invite TENDERS either for part or the whole of 7,500 TONS
 of SLACK, to be delivered at the Electricity Works, Howley, Warrington,
 during six months commencing 10th September, 1917, to be delivered in
 accordance with the conditions of Specification, copies of which can be
 obtained from the undersigned on payment of One Guinea, which will be
 returned on receipt of a bona fide Tender.

Five Shillings will be charged for extra copies of the Specification.
 In the alternative the Committee invite TENDERS either for part or the
 whole of 15,000 tons of SLACK, to be delivered during the 12 months
 commencing 10th September, 1917.
 Tenders, addressed to the Chairman of the Electricity and Tram-
 ways Committee, Town Hall, Warrington, must be sealed with wax,
 and endorsed "Tender for Slack" and delivered not later than 12 o'clock
 noon on Tuesday, August 14th, 1917.
 The lowest or any Tender will not necessarily be accepted.

F. V. L. MATHIAS,
 Borough Electrical and Tramways
 Engineer.

Howley, Warrington.

DISMANTLEMENT SALE

ACHDDU COLLIERY, BURRY PORT.

IMPORTANT SALE OF PLANT AND MACHINERY.

Mr. W. N. Jones has received instruc-
 tions to SELL by PUBLIC AUCTION, at the above place, on
 WEDNESDAY, August 1st, 1917, the whole of the
PLANT AND MACHINERY,

including 2 d.c. Generating Sets, 500 volts, 300 amps., Hauling Engine,
 4 Lancashire Boilers, 10 Motors, Large Quantity of Armour-plate and other
 Cables, about 80 Tons of Steel Flange Rails, Pipes, 2 Three-throw Pumps
 by Scott & Mcnair, 1 Guttermuir Valve Pump, Saw Bench and Engine,
 Steam Winch, Tanks, Brickmaking machinery, Scrap Iron, etc., etc.

Sale to commence at 1.30 p.m. prompt.
 Terms—Cash.
 Catalogues are in course of preparation, and can be had from the
AUCTIONEER, Ammanford, or obtainable at the Colliery.
 Ammanford July 5th, 1917.

Wanted, any number up to Fifty 10-
 or 12-ton COAL WAGONS.—Send particulars to "WAGONS,"
Box 6796, Colliery Guardian Office, 30 & 31, Farnival street, Holborn,
London, E.C. 4.

For Sale, 125 tons of D.H. Rails, 72 and
 81 lb. per yard, chiefly in 24 ft. and 30 ft. lengths: in first-class
 condition.—**JONAS WILDSMITH,** Queen's-road, Barnsley.

MAXA THE POWER SAVER.

For BELTS, ROPES, & WIRE ROPES.
MAXA LTD., 43, Cannon St., London, E.C.

J. W. BAIRD AND COMPANY,

PITWOOD IMPORTERS,

WEST HARTLEPOOL,

YEARLY CONTRACTS ENTERED INTO WITH COLLIERIES.

OSBECK & COMPANY LIMITED,

PIT-TIMBER MERCHANTS,

NEWCASTLE-ON-TYNE.

SUPPLY ALL KINDS OF COLLIERY TIMBER.

TELEGRAMS—"OSBECKS, NEWCASTLE-ON-TYNE."

** For other Miscellaneous Advertisements see Last
 White Page.

The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, JULY 20, 1917.

The London coal trade continues active, and at
 most depots delivery is in full swing. Prompt arrivals
 are somewhat offset by shortage of labour. The
 Coal Controller's new regulations are regarded
 favourably as pointing to a better supply for London.

The market in Northumberland remains dull, new
 business being on very meagre lines. Lancashire
 and Yorkshire markets continue very active, the
 demands for house coal being much greater than can

be met. Practically no change is reported from the Midlands. There is no real change in the position in South Wales, and the market is almost at a standstill. Temporary stoppages are reported from some districts owing to shortage of wagons. The Scotch markets maintain a quiet tone.

The shortage of tonnage is still restricting business on the freight market. Late rates are fully held. In South Wales chartering has only been possible on narrow lines, as merchants, while offering attractive rates for all destinations, have been unable to induce counter offers from owners.

The annual general meeting of the members of the Midland Institute of Mining, Civil and Mechanical Engineers will be held at The University, St. George's-square, Sheffield, on Thursday next, July 26, at 3 p.m. A lecture on the "Forests of the Coal Age" will be delivered by Dr. D. H. Scott, F.R.S.

Many matters of general interest will be raised at the meeting of the Miners' Federation of Great Britain to be held in Glasgow during next week.

An official statement may be expected within a few days giving details of the Coal Controller's scheme for regulating the distribution of coal within the Metropolitan area. It is understood that it will differ in important respects from the original draft of which some particulars have already been published.

The quantity of coal exported from the United Kingdom during June was 3,666,068 tons, value £4,899,526, which compares with 3,503,955 tons, value £4,751,977, a year ago. The exports for the half-year ending June 30 reached 19,461,371 tons, value £25,862,547, against 20,504,687 tons, value £23,303,161, in the corresponding period a year ago.

Chemistry Applied to Fuel Practice.

THE Society of Chemical Industry has done much for technical science and we welcome the appearance of the first volume of a series of reports summarising the progress that has been made in the various branches of applied chemistry.* The book covers a wide range of subjects, and we propose to consider here those portions only which directly concern fuel. One of the chief uses of a work of this kind is to show the intimate relation existing between pure and applied science. It has frequently been urged that science teaching in our university and college laboratories is too academic in character because professors and teachers are not in touch with practical questions. There is little if any foundation for this statement. It would be a national disaster of the first magnitude if any check were imposed upon pure research, and nowhere is the truth of this conclusion more abundantly or clearly shown than in the relationship between theoretical chemistry and fuel technology. To Prof. J. W. COBB has been allotted the task of drawing up the Report on Fuel and Heating, a task for which he, as the Livesey Professor of Fuel and Gas Industries at Leeds University, is eminently fitted. His report is a striking proof of the soundness of the late Sir G. LIVESEY's belief in the value to industry of a university training in science.

Prof. COBB devotes the first pages of his report to the Chemistry of Coal, a subject which we have so lately discussed in this column that we refrain from enlarging further upon it, except to call attention to FIELDNER's researches on the influence of atmosphere on the softening temperature of coal ashes under heat. Comparative tests were made on 50 coals in an atmosphere of steam and hydrogen, which lowers the fluxing temperature of coal ash by the formation of ferrous silicate. With a more strongly reducing atmosphere, such as one containing carbon monoxide, metallic iron is formed, and the fluxing temperature is accordingly raised. As Prof. COBB remarks, the bearing of this work on gas-producer and general furnace practice is sufficiently obvious. With regard to the treatment and use of coal as a raw material of chemical industry, it is rightly urged that no method can be considered ideal which does not take into account the triple function of coal—viz., as a means of obtaining heat and light, as a reducing agent in the form of coke, and as a source of valuable by-products, such as tar and

nitrogen compounds. Chemical progress, however, can scarcely be expected to advance equally in these three directions. We are, in fact, still a long way from the discovery of a rational use of fuel which will satisfy all the above requirements in a practical manner conformable to modern requirements. It may be admitted that some of these requirements are founded largely upon custom and prejudice, as, for instance, the open coal fire habit and standard steam boiler practice. But there is little use in railing against established custom, for which consumers are not primarily to blame, since in most cases they are the victims of circumstances. Even if the open grate and steam boiler were abolished by legislation, it is doubtful whether we should be much better off, because many of the alternative methods of obtaining heat are, from a chemical standpoint, equally wasteful. Obviously, therefore, the problem cannot be solved by any practical prohibition; it can only be attacked in a piecemeal fashion, and every progressive step made by research must be regarded as bringing us nearer to the ideal solution.

Prof. COBB refers to the value which attaches to improvements in the methods of using small coal and coke, and low-grade coals of high ash content. The problems, he says, are largely mechanical; and he refers to the methods adopted by the Simon-Carves Coke Oven Company, by which the very finest coal from a washing plant is so intimately mixed with the coarser coal that it is able to be profitably used in the coke oven. While referring to coke oven practice, attention is directed to a recent improvement in benzol extraction by WILTON's process, in which the use of steam in the distillation of the wash oil is entirely eliminated. Incidentally, it is satisfactory to note that Leeds has followed Middlesbrough in the use of coke oven gas for town supply, one million cubic feet per day being piped from the Middleton coke ovens for that purpose.

The increased demand for liquid fuel gives interest to the investigations of BERGIUS, who, by heating coal tar with hydrogen under pressure, has obtained about 60 per cent. of a distillate resembling petroleum. Judging from the work of MOORE, also, it is possible that coal tars obtained by low-temperature distillation can be used as fuel for engines of the Diesel type. Encouraging work has also been done on the use of naphthalene as a source of liquid fuel, and BRUNN, in the *Journal für Gasbeleuchtung*, discusses the possibility of the direct use of this substance for internal combustion engines.

Prof. COBB gives an admirable summary of recent work on the design of gas producers. Especially interesting are the attempts to minimise labour by discarding hand-poking, and the progress that has been made in destroying the tar formed in the producer. There have also been promising investigations on the use of peat in the gas producer, and the high ammonia recovery practicable in plants of the Mond type has been demonstrated by Rossi in an Italian installation. As regards the ash difficulty in producer plants, generally met by the free use of steam, it is worthy of note that Paul Würth and Co. have described in *Stahl und Eisen*, a method in which steam is not employed, and the ash is run off as a liquid slag, from which a high-silicon, low-sulphur pig iron can be recovered. In regard to ammonia recovery, again, the Moore producer claims to obtain as good a yield as the Mond process, with about one-third of the steam supply. This is got by means of an annular jacket acting both as a boiler and a gas-cooler, the effect of a water-jacketed producer being to prevent destruction of ammonia by heat. There seems to be still a large field for research in ammonia yield from gas producers. Attention is called, also, to recent attempts to produce ammonium sulphate without the addition of sulphuric acid—that is to say, by the oxidation of ammonium sulphide formed by the reaction between ammonia and sulphuretted hydrogen within the producer. Processes by FELD and BURKHEISER, with this object in view, have been under trial, and Prof. COBB himself has experimented with promising results in a similar direction. Advances in gas heating have been made in many directions, and this method is extending both for industrial and domestic purposes. One of the most modern methods of adopting gas firing to steam-raising is the Boncourt surface-combustion boiler, which has lately been installed in a Midland iron works.

There is also considerable activity in extending the use of coke for steam boiler firing. In Germany, good results have recently been obtained for a mixture of coal and coke in equal parts, which means also the smoke nuisance was nearly eliminated, even when smoky coals were employed. Perhaps this method may prove advantageous in certain cases under the new coal distribution scheme shortly to come into force, and may help to overcome the threatened increase in the amount of smoke issuing from the factory chimney.

Root Principles in the Law of Subsidence.

WE concluded last week an account of the present state of knowledge of the important subject of subsidence in mining areas, based upon the report recently prepared by the joint efforts of the Engineering Experiment Station of the University of Illinois, the Illinois State Geological Survey, and the United States Bureau of Mines. This valuable work was undertaken as a preliminary to a detailed investigation of subsidence conditions in Illinois, where the subject is of growing interest on account of the extension of mining, the increased value of the surface, and the growth of towns, railroads, and other costly structures in mineral areas. Before commencing this investigation it was felt that the literature of the subject should be digested and summarised, in order to appreciate the value of acquired experience in other mining areas. This is the procedure that should always be followed in such cases. We cannot avoid the conclusion that if a similar survey had been possible in Great Britain at the time when the subsidence clauses of the Waterworks and Railways Acts of this country were framed, the law would have been placed upon a more satisfactory basis than it is at present. The uncertain state of the law in this country, coupled with the finding in the Howley Park case, is tending towards increasing the difficulties of opening up new mineral areas, and in some cases is leading mine owners to consider the question of purchasing surface rights in order to evade legal obligations which, owing to their indefinite character, constitute a serious addition to the ordinary risks of mining. Where both surface and mineral rights are owned by the same party it might seem to be a simple matter to introduce protective clauses, providing that mining lessees shall not be liable for surface damage, and that the title to the surface shall not include any right to compensation for damage by subsidence. But such conditions are comparatively seldom realised in practice, and even the purchase of the surface does not give absolute immunity. Let us take, for example, the surface rights of municipalities, whose areas of jurisdiction are liable to progressive enlargement with the growth of towns in industrial areas. In the United States, where this question is of gradually increasing importance, there is a tendency to establish two fundamental considerations. The first of these is the recognition of the principle that the use of property of all kinds must be regulated by considerations of the interdependence of modern life. The second is that Society must accommodate itself to such costs as are incidental to communal activities, notwithstanding any private contracts. These same principles are recognised in English law to some degree only. That is to say, in the case of public works, such as canals or railways, private rights, such as those defined in a mineral lease, are provisionally set aside upon certain specified conditions, viz., that subjacent minerals may be purchased by the surface owners. In the United States, however, the view has been widely taken that the maintenance of the surface should be considered a factor in the cost of mining and should be paid for by the consumer. The law as regards subsidence in that country, however, in cases where any law upon the subject at all exists, differs in the various States. In Pennsylvania, where the conditions are defined in the Davis Mine Cave Act of 1913, the right of support is not infringed by excavation, but only by the occurrence of actual subsidence. But it has lately been held that the cause of action accrues when the support is removed, and is barred after the lapse of six years after such removal. The view appears to be that any more onerous rule would encourage the purchase of the surface overlying coal mines for the purpose of

* Reports on the Progress of Applied Chemistry, Vol. I., 1916. London: Apartments of the Society, Broadway Chambers, Westminster, 1917; price 3s. to members, 5s. 6d. to non-members, post free.

speculation in future law suits. The mine owner is liable to the surface owner for subsidence caused by operations made by his predecessor, even if the damage does not occur until after the owner came into possession. Neither the right of compensation pass with the title from one surface owner to another, if the damage was done in the previous ownership. If there should be a depreciation in surface value owing to the apprehension of future damage, there is no cause of action, since the Court can only consider subsidence which has actually taken place. But an injunction can be obtained even although the damage is inappreciable, provided that substantial subsidence can be proved. In the absence of any contract for the support of a building there is no right to compensation unless it can be proved that injury to the surface would have occurred if the building had not been there. That is to say, where the land has been artificially burdened there is no right to have the extra weight supported either laterally or vertically, in the absence of a special provision. The amount of damages awarded in subsidence cases is usually the difference in market value before and after the injury, but in some cases the cost of repair is taken as the amount of the compensation awarded. Many cases have occurred where buildings have been constructed over mined-out areas. This is the case with the residential portion of the city of Pittsburgh, where special precautions for securing the foundations have sometimes to be taken. On the other hand, colliery companies are often faced with the problem of winning coal under populated districts. A notable example was the case of the Mammoth seam, 40 to 60 feet thick, underlying Shenandoah. In this case hydraulic flushing was adopted with success. Other filling methods adopted for the prevention of subsidence, in addition to pillars, piers, etc., include such measures as blasting the worked-out parts, taking advantage of the fact that loose rock occupies nearly twice the volume of the same weight of rock in place. There are, however, many questions relating to surface subsidence still remaining in doubt, amongst which may be mentioned the time factor, about which little is definitely known. There is also a want of agreement as to the angle of break and draw, which would be expected to vary in different mines. Valuable records have been kept in certain cases, as, for example, in the Commentry Mine in France, and the South Kirby, Hickleton Main, and Shirebrook collieries in England; but in America few data have been published, and results of the proposed investigation by the University of Illinois, whenever available, will be of considerable interest and value to mining engineers both in that country and in Europe. We have dwelt somewhat fully upon the American point of view upon this question, upon which it is clear that the last word has not yet been said. Neither can the present state of the law in Great Britain, especially in regard to the arbitrary definition of the prescribed limit, be considered as resting upon a sound scientific basis.

OBITUARY.

With the deepest regret we have to announce that Lady Ratcliffe-Ellis died last week at Wigan, after an illness which only recently assumed a critical form. A native of Wigan, Lady Ratcliffe-Ellis was greatly respected throughout the district. To Sir Thomas Ratcliffe-Ellis and the members of his family we offer our most sincere condolence in their bereavement, and in doing so we are sure that we are expressing the unanimous sympathy of the whole coal mining community, amongst whom no one in this country is held in greater esteem than Sir Thomas, for the fairness and breadth of his judgment through many an acute phase in the industry which he so ably represents.

We regret to record the death, at the early age of 37, of Mr. James Turner (D. M. Stevenson and Company), of Hull, which occurred at Edinburgh last week. Mr. Turner was a native of Glasgow, and, going to Hull in 1907, became vice-president of the Humber Coal Exporters and Shippers' Association, chairman of the local Committee for the Supply of Coal to France and Italy, and a member of the Central Executive in London.

The death has occurred of Mr. R. D. Cochrane, late of Hetton-le-Hole, Durham, aged 73 years. For many years Mr. Cochrane was first accountant and then secretary to the Hetton Coal Company, from which he retired when it was taken over by Lord Joicey a few years ago.

Sir Charles Stamp Milburn, second baronet, who died last Monday, was born in 1878, and succeeded his father, the late Sir John Milburn, in the baronetcy in 1907. He was head of the firm of William Milburn and Company, merchants, Newcastle and London, and South Medomsley Colliery Limited.

Mr. J. Davison, of Shirey-row, who has been a colliery clerk at Bunker Hill, Philadelphia, after 47 years' service.

THE COAL AND IRON TRADES.

THURSDAY, JULY 19.

Scotland.—Western District.

COAL.

The tendency in the Scotch coal trade continues dull, more especially in the export branch. There has been a general stoppage for the annual fair holidays, and operations will not be fully resumed until Monday next. In the West of Scotland district business is slack, and collieries have had little difficulty in meeting demands. Shipments for the week amounted to 114,650 tons against 115,262 in the preceding week, and 131,994 tons in the corresponding week of last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	23/6-25/	26/-28/
Ell	26/6-28/	26/-28/	28/-30/
Splint.....	28/-30/	28/-30/	35/-40/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The ironworks in Scotland have also been closed down for ten days holiday, during which the necessary repairs and additions to machinery are being made. Trade conditions show little alteration. Pig-iron makers have plenty of orders, principally in connection with Government work, and private consumers are receiving scanty supplies. Prices, however, are firm and unchanged. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. There is no change to report in the malleable iron trade. Mills still concentrate on war requirements, and ordinary mercantile business is relegated to the background. Engineers are very active, and ship-building makes good progress.

Scotland.—Eastern District.

COAL.

The situation in the Lothian coal trade is very poor. Collieries have few outlets for their produce, and idle time is prevalent. Shipments amounted to 20,710 tons against 17,497 in the preceding week, and 36,073 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	37/6-40/
Secondary qualities.....	25/6	25/6	37/-38/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

In the Fifeshire district, too, there is little doing, and few of the collieries are getting more than three days' work per week. Clearances were 25,613 tons against 27,605 in the preceding week, and 48,317 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	45/-50/
Unscreened do.....	24/-25/	24/-25/	40/-42/6
First-class steam coal.....	28/	28/	40/-45/
Third-class do.	24/	24/	32/-35/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 161,373 tons compared with 160,364 in the preceding week, and 216,384 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

Another barren period is to be recorded, for the tonnage shortage has been so acute as to prevent the transaction of any but the smallest and least important items of business. At the end of last week the scarcity was most severe, but arrivals are now appreciably better, although far from adequate to meet requirements. As a result, much time has been lost by local collieries, and at the time of writing the outlook is by no means good. Numerous enquiries for supplies are in circulation, but transactions are blocked by the inability of buyers to obtain the necessary tonnage. Steam coal pits are hard hit for want of prompt teams. Gas coal and coking coal collieries are similarly affected, although, perhaps, not to quite the same extent. Every quality of Northumberland and Durham coal is readily obtainable at the scheduled figures, and second-hand holders of several qualities are risking the quotation of discounts on these minimum prices. The bunker market is flat. Coke of all descriptions is plentiful and weak.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	42/6-47/6
Do. Tynes (Bowers, &c.) ...	29/6	29/6	45/-50/
Secondary, Blyths	25/6	25/6	40/-45/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	40/-45/
Unscreened	23/6-25/	23/6-25/	30/-37/6
Small, Blyths	20/	20/	30/
Do. Tynes.....	18/6	18/6	27/6
Do. specials.....	20/6	20/6	30/-32/6
Other sorts:—			
Smithies.....	25/	25/	35/
Best gas coals (New Pelton or Holmside) ...	25/	25/	35/
Secondary gas coals (Pelaw Main or similar) ...	23/6	23/6	33/-34/
Special gas coals	26/6-30/	26/6-30/	37/6
Unscreened bunkers, Durhams	24/-25/	24/-25/	33/-35/
Do. do. Northumbrians	24/-25/	24/-25/	32/6-35/
Coking coals	24/-25/	24/-25/	33/-34/
Do. smalls	24/-25/	24/-25/	32/
House coals	23/6-30/	23/6-30/	47/6-50/
Coke, foundry	42/6	42/6	42/6-47/6
Do. blast-furnace	42/6	42/6	42/6-45/
Do. gas	30/-32/	30/-32/	32/6-34/

Sunderland.

COAL.

The market here is in a dull and unsatisfactory condition, largely as a result of an extreme scarcity of tonnage; allocations to France are below the average. The result is that collieries are working badly. Prices are nominal, but fairly held at the official minima in most cases, though for the home market there is some cutting on the part of holders of cheap coal. On the other hand, for neutral shipments there is no disposition to take business, except at the full official figures, and if only a better tonnage were available export prices would probably rise. Meanwhile, all grades of steam, gas and coking coals are offered freely at unchanged prices. Bunkers are weak on ample supplies. Coke is abundant and easy, with considerable quantities available for prompt delivery.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6	40/
Secondary do.	23/6-25/	23/6-25/	33/6-34/
House coals:—			
Best house coals	30/	30/	50/
Ordinary do.	28/6	28/6	40/
Other sorts:—			
Lambton screened	28/6-30/	30/	47/6
South Hetton do.	28/6-30/	30/	47/6
Lambton unscreened ...	24/	24/	34/
South Hetton do.	24/	24/	34/
Do. treble nuts	20/	20/	35/6
Coking coals unscreened	25/	25/	34/
Do. smalls	25/	25/	32/6
Smithies.....	25/	25/	35/
Peas and nuts	24/6-26/	24/6-26/	37/6
Best bunkers.....	25/	25/	36/
Ordinary bunkers.....	24/	24/	33/
Coke:—			
Foundry coke	42/6	42/6	47/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	32/	32/	35/

The outward market is unchanged. For neutral ports owners can dictate their own terms; the home coasting section is firm.

Middlesbrough-on-Tees.

COAL.

The coal market is very quiet, but colliery positions are understood to be slightly better on the whole. There are complaints that tonnage is much delayed at ports of discharge. Official absorption continues fairly good, and deliveries on contract keep pace with opportunity. Altogether there is little new business offering, and enquiries from abroad are now small. Best Durham gas coals are 25s., and seconds 23s. 6d., whilst special Wears range from 26s. 6d. to 30s. Unscreened Durham bunkers are 24s., and higher price is asked for special qualities. Household coal shows no change. Coking coal continues to be well taken up at rates last named. The coke market is somewhat disorganised. Supply is plentiful, but values show no sign of weakening. Beehive quality and patent oven are both quoted 42s. 6d., and gas-house coke is in the neighbourhood of 29s. to 30s. Descriptions needed for the local blastfurnaces continue in very good demand, and command full prices. Average kinds realise 28s. at the ovens, and qualities low in phosphorus are selling at 30s. 6d. at the ovens.

IRON.

The pig iron market is quiet but steady and firm. With initiative closely circumscribed by official regulations, now developments can hardly be expected. Cleveland pig is very plentiful, but little home business is passing, buyers here having covered themselves for the month, and customers north of the Tweed needing small supplies owing to the Scottish holidays. Renewal of activity, however, is looked for with the issue of August allocations. Heavy Continental enquiries continue, and export business shows some improvement. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Pressure for demand of east coast hæmatite iron is as insistent as ever, both on home and foreign account. The work of allocation is difficult, but under strict official supervision home requirements are being adequately met, and the quantities available for our Allies are being carefully allotted. Applications are so dealt with as to assure as far as possible the minimum needs of the Allies. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France, and 142s. 6d. for export to Italy. Unprecedentedly heavy demand for finished iron and steel is taxing the efforts of manufacturers. Needs of the Government and ship yard requirements practically absorb the output, so that facility for transaction of ordinary commercial business is small indeed. Quotations all round are very stiff.

Cumberland.

Maryport.

COAL.

The demand is probably not quite so pressing, but fuel is moving away more freely from both the dock and railway sidings, and the situation is now more satisfactory than it has been for some weeks. The home market is improving and there is a fairly strong enquiry for best steam coal and all varieties of works fuel, both for shipping and local consumption. There is not much life in the house coal trade. Gas coal is in firm request, all the pits are working regularly and yielding good outputs. Prices of all sorts are firm but unchanged.

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " ...	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit.....	21/	21/	21/
St. Helons (Siddick) best coal at pit	22/6	22/6	22/6
St. Helons best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	25/	25/	25/
30/	30/	30/	
Bunkers (mixed nuts and steam coal) (coastwise) Do. (foreign)	21/6	21/6	21/6
25/	25/	25/	
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

The hæmatite pig iron trade in the district on the west coast between Maryport and Carnforth is still very brisk, and the call for special and ordinary iron is phenomenal. Smelters have still more on hand than they can comfortably deal with, and as so much is now required for Government purposes, they have none to sell. All the iron that can be made in this locality is going into prompt use. There is a pressing need for a bigger production of iron, but until there is a substantial increase in the output of local ore it is practically impossible to put any more furnaces into blast. Prices are easily maintained at the Government maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at cash at 115s. per ton. Special iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton f.o.t. The market for ferro-manganese is very firm, prices are on the increase, and the demand is very much stronger. Supplies, however, are very scarce, and it is somewhat doubtful whether makers will have any available for shipment this year. One furnace has been put out of blast at Distington, but another has been lighted. The steel industry is feverishly busy, all the mills at Barrow and Workington are in full swing, and a heavy output is maintained. Heavy steel rails are quoted at from £10 17s. 6d. to £11 10s. per ton, with light sections at from £14 to £14 10s. per ton. Heavy tram rails are £14 per ton, ship plates £11 10s., and boiler plates £12 10s. per ton. Billets are in strong demand at £12 per ton. Engineering is brisk, and most of the shops in this district are heavily engaged on Government account. The iron ore industry is prosperous, and there is a heavy demand for all grades of native ore. All the mines are working full time, but production is still very much below requirements. Prices of all sorts are unchanged. The imports of foreign ore at Maryport this week have amounted to 10,000 tons.

South-West Lancashire.

COAL.

In household coals the demand continues as brisk as ever, but so far little stocking is being done by the merchant; his order book is still in such a condition that he has to pass large quantities forward to the consumer who no doubt is laying the major portion by for future use. There is not much fresh to report with respect to steam coal, bunker demand on account of contract being fair. With regard to open sale, there has been some little shipment, with a few enquiries, but only a limited quantity of coal on offer, and this of course is at controlled price and conditions. In the coastwise and cross-channel trade for household fuel much the same condition of affairs exists as in the inland market for the same article. The trade is very brisk, but it is not all going into consumption. In slacks the holiday period in the manufacturing towns is easing the position somewhat, and advantage of this is being taken by other users to add to their stock.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/ -22/	21/ -22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/ -20/	19/ -20/	19/ -20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—	—	24/6-25/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds

* As per official list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. The demand for house coal is much greater than can be met. Manufacturing fuel and slacks are a little easier. The demand for shipping coal continues steady. Prices generally are as follow:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/ -23/	22/ -23/	22/ -23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/ -18/6	18/ -18/6	18/ -18/6
Furnace coal	17/6-18/	17/6-18/	17/ -18/
Bunker (f.o.b. Partington)	—	25/ -26/	25/ -26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

IRON.

The restrictions that have been placed on all goods other than for the Government are such that it is quite impossible to carry on even a part of one's ordinary trade. Works are full and have been allocated far more work than they can produce. Maximum prices of hæmatite and South Staffordshire pig have been increased, which will mean an increase in cost of steel to the consumer, and an advance in the price of production of pig, as the average selling prices will be higher, and blastfurnacemen will take their toll. Engineers are full of work, wagon builders also, and foundries report more enquiry, but, owing to labour shortage, are compelled to decline work where quick delivery is of importance.

Yorkshire and Derbyshire.

Leeds.

COAL.

Probably owing to the approach of the holiday season, the attendance on the Leeds Coal Exchange on Tuesday was somewhat below the average, but the pressure for supplies, especially for house coal, continued. Buyers, amongst whom were quite a good number from London and also from Lancashire, were in a distinct majority, and they found prompt supplies difficult to secure in any quantity. The scheme of distribution received a good deal of attention in conversation, the general attitude being that of satisfaction and even warm support. Some works outside the areas of unrestricted supplies from Yorkshire have already taken steps to secure certificates enabling them to still receive specialised Yorkshire fuel. Colliery conditions are on satisfactory lines—viz., full time working, the output well maintained, and a fairly good wagon supply. London merchants and factors are pressing for all the house coal they can get from the collieries, but the latter are quite unable to augment deliveries. The depots, especially in the south, are reported to be almost, and in many cases quite, without coal, except that which comes to hand from day to day, and there are still arrears of stocking orders to overtake. Rather more coal appears to be sent coastwise to the Thames wharves, however. Freights are inclined to fluctuate, but are a little harder on the week, being about 17s. per ton, Hull to London. Local trade in house coal is quieter, but the supplies from the collieries are by no means plentiful, and best qualities cannot be procured. Pit prices for the West Riding:—Haigh Moor selected, 21s. to 22s.; Silkstone best, 20s. to 21s.; Silkstone house, 18s. to 19s.; other qualities 17s. to 18s. Despite the marked improvement which has taken place in recent weeks in regard to stocks of gas coal at the works, gas engineers generally are by no means relieved of anxiety as to their winter supplies, and there is a ready outlet for any prompt parcels which may become available. It is rarely that this occurs, however, as collieries in most cases find it difficult to maintain contract deliveries, and in addition fairly large quantities of gas coal are being shipped for France at the Humber ports. The demand for manufacturing fuel shows no abatement, although small steam slacks are plentiful in comparison with other qualities of steam fuel. Government-controlled works absorb all the output of washed nuts, and the call for all specialised qualities is very keen. Unfortunately for makers of washed furnace coke, the relative ease in small slacks does not apply to coking qualities, which are extremely scarce, making it difficult to maintain the full output of the ovens and to meet the heavy demand for coke. The pit prices on the subjoined list are more or less nominal:—

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	20/ -21/	20/ -21/	20/ -21/
Wallsend & London best	19/ -20/	19/ -20/	19/ -20/
Silkstone best	19/ -20/	19/ -20/	19/ -20/
Do. house	17/ -18/	17/ -18/	17/ -18/
House nuts	16/ -17/	16/ -17/	16/ -17/
Prices f.o.b. Hull:—			
Haigh Moor best	23/ -24/	23/ -24/	23/ -24/
Silkstone best	22/ -23/	22/ -23/	22/ -23/
Do. house	20/ -21/	20/ -21/	20/ -21/
Other qualities	19/ -20/	19/ -20/	19/ -20/
Gas coal:—			
Prices at pit:			
Screened gas coal.....	16/ -17/	16/ -17/	16/ -17/
Gas nuts.....	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/ -16/	15/ -16/	15/ -16/
Other sorts:—			
Prices at pit:			
Washed nuts.....	17/ -18/	17/ -18/	17/ -18/
Large double-scrned engine nuts	16/ -17/	16/ -17/	16/ -17/
Small nuts.....	15/ -16/	15/ -16/	15/ -16/
Rough unscreened engine coal.....	15/ -16/	15/ -16/	15/ -16/
Best rough slacks.....	14/ -15/	14/ -15/	14/ -15/
Small do.	12/ -13/	12/ -13/	12/ -13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

The difficulty of procuring an adequate supply of most classes of fuel continues to be experienced, but there is little collieries can do to alter the position. Small bodies of miners are still leaving the pit for war service, and it is not possible to maintain the output, though, all things considered, the product is well maintained. The diversion of supplies, however, caused shortage in certain areas, though the inconvenience is alternately borne, and seems likely to continue. The position is particularly difficult in respect of large steam coal, owing to the varied and hurried demands which are made inevitable for prompt supplies. There is little coal available for export purposes, though the traffic continues to be on restricted lines. The

needs of the Admiralty and the railway are particularly heavy for this area, and little surplus fuel is offered in the open market. The demand for gas nuts is also keenly evident, with the bulk of the supply going to the munition firms and other engineering concerns. The position in regard to gas coal is maintained with the deliveries on contract account hardly a factory as could be wished for. Still there is little chance of obtaining surplus lots in the market, particularly of unscreened sorts, owing to the utilisation of every effort to obtain an adequate supply of slack to keep the by-products plants at work. Thin seams which can be quickly got at are being opened out to obtain a further supply, but in spite of all efforts it is exceedingly difficult to meet the situation. The enquiry for all kinds of small steam fuel is again very active, and the only weakness is in ordinary slacks, which are more freely procurable. The heavy demand for house coal for London and the south is again experienced, and other districts are still unable to procure such deliveries as afford any material assistance towards laying in stock for the coming winter period. The demand for furnace coke is more active, and the make is insufficient to meet the situation. Values largely remain of a nominal character, as follow:

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	20/ -22/	20/ -22/	20/ -22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/ -17/6	17/ -17/6	16/6-17/6
Best house nuts	16/ -17/	16/ -17/	16/ -17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals.....	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts.....	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts.....	16/	16/	16/
Furnace coke.....	25/8	25/8	25/8

Hull.

COAL.

The past few days in the Humber coal trade have been quite featureless, and prompt business extremely quiet. Shipments to the Allies are proceeding fairly satisfactorily, but business with neutrals has not been resumed, although certain points regarding the grading of coal in the new price list have apparently been cleared up. As has already been stated, neutrals are not prejudiced in the matter of the best kinds of coal, since the fixed minimum prices are no more than the current market value, though they will have to pay more for the smaller sorts of manufacturing fuel. But the real obstacle in the way of the expansion of neutral trade is the difficulty would-be importers on the other side have in securing shipping tonnage even at the phenomenal rates which are now ruling. The longer the delay continues the less probable it becomes that neutral wants can be met from the Yorkshire output—so great and increasing are the demands upon it for official, industrial, and Allied needs. No Derbyshire or Notts coal is now being exported from the Humber, and it is quite likely that before long the licensing regulations will be applied so discriminately to Yorkshire coal, that little will be allowed shipment except for France and Italy. Under the present circumstances prices for export to neutrals are largely nominal at the level of the Controller's minima, viz.: Best South Yorkshire hards, 30s.; washed nuts, 23s. to 25s.; West Yorkshire Hartleys, 27s. 6d. (Goole), 28s. 3d. (Hull): screened gas, 26s.; rough slack, 20s. The freight market has been stagnant, the only steamers chartered being those for Allied ports at the fixed maximum rates.

Chesterfield.

COAL.

No special feature is to be noted. Every class of coal continues in great demand, and consumers are pressing for deliveries. There is considerable anxiety with regard to the proposed change of areas whence supplies of fuel will be drawn, and this feeling is specially observable in Sheffield, seeing that the larger proportion of fuel for gas producers is now obtained from North Derbyshire. Under the new scheme Derbyshire collieries are prohibited from sending coal into Yorkshire. Cobbles and nuts are much sought after, but the supply of these is still much below the needs of the market. Slacks of all kinds for boiler firing are going off freely, but very fine sorts are difficult to dispose of. There is not the great pressure for steam coal for locomotive purposes that has recently been experienced, and railway companies are in an easier position at present with regard to supplies. This may be due to the fact that the export of coal from Derbyshire is prohibited, thus throwing a substantial quantity of steam coal on the market for home requirements. The coke trade is active, every quality being in good demand.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

A full demand is experienced for all classes of iron, and all the works of the district are running at high pressure.

Nottingham.

COAL.

For the time of the year the demand for domestic fuel on the part of a considerable section of the public continues to be of a most active character. Householders continue to get in stock for the winter, and local merchants are being kept busy with such orders which preclude them from allocating a portion of the supplies received from the collieries to reserve for winter requirements. The pressure on collieries is maintained, but it is anticipated that this run of mid-summer purchasing by the public will bring relief later on. The output of all classes of house holds is readily disposed of by collieries, and prices retain their firmness. In the steam coal branch a strong tone

prevails. The home consumption of large steams, fully by the railway companies, is heavy owing to the war material, while smaller grades of fuel are in ammunition works and for manufacturing main on the scarce side, and it is difficult to obtain supplies. Slacks are meeting, but the supplies suitable for coke, mate to meet all requirements. The out- is absorbed by contract obligations.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	15/6-16/6
Best hard coals.....	16/9-17/6	16/-17/6	17/-17/6
Secondary do	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	11/-12/
Do. (soft)	11/	11/	11/

Leicestershire. COAL.

The formation of local committees under the transport reorganisation scheme is proceeding, but it is obvious that a great deal of important work will have to be performed in the seven weeks that elapse before the scheme is in full operation. As far as the regulations are interpreted it is understood that colliery managers will be practically under the control of the district committee, but it is feared that with a great number of small users the complications will be very great indeed. There is an enormous influx of orders from districts which will be excluded under the new scheme, and great pressure is being used to obtain deliveries for large works of public utility as speedily as possible. Great numbers of enquiries are also coming to hand dealing with an endless variety of questions regarding future supplies, many coal merchants whose business covers more than one area being quite at a loss regarding the proper procedure. The colliery sidings are overcrowded with the wagons of private merchants who are more eager than ever to obtain deliveries, there being in many instances quite an apprehension that supplies will be seriously curtailed later in the year. The orders for London and district are of great volume for all classes of household, as well as deep and main cobbles and nuts and small nuts for mechanical stokers. Some progress is being made in the reduction of the arrears for the deliveries to country merchants, but the supplies at country stations are still very much below the average for the season of the year. Efforts are being made by merchants who will have to handle new qualities of coal to adjust them as far as possible to meet the needs of their customers. There are no reserves of any kind at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	16/6-18/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-16/6
Deep screened cobbles ...	16/-17/	16/-17/	16/6-17/
Deep large nuts	16/-16/6	16/-16/6	16/-16/6
Bakers' nuts	15/-15/6	15/-15/6	15/-15/6
Small nuts.....	14/6-15/	14/6-15/	14/6-15/
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/	6/-7/	6/-7/
Main nuts for London kitcheners	13/6-14/	13/6-14/	13/-13/6
Steams, best hand picked	14/-14/6	14/-14/6	14/-14/6
Steams, seconds	13/-13/6	13/-13/6	13/-13/6
Main cobbles for kitcheners	13/6-14/	13/6-14/	13/6-14/
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire. Birmingham.

COAL.

The merchants of the city are taking steps to ascertain the collective opinion of the trade of the Coal Controller's proposals. There are several points on which more information is desired, though in the main the scheme has been favourably received. It is agreed that a certain amount of haulage will be saved—a valuable item just now—and it is affirmed that the trucks owned in this area should be more than ample for the distribution of locally raised coal on the radius principle. One suggested drawback is that householders will perforce have to take the poor coal of their own districts, better qualities for outside districts not being available. However, until some experience of the working of the scheme has been obtained it is impossible to dogmatise about it. So far, it has had no effect on the market of any kind. Although the output is well sustained, a considerable shortage still prevails. Consumers find it difficult to obtain requisite quantities of nuts. A heavy demand also exists for all classes of sualls.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase) :—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire :—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

As was expected, the quarterly meeting did not add a books, for the reason that these manufacturers are compelled to matter of fact, their bookings will their output for the remainder could have no difficulty, were they themselves of contracts into next

year. Prices of bar iron have not been interfered with, but makers point out that since the last revision the cost of production, including a 2½ per cent. advance in wages, has risen by something like 5s. a ton. The output of puddled iron is inadequate, and a return of hot weather will make it even more so. For what bars are available £12 5s. a ton is quoted, while for billets the price ranges from £13 5s. to £13 10s. These values, producers say, could easily be increased, but for a desire not to unduly inflate prices and unsettle the market. Full pressure is experienced in the pig iron branches, and some makers have pledged the greater part of their output for the remainder of the year. Naturally, full maximum rates are paid by consumers, and probably they would not be averse to paying more if it would expedite deliveries. Makers outside Staffordshire still attach the protecting clause against any advance, though this is more of a formality than the outcome of any expectation of a concession being granted by the Ministry. The demand embraces forge as well as foundry grades. The sheet trade is listless, and values remain unchanged at £28 10s. for galvanised sheets, and £19 10s. for black, plain and corrugated. For painting the latter, 25s. is now the regular charge. The rates for Staffordshire tinned sheets have been reaffirmed at 52s. per cwt. for best charcoal, 50s. charcoal, and 46s. coke, unassorted. Shipments have been suspended, but a big home trade is being done. Tin-plate makers report extensive orders; their rates range from 46s. to 60s. per box. American wire rods have reached the abnormal price of from £28 to £29, Liverpool. A few hollow blooms are offered, also at extravagant prices. There is no relief in steel generally, supplies being much short of requirements. National needs dominate the situation. Joists and sections continue at £11 2s. 6d. net, at makers' works.

Forest of Dean.

Lydney.

COAL.

The position of the house coal trade in this field continues one of undiminished strength. All descriptions of fuel are in strong demand and the output, with the collieries fully engaged, is quite inadequate to meet the requirements of merchants, and for every quality produced there is more or less delay in despatching orders. The inland buyers are still ordering freely whilst there are a large number of vessels awaiting their cargoes. The production of steam qualities is not sufficient to meet the heavy enquiry, and consumers have to go short in many cases.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals :—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	16/6	16/6	15/
Steam coal :—			
Large	20/-21/	20/-21/	18/-19/
Small	16/-17/	16/-17/	16/-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

Messrs. W. Wade and Son report that a fair amount of house, steam and gas coal is now being received throughout the district, but house coal merchants find that they are able to place very little in stock and feel concerned as to obtaining full autumn and winter supplies, as this district is the remotest in England from the colliery areas. Very great interest is being taken in the Controller of Mines' new rules as to the distribution areas. It is admitted that an immense saving in railway mileage must result, and it is hoped that this will lead to quick transit and regular working at the pits.

THE BY-PRODUCTS TRADE.

Tar Products.—London and provincial markets remain practically as a week ago. The home trade demand for pitch is fairly good, while enquiries for shipment over next season are increasing, but makers are not inclined to sell ahead. There is a good demand for solvent naphtha. Creosote dealings can now only be made under licence, the Government having assumed control of all supplies. Average provincial prices are as follow :—Tar (gas works), 20s. 6d. to 24s. 6d. Pitch, east coast, 16s. 6d. to 17s. 6d. per ton; ditto, Manchester, 15s. 6d. to 16s. 6d.; ditto, Liverpool, 16s. 6d. to 17s. 6d.; ditto, Clyde, 17s. to 18s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½d. to 6½d. Solvent naphtha, naked, north, 1s. 8d. to 1s. 9d. Heavy naphtha, north, 1s. 2d. to 1s. 3d. Heavy oils, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—A good demand for agricultural purposes is noted, at the official quotations. There will be much to be recorded after the war about the results obtained by the spring and late autumn application of sulphate of ammonia. Provided prices are not advanced unreasonably, there should, and in all reasonable possibility will, be a greatly increased demand in France for this fertiliser. And seeing that, for obvious reasons, it will take a considerable time for the French and Belgian sources of supply to get back to the normal rate of production, this market is worthy of immediate consideration concerning sales organisation.

THE TIN-PLATE TRADE.

Liverpool.—There is a big demand for sizes which have been released for sale without a certificate, and very high prices are being paid by consumers who must have plates at all costs, but are unable to give a reference number; 43s. basis f.o.b. Wales was easily obtained during the week. Works are very fully booked up with class A orders, and deliveries are much behind time in most cases. The consequence is that but few makers care to commit themselves any further at present. Where quotations are obtainable, however, 36s. 6d. to 37s. 6d. basis is generally asked for approved sizes in coke finish, delivery not earlier than, say, November. All f.o.b. Wales, less 4 per cent.

THE WELSH COAL AND IRON TRADES.

THURSDAY, JULY 19.

North Wales.

Wrexham.

COAL.

Nothing of great import has occurred in this coal field during the past week or two. All the pits are working full time, and no difficulty is experienced in readily disposing of the output. Steam coal remains steady, and there is a good demand by railway companies and other Government buyers. There is also a fair demand for coal for shipment from the Mersey ports. As seaborne coal will not be affected by the new scheme, contracts are likely to be fixed up on similar lines to the expiring ones. The demand for gas-producing fuel is keen (both for large coal and nuts). Gas companies out of the locality who have used coal from the local collieries hitherto, are no doubt anxious to secure what stock they can on account of contracts now running, before they fix up with collieries in other areas as they will be required to do. North Wales coal has always been popular as a gas coal, and a large trade has been done with works which will, in future, be situated in various areas, and therefore will have to transfer their contracts accordingly. There is still a good local demand for gas coke. Slack remains steady, and apparently there is no accumulation of stocks. Prices are the same as have been quoted for some time past. Best large house coal is listed at 22s. to 23s. per ton at pit; seconds at 21s. to 22s.; while at landsale depots 27s. 6d. to 30s. is the retail price for best, and 25s. to 27s. 6d. for second grade. Steam and large gas coal is offered at 19s. to 20s. at pit, nuts at 18s. to 19s. per ton, and slack at 12s. to 14s. at pit. The price of gas coke is 21s. 5d. to 23s. 4d. at local works. Appended is a list of current quotations.

	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit f.o.b. :—			
Best house coal	22/-23/	21/-23/	—
Secondary do.	21/-22/	20/-22/	—
Steam coal.....	19/-20/	19/-21/	—
Gas coal.....	19/-20/	19/-21/	—
Bunkers	19/-20/	19/-21/	—
Nuts	18/-19/	18/-20/	—
Slack	12/-14/	12/-14/6	—
Gas coke (at works).....	21/8-23/4	21/8-23/4	—
Prices landsale :—			
Best house coal	27/6-30/	27/6-30/	—
Secouds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

There was an appreciable improvement in the appearance of the coal market in this district at the opening of the present week. The arrival of tonnage had been more satisfactory than for several weeks past, and the tips at the docks were for some days kept quite busy in loading cargoes. There seems, too, some indication of the improvement being maintained, and of stocks thereby being diminished, and of the mines working much more regularly than during the past month. The change in situation has not affected prices, at all events for the present, and there is a good deal of business on quotations for prompt shipment.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals :—			
Best Black Vein large...	27/-29/	27/-29/	40/-41/
Western-valleys, ordin'y	24/6-26/	24/6-26/	39/-40/
Best Eastern-valleys ...	23/6-24/6	23/6-24/6	38/-40/
Secondary do.	19/6-21/	19/6-21/	34/-35/
Best small coals	14/6-16/	14/6-16/	25/-26/
Secondary do.	9/-12/	9/-12/	23/-24/
Inferior do.	6/-8/6	6/-8/6	19/-20/
Screenings	15/-17/6	15/-17/6	25/-26/
Through coals	19/-21/	19/-21/	25/-28/
Best washed nuts.....	—	—	29/-31/
Other sorts :—			
Best house coal, at pit...	25/-26/	25/-26/	24/-26/6
Secondary do. do. ...	22/-23/6	22/-23/6	22/-24/
Patent fuel	30/-32/6	30/-32/6	50/-51/
Furnace coke.....	—	—	51/-52/6
Foundry coke	—	—	61/6-62/

* Nominal.

IRON.

The iron and steel trades of the district are still working at the highest tension to keep pace with the demands, especially on Government account. Prices are naturally only nominal, as there is very little of the output free. There has been a reorganisation of the tin bar mill at the Monmouthshire Steel and Tin Plate Company's works at Pontymister, and an electrically-driven reversing mill has been installed to supersede the steam plant. This is one of the earliest of a number of conversions and developments going on in the district. The pitwood market is disturbed by the scarcity of empty wagons, and prices have drooped, small sizes being obtained at about 60s. ex ship, and others up to 65s.

Cardiff.

COAL.

There is practically no real change in the position, and the market is almost at a standstill. This is chiefly owing to the scarcity of tonnage, and although arrivals over the week-end were on a moderate scale, the vessels available are entirely inadequate for the requirements of the trade. Fixtures reported last week were only 7,400 tons, whereas in normal times that figure could be multiplied by twenty. Admiralty demands continue steady, and all the best and superior second qualities are reserved. There is, however, an excess of the lower grades, and stocks continue to accumulate, with the result that the sidings are congested, and temporary stoppages are reported from various districts, owing to shortage of wagons. No details have yet been published with regard to the classification scheme. The local committee have finished their work, and the recommendations have been sent to the Controller for final sanction before publication. It is understood that suggestions have been made to add seven or eight new grades to the classification list, in order to deal with inferior grades of coal, which it is admitted on all hands cannot be fairly included in the present schedule. What action will

ultimately be taken is not known, but the delay in announcing the full scheme is hampering business. The small coal market is depressed. No business is being done at the maximum price of 23s., and it is considered that 18s. for inferior grades is excessive, as these could be obtained several weeks ago at 8s. to 10s. per ton less than the rates fixed by the Controller. It is anticipated that there will be a better demand for Monmouthshire bituminous coals in the near future, owing to the new regulations under the Coal Distribution Order. It is now considered that there will be a much heavier demand for the second grade Eastern Valley coal. All transactions at present are on the basis of the new fixed rates, subject to revision when the classification scheme has been made public. The shortage of wagons has affected the pitwood business, and French fir has been offering at prices varying from 57s. 6d. to 62s. 6d. per ton. Patent fuel is plentiful, and nominally quoted at 30s. to 32s. 6d. per ton.

Prices f.o.b. Cardiff (except where otherwise stated).

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	40/-42/6
Ordinary	30/	30/	38/-40/
Best bunker smalls	23/	23/	27/6-28/6
Best ordinaries	21/6	21/6	25/-27/
Cargo qualities	20/	20/	20/-23/
Inferior smalls	18/	18/	19/-20/
Best dry coals	30/	30/	36/-38/
Ordinary dries	28/6	28/6	34/-36/
Best washed nuts	30/	30/	35/-38/
Seconds	28/6	28/6	33/-35/
Best washed peas	27/6	27/6	31/-34/
Seconds	26/6	26/6	30/-31/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	40/-42/6
Western-valleys	29/	29/	39/-41/
Eastern-valleys	29/	29/	38/-39/
Inferior do.	28/	28/	35/-37/
Bituminous coals:—			
Best house coals (at pit) ..	33/	33/	25/6-26/6
Second qualities (at pit) ..	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	43/-45/
Through-and-through	—	—	37/6-40/
Small	26/	26/	32/6-35/
No. 2 Rhondda—			
Large	27/	27/	35/-37/
Through-and-through	25/	25/	28/-30/
Small	20/	20/	24/-25/
Best patent fuel	32/6	30/-32/6	52/6-55/
Seconds	30/	28/-30/	50/-52/6
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	52/6-57/6
Pitwood (ex-ship)	57/6-62/6	67/6-70/	39/-41/

* Nominal.

IRON.

The only drawback in the tinplate trade is the unsatisfactory delivery of raw material. The demand for steel bars for munition purposes is so great that the supplies for the tinplate works are irregular, and many stoppages are reported in consequence. Shipments last week were 36,821 boxes, compared with 30,753 boxes received from works. Stocks in the docks warehouses and vans are now down to 84,427 boxes, which is the lowest record for years. A year ago stocks amounted to 196,548 boxes. With regard to prices there is still a firm and rising tendency, Bessemer standard cokes, 20 x 14, realising 36s. to 37s. for Class A work, and 43s. for free parcels. Other permitted sizes are on the same basis. In the galvanised sheet trade there is no change, all works being busily engaged in the production of black plate and painted sheets. Prices are nominal. Spelter is steady at £54 per ton for prompt, and £50 for October delivery. At the steel works the blast furnaces and mills are working at high pressure, and outputs are being well maintained. Prices in all cases are nominal. Iron ore arrivals continue to be satisfactory. The millmen and others employed at the tinplate works have applied for a war bonus of 100 per cent. on pre-war rates.

Llanelli.

COAL.

There is very little change to advise as to the local market. Tonnage arrivals are still far from satisfactory, and it is therefore impossible to give clearance to existing contracts. Collieries are also experiencing play days through shortage of empty wagons. This is handicapping the position of inland orders, as sellers will naturally give

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite ..	30/	30/	30/-32/
Seconds	29/	29/	27/-29/
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	25/6-27/6
Machine-made cobbles	42/6	42/6	36/-38/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles	36/	36/	—
Machine-made nuts	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	32/6-34/6
Seconds	34/	34/	—
Thirds	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm	13/	13/	13/-13/6
Red Vein culm	11/	11/	—
Breakers dnff	10/	10/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	37/-38/
Seconds	27/	27/	—
Bunkers through	25/	25/	28/6-32/6
Smalls	19/	19/	20/-22/
Bituminous:—			
Bituminous through ..	27/	27/	—
Smalls	24/	24/	—
Coke-oven coke	47/6	47/6	27/6-29/6

preference to orders for shipment so as to secure better supplies of empties. Anthracite large kinds are still very easy, and with heavy stocks accumulated there is no present indication of activity in these qualities. Machine-made sorts are generally in good demand, and buyers are experiencing difficulty in securing full supplies of some kinds. The inland demand is strong, with considerable delays experienced in execution of orders. Steam coals are irregular owing to scarcity of tonnage, and it is possible to secure supplies of practically all grades. House coals are scarce, and manufacturing coals are also a strong market.

Swansea.

COAL.

There was an improvement in the trade of the port last week, compared with the week previous, both in exports of coal and patent fuel. The shipments together totalled 88,662 tons. There was no alteration in the condition of the market to-day. Arrivals of tonnage were moderate, and shipments were at about recent levels. In anthracite there was an active demand for machine-made sizes, but other classes are quiet. Steam coals continued slow.

THE IRISH COAL TRADE.

THURSDAY, JULY 19.

Dublin.

There is no further change in the port, business being better than usual at the time of year, owing to fears for a scarcity in the winter, and there is a fair demand from country districts. Prices are as follow: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; slack, 35s.; all less 1s. per ton discount. Irish coals at Castlecomer Collieries, county Kilkenny, are: Best small coal, 28s. 4d. per ton; best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d., all at the pithead. Coals from the Wolfhill Collieries, Queen's County, are: Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.r. Athy, on the Great Southern and Western line. A number of unemployed men were selected last week by the secretary of the National Service Department for work at the construction of the railway between Athy and the Wolfhill mines. The total quantity of coal discharged upon the quays during the past week was 32,308 tons. Under the new Order issued by the Coal Controller, it appears that only 300,000 tons of coal can now be shipped to Dublin each year from Lancashire, the quantity formerly sent being 700,000 tons. The secretary of the Irish Exploration and Development Company Limited states that in the event of the company taking over the Cavan and Leitrim Light Railway and constructing a wide gauge line instead to develop the Arigna mineral area in county Leitrim, the company would be in a position to meet the local demand for coal next winter.

Belfast.

Consumers of house coal continue stocking their cellars for winter, demand being above the average, and there is a fairly good enquiry for other qualities. Prices are unchanged for household coal, and range from 39s. 6d. to 43s. 6d. per ton; Orrell slack, 39s. 6d.; coke, from about 40s. to 48s. per ton.

THE LONDON COAL TRADE.

THURSDAY, JULY 19.

Trade continues persistently active, and at all the depots the delivery trade is in full swing. The arrival of the loaded coal trucks within a few days of leaving the collieries naturally tends towards a vigorous movement in the execution of the unusual number of orders in hand from the public, and the enquiry for coal on the London market is as keen as ever. The shortage of men at the wharves and depots for loading up and cartage renders it an increasingly difficult problem to get the coal away, and the actual tonnage arriving is still much below the normal. The bulk of the householders' orders are being dealt with in regular routine, and the Controller's demand that not more than four tons should be delivered at a time enables the bulk of the merchants to deal *pro rata* with all the orders in hand. Very few of the North London depots can complain now of the tonnage arriving, but there are still many of the southern depots who are keenly anxious for a better supply. The main difficulty is to get the coal delivered to the cellars with the diminished labour available at the depots. All the yearly contracts have been renewed, and in every case at last year's prices, mainly, with a decreased monthly quantity, but as a whole this points to no increase in the delivery prices throughout the year. Winter prices will be exactly similar to last year, except, of course, when a heavy fall of snow renders the extra cost of cartage a serious item. All large institutions, hotels, etc., are aiming at a big stock in anticipation of the coming winter's demand, and the fuel is being stored in a number of crypts and underground passages, never before used for purposes of this kind. House coal prices are stationary, but the pressure has been somewhat easier. Hard steam coals are exceedingly difficult to obtain; there is a good enquiry for them, but supplies are unusually restricted in the London area, so much of the coal being required for Government orders. Kitchener cobbles and bakers' nuts are also difficult to obtain, as so many of these are absorbed by the local munition works. The new regulations of the Coal Controller is looked upon very favourably, as it seems to point to a better supply for London, but the coal coming from the Durham pits by rail, and the Lancashire pits, will be cut off for the time being. The West of England stations look like suffering most from the new order of things. On Monday's market 40 coal vessels were returned as arriving in the River Thames and 13 for Wednesday, but all were contract cargoes. This regular quantity coming forward by sea has largely helped the various gas companies to put a good quantity into stock, and the few vessels loaded with North Country or Yorkshire house coal have had a good sale. The freight market has been slow, owing to the scarcity of boats. Fixtures have been made from the Humber to London at 18s. per ton. South Yorkshire hards are firm at 30s. per ton f.o.b., and it is reported that no Derbyshire hards are now offered for export at any of the Humber ports. The coal merchants generally are now very anxious to put a good stock on the ground, but as the orders from householders are of paramount importance just now, the opportunities for putting coal into stock at the various coal yards is somewhat vague. The Household Distribution Order (No. 1), 1917, is now in the hands of the Metropolitan borough councils and the coal merchants generally;

the principal basis of the scheme is to secure a regular supply, and the number of rooms in each house, and the number of occupants, in the first instance, are to come under the control of the Coal Controller, and special provisions are to be made to prevent large quantities going to any one consumer to the detriment of others. The Great Eastern Railway Company are offering facilities for the storage of a good quantity of coal required by farmers and agricultural engines generally throughout all their stations in East Anglia.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, JULY 13.—There was no alteration in the sea borne house coal market, the demand for which was good, but no cargoes reported sold. Cargoes, 26.

MONDAY, JULY 16.—There was a good demand for sea borne house coal, but no available cargoes on offer. Arrivals, 40.

WEDNESDAY, JULY 18.—The demand for sea borne house coal continued good, but no cargoes on offer. Cargoes, 13.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The yearly meeting of the Blaenavon district of the National Union of Enginemen and Electrical Workers was held on Saturday evening, Mr. Herbert Newman presiding. The following officers were appointed: President, Mr. Enos Bancroft; vice-president, Mr. Thomas Watkins; treasurer, Mr. H. Witchell; secretary, Mr. I. J. Hayward; assistant secretary, Mr. T. Jenkins.

The South Wales and Monmouthshire Colliery Examiners' Association has passed a resolution to take a ballot of the members in Monmouthshire with a view to notices being tendered on the 1st prox., so as to bring about a meeting of the coal owners of the county and representatives of the examiners for the discussion of establishment of a wage rate for the county as a whole, and the formation of a joint board to deal with complaints and disputes. As indicative of the heavy advance in wage rates and also of the tendency to further increase, it has to be noted that engineers desire further concessions which would make a total of 100 per cent. on pre-war rates, and that tin-plate and Siemens steel workers seek similar double rates.

Eight hundred men were idle at Bedwas last week because of a dispute respecting one individual; and on Sunday it was resolved not to return to work till the man concerned had been re-instated. This resolution extends the trouble to nearer 1,400 employees.

The district council of the British Steel Smelters' Society has decided to take steps to secure stoppage of week-end work in South Wales, and also to press for the eight-hour day in all cases.

North of England.

At the annual conference of the Miners' Federation of Great Britain in Glasgow on July 24, the Northumberland Miners' Association will move to ask the Coal Controller, or, if necessary, the coal owners of Great Britain, to grant a general advance in miners' wages, owing to the increase in the cost of living, the advance to apply also to minimum wage men. A motion from the Durham Miners' Association, protesting against the restrictions governing the extra grant to old-age pensioners, has also been tabled.

At a meeting of miners, enginemen, and mine surface-men connected with the Furness Miners' Union, held at Dalton last week, to consider the wages question, it was decided to make application to the Ministry of Munitions for an advance of 15 per cent. all round.

According to a statement issued by Mr. Harry Dack to the members of the Cleveland Miners' Association to the effect that the Cleveland representative of the Ministry of Munitions has informed the executive committee that Messrs. Bolekow, Vaughan and Company are ready to blow in a furnace at Clay Lane, and have asked for 2,000 tons of ironstone per week extra. The miners are requested to do all they can to furnish the additional output which will be required before the end of the present month.

It would seem, by the report which Mr. Harry Dack has issued to the members of the Cleveland Miners' and Quarrymen's Association, that the difficulties attendant on the introduction of outside labour to assist in increasing the output of ironstone at the Cleveland mines have now been overcome. The Cleveland miners have been assured by the Ministry of Munitions that before any men come into the district the mine owners' and the miners' associations shall be notified, so that their coming may cause as little inconvenience as possible to the men already in the mines; the Ministry will endeavour to secure the release of as many men as possible from the Colours, whether on home or foreign service, for work in the mines; the wages of the Cleveland men shall not be reduced in any way by the bringing in of outside labour; on demobilisation, all Cleveland men shall be found employment, even though outside labour should have to be dismissed to meet this claim; the proposed imported labour shall not be used as a substitution to enable the release of practical ironstone miners for service with the Colours; and all workmen brought into the district must become members of the miners' association, and be subject to the working conditions prevailing in the district. It has been agreed between the mine owners' and miners' associations and the local representative of the Ministry of Munitions that, as far as datal work is concerned, the men imported shall be paid the rate applicable to the grade of employment in which they may be placed. In the case of piecework men, where new labour is necessary, districts in the mine shall be set aside for them, and they shall be set to work in pairs under the supervision of practical Cleveland miners, who shall instruct and guide them in the winning of stone and in other matters, an arrangement which the report suggests is not likely to cause friction, as the new men will not in any way interfere with the interests of the rest. The report notes that the number of accidents in the mines is becoming a very serious matter, and states that, during the three months just ended, six members five at the mines and one at the quarries have been killed while following their employment.

The wages committee of the Northumberland Miners' Association have decided to seek another interview with the coal owners, with a view to securing their assent to get such an arrangement with the Coal Controller as will give a more equitable distribution of the trade, in such a way as to prevent the people at some pits from starving while at other pits the workmen are working almost all the time.

Federated Area.

At meetings of miners on Monday night in the Warrington district, near Manchester, it was reported that the min-

As further illustration of the high wages earned by colliers, reference may be made to two cases heard on Saturday in Newport Court, where one man's average weekly earnings were stated to have been £6 13s. 4d., one week having been as much as £9; and a second man's average was stated at £4 3s. 9d.

The Newport Harbour trustees at their annual meeting re-elected Mr. Moxon as chairman, and, in acknowledging the confidence placed in him, Mr. Moxon said that the trustees had been successful in getting more money, inasmuch as the Government had recognised their claim to be paid dues upon Admiralty shipping coming to the port for coal. That had amounted to a considerable sum during the year. Complaints had been made and criticisms passed as to what the trustees were doing, but the very bodies who complained were those who opposed the increasing of the dues, which would have enabled the trustees to do more than had been done in the past.

Fire was discovered on Saturday in the oil stores and lamp room of Blaengwawr Colliery, Aberdare, and though the oil shed was destroyed, the company's employees, with the local fire brigade, prevented extension of the outbreak, and there was no interruption of colliery work, the men being able to descend as usual. Damage to the extent of between £200 and £300 is reported.

The Ebbw Vale Company state that no less than £32,316 has been paid out in war allowances during the year ended March 31. The report to shareholders refers also to the acquisition (with T. Beynon and Company) of Powell's Tillery property and of that of J. Lancaster and Company, but none of the profit of these concerns is brought into the year's account.

A colliery fireman named Mr. John H. Jones, Cwmpark, Treorchy, has made rapid progress in his mining career. He is 21 years of age, and commenced work at the Park Pit (Ocean Coal Company), Cwmpark. At the age of 12, when at Park Council Schools, he succeeded in gaining an entrance scholarship to Porth County School, subsequently came out top of 316 at the Pentre Elementary School. In 1913 he entered the School of Mines, Treforest, Pontypridd, as a half-time student, and was "top boy," and in an engineering course he won the silver medal. In 1914 he again headed the list, this time winning £10 and a silver medal, and repeated the achievement the following year. During the session 1916-17 at Treforest, Mr. Jones has been placed first on the list, and again awarded the gold medal.

For conspicuous gallantry and devotion to duty on the battlefield in handling his gun, putting an enemy gun out of action, and assisting his own bombers, Pte. P. J. Phillips, Welsh Regiment, a collier at the Fernhill Colliery, Treherbert, has been awarded the Military Medal and the French Croix de Guerre.

Numerous Monmouthshire colliery ambulance brigades were represented at the annual final competition for the Martin Championship Shield on Saturday. In the senior team contest, Tirpentwys, Pontypool (the winners) received 183 marks out of a possible 300; Powell's Tillery 179, and Crmulin 178. The competition for juniors attracted five teams, with the result that Six Bells were awarded 162 marks out of a possible 200, Rhymney 155, and Tirpentwys, Pontypool, 145. Mr. T. Greenland Davies, chief inspector of mines, presented the prizes to the winning teams.

The Tirpentwys Colliery, Pontypool, and the Ynyssafon Colliery, Treherbert, were idle on several days last week, owing to a shortage of trucks. Tirpentwys was also idle on Monday of this week. Lack of clearing facilities was responsible for a stoppage of work at the Sheet and Galvanising Works, Pontnewynydd, on Friday and Saturday.

An interesting report was circulated in the Upper Rhondda early in the week to the effect that progress was being made with the operations in connection with the re-opening of the Tylacoch workings at Treorchy. The matter of dealing with the volume of water which has accumulated in the shaft during a long period of dormancy is well forward. It is now 25 years since the last tram of coal was brought to the surface from these workings, and the renown of the concern has been so well preserved in local history that the prospect of its being re-opened within the next two years has heightened the spirits of the industrial classes of the district.

Notification that they are to be awarded the V.C. has been conveyed to two South Wales miners, namely, Corpl. H. Holman, 17th Welsh Regiment, of 33, Francis-street, Rhydfelin, Pontypridd, and Sergt. James Northey, 2nd Welsh Regiment, son of Mr. John Northey, 8, Thomas-street, Pentre, Rhondda. The first named was a timberman at the Cymmer Colliery, Porth, and the other soldier-miner, who has since died of wounds, was a haulier at the Gelly Colliery, Ystrad-Rhondda.

At a meeting of the Risca Colliery workmen on Monday, Conn. J. Powell spoke of considerable discontent existing among labour representatives on local authorities and the Assessment Committees that colliery properties were assessed in many cases much below their value, whilst house properties were too highly assessed in order to make good the deficiency. All classes of organised wage-earners are moving in this matter; and its special importance is due to the great schemes of Council outlay that are foreshadowed in the immediate future. The effect of these schemes upon colliery returns is material, because so very large a proportion of the rates has to be raised from the colliery properties. The miners, through organisation, aimed at an extension of the rating area, particularly by a levy upon royalties. Apart, however, from new enterprises, there has been, and must continue to be, a large increase in the amount of rates imposed, and it would be of material assistance in dealing with this matter if the different colliery companies would show as a separate item in balance-sheets, the amounts they have to pay in respect of local rates and imperial taxes. One or two companies already do this; and thus furnish evidence of how far rates and taxes unite with ever-increasing wage charges to hamper enterprise.

The Ocean Coal Company are extending their operations to Carmarthen county, being in negotiation to acquire the anthracite collieries of the Ammanford Company, who have about 1,300 employees, with an output of over 350,000 tons per annum. The output of the Ocean pits in Glamorgan is between 2,500,000 and 3,000,000 tons. The present capital exceeds 4½ millions sterling.

Tenby Town Council has purchased 200 tons of house coal to retail during the winter to residents who are unable to lay in stocks at the present time.

Northumberland and Durham.

Tyne Improvement Commission's Report—Evading the Coal Controller's Order—Coal Workers for the Harvest—Government Commissioner to Visit Teesdale.

New magistrates just appointed for Darlington include Mr. T. W. Marley, secretary of the Horden Collieries Limited, and secretary and director of the North Brancepeth Coal Company Limited.

It is announced that a Government Commissioner is to visit Teesdale at an early date to make enquiry about the mineral wealth of the dale.

A notice has been posted on Newcastle Commercial Exchange intimating that the Coal Controller states that the regulations as to bunker coal in the recent Order apply to coasting steamers.

The following have been elected as members of the executive committee of the Durham Miners' Association: Fenwick Bell (Hebburn), Francis Quinn (Wheatley Hill), James Gilliland (Ouston E pit, Birtley), Martin Eddy (Browney), Peter Clark (South Moor), and Edward Stoker (High Spen).

Mr. Gray Batty, who has resigned his position as master shifter at Wallsend Rising Sun Colliery in order to take up another appointment, has been presented by the officials and workmen at the colliery with a gold signet ring, a silver-mounted walking stick, a pipe, and a snuff-box.

At last week's meeting of the Durham County War Agricultural Executive Committee, a letter was read from Mr. Reginald Guthrie, secretary of the Durham Coal Owners' Association, stating that the owners were willing to assist the committee as far as possible by giving facilities for relays of workmen for harvesting purposes when not required for the output of coal.

Mr. William Armin, secretary of the Kimblesworth lodge of the Durham Miners' Association, has collected £106 for the purpose of making a presentation to each member of the rescue party which extricated John Rowell, deputy, from under a fall of stone at Kimblesworth Colliery on April 22 last; £50 of the amount has been received from the Carnegie Hero Trust Fund. The presentation is to take place on Saturday, July 28, when a gold watch will be given to each of the rescuers.

Charged at Durham City with having unlawfully withheld £10 8s. 8d., the moneys of the trustees of the Durham Cokemen's Association, of which he was secretary at Teams lodge, John William Johnson pleaded guilty, and, the association not desiring to press the charge unduly, was fined £1; his offer to repay the money in instalments of 5s. per week was accepted.

To-morrow (Saturday) there will be a further meeting of representatives of the Northumberland Miners' Association and of the coal owners in Newcastle, to consider the question of allocation of trade in the county. Some collieries are working better than others, and the idea is to spread the available trade over as many pits as possible.

The dulness of the prompt coal market at Newcastle has resulted in a state of affairs of somewhat dubious legality. Certain second-hand holders of coal, who made their contracts before the advent of the new Order regulating prices, are offering supplies at discounts on the minimum figures authorised by the Coal Controller. By so doing, they are obviously breaking the spirit of the Order; the question is whether they are not infringing the letter also. The argument they advance as to their right to act as they are doing is that the Order was promulgated "with a view to dealing with fluctuations in colliery prices," and that, as these coals have already passed from the colliery to themselves, they are entitled to sell them at whatever prices they choose. Of course, collieries always have been subject to the "bearing" influence of second-hand holders, but to exert that influence now is to do that which is certainly impolitic, and may bring the sellers within reach of the law, for, whilst the Board of Trade announcement did undoubtedly speak of "colliery prices," the detailed text of the scheme was very definite in stating that "prices are net, and no discount, rebate, or allowances of any kind, either in money, credit, or otherwise is to be given to any buyer." The next clause of the Order recognises the existence and regulates the conduct of "exporters, whether coal owners or merchants," and it would seem, therefore, that those who argue that the second-hand holders have no right to cut prices below the scheduled minimum figures have a very strong case.

A report presented to the Tyne Improvement Commissioners' meeting at Newcastle a week ago, showed that during June 865,715 tons of coal as cargo, 69,400 tons as bunkers, and 40,372 tons of coke were shipped from the river, decreases of 171,708 tons, 42,536 tons, and 52,353 tons respectively when compared with the shipments in June last year. During the half-year, the shipments were 4,744,937 tons, 486,378 tons, and 296,120 tons respectively, decreases of 919,699 tons, 190,501 tons, and 120,145 tons respectively when compared with the corresponding period of 1916. The question was raised at the meeting as to the advisability of the all-round operation of the new increase in dues, etc., by one-third. It was pointed out that the bridge dues were raised by one-third 12 months ago, and were now being raised by another third. Such an increase might defeat the end of raising revenue, for there was no longer any advantage to a number of collieries in shipping coal above bridges, and a premium was being put on the shipment of coals at private staiths in the river. Ald. Readhead pointed out that the increase only amounted to 1d. or 1½d. per ton, and that no complaints had been received from any associations interested. Mr. Scholefield (chairman of the Finance Committee) said that, if they started differentiating, they would land themselves in trouble. They needed revenue, and felt it better to stick to a uniform increase, even although it might strike at some interests.

The question whether the trustees under the will of George John Scurfield, deceased, of Hurworth, had power to lease unopened mines, and, if so, how the income was to be apportioned, was the principal point involved in the case of Slingsby and another v. Scurfield and others, heard by the Chancellor (Mr. Tindal Atkinson) at Durham Chancery Court last Saturday. For the trustees, it was stated that the original executors of the will were Sir George Willis and Miss Scurfield. The latter died, and the former wishing to be clear, Messrs. Slingsby and Clark, the present executors, were appointed. Part of the property left was the Crindon estate, near Hartlepool, where there was known to be coal in unopened mines. Mrs. Scurfield was anxious that the mines should be worked, and a lease was arranged with the Horden Collieries Limited and the trustees of the mine. For Mrs. Scurfield, it was contended that if the Chancellor held that the trustees could make a lease under the power contained in the will, there was little doubt that Mrs. Scurfield, as tenant for life, was entitled to the entire rents and royalties. If, however, on the other hand, the trustees had not that power, the only course would be for the tenant for life to make the lease under the Settled Lands Act, under which she would enjoy a quarter of the income, and three-quarters would be capitalised. She claimed that the trustees had power to make a lease on the Crindon royalties, but the second tenant for life, Maj. Williamson, submitted that the trustees had no such power. The Chancellor decided that the trustees had the power to grant leases in respect of unopened mines, with the result that the tenant for life was entitled to the rents and royalties as part of her life interest in the estate.

Cleveland.

The recent blowing out of a hæmatite blastfurnace at Middlesbrough reduces the number of furnaces in operation on the north-east coast to 77, of which 35 are pro-

ducing Cleveland pig, 28 are making hæmatite, and 11 are manufacturing special kinds of iron. Several of the furnaces are quite ready for lighting when labour and fuel are forthcoming, and one is to be started immediately at the Clay Lane Works of Messrs. Bolekow, Vaughan and Co. company. That firm have made application for an order for supply of 2,000 tons of Cleveland ironstone.

Cumberland.

The Gillhead Colliery and Brick Works, near Flimby, have been acquired by the Workington Iron and Steel Company, as and from April 1. The colliery yields fire clay and coal.

The annual meeting of the Cumberland Coal Conciliation Board was held at Workington on Friday of last week. Mr. R. Steel, of Whitehaven, was appointed president for the year; Mr. J. Dickinson, Aspatria, vice-president; and Messrs. T. P. Martin and Thos. Cape were re-appointed joint secretaries. Names were submitted for the neutral chairmanship, but the Board could not agree, and the matter is to be considered further at an early date. Mr. Courtenay Hodgson, Carlisle, was re-appointed neutral vice-chairman.

At the same meeting, Mr. Andrew Sharp, of Maryport, the former general secretary of the Cumberland Miners' Association, was presented with his portrait in oils (painted by Mr. Kenworthy, of St. Bees) as a recognition by the coal owners and coal miners of the valued services he rendered to the coal trade of the district for 42 years, and as joint secretary of the Cumberland Conciliation Board from its formation until 1916, when he retired.

Lancashire and Cheshire.

The opening of the new mines at Mosses, J. Speakman and Sons' Woodend Collieries, Bedford Leigh, is being pushed forward as expeditiously as the present state of the labour market will permit.

Housing schemes are under contemplation by the local authorities in the Walkden, Little Hulton, Tyldesley, and Atherton coal mining districts of South Lancashire.

Although large numbers of miners have lately been "combed out" of collieries in South and South-East Lancashire, there are actually more men now employed in many pits in Manchester, Bolton, and Leigh areas than there were in pre-war days.

The Maskell Peace Memorial Scholarship in Mining, which is of the value of £52 per annum, and is tenable for two years at the Wigan and District Mining and Technical College, has been awarded to Mr. J. H. Armitstead, of Hindley, near Wigan, a former pupil of the Hindley and Abram Grammar School.

Owing to depletion of staffs through the operations of the Military Service Acts, there is now a great dearth of male clerks at many collieries in South and South-West Lancashire.

Notts and Derbyshire.

At the Langwith Institute on Saturday last, Mr. T. H. Elliott, manager at the Langwith Colliery, was presented by the officials and workmen with £100 and a gold wrist watch on the occasion of his leaving Langwith to become manager and agent at the Blackwell (A and B Winning) Collieries and By-product Works.

Mr. C. R. Morgan has been appointed London agent for the Sheepbridge Coal and Iron Company, in succession to the late Mr. Geo. J. Wood.

In a prosecution by the Staveley Coal and Iron Company at Chesterfield, against three Staveley boys, for damaging electric insulators to the amount of £4 10s., it was stated that nine insulators were broken, causing a stoppage for 50 minutes at two of the company's pits. Since the commencement of the war the company had suffered £293 damage through broken insulators. Patrols had been instituted, and other measures taken to stop the evil, but without success. Defendants were ordered to pay £1 15s. 6d. each, and warning was given that older offenders would be sent to gaol.

Mr. Maurice Deacon, M.I.C.E., managing director of the Sheepbridge Coal and Iron Company Limited, has accepted the honorary position of technical adviser to the British Government in association with the French Ministry of Mines with regard to the recovery of the French collieries which have been destroyed by the Germans in the Lens coal field.

The Midlands.

The Government scheme for railway traffic economising in the distribution of coal is regarded in South Staffordshire as a sensible development, but beyond their broader aspects the Controller's proposals are only imperfectly known, and a good many knotty points remain to be threshed out. The district of which Birmingham is the centre produces considerably more coal than it consumes. Probably a third of its output is available for those parts of the country which are without collieries. Hitherto the surplus has gone south and west. London, of course, receives appreciable supplies from Warwickshire and Staffordshire. On the other hand, this district is by no means self-sufficing, and has to import gas coal from Derbyshire and South Yorkshire, anthracite and other steam coal from Wales. The South Staffordshire and Warwickshire districts produce no equivalent of these. It is expected that the scheme will help materially to relieve present difficulties connected with the shortage of railway trucks, and the consequent intermittent working of pits. The trucks owned in this area should be more than ample for the distribution of locally raised coal on the radius principle.

The Lord Mayor of Birmingham, at the Coal Controller's request, has appointed a committee to consider the question of the probable shortage of house coal during the coming winter. Enquiries are being made as to the requirements of the city, the supplies that are likely to be available, and the best means of making up the difference between the available supplies and the demand not likely to be met by ordinary business methods.

Kent.

Tilmanstone Colliery output improved last week, and is again approaching the 3,000 tons level, the quantity brought to bank for the week being 2,830 tons. Snowdown Colliery is also raising nearly 3,000 tons weekly.

Sir Hugh Bell, the prominent ironmaster and colliery owner, speaking at a recent meeting in connection with the Kent Colliery amalgamation, expressed the opinion that there is the prospect of a very important metallurgical development in Kent. He described the Kent coal field as very interesting, but not very extensive as coal fields, but pointed out that it was the only one in England where development was still in the purely initial stages. If the views of himself and colleagues as to the ironstone deposits were correct, then there was to be superadded to the coal development a great ironstone industry in Kent. Sir Hugh reminded his hearers that at one time the great

source of iron in England had been the county of Sussex. The law no reason why that industry, which ended in the reign of Queen Anne, should not be revived.

Scotland.

Coal Shipments—Development of Scotch Resources—Effect of New Distribution Order.

Two pits belonging to Messrs. John Nimmo & Co., Rosebank Colliery, Fifeshire, were closed down. The displacing sale took place on Friday last, when fairly good prices were obtained for the various classes of colliery plant. The dismantling of the two pits has removed any lingering hope that existed that they might be re-opened in the near future.

The new scheme which the Coal Controller has issued for the supply and distribution affects Scotland, roughly speaking, as follows: Lanarkshire coal will be used only on the Clyde and in Argyllshire; Ayrshire coal in all the country bearing west of a line drawn between Ayr and Gteta; Lothian coal will be available mainly for the Lothians; while Fifeshire fuel is reserved for Perthshire, Fifeshire, Forfarshire, and the North of Scotland. The expectation is that Clydesdale and the Lothians will consume more coal than can be produced in these counties, and the surplus from Ayrshire and Fifeshire will be available for Lanarkshire (including Glasgow) and the Lothians respectively.

In the Hamilton Sheriff Court Robert Pritchard, colliery fireman, Hamilton, was charged with having on June 14 in No. 1 pit, Blantyre Colliery, High Blantyre, retained in his possession three detonators, which he should have returned at the end of his shift. He admitted the offence, and was fined 20s. with the alternative of fourteen days' imprisonment.

At a representative meeting of those interested in the lead mining industry in Scotland, attention was called to the fact that the Ministry of Munitions had started a department for the development of the mineral resources of the country, and were making a special survey of lead resources. It was thought the time was opportune for calling the attention of the Minister of Munitions to the unleased and undeveloped lead mines in the Leadhills area, which was considered one of the richest metalliferous areas in Britain.

Yet another change of management has taken place in Fife collieries. Mr. Spence, of Moss-side, it is reported, takes over the management of Keltie and Lassodie Collieries, while Mr. McDonald, of Blairadam, takes over Moss-side.

The shipment of coal from Burntisland for the last week amounted to 9,160 tons, being an increase on the preceding week of over 2,800 tons.

On the occasion of his leaving Bowhill, Mr. N. A. Wilkie, J.P., was presented with a silver salver and a cheque, subscribed for by the workmen of the various collieries formerly under his charge. Mr. Wilkie has been agent of the group of collieries belonging to the Fife Coal Company for over seven years, and is leaving to take up the duties of general manager to the Townhill Collieries (Dunfermline).

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Brightside Foundry and Engineering Company Limited.

The directors, in a circular issued to shareholders, state that owing to the uncertainty of the demands that may be made upon the company under the provisions of the Finance and the Munitions of War Acts for excess profits, it will not be possible for them to present a report and balance-sheet for the year ended June 30 last. They are, however, satisfied that sufficient profit has been made to justify the declaration of a dividend of 10 per cent. and a bonus of 5 per cent., free of income tax. The report for the year ended June 30, 1916, states that the profit amounted to £17,817, which with £2,855 brought forward makes £20,672. After deducting interim dividends, there is left for disposal £18,422. At a general meeting on August 17, 1916, there was declared a dividend of 10 per cent., free of tax, on 40,000 £1 ordinary shares, and a bonus of 2½ per cent., free of tax. The directors propose to reserve towards special depreciation and extensions £6,000, to place to reserve account £5,000, and to carry forward £2,422.

Ebbw Vale Steel, Iron and Coal Company Limited.

The report for the year ended March 31 last states that the whole of the operations of the company are now controlled by the Government. The development of the iron ore bearing lands in Northamptonshire has progressed satisfactorily, and it is expected that this property will become productive during the current financial year. The application to the Treasury for permission to issue £600,000 ordinary share capital resulted in authority being given for £250,000 only, ordinary shares to this amount being duly issued, at a premium, in August 1916, and it will be necessary for a further issue of shares to be made when the Treasury permit. The total expenditure for property purchased and upon new work after depreciation amounted to £259,893, which has been added to the property account. The gross profits for the year, after provision for income tax, excess profits duty, and depreciation, amount to £299,489, which with £29,227 brought forward, makes £328,716. After deducting general and legal expenses, £9,340; interest on debentures, £22,500; interest on special loans, £36,071; war allowances, £32,307, there is an available balance of £228,499. For expenditure on new works there has been provided £13,778, and after deducting interim dividend on preference shares already paid, there is left £202,721. A dividend on the ordinary shares at the rate of 15 per cent. for the year is proposed, £50,000 placed to reserve, leaving £13,221 to be carried forward.

Gloucester Railway Carriage and Wagon Company Limited.

The report for the year ended May 31 states that the profit on trading is £69,856, and the disposable balance, after deducting the interim dividend paid February 1 last, amounts to £100,566. It is proposed to transfer £10,000 to reserve, and to pay a dividend for the past half-year at the rate of 10 per cent. per annum, less income tax, making 10 per cent. for the year, and a bonus of 7s. 6d. for each class "A" share and 3s. 10d. for each class "B" share, free of income tax, carrying forward £51,902.

Knowles (Andrew) and Sons Limited.

An interim dividend for the half-year at the rate of 3 per cent. (6 per cent. per annum) has been declared. The distribution on the £1 shares will be 5-76d. per share. Last year's dividend was at the rate of 4 per cent.

North British Steel Company Limited.

The report for the year ended March 31 last states that after making allowances for depreciation and munitions levy, and excess profits duty, the profit is £19,303, which with £22,581 makes £41,884. After deducting divi-

dends already paid, there is left £40,884. The directors propose, after providing £2,605 for directors' and auditors' fees, to carry forward the balance of £38,279. In view of the commitments of the company in connection with the works extensions, munitions levy, etc., it is proposed that no further dividend be paid on the ordinary shares, but that after providing £2,605 for directors' and auditors' fees, the balance of £38,279 should be carried forward.

Lancashire Power Construction Company Limited.—The report for the year ended March 31 last states that the trading profit amounted to £38,710, to which has to be added interest on hire purchase plants, etc., amounting to £1,129, making a total of £39,839, compared with £32,843 for 1915. The balance brought forward from 1915 was £2,064, making the amount available for division £41,903. A dividend of 3 per cent. is proposed, carrying forward £7,703.

Mather and Platt Limited.—The directors have declared an interim dividend on the ordinary shares of 5 per cent. (less income tax) for the half-year ended June 30, being at the rate of 10 per cent. per annum.

Mond Nickel Company Limited.—The report for the year ended April 30 last shows a balance to the credit of profit and loss account of £410,198. The directors propose a final dividend on the ordinary shares at 15 per cent per annum, less tax, to place to reserve account £50,000, and to carry forward £111,598.

Newport-Abercarn (Black Vein) Steam Coal Company Limited.—The report for the year ended March 31 last states that the net profit, after deduction of debenture interest and making provision for excess profits duty, was £60,331, which with £15,138 brought forward, makes £75,469. A dividend of 20 per cent. on the ordinary shares (free of income tax) is proposed, carrying forward £49,594.

NEW COMPANIES.

Air Turbines Limited.—Private company. Registered office, 38, Victoria-street, Westminster, S.W. Registered July 10. To carry on the businesses of iron foundries, mechanical engineers, etc. Capital, £1,000 in 10,000 2s. shares. Directors to be appointed by the subscribers. Subscribers: R. Keedwell and G. D. T. Stebbing.

British Sintering Company Limited.—Private company. Registered July 9. To carry on the trades or businesses of iron masters, colliery proprietors, etc. Capital, £5,000 in 5,000 £1 shares. Directors to be appointed by the subscribers. Subscribers: F. C. Heley and F. G. R. Garman.

Briton Ferry Coal and Metals Company Limited.—Private company. Registered July 10. Nature of business indicated by title. Capital, £1,000. Subscribers: J. Perrett and W. F. Thomas.

Deutsch and Brenner Limited.—Private company. Registered office, 44, Harford-street, Birmingham. Registered July 13. To purchase, acquire, and take over as a going concern, and to carry on the trade or business of metal merchants and manufacturers of re-melted spelter, ingot and bar lead, etc. Capital, £20,000. Directors: A. Brenner, S. Brenner, and O. Deutsch.

Du Croo and Brauns Limited.—Private company. Registered office, 53, Victoria-street, London, S.W. Registered July 10. To carry on the business or businesses of constructional, manufacturing, and general engineers, etc. Capital, £10,000. Directors to be appointed by the subscribers. Subscribers: E. J. Q. Maggs, R. H. Whittle, J. Fowler, and Ethel H. Buckoke.

Guest and Chimes Limited.—Private company. Registered July 14. To carry on the businesses of brass foundries, iron foundries, engineers, etc. Capital, £150,000. Director, F. M. Watson, Foundry and Brass Works, Rotherham, brass founder.

Herbert (Alfred) (Russia) Limited.—Private company. Registered July 10. To carry on in Russia or elsewhere on the Continent the business of buying, selling, manufacturing, repairing, letting on hire, and dealing in machinery, machine tools, etc. Capital, £25,000. Director, A. Herbert, Dunley Manor, Whitchurch, Hants, chairman of Alfred Herbert Limited, Coventry.

Motor Gear and Engineering Company Limited.—Private company. Registered office, 75, Curtain-road, London, E.C. Registered July 10. Nature of business indicated by title. Capital, £5,000. Directors: F. J. Gordon and A. S. F. Morris.

Powerite Steam Jointing Company Limited.—Private company. Registered office, The Wier Factory, Rayleigh, Essex. Registered July 13. Nature of business indicated by title. Nominal capital, £1,000 in 950 £1 "A" shares and 1,000 1s. "B" shares. Directors to be appointed by the subscribers. Subscribers: W. H. M. Randall and L. B. Hay.

Slack and Parr Limited.—Private company. Registered office, Sidelcy-road, Kegworth, Leicestershire. Registered July 12. To carry on the businesses of mechanical, electrical, and general engineers, etc. Capital, £1,000. Directors: H. S. Slack, H. B. Parr, and D. J. Bedford.

United Ores Limited.—Private company. Registered office, 224, Corn Exchange Buildings, Cathedral-street, Manchester, Lancashire. Registered July 10. To carry on the trades or businesses of iron masters, steel makers, etc. Capital, £5,000. Directors: H. H. Williamson, 61, Ennismore-gardens, London; H. Berchall, Hazel Hurst, Wolstanton, Staffordshire; G. P. Rawstron, 25, Grove Park, Liverpool.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

Exports and Imports of Mining Machinery.—The value of imports and exports of mining machinery during June is given below:—

	June.		Jan.-June.	
	1916.	1917.	1916.	1917.
Imports	£ 10,646	£ 10,020	£ 59,169	£ 87,515
Exports	£ 51,671	£ 22,464	£ 308,945	£ 356,620

These figures are not inclusive of prime movers or electrical machinery. The following shows the value of exports of prime movers other than electrical:—

	June.		Jan.-June.	
	1916.	1917.	1916.	1917.
All prime movers (except electrical) ..	£ 368,086	£ 265,837	£ 1,151,522	£ 1,898,855
Rail locomotives	£ 59,209	£ 108,616	£ 586,598	£ 742,159
Pumping	£ 59,171	£ 38,039	£ 270,509	£ 224,859
Winding	£ 2,013	£ 479	£ 6,174	£ 5,302

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST White pages.

ATHLONE, JULY 25.—The Urban District Council of Athlone invite tenders for the supply of about 1,500 tons of best gas coal, delivered and stored at their works at Athlone in good and dry condition in such quantities as may be required during the period of one year from the date of contract. The lowest or any tender not necessarily accepted. Tenders should reach the clerk, Town Hall, Athlone, by July 25.

BLACKBURN, AUGUST 4.—The Electricity Committee is prepared to receive tenders for the supply and delivery of steam coal for the twelve months ending August 31, 1918. Specifications and forms of tender may be obtained on application at the Electricity Works, Jubilee-street, on and after Saturday, July 21, 1917. Sealed tenders, endorsed "Steam coal" and addressed to the Chairman of the Electricity Committee, will be received at the Town Hall up to mid-day Saturday, August 4, 1917.

FOLKESTONE, JULY 30.—The Folkestone Corporation invite tenders for the supply of 500-1,000 tons of coal, to be delivered to Folkestone Junction Station before December 31, 1917. Tenders to be sent to the Town Clerk, at the Town Clerk's Office, Folkestone.

KEIGHLEY, AUGUST 3.—The Electricity Committee are open to receive prices for the supply of best slack and small slack of good quality, free from dirt, the best slack to be about 1½ in., and the small slack from ½ in. to ¾ in. The total contract will be for about 12,000 tons, which will be split up between several collieries, and prices are to be submitted based on a six-monthly or twelve-monthly period. It is proposed to try sample trucks of the coal offered. The latest date for receiving offers and prices will be August 3. It is proposed to commence the new contracts about the middle of September. Any further particulars may be obtained on written application to the borough electrical engineer and tramways manager, Power Station, Coney-lane, Keighley.

OLDHAM, JULY 17.—The Gas Works Committee invite tenders for the supply of about 20,000 tons of gas coals, commencing as early as possible, and the whole quantity to be delivered by June 30, 1918. Conditions and forms of tender may be obtained on application to Mr. Isaac H. Massey, Gas Offices, Oldham, to whom tenders are to be delivered not later than Tuesday, July 17.

WARRINGTON, AUGUST 14.—The Electricity and Tramways Committee invite tenders either for part or the whole of 7,500 tons of slack, to be delivered at the Electricity Works, Howley, Warrington, during six months commencing September 10, 1917, to be delivered in accordance with the conditions of specification, copies of which can be obtained from F. V. L. Mathias, borough electrical and tramways engineer, Howley, Warrington, on payment of one guinea, which will be returned on receipt of a *bona-fide* tender. In the alternative the Committee invite tenders either for part or the whole of 15,000 tons of slack, to be delivered during the 12 months commencing September 10, 1917. Tenders, addressed to the "Chairman of the Electricity and Tramways Committee, Town Hall, Warrington," must be sealed with wax, and endorsed, "Tender for slack," and delivered not later than 12 o'clock noon, on Tuesday, August 14, 1917. The lowest or any tender will not necessarily be accepted.

Abstracts of Contracts Open.

ASHFORD.—400 tons of kitchen coal. Quotations to Messrs Frank Davis and Company, timber merchants, Ashford.

ASHTON-UNDER-LYNE.—Coal for Corporation. Tenders (local merchants) to Borough treasurer, Town Hall.

BALLINROBE, JULY 23.—60 tons of best Wigan or Whitehaven coal for the Guardians. Tenders to the clerk, Board Room.

BRENTFORD, JULY 23.—600 tons of steam coal for the Guardians. Tenders to the clerk.

BRIDLINGTON, JULY 27.—100 tons South Yorkshire coal for the Guardians, delivered at Union Institution. Tenders to the clerk to the Guardians, Union Offices, Longham, Bridlington.

BRISTOL, JULY 26.—23,000 tons of unwashed small coal for its Electrical Committee. Tenders to the chief engineer, Electricity Department, The Exchange, Bristol.

EDINBURGH, JULY 23.—Coal for the Governors of George Heriot's Trust. Forms from Mr. P. Macnaughton, Heriot Trust Offices, 20, York-place, Edinburgh.

GREENWICH, JULY 26.—300 tons of house coal, 50 tons of steam, 300 tons of anthracite, 100 tons of house coal, 100 tons of steam. Forms from the Guardians' offices, Board Room, East Greenwich.

JARBAG, JULY 24.—Coal for the Education Committee. Forms from the secretary, Education Offices, Town Hall.

LONDON, E., JULY 24.—100 tons of steam coal. Forms from the clerk to the managers, Clerk's Office, Sick Asylum, Devons-road, E. 3.

LONDON, E., JULY 25.—600 tons of house coal for the Poplar Guardians. Tenders from clerk, Guardians' Office, 45, Upper North-street, Poplar, E. 14.

LONDON, E., JULY 26.—Coal for the Guardians. Forms from the Guardians' Offices, Barnes-street, Stepney, London, E. 14.

LONDON, N.W., JULY 23.—Coal for the St. Pancras Borough Council. Forms from town clerk, Town Hall, Pancras-road, N.W. 1.

MANCHESTER, JULY 23.—Coal for the Guardians. Forms from the clerk, Union Offices, All Saints'.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport, Isle of Wight.

RATHMINES, JULY 24.—100 tons of Wigan coal for the Rathmines and Rathgar U.D. Council. Tenders to the Chairman, Town Hall.

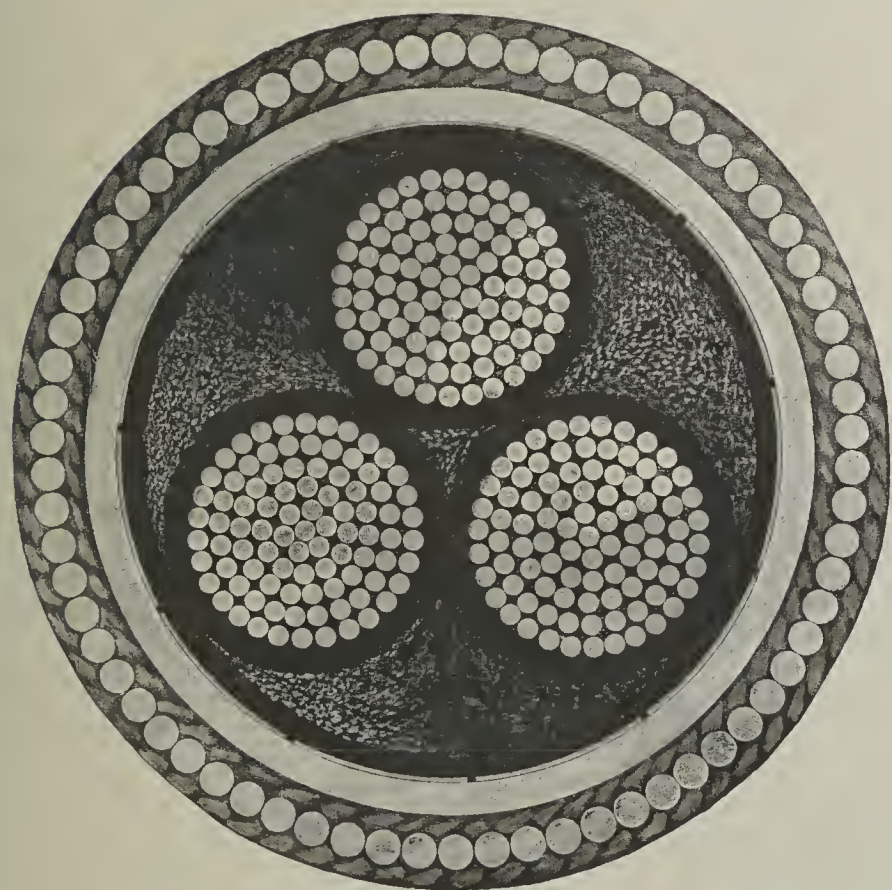
STAFFORD, JULY 26.—Coal (twelve months) for the Staffordshire Education Committee. Forms from director of education, County Education Offices.

WIGAN, JULY 25.—Coal (twelve months) for the Corporation. Tenders to town clerk.

The date given is the latest upon which tenders can be received.

The estate of the late Mr. J. Roberts, J.P., formerly manager for Messrs. Cory, Yeo and Company, and for Sir J. T. D. Llewellyn's mining properties, has been valued at £10,780.

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15, South Saint David Street, Edinburgh.
30, Mosley Street, Newcastle-upon-Tyne.
247/9, Deansgate, Manchester.
91, Whitechapel, Liverpool.

165/7, Edmund Street, Birmingham.
88, Albion Street, Leeds.
56, Victoria Street, Bristol.
20, West Bute Street, Cardiff.

THE FREIGHT MARKET.

Outward freight market the scarcity of shipping is exceptionally severe, even for a period in which there have been so very short, and the result is that little chartering to report. On the north-western coast the number of fixtures of coke tonnage from Atlantic ports shows quite a material falling off. For other directions very little has been done. (Gibraltar has been fixed for at 85s., Valencia at 175s., and Gothenburg (twice) at 190 kr. These are the only long-distance items mentioned. The coasting market is somewhat stronger, at 16s. to London. Orders for all directions are very numerous, and high rates—e.g., 85s. to Lisbon, 95s. to Oporto, and 150s. to Barcelona—continue to be quoted. At South Wales, the tone of the market is firm all round, with a considerable difficulty in getting boats nullifying the briskness of the demand. The only unrestricted directions for which charters have been arranged are Barcelona, from Cardiff, at 220s.; Bilbao, from Newport, at 120s.; and Dublin, from Swansea, at 18s. From the Mersey, a 3,500-ton vessel has been taken up for Lisbon at 90s.

Homewards, there is no change in the position of the River Plate, the market continuing dull, and based on 145s. from up-river and 110s. from down-river ports to the United Kingdom. At the United States, coal freights are still based on 125s. from Virginia to Buenos Ayres, with Rio discharge at about 30 dols. On net form, Northern Range to France is quoted at 200s., with 180s. for United Kingdom discharge. On heavy grain basis, 35s. is quoted for Gulf-Mediterranean, 32s. for Gulf-France, 30s. for Northern Range-France, and 32s. for Northern Range-West Italy. At the Far East, rates are generally well maintained. Kurrachee to United Kingdom is quoted at 250s., with Bombay to United Kingdom steady at 320s., and 425s. quoted for West Italian discharge. Calcutta to Genoa with jute is unaltered at 285s. Madras Coast to Marseilles with kernels is still transactable at 500s. The rice ports are enquiring for a good deal of tonnage for Mediterranean discharge, and are offering fully late rates. Mediterranean ore and phosphate ports have a brisk demand for cargo space, and are offering very high figures.

Tyne to Boulogne, 900, 45s., coke; 450, 45s., coke, three voyages; Calais or Dunkirk, 500 and 350, 45s., coke; Calais or Boulogne, 500, 45s., coke; 240, 50s., coke; Dieppe, 800, 46s., coke; Gibraltar, 1,500, 85s.; Gothenburg, 1,250 and 2,200, 190 kr.; London, 850, 16s.; North French Range, 400, 45s., coke, voyages; 500, 350, and 1,000, 45s., coke; 240, 50s., coke; and Valencia, 4,000, 175s.

Cardiff to Barcelona, 3,200, 220s.; Cherbourg, 220 and 200, 120s., sail; Caen, 300, 120s., sail, several voyages; 600 and 550, 47s. 6d., neutral; 700, 48s., neutral; Dieppe, 900, 24s. 6d.; 120, private terms; 950, 24s. 6d.; Ilonfleuer, 250 and 220, 120s., sail, several voyages; Oran, 4,200, private terms; and Rouen, 1,500, 74s. 3d., coke, neutral; and 1,800, 48s. 9d., neutral.

Newport to Bilbao, 2,500, 120s.

Swansea to Caen, 500 and 900, 48s., neutral; and Dublin, 400, 18s.

Mersey to Lisbon, 3,500, 90s., neutral, July; and Dieppe, 250, 120s., sail.

PUBLICATIONS RECEIVED.

"Kelly's Directory of the Engineers, Iron and Metal, and Electrical Trades, 1917" (Kelly's Directories Limited, London), price 36s.; University of Manchester: "Prospectus of University Courses in the Municipal School of Technology, Manchester, Session 1917-18"; Chicago Pneumatic Tool Company (Bulletin 34-Y), "Gas- and Gasoline-Driven Air Compressors"; "Compressed Air Magazine" (Vol. 22, No. 6), June 1917, price 10c.; "The Mining Magazine" (Vol. 17, No. 1), July 1917, price 1s.; "Journal of the Western Society of Engineers" (Vol. 22, No. 1), January 1917, price 50c. per number; "The Journal of State Medicine" (Vol. 25, No. 7), price 2s. net; "Symons's Meteorological Magazine" (Vol. 52, No. 618), July 1917 (edited by Hugh Robert Mill), price 4d.; "Transactions of the North-East Coast Institute of Engineers and Shipbuilders" (Vol. 33, part 5), July 1917 (edited by E. W. Fraser Smith, secretary), price 5s.; "Journal of the Western Society of Engineers" (Vol. 21, No. 9), November 1916, price 50c.

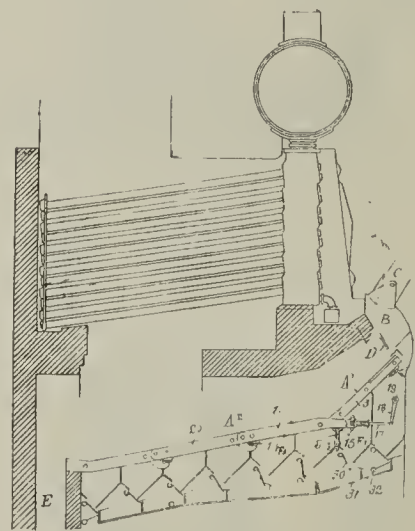
United States Department of Commerce, Bureau of Standards: (Technologic Paper No. 70), "Durability of Stucco and Plaster Construction" (Progress Report, Containing Results of Investigations up to April 1916), by R. J. Wig, J. R. Pearson, and W. E. Emley.

United States Public Health Service, Treasury Department: (Hygienic Laboratory—Bulletin No. 106), "Studies in Pellagra: I. Tissue Alteration in Malnutrition and Pellagra; II. Cultivation Experiments with the Blood and Spinal Fluid of Pellagrins; III. Further Attempts to Transmit Pellagra to Monkeys."

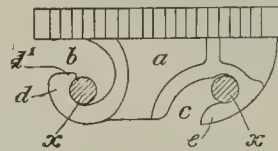
United States Bureau of Mines, Department of the Interior: (Bulletin 128), "Refining and Utilisation of Georgia Kaolins," by Ira E. Sproat; "Coal Mine Fatalities in the United States, 1916," compiled by Albert H. Fay; (Technical Paper 137), "Combustion in the Fuel Bed of Hand-Fired Furnaces," by Henry Keisinger, F. K. Ovitz, and C. E. Augustine; (Technical Paper 168), "Metal Mine Accidents in the United States During the Calendar Year 1915," compiled by Albert H. Fay; (Technical Paper 87), "Methods of Testing Natural Gas for Gasoline Content," by G. A. Burrell and G. W. Jones; (Technical Paper 138), "Suggested Safety Rules for Installing and Using Electrical Equipment in Bituminous Coal Mines," by H. H. Clark and C. M. Means; (Technical Paper 163), "Physical and Chemical Properties of Gasolines Sold Throughout the United States During the Calendar Year 1915," by W. F. Rittman and others; (Bulletin 107), "Prospecting and Mining of Copper Ore at Santa Rita, New Mexico," by D. F. Macdonald and Charles Enzian; (Bulletin 109), "Operating Details of Gas Producers," by R. H. Fernald; (Bulletin 111), "Molybdenum: Its Ores and Their Concentration, with a Discussion of Markets, Prices, and Uses," by Frederick W. Horton; (Bulletin 119), "Analyses of Coals Purchased by the Government During the Fiscal Years 1908-1915," by George S. Pope; (Bulletin 122), "The Principles and Practice of Sampling Metallic Metallurgical Materials," with Special Reference to the Sampling of Iron and Steel," by Edward Keller; (Bulletin 125), "Distillation of Petroleum," by W. F. Dean; "Monthly Statement of Coal Production in the United States, November 1916—Visible Explosives, Lamps, and Motors December 31, 1916," compiled by Albert

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

4514 (1915). *Improvements in Furnace Grates.* Société J. and A. Niclausse, 24, Rue des Ardennes, Paris.—In the figure, the grate located between the walls of the boiler beneath the tubes has above it an arch, and is divided into at least two parts. (1) A front inclined part A¹ which distributes and feeds the fuel downwards. The fuel is delivered in any suitable manner, for example, by means of a hopper B and a shoot C, a stop D being provided to regulate the depth of fuel on the bars. (2) A rear part A² which is less inclined, and which receives partially burnt fuel from the front part, combustion proceeding until at the end of the grate only sinder, clinker, and scoria remain, which are thrown into a pit E. Each part A¹ and A², as shown in the drawing is composed of a certain number of fixed bars alternating with bars which are movable to and fro. They may, however, be each formed solely of movable bars. In the front grate A¹, each fixed and each movable bar is formed of three adjacent bars 1, 2, and 3, supported at the top by a guide 4, and assembled together by projections 5 on the central bar 2, which take into corresponding recesses 6 6 in the two side bars 1 and 3. The central bar 2 has at its lower end a stem 7, which rests upon a guide 8; this stem serves in the case of a fixed bar to maintain the bars 1, 2, 3 in position, and in the case of a movable bar to impart to its foot the travel desired. As the rear grate A² is generally longer than the front grate A¹, the bars are made in suitable lengths as may be necessary. In the drawing three nearly equal lengths are shown. The first length of each bar, whether fixed or movable, forms to some extent the continuation of the front grate A¹. It is composed of three adjoining bars 9, 10, and 11 assembled together by pins 12 on the central part 10, and is supported at both ends on the guides 8 and 13. While the central bar 10 stops near to the guide 8, thus leaving an empty space 14, the two side bars 9 and 11 are prolonged (on both sides of the stem 7 on the central bar 2 of the corresponding front bar) beyond the guide 8, and are joined together by the pin 15. The side bars 9 and 11 are provided with grooves 16, in which engage the shoulders 7 of the stems 7. A to and fro movement is transmitted to the movable bars of the rear grate A² by means of a connecting rod 17 (made fast to the side bars 9 and 11 by the pin 15), the lever 18, and the rock shaft 19. The movable bars of the rear grate A² drive through the stems 7 the movable bars of the front grate A¹. The arrangement is such that the horizontal travel of the stem 7 is equal to the difference between the travel of the first length of movable bar of the rear grate A² and the length of the grooves 16 in the bars 9 and 11. The speed and the travel of the bars may be varied by varying the speed of the lever 18 and by known means the level of the lever 18. The travel of the front grate A¹ may be varied by varying its inclination, and if in place of arranging the rear grate sections in one plane and the guides 13 parallel to the guide 8, they are arranged in several planes and the guides 13 not parallel to the guide 8, the sections will be moved variably, and thus different movements for different parts of the grate can be obtained by altering the position and inclination of the guides. In order to allow different qualities of fuel to be employed under the best conditions, the grate may be regulated as to slope and its travel and the speed of the movable bars. The travel of the movable bars may be different at different portions of the grate. Thus by regulating the thickness of the layer of fuel, the grate is well adapted to burn the desired quantity of different qualities of fuel. (Six claims.)

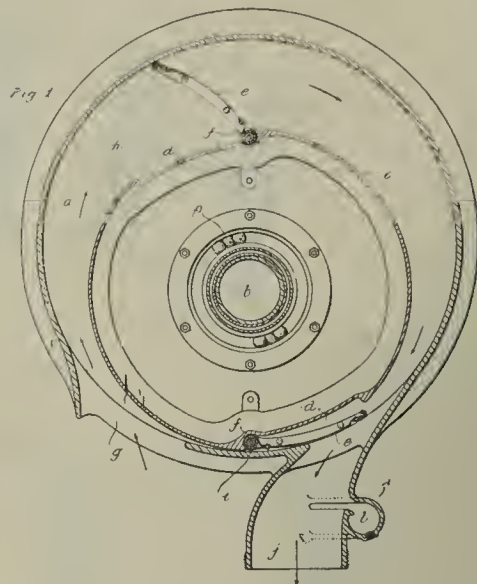


106371. *Improvements in Chain Grates for Furnaces.* J. Mallinson, 44, North Park-street, Queen's Cross, Glasgow.—This invention relates to chain grates of furnaces, and particularly to the chain grates used in the furnaces of Babcock and Wilcox and Stirling boilers. Owing to the construction of the links in the present grates, great difficulty is experienced in removing and replacing a burned or broken link, and the object of the present invention is to provide an improved construction of link which shall not only be capable of being readily fitted in position in the grate, but also of being readily removed therefrom. In the accompanying figure, the link a, which may be otherwise of usual construction, has two open slots b, c, the forward slot c being open at the bottom and curving upwardly and forwardly, whilst the back slot b is open at the top and extends downwardly and rearwardly. Usually the rods x are about 1 in. in diameter, and the slots may be 1 1/4 in. wide at the open ends and gradually diminish in width to 1 1/8 in. Owing to the shape of the slots, two hooks d, e, are formed, the hook e being adapted to pass over and engage one rod x from above and the hook d (with its heel) the other rod x from below. d' is the heel which is adapted to be forced over the rod. (Two claims.)



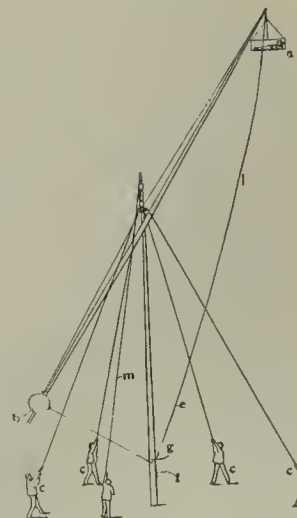
106521. *Improvements in Rotary Air Blowers.* R. F. Wells, 10a, Elystan-street, Chelsea; and H. L. Milner, West Park, Kew Gardens.—This invention relates to improvements in rotary air blowers of the type comprising a fixed cylindrical casing provided with an inlet and outlet port, and a cylindrical rotor of a smaller diameter mounted eccentrically within the casing. Fig. 1 is a sectional side elevation of a blower constructed according to this invention. The blower comprises a fixed cylindrical casing formed of two main parts a, a', a fixed central shaft b, and a drum c mounted to revolve about the said shaft. Recesses d are provided in the periphery of the rotor c, in which the blades e of the blower (preferably two in number) are freely mounted, the same being loosely pivoted at f at one of their ends to the rotor c. The other ends of the blades e are free to swing outward, upon rotation of the rotor c, varying distances to coincide with the distance between the said rotor and the casing a, thus always contacting with the inner periphery of the casing while the

apparatus is in motion. The blades e and recesses d are of such dimensions that, when the former are completely laid within the latter they practically form a continuation of the periphery of the rotor. The inlet port g is formed through the periphery of the casing a in a narrow portion of the air chamber h formed between the same and the rotor c, just to one side of the position i, in which the two contact with one another, and is positioned tangentially to the periphery of the casing. The outlet port j is



situated at the other side of the contact point i to that on which the inlet port g is arranged, and it is also tangentially arranged in relation to the casing a. As the rotor c revolves, one of the blades e passes the inlet port g, and sets up a vacuum, causing the air to flow into the chamber. This action continues until the other blade e passes the inlet port g and shuts off the air between the two blades e from the atmosphere. It will be understood that the second blade e also draws air in behind it in the same manner. Upon further rotation of the device, the first mentioned blade e passes the outlet opening j, and the air trapped between the two blades is forced out, being prevented from further following the blade by the rotor c and the casing a meeting. This blade, after passing the point of contact i reaches the inlet port g, and the same operations follow it serving to trap air behind the second mentioned blade, and to draw a further supply in behind it. (Two claims.)

106526. *Improved Long Arm for Lifting a Weight.* G. J. Money, 247, Dalston-lane, London, N.E.—This invention relates to an improved long arm or spar applicable for lifting a weight or a person to a considerable height from the ground, for signalling and look-out purposes, for fire extinguishing, for unloading vessels, and for similar purposes. The sketch shows the apparatus in perspective as provided for look-out purposes. The long arm or spar is represented as drawn up to the top of the supporting pole and tipped upward. The spar carries a cage at a, while at the opposite end a balance weight b is mounted with facility of adjustment in positions to balance or partly balance the load. c indicates the rope connected to the respective ends of the long arm or spar by means of which the end carrying the load may be lifted and lowered. e indicates the figures holding the supporting guys which are connected to a bracket or fitting at the upper end of the pole. g indicates a fastening bracket, by



means of which the arm or spar may be held in its uplifted position. f indicates a bracket, by means of which the rope m may be fastened after the long arm or spar has been raised to such a position as illustrated. The long arm or spar may carry in a central or other convenient position a bolt such as j, at the end of which an eye or loop may be formed, by which it may be suspended from the lower pulley block h. A stent wire or rope k may be passed through the eye or loop of the bolt j, and its opposite ends may be connected to the respective ends of the arm or spar. (Two claims.)

106627. *Improvements in Loading and Discharging Apparatus for Coal, etc.* J. W. Taylor and R. P. Forster, both of Spennymoor, Durham.—This invention relates to improvements in loading and discharging apparatus for coal, etc., of the type comprising a self-propelled vehicle and means for discharging the coal or the like therefrom, and while it is particularly applicable to apparatus for charging, filling and loading coke ovens, furnaces, vehicles, barges, boats, steel slag tips, pig beds, or the like, it is also capable of general application to apparatus where coal or other material is required to be discharged or loaded in an expeditious and economical manner. The diagram is a front elevation of one form of car in accordance with the invention. In carrying the invention into effect in one convenient manner, as, for example, when producing a more or less automatically operating charging apparatus for coke ovens or furnaces, a wagon or car a of suitable construction is employed to provide the necessary strength and rigidity, which are may be driven by an electric motor, to which the power is supplied in any suitable manner, as, for example, by the overhead trolley arm c or any other suitable form of prime mover may be employed for driving the car. In one convenient construction, the car is provided with a receiving hopper d or a series of such hoppers of suitable capacity and shape into which the material is fed from the storage receptacles, the receiving hopper or hoppers being either mounted in trunnions or bearings e, so that by suitable gearing such as racks f and pinions g under the control of an operator seated in a cabin on the car the hopper may be tipped, or the hopper or hoppers being provided with slides, valves, or sluices, adapted to be actuated by the operator so that the material when required to be discharged may be emptied from the (or each) receiving hopper d into a corresponding distributing hopper or chute i placed beneath it, which distributing hopper or device may, if desired, also be provided with

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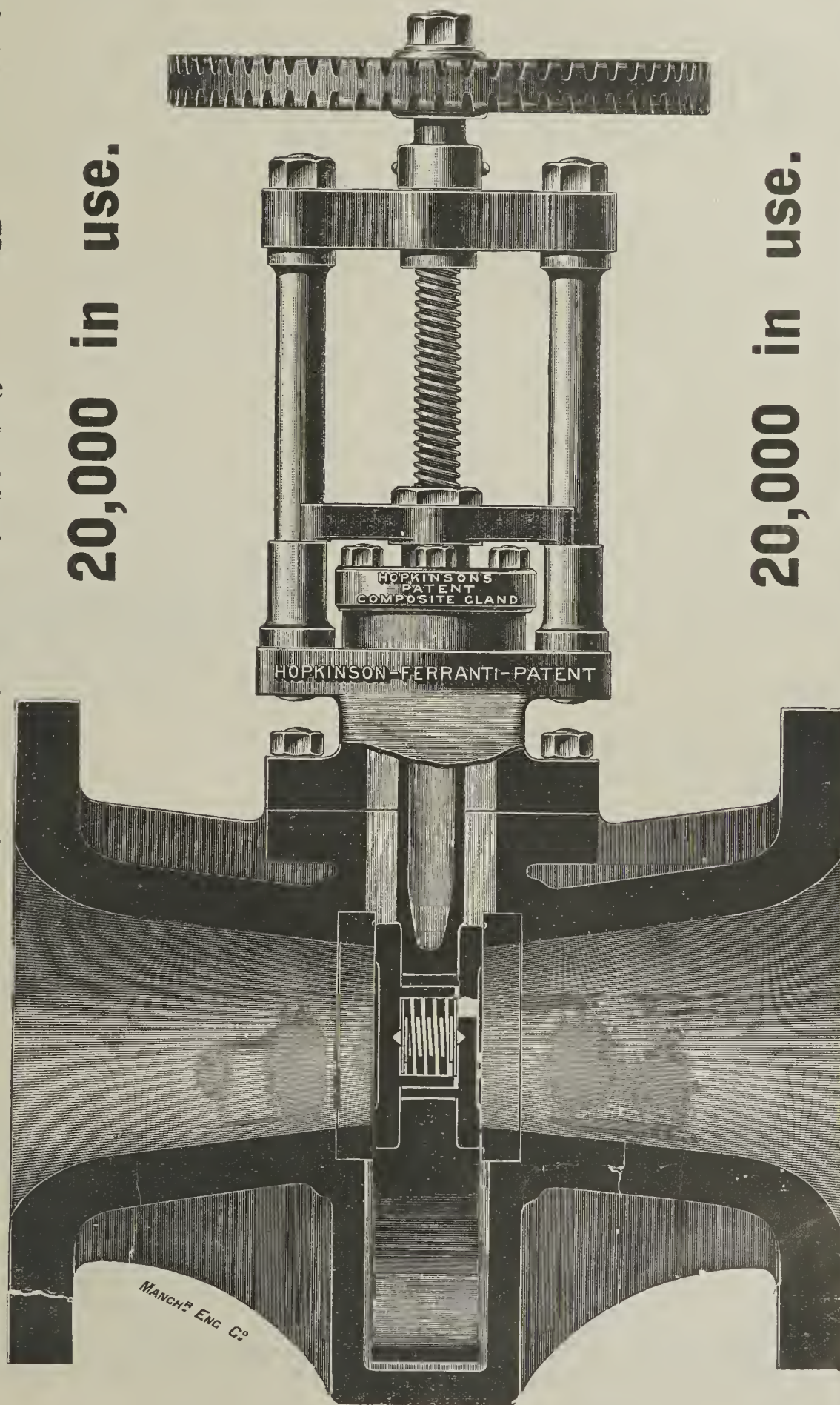
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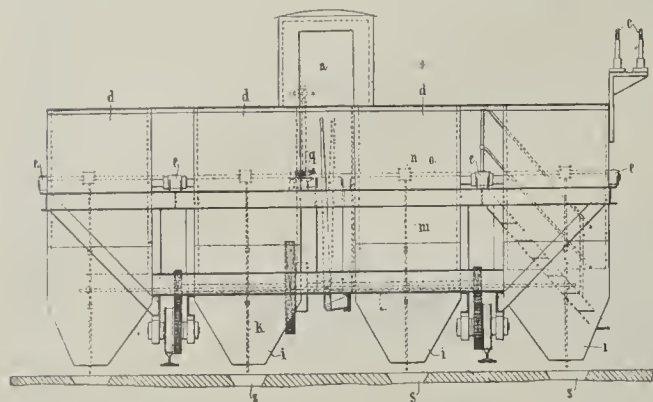
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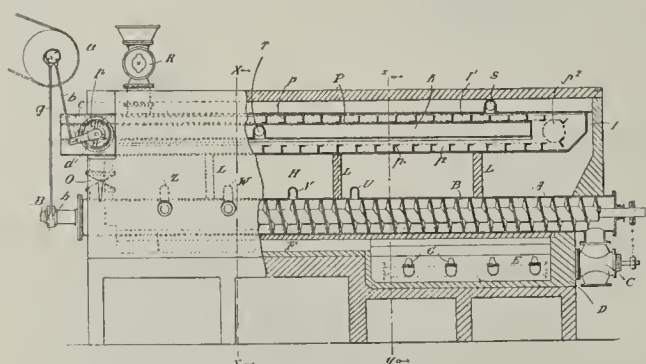
Imperial House, Kingsway, LONDON, W.C. 2; 41, Bothwell St., GLASGOW; 2, York Buildings, York Place, EDINBURGH; Royal Buildings, Park Place, CARDIFF; 7, Manchester Street, OLDHAM; PARIS and PETROGRAD.

d. or sluices for controlling the rate of discharge thereof, such as are not shown in the figure. If desired, a receiving hopper or the like *i* may be formed with a cover *h* conveyed in order to break the material, and distribute the same into the mouth of the receiving hopper or chute. The car may be provided with a cover *h* or other indicator upon which the operator may be brought to a stand in the required position, the operator by suitable contrivances upon the car is enabled to grip the cover or covers of the oven charging hole, and raise the same, retaining them suspended from the contrivances upon the car. In one convenient construction, this may be effected by providing levers *k* with hook ends pitched at the same centres as the oven charging holes, and having ropes *m* attached thereto connected with drums *n* keyed upon a suitable shaft *o* adapted to be operated by the driver with a worm *p* and worm wheel *q* or other suitable gear. When the covers have thus been raised the car is propelled by the operator by hand or power operated means, so that it is brought into a position where the outlet from the distributing hopper or chute *i* is vertically over the oven charging hole *s*, and in this position the



operator tips the receiving hopper or opens the discharging outlet therefrom (if receiving hopper is fixed) so that the material is discharged into distributing hopper or chute, from which it will discharge freely into oven charging hole and this double or multiple discharge, as it were, of the material, will entirely obviate the tendency of the latter to bind or adhere together. As soon as the discharging operation is completed the operator couples his gear in such a manner that he obtains a reverse motion for the purpose of bringing the bar back to a predetermined position from the charging hole after which he lowers the covers into position, and the car returns upon its inward journey for re-loading. Arrangements are also made for lifting the end doors of coke ovens and the like. (Six claims.)

105626. *Apparatus for Preparing Peat for Distillation.* W. L. St. J. Prioleau, 1, Trafalgar-square, Chelsea.—This invention relates to improvements in the construction of apparatus for distilling and condensing the volatile products from carbonaceous materials containing a considerable degree of moisture. To some extent the apparatus is of the type in which such carbonaceous materials are first dried and later submitted to a coking process, but in the present invention an essential feature is the collection of the volatile products at the same time, and material differences in the apparatus are necessitated thereby. The figure



is a side view partly in section showing the complete apparatus. A is one of the distillation retorts along which the carbonaceous material is slowly carried by the screw B, until it is withdrawn through the outlet valves C. The retorts are supported by brickwork D, in which are formed chambers E containing the fuel burners G, and extending from the burner chambers are flues F, which heat the earlier part of the retorts. The brickwork is continued up on the outside of the retorts so as to form the chamber H, and cross walls L are built therein which support the casings I, each of which casings is a double one, having an open centre such as K, and each of them is formed with upper and lower compartments, such as I¹, I². The chamber H is divided by the casings I and connecting blocks so as to form a partition which causes the hotter heating gases to impinge on the lower side of the casings before passing to the upper side, where they surround the compartment I¹ and the top of compartment I². A direct connection O is made between the end of the compartment I² and the front end of the retort A. Within the casings I, conveyor belts such as P are arranged, and provided with rakes or plates

p; operated by rotating pulleys such as *p*¹, they cause material fed into the casing I to be carried along the compartment I¹ and back along the compartment I² before being fed through the opening O into the retort A. By means of the well-known rotary feed valves R and delivery valves C air is prevented from entering either the drier compartments or the retorts. It will thus be seen that the material in being traversed along the inlet R to the outlet C passes through a series of continuously increasing temperatures without admission of air. To the outlets condensers will be attached, preferably operated by means of cool non-condensable gas, in accordance with the earlier patent No. 23165/14 on this subject. The movement of the belt P is obtained from the power shaft *a* by means of the eccentric rod *b*, having a pawl *c*, which intermittently rotates the ratchet wheel *d*, and thus the front belt carrier wheel *p*¹ corresponding to the carrier wheel *p*². The retort screw B is also rotated by the eccentric rod *g* with the pawl *h* operating on the ratchet wheel *j* attached to the shaft of the screw B, while the eccentric rod *k* similarly actuates the retort screw B¹. The relative motion of these several ratchet wheels is such as will cause an even passage of the material throughout the apparatus. (Four claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Allingham, T. G. Self-driving liquid motor. (9958)
 Atkinson, E. Steam generators for road wagons. (9985)
 Austin, H., and Austin Motor Company. Internal combustion engines. (9880)
 Baines, W. H. Means for preventing overcharging of hydraulic telemotor, etc., apparatus. (9883)
 Barnes, W. H. Grinding and crushing machines. (10050)
 Beattie, F. E. Rotary internal explosion engines. (10225)
 Best, C. E. Apparatus for distillation of carbonaceous materials. (9904)
 British Thomson-Houston Company (General Electric Company). Elastic fluid turbines. (9892)
 British Thomson-Houston Company (General Electric Company). Systems of electric distribution. (9953)
 Broadley, J. R. Machines for grinding ores, minerals, stones, etc. (10145)
 Cooper, T. L. R. Electric motors. (9960)
 Curle, J. A. Burners for liquid fuel. (9887)
 Drägerwerk, H. and B. Dräger. Inhaling apparatus. (10131)
 Eteheverry, H. H. G. Rope railways and tramways. (9981)
 Faisey, W. R. Two-cycle internal combustion engines. (9969)
 Fenell, W. Manufacture of iron and steel and alloys thereof. (9971)
 Furse, A. D. Crushing and pulverising machines. (10150)
 Grabowsky, R. Hollow water cooled grates. (9920)
 Hall, I. Heating furnaces. (10066)
 Hamilton, W. L. Aerial or suspended railways. (10137)
 Harger, J. Utilisation and combustion of fuel. (9942)
 Haythorn, J. Steam generators for road wagons. (9985)
 Helps, G. Utilisation and combustion of fuel. (9942)
 Helps, G. Manufacture and treatment of coal gas. (10224)
 Hinks, L. S. Internal combustion engines. (10138)
 Hood, J. Reversible engine having passive and positive action. (9943)
 Howden and Company, J., and Hume, J. H. Draught installations for boilers. (10080)
 Howden and Company, J., and Hume, J. H. Furnace fronts. (10229)
 Ionides, A. C. Furnaces. (9893)
 Jorgensen, A. V. N. Steam boilers. (10135)
 Lewis, E. F. and R. J. Pit props and beams or supports for roadways for coal mines, etc. (10009)
 Macfarlane, G. T. Winches. (10200)
 MacPhail, E. Internal combustion engines. (10101)
 Manley, W. V. Forced draught. (9983)
 Milligan, J. Mine signalling apparatus. (10162)
 Mills, J. G. Transmission of power. (10107)
 Mohn, T. Gas engine driven air compressors. (9957)
 Motion, R. Bucket hoists. (10014)
 Möystad, J. K. Internal combustion engines. (9894)
 National Gas Engine Company. Gas engine driven air compressors. (9957)
 Neill, A. J. Crushing and pulverising machines. (10 50)
 Perry and Company, and Smith, H. E. Adaptation of twin generator gas plants for manufacture of water gas containing varying proportions of the component gases. (10059)
 Remy Electric Company. Dynamo electric machines. (10187)
 Rollason, A. Use of mill scale, etc., in manufacture of steel. (9998)
 Rowlands, P. O. Liquid fuel internal combustion engines. (10000)
 Royle, J. J., and Royle Limited. Boiler feed water control apparatus, etc. (9934)
 Rundle, J. H. and J. L. Rotary engines. (10125)
 Ryder, A. Inclometers. (10007)
 Schultz, E. J. A. Internal combustion engines. (9899)

- Soc. Anon. Ateliers Clerc et Quantin. Pumps. (9968)
 Spinney, H. J. Conveyors. (9948)
 Stackard, S. F. Burners for liquid fuel. (9887)
 Stoneham, J. A. Method of combining liquid hydrocarbons to render them suitable as fuel for internal combustion engines. (9954)
 Stuart, F. L. Loading and storing apparatus. (10108)
 Telford, Grier, and Mackay. Internal combustion engines. (10101)
 Tench, H. G. Oil fuel sprayer for burning liquid fuel under pressure. (10017)
 Thomsen, A. L. Producing light mineral oils from petroleum, etc. (9906)
 Thomson, A. Means for preventing overcharging of hydraulic telemotor, etc., apparatus. (9883)
 Varcoe, W., and Varcoe and Sons, W. Firebrick coal saver. (10208)
 Whyte, S. Purification of iron. (10234)

Complete Specifications Accepted.

(To be published on August 2.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.

7415. Smith, H., and Vestraut, G. van. Pistons and the like. (107611)
 9329. Mott, B. Underground tunnelling, boring, shaft sinking, and the like, and apparatus therefor. (107631)
 9375. Ingleby, J. C. B. Mechanism for producing power by the compression of gases, and worked by the explosion of gases or other substances. (107634)
 9475. Burrows, L. P. Process for treating iron ore for the recovery of iron and manufacture of steel therefrom. (107644)
 9541. British Westinghouse Electric and Manufacturing Company. Electric rotary converters. (100847)
 9688. Wood, T. E. Apparatus for water cooling, condensing, air heating, superheating, and the like. (107652)
 10106. Davis, H. N., and Twigg, W. R. Liquid fuel burners. (107665)
 10170. Algrin, R., and Breton, J. L. Internal combustion engines. (101338)
 10692. Edwards, E., and Richards, D. Socket for miners' drilling machines. (107679)
 10720. Midgley, A. H., and Vandervell and Company, C. A. Combined starter and lighting dynamos. (107680)
 13139. Hughes, H. R. Method of and apparatus for forming and enlarging boreholes. (106264)
 14738. Knyff, R. de. Pressure reducers. (104864)
 16645. Roger, R. Mounting winding drums. (107715)
 18493. McKean, J. G. Steam engines of the double cylinder type. (107726)

1917.

1275. Constantinesco, G., and Haddon, W. Rock drills. (107734)
 3740. Aktiebolaget Ingenjorsfirma F. Egnell. Gas filters. (104880)
 5547. Proctor Limited, J., and Holden, A. Coal or like elevating mechanism. (107746)
 5987. Matthews, W. C. Means for supplying gaseous oxygen to internal combustion engines. (107747)
 7006. Gould, L. W. (Fixen, L. G.). Auxiliary air and steam valve for combustion engines. (107749)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.

1545. Leary, J. I. Apparatus for generating and burning hydrocarbon vapours. (107755)
 9571. Siemens-Schuckertwerke Ges. Winding or hauling machinery. (107766)
 9736. Wust, F. Method of improving the Thomas process. (107770)

CATALOGUES AND PRICE LISTS RECEIVED.

T. E. Copley and Company (Sheffield).—We have received a small illustrated booklet on the subject of machine coal cutter picks, the manufacture of which is one of the specialties of this firm. A useful hint to purchasers is that low- and high-priced cutters are equally valueless if they will not perform maximum service; and in order that users may secure a pick of exactly the correct temper, the makers recommend that enquiries for quotations should state the class of work to be done, as by this method satisfaction will be ensured.

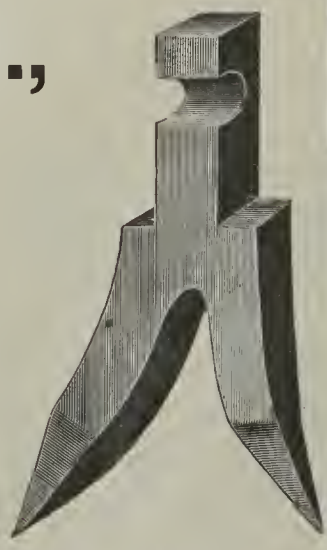
Gas and Coal Economy.—Various questions of a technical character having recently arisen relating to the supply of gas, the Fuel Research Board have undertaken, at the request of the Board of Trade and other Government departments concerned, to conduct an investigation and to advise them as to the most suitable composition and quality of gas and the minimum pressure at which it should be generally supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of by-products, and the purposes for which coal is now used.

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THE COLLIERY GUARDIAN

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No. 2952.

COAL AND SHIPPING.

By F. J. WARDEN-STEVENS,
M.I.M.E., A.M.I.E.E., &c.

XIX.—Coal Handling in Germany.

Having in view the conditions and developments which will be essential after the war, it will not be out of place to consider the pre-war position of Germany as regards coal transport, and to indicate more particularly, although very briefly, some of the types of machinery used there for loading, discharging, and distributing coal. In the first place, it must not be overlooked that Germany had attained the position of the third greatest coal producing country, the output for the year 1913 being about 191½ million tons; whilst exports of coal were also being rapidly increased, notwithstanding that coal figured amongst the imports of Germany, over nine million tons having been imported from the United Kingdom during the year 1913, and

waterside stations alone over seven million tons were consigned to Rotterdam in 1913. In addition, large supplies for Germany's own industrial requirements were also loaded at these harbours for delivery to stations on the Upper Rhine, for example, at Mannheim-Rheinau, where about 3½ million tons were discharged during 1913.

Some remarks may here be made about the sea ports of Germany which are concerned with coal supplies—more particularly for bunkers. The ports in the North Sea include Emden, Bremerhaven, Hamburg (which is accessible by the River Elbe), and Bremen (which is on the River Weser); and, in addition, there are the naval stations of Wilhelmshaven and Cuxhaven.

the mouth of the River Weser, Bremen, a prominent district and river port, being some 30 miles distant.

Hamburg, of course, is Germany's chief port, although 65 miles from the mouth of the River Elbe. The total value of the imports there in 1913 amounted to no less than £235,000,000, and showed an increase of about £10,000,000 over the previous year, whilst the value of the exports the same year was £193,000,000, being about £15,500,000 in excess of 1912. Taking the item of coal alone, it may be stated that the coal imports at Hamburg from the United Kingdom exceeded four million tons during the year 1913, with a value of over £3,000,000, which figure is the maximum for British coal received at that port in any year. To indicate the extent of shipping at Hamburg, the following figures are of interest, as concerning bunker supplies to some extent. During 1913, about 14,000 vessels with cargo entered the port, representing a registered tonnage of over 13 millions, and about 2,370 vessels, having a combined tonnage of over one million, arrived in ballast; whilst clearances amounted to over 10¼ million registered tons with cargo, and over four million tons in ballast. For bunker supplies, although Westphalian coal is available, English coal is in great demand, and large stocks are kept at the port. Vessels go alongside the quays, but deliveries are mostly effected from large lighters, and there are several floating mechanical equipments available, which will be referred to later. Altona and Hamburg are smaller ports near Hamburg, the latter being on the opposite bank of the Elbe. Both are provided with coaling equipments, which will also be mentioned later.

Cuxhaven, situated at the mouth of the Elbe, although a naval station, provides for bunkering alongside the wharves or from large lighters, a considerable supply of Westphalian and also some English coal being stocked there; but Wilhelmshaven is entirely a naval port, where an extensive storage of coal is kept solely for naval requirements. These may be considered the principal of Germany's ports adjacent to the North Sea, although mention may be made of the port of Tönning, situated some 20 miles from the mouth of the River Eider, which is north of the Elbe. Although a small port, it serves—together with Friedrichstadt and Pahlhude, also on the Eider—the north-west territory of Germany. Brunsbüttel also should be noted, situated as it is on the Elbe at the western entrance to the Kiel Canal.

As regards the Baltic ports, at Danzig, situated near the mouth of the River Vistula, large supplies of

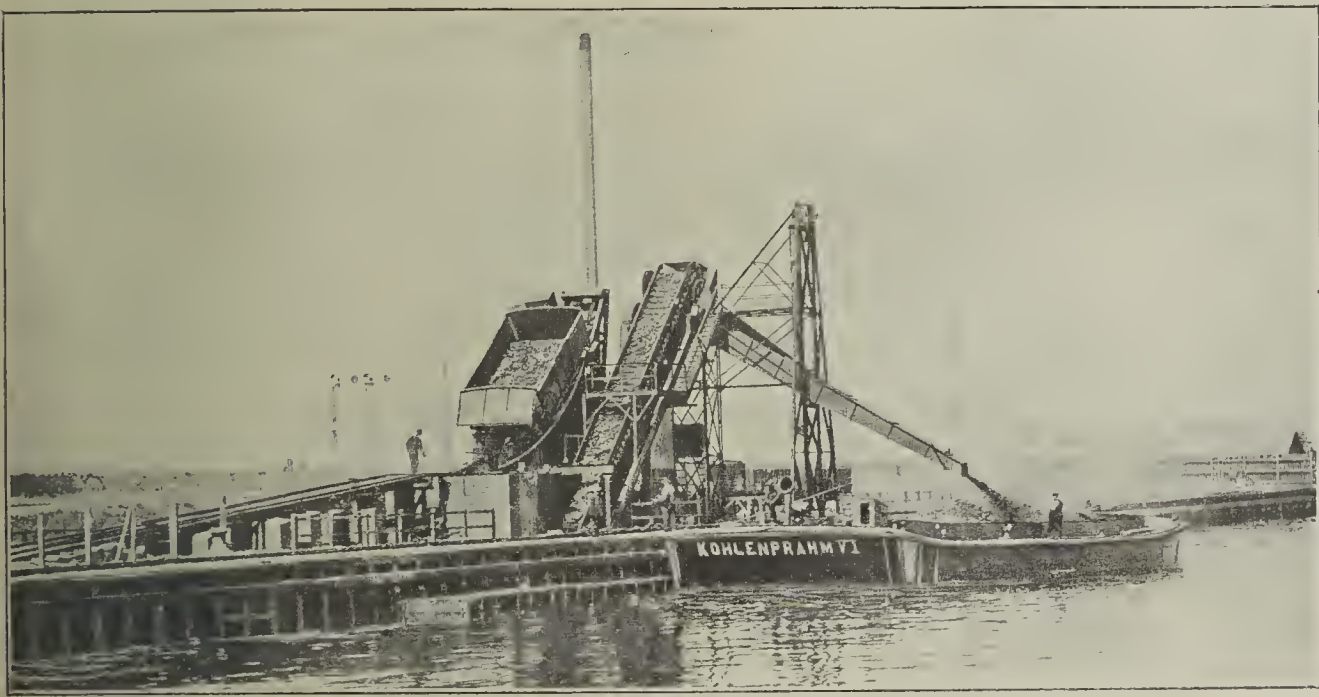


FIG. 1.—WAGON TIP WITH ELEVATOR AT BREMERHAVEN.

from Holland and Austria—in the latter case lignite—to the extent of about a million tons.

The markets for Germany's exports of coal are Austria, Italy, France, Belgium, Sweden, etc., to which last country the figures increased in 1913 about 100 per cent. over the shipments in 1912. Not content with exports to neighbouring countries in Europe, however, Germany has been making great endeavours to export coal for bunker supplies at oversea coaling stations, and even to British territories, cargoes having been consigned to India and to British ports in the Mediterranean. In fact, Germany has looked to coal, iron, and agricultural produce as a means of increasing exports, the aim being to augment the total exports to such an extent that the trade of the country should show a balance of exports to imports, or an excess of exports.

A feature of the development of the coal industry in Germany has been the close attention given to preparing the coal for the market after its arrival at the pit bank. Washing and grading with modern equipment have been considered necessary, and discrimination has been exercised to provide a suitable class of coal to meet particular requirements. It is greatly due to this attention that German coal has successfully competed in certain foreign markets. Also the use of low-grade coals and lignites has been carefully studied, and it should be noted that the output of briquetted fuel has largely increased, as well as the number of by-product coke oven plants. This will be evident from the fact that about 27¼ million tons of briquettes were produced in 1913, and over 32 million tons of coke; of the latter, about 6½ million tons were exported (one-third to France).

Transport of Coal.

Reverting to the transport of German coal, it should be noted that large quantities are consigned *via* Holland, Rotterdam being a prominent port for distributing Westphalian coal supplies, and over eight million tons were delivered there during 1913. Waterborne coal from the Westphalian fields is conveyed, down the Rhine, in great barges having a capacity of up to about 3,500 tons, and with a draught loaded of only about 9 ft. These barges are provided with large open hatchways, which, when the covers are removed, leave almost an open hold, and thus facilitate loading and discharge. The principal stations for loading Westphalian coal to be transported by water are the Ruhr harbours of Duisburg-Ruhrort, Rheinpreussen-Homburg, Schwelgern, and Walsum, from which



FIG. 2.—FLOATING DISCHARGING TRANSPORTER AT HAMBURG

On the Baltic, the principal ports are Danzig and Königsberg, together with Stettin (the latter available by the River Oder), and the naval station of Kiel at the eastern entrance to the Kiel Canal.

Ports of Germany.

Emden is situated at the mouth of the River Ems, and is the most westerly port of Germany. It has been considerably developed, and is the principal port for ocean shipment of Westphalian coal. Large quantities of that coal are also available for bunker supplies, which are delivered alongside the quays, or ex lighters of up to about 200 tons capacity. At Bremerhaven also, large stocks of Westphalian coal are kept for bunkers, and in covered stores, supplies being effected either alongside the quays or from lighters, some of which have a capacity of 500 tons; Bremerhaven and the adjoining port of Geestmünde are at

coal are available from the Silesian coal fields, but a stock of English coal for bunker supplies is also kept in hulks moored in the river. Pillau, which is situated in the Gulf of Danzig, is connected with Königsberg by a canal about 35 miles in length, and with 21 ft. depth of water. At Pillau, a storage of coal is kept for naval requirements, and at Königsberg a considerable stock of English coal is available, as well as a small supply of Silesian, bunkering being effected either at the wharves or from lighters. Swinemünde is at the mouth of the River Oder, and 36 miles up is the prominent port of Stettin, which is available for vessels drawing not more than 22 ft. There is a considerable demand for Welsh and Newcastle coals at Stettin, although some Silesian is available, and English coal is also stocked at Swinemünde, bunkers being supplied either from lighters or alongside the quays at both ports. Kiel is a naval port, and is

on the Baltic at the eastern entrance to the canal, and English coal is received there and for bunkering requirements. Other Baltic ports where English coal is in demand for bunker supplies are Lübeck, Rostock, Memel, and Flensburg. The last-named port also stocks Westphalian coal to a great extent. Memel is the most easterly port of Germany, and adjoins Russian territory, whilst Flensburg is north of the Kiel Canal. These notes will serve perhaps to indicate not only the principal sea ports of Germany, but that the demand for English coal predominates for bunker supplies at those ports.

Reference will now be made to some of the equipment in use in Germany for the handling of coal, but owing to space limitations it will only be possible to indicate briefly a few examples, not necessarily the most important, of different types of equipment—in

not carry full cargoes on account of the insufficient depth of water available in the canal, and therefore required to load up fully before proceeding to their destinations—coast ports on the North Sea and Baltic. This hoist-tip, however, is also used for supplying bunkers to large vessels visiting the port of Emden. Yet another form of tip, used to some extent in Germany, is of the nature of a blastfurnace hoist, and comprises an inclined track, up which the wagon is hauled and discharged at the top into a hopper, delivery also being effected by an adjustable chute.

Some examples of floating coal-handling plant may next be mentioned.

Floating Coal-Handling Plant.

A floating equipment at Hamburg (fig. 2) consists of a barge about 115 ft. in length and 35 ft. in width,

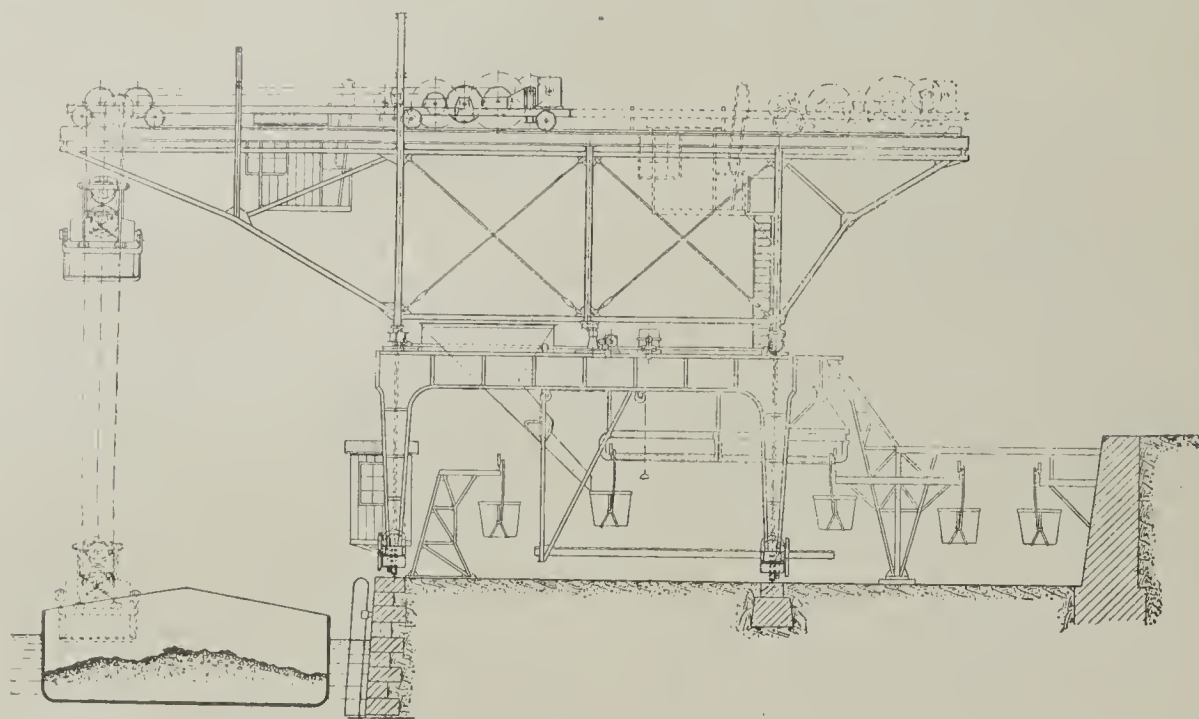


FIG. 3.—DISCHARGING TRANSPORTER AND TELFER TRACKS AT MARIENDORF (TELLOW CANAL).

the first place, a few examples of the tips and hoists used for discharging railway wagons into vessels and barges.

Tips and Hoists.

At Dortmund, the coal is received from the mines in railway wagons, generally of 10 or 15 tons capacity, and of the end flap-door type. One of the tips in operation there comprises a pivoted cradle or platform supported by trunnions. The wagon is pushed on to the cradle, the forward part of which is connected to a ram, which operates in an hydraulic cylinder supported by the masonry foundation beneath the platform. This cylinder, being carried on trunnions, is capable of a vertical radial motion according to the movement of the cradle; the opposite or inner end of the cradle is weighted for balancing, and the cylinder is connected to an accumulator (pressure 250 lb. per sq. in.). The difference between the pressure in the accumulator and that in the cylinder is about 45 lb. per sq. in., this excess being produced by the loaded wagon forcing the ram into the cylinder. The pressure gradually diminishes as the weight is removed by the discharge of the coal, until it is some 45 lb. less than that in the accumulator, so that there is a variation of 90 lb. per sq. in., the higher pressure in the accumulator when the wagon has been discharged sufficing to return the cradle with the empty wagon to normal or horizontal position. The control of this tip is effected by a valve on the hydraulic connection between the accumulator and the cylinder, opening the valve allowing the ram to operate and the cradle to tilt to a maximum angle of 45 degs. The speed of descent is governed by the extent of opening of the valve or throttling of the waterway. When the forward end of the cradle has reached its lowest position, the valve is closed, and is opened again to allow the water, then at the higher pressure, to flow into the cylinder and force out the ram, thereby returning the cradle. Attached to the front or discharge end of the cradle is an adjustable chute, which is controlled by two hand winches, and by which the flow of coal into the barges is regulated. Several gravity tips are in use at other coal-loading stations on the Rhine, and as the railway tracks are mostly at the quay level and the height of discharge is low, it is therefore only necessary for the service track to have a slight incline to the tip.

An example of a different form of coal tip is in operation at Bremerhaven. (Fig. 1.) This consists of an upward curved rail track supporting a movable bogie truck, on to which the wagon to be discharged is hauled by means of a capstan. The front axle of the wagon is then made secure to the bogie, which is hauled up the curved track by means of a hoisting gear situated in a cabin beneath the track. When the front end of the wagon has reached the highest position on the rail track, it has attained an angle of about 45 or 50 degs., and the coal is discharged into a hopper which serves as an inclined elevator, delivery from this being effected by an adjustable chute. At Emden, there is an electrically-operated hoist and tip of somewhat similar construction to that to be seen at Rotterdam. A special feature of this hoist-tip is that the operating machinery is situated at ground level, unlike the electrically-operated hoist-tips at Rothesay Dock, Glasgow, where the hoist structure supports the winding gears, which are situated at the top. The hoist structure is about 100 ft. in height, and the cradle can be raised a distance of 100 ft. The driver's cabin is situated on the structure, but the electric hoisting machinery is at ground level. This is clearly intended for loading up the barge from the coal shipping at the Ems-Dortmund Canal, which could

which carries a steel structure about 60 ft. in height above the deck level. This supports a horizontal hinged boom track for a grab trolley, which is operated by steel ropes, the track affording an outreach of about 25 ft. over one side of the barge and a clearance of 30 ft. above water level. Coal is discharged from river craft by means of the grab, which delivers into a hopper situated above the deck of the barge. From this hopper the coal passes into the boots of either or both of two inclined elevators, extending from the bottom of the barge, one to the top of the supporting structure, and the other to just above the level of the horizontal boom, the delivery heads of the elevators

can be effected through a chute to deck hatches of large vessels at a height of about 65 ft. above water level, the chutes previously referred to being intended for side port bunkering. Other floating equipment includes tower-type steam power jib cranes erected on barges and working with grabs. A number of these are in use at various ports, those at Harburg having a capacity of five tons, with a radius of 46 ft., and being capable of handling 60 to 70 tons per hour.

Distribution Equipment.

An interesting example of coal distribution is that in use at Mariendorf, on the Teltow Canal (fig. 3). Transporters are available on the quay, which are used to discharge the coal arriving in large barges. These transporters are mounted in pairs on a gantry, each operating a grab which discharges into hoppers, each suspended from the gantry, and these serve the skips of a rope-operated telfer line. There are several of these telfer tracks, each line being worked independently, and served by two of the transporters above mentioned. The discharging grabs have a capacity of about 4 cu. yds., and 25 to 30 loads an hour are hoisted and discharged by each into the hoppers, each pair of transporters thus handling about 100 tons per hour. The telfer lines extend parallel with and adjoin the quay, and then branch off at an angle of about 45 degs. back from the quay, the track being on a gradient, and extending between two storage grounds parallel with the quay. There is a loop service rail track suspended from the gantry of the transporters, along which the telfer buckets travel to and from the main track for loading from the hoppers. Each of the storage grounds is spanned by a movable bridge, 187 ft. in length, which supports two travelling jib cranes. These take the coal from storage by means of grabs, and discharge into a hopper on the bridge, each crane being capable of handling 50 tons per hour. The bridges also carry loop tracks for the telfer buckets, which pass from the main tracks for discharge or loading. The capacity of the telfer buckets is about 23 cwt., and they follow on the track at intervals of about 50 ft., travelling at a speed of about 200 ft. per minute. The whole plant, including the discharging transporters, the distributing bridges, and the suspended telfer buckets, is electrically operated, the last-named by a continuous steel rope from a driving station, which is also an angle or turning station on the track. Though no attempt has been made to describe this equipment in detail, sufficient has, however, doubtless been mentioned to indicate the system. It may be added that the cost of working amounts to the equivalent of about 2d. per ton discharging to storage and 1½d. per ton re-handling from storage. A development of the rope-operated telfer is an independently operated electric system, each bucket being carried by a separate electric motor trolley and automatically controlled—a system which has been extensively worked out and adopted in Germany for the transport and distribution of coal over large areas. The independently operated electric telfer system (fig. 4) comprises an elevated single-

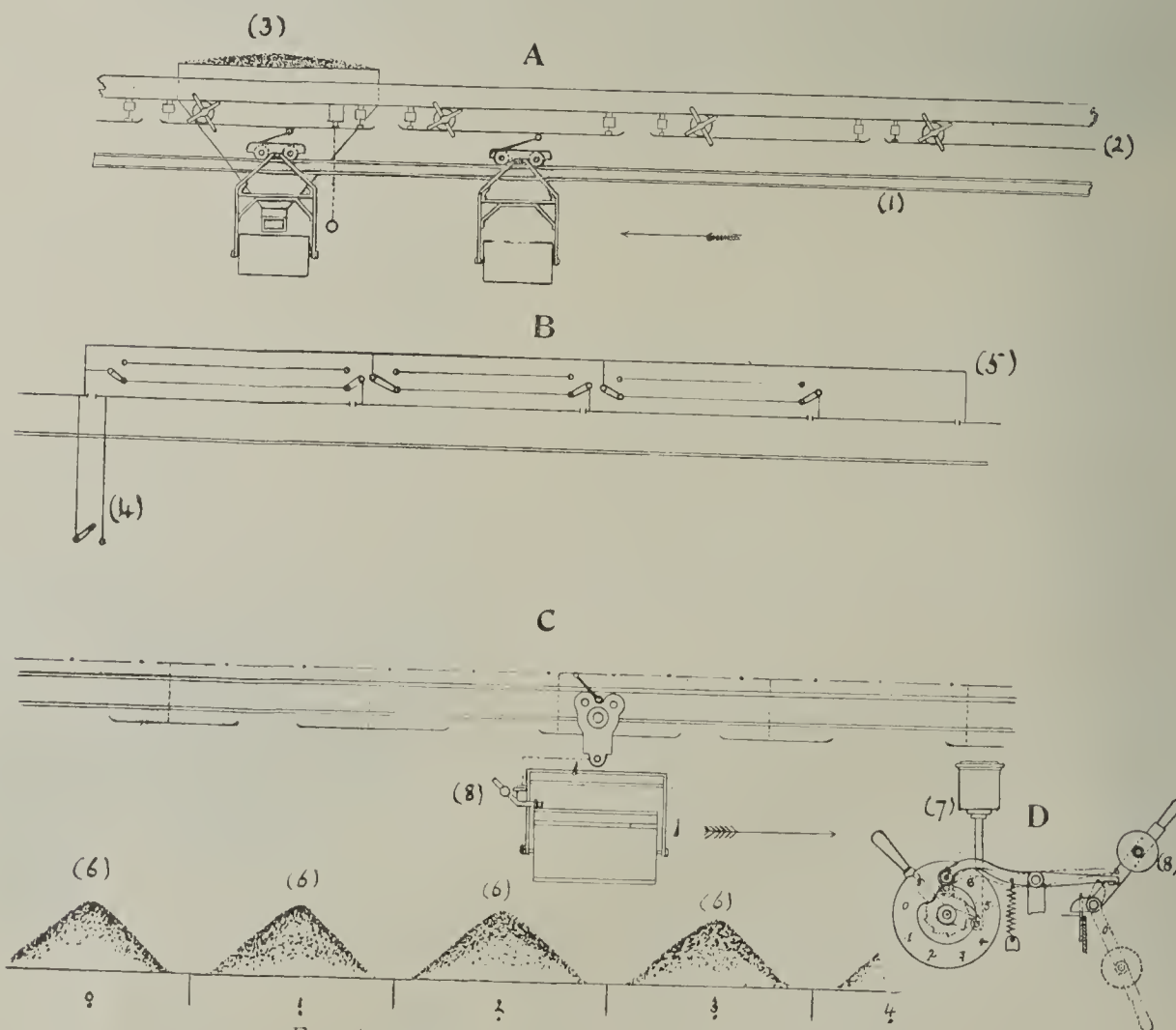


FIG. 4.—AUTOMATIC ELECTRIC TELFER SYSTEM.

being situated at the opposite side of the barge to that of the boom. The coal is finally delivered from the elevator to vessels or barges by adjustable chutes. The two elevators provide different heights of discharge, and the capacity of this plant is up to about 150 tons per hour. Another floating equipment at Hamburg is of a rather different design. In this case, the horizontal boom for the grab trolley track is about 76 ft. above water level, the supporting structure being 98 ft. in height above the deck of the barge. The receiving hopper for taking the discharge from the grab is at an elevation of about 65 ft. on the structure, and serves two adjustable chutes, providing a range of delivery about 10 ft. in height. The equipment also includes a belt conveyor situated just beneath the hopper, and extending across the barge. The delivery end of this conveyor can be raised, and by this means supplies

rail track, from which the motor-operated trolleys are suspended, and to which are attached the carrying buckets or skips. The trolleys collect their power from an electrical conductor fixed parallel with the rail track, the return current passing by way of the track itself. The track is divided electrically into sections, and by means of switches actuated by the trolleys, as they pass from one section to another, the supply of current to a trolley in one section of the track is stopped by the preceding trolley automatically switching off the supply on leaving, and switching it on again on entering the next section. By this means it is impossible for two trolleys to be on any one section at a time. When a trolley arrives at a loading station, it automatically stops itself by a switch cutting off the electric supply. The attendant then has to only load the bucket and start the trolley on

its journey; whilst at the position of discharge the flaps or doors of the bucket are automatically released by a striker on the track. Even attendance at the loading stations can be rendered unnecessary by another electrical development of this system, whereby the empty trolley at the loading station, in passing on to a weighing track, is stopped by means of a switch, which also starts a motor controlling the chute of the loading hopper. The increasing weight of the trolley, as the bucket is being loaded, depresses the weighing beam, and this motion is utilised to close the hopper chute and start the loaded trolley. A still further development of the system provides for lowering and hoisting the loaded bucket of the trolley, which, in such case, carries also a small self-contained electric winch, this receiving power from a second electric conductor fixed adjoining the conductor for the travelling, but only at positions on the track where hoisting or lowering are required, the second or winch conductor taking its power from the main or travelling conductor. The control of the winch is effected by a hand control lever or by distant control electrically; or, if required, automatic working can also be introduced for this service. This independent electric telfer system has certainly been very carefully worked out, and embodies several ingenious devices to provide for automatic working—stopping, loading, weighing, and discharging; also, if required, lowering and hoisting the trolley bucket, as well as controlling the trolleys on the tracks.

In fig. 4, A represents the track (1) with trolleys, the electric conductor for travelling (2) and switches, also loading hopper (3); the diagram B indicates an unloading station (4) and return conductor (5); C refers to the arrangement for discharge at several positions (6); and D the device attached to the trolley for this purpose, with the operating magnet (7) and discharging lever (8), the lever being set on the dial according to the position of discharge required.

Although distribution equipment is closely associated with discharging and loading, we will next consider the more general form of the latter equipment, including cranes and transporter bridges.

Discharging and Loading Equipment.

At Walsum, on the Rhine, the quay is equipped with electrically-operated jib cranes of 11 tons capacity, and with a radius of 40 ft. These cranes are movable on rail tracks along the quay, and serve to load coal from railway wagons to barges. The wagons are of the platform type, and carry a special skip, hinged from the top, which is automatically discharged by the crane driver releasing a cross bar. A similar system of loading is in operation at Homberg, on the Rhine, the coal being consigned from the Rheinpreussen Colliery. At Mannheim, movable semi-gantry steam cranes are provided, the single rail track at the riverside being at a lower level than the shore side track supporting the top of the gantry, as the river bank has a considerable slope. These cranes have a capacity of three tons, a radius of 45 ft., and are worked with grabs, whilst for distributing the coal movable bridges are used, which span the storage ground. At Altona, near Hamburg, there is an important installation of transporter bridges for discharging coal, four of which can handle about 650 tons per hour. Another equipment of electrically-operated cranes is to be noted at Frankfurt-on-Main, where large quantities of coal are handled. These cranes are

ing equipment (fig. 5) consists of cantilever transporters which serve rope-operated suspended buckets on single-rail elevated tracks. The coal is discharged by grab, either direct to storage alongside the quay, into railway wagons on two lines of track beneath the gantry, or into a hopper on the gantry from which the telfer buckets are loaded for distribution.

At Emden, there are large electrically operated movable storage bridges working with jib cranes and grab trolleys.

An equipment at Hamburg comprises gantry transporters alongside India quay, as well as a transporter bridge spanning a storage ground. This equipment is provided for discharging coking coal consigned from England, and also for loading coke into railway wagons or vessels. Automatic tipping buckets are used with the gantry transporters, and discharge into hoppers serving conveyors and elevators, which carry the coal to the screening plant and washery of a by-product coking plant. The transporter bridge delivers

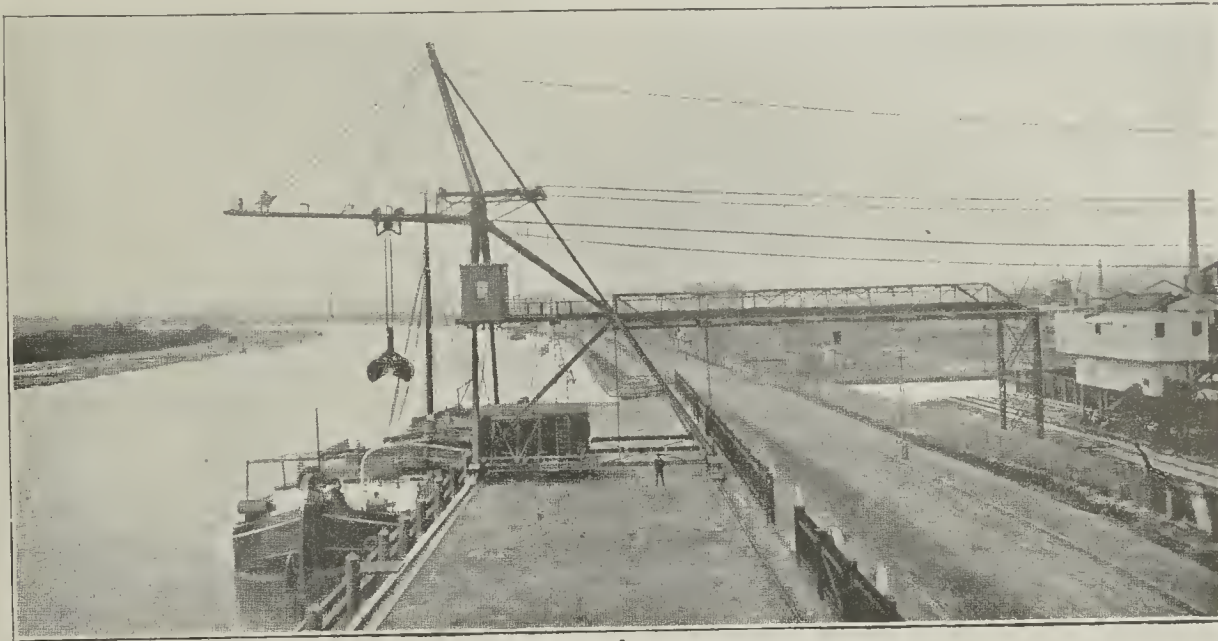


FIG. 6.—TYPE OF CABLE CRANE FOR DISCHARGING COAL.

the coal to the storage ground, and re-handles it, by means of tipping bucket or grab, to a hopper serving a conveyor, also for delivery to the washing plant. The transporter bridge has a span of 185 ft., with a cantilever extension of 71 ft., whilst the quayside hinged track extension of the gantry transporters, as well as the bridge, is 40 ft. in length, and the capacity of each plant is 60 tons per hour.

At the harbour of Schwegern, which is situated near Brückhausen, on the Rhine, and which is one of the Ruhr harbours first referred to, there are a number of travelling gantry cranes, movable bridge transporters, and travelling gantry transporters.

Before concluding, comment may be made on the adaptation of cableways for coal handling in Germany, where they are sometimes termed cable cranes. These may be compared with bridge transporters, the former having a flexible cable track, whereas, of course, the latter have a rigid girder track for the travelling

tures the opinion that British manufacturers learn little, if anything, to learn from the types of plant and the general construction. The German manufacturer is inclined to criticise the British machinery as being crude and heavy; but, although he gives greater attention to the designing office and details, he is probably inclined towards a low factor of safety. Hoists and tips have been more in demand in England for ocean shipping on account of the greater exports of coal from England than from Germany, and therefore have doubtless received greater attention on the part of British manufacturers. On the other hand, distributing equipment for large areas is probably more in evidence in Germany than in England, owing to the more extensive storages. The automatic electric telfer system briefly described is certainly worthy of attention, and the writer has had the opportunity of studying the working of that system both in Germany and in Belgium, where it has been largely adopted for gas works. Aided doubtless by export

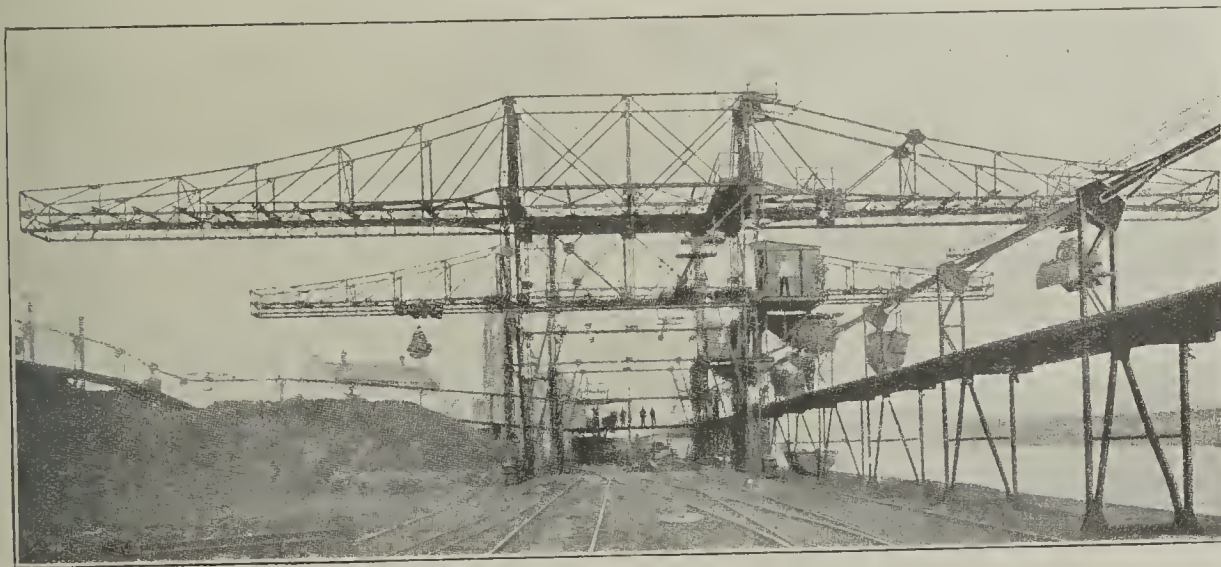


FIG. 5.—TRANSPORTERS AND TELFER AT BREMERHAVEN.

of the movable jib type, mounted on a travelling gantry, which spans a double line of railway track at the quay side. The cranes work with grabs, and have a capacity of four tons and a radius of 60 ft. Spanning the storage ground at the back of the quay are a number of fixed bridges, with which the crane gantries at the quay side connect, so that the cranes can travel from their gantries along the storage ground bridges for stacking or loading into railway wagons. The Westphalian Coal Syndicate have a large discharging and distributing equipment at Rheinau, which consists of movable angle gantry steam jib cranes on the river bank. These cranes, which are of four tons capacity, discharge barges by means of grabs, and serve movable bridges spanning the storage ground—about 395 ft. in width. The lower girders of the bridges support a narrow-gauge rail track, whilst the upper girders carry a grab trolley. Distribution is effected by side-tipping trucks served by a hopper, fixed at the quay side end of the bridge, into which the crane grab discharges, the trucks being hauled along the bridge by a small electric locomotive and tipped on the ground where required. For re-handling from storage into railway wagons adjoining the storage ground, the grab trolley is used, which is electrically operated, and has a capacity of six tons. At Bremerhaven, an interest-

trolley. The advantages generally claimed for cable cranes is lighter and less expensive construction and greater span, the last-named enabling a deep storage ground to be more easily dealt with and saving width or valuable space near the quayside.

Fig. 6 shows a so-called cable crane, for discharging barges, the quayside support having a hinged jib track, and a bridge is indicated extending across a roadway. This is quite a light structure, and is only intended as a protective measure in case of the grab dropping any of its load whilst travelling over the roadway. The cable track has a span of 525 ft., and the grab is operated by wire rope, although they are also constructed for use with an independent trolley, with which the operator travels. Further, either or both the supports can be made movable, in the former case on a radial track, and in the latter case on parallel tracks, to distribute the coal according to the area of the storage ground.

Conveyors are also used to some extent, but more frequently in conjunction with other equipment and for auxiliary services. The examples named will perhaps serve to indicate, at least to a slight extent, some of the coal-handling equipment used in Germany. The writer has had the opportunity of inspecting various plants there, and, from his knowledge, ven-

bounties, oversea organisation, and trade banks, German coal-handling machinery has found its way abroad to a considerable extent, and even to British possessions, a condition of things which ought, in future, to be remedied by improved methods of developing British trade abroad in such appliances, the demand for which is certain to increase.

IRELAND'S COAL SUPPLIES.

In an article on the coal needs and supplies of Ireland, as affected by the Controller's new Order, the *Irish Times* remarks that no steps have been taken to deal with these matters in the way of regulating supplies, arrangements for which consequently remain in private hands. The Ministry of Munitions in Ireland does not make its own arrangements for importing coal for munition factories, but orders supplies through the trade. At present there appears to be no actual difficulty in procuring coal, but some amount of apprehension seems to be felt about future supplies, owing to the great calls upon shipping. About 120,000 tons of coal a month pass upon to Dublin from Great Britain, and it is clear that consumers are now laying in stocks. That, however, must apply chiefly in the case of coal used for the warming of private or public buildings, though consumption is probably reduced also during the summer at electric lighting and gas-making plants. The chief source of supply for this part of Ireland is Lancashire. From South Wales only steam coal is imported. Supplies from Yorkshire and Notts have been reduced to some extent. By no means all the coal that comes into Dublin remains in the city; a good deal of it goes across the country to Galway, Limerick, and Cork. Towns in the south and west find it difficult to get supplies by sea, owing to lack of tonnage and high freightage. There is also, of course, more risk of loss by sea to the west instead of by sea to Dublin and thence by rail. It is unlikely that much coal is stored in the south and west, for these parts of the country have not been too well supplied. There are several uncertain factors in regard to future supplies. It is hardly likely, however, that the needs of Ireland have escaped the attention of the Coal Controller, so that an announcement of action on his part would not be surprising. His latest restrictions of the transport of English and Scotch coal do not annul export contracts, but the result of the latest Order will be to reserve some of the supplies which have been available for Ireland for the use of the areas in which they are raised. The exports from Lancashire are being seriously curtailed, and to make up the deficiency in this chief supply Irish merchants will have to turn to Scottish coal fields. That necessity will raise the question of quality, and the still more serious one of freight, owing to the longer voyage. In a short time the coal fields of Ireland should be supplying an increased yield, but all who deal with coal are agreed that the native supplies constitute a small proportion of those consumed in this country. It is computed that last year the entire output of Irish mines was 82,000 tons, and it is unlikely that the increase in output will compensate for the decrease in supplies from Lancashire.

The Chief Inspector of Factories gives notice that an appointment as certifying surgeon under the Factory and Workshop Acts at Omagh, in the county of Tyrone is vacant.

SAFETY RULES FOR ELECTRICAL EQUIPMENT IN COAL MINES.†

H. H. CLARK and C. M. MEANS.

(Continued from page 112.)

DIVISION 3. MACHINES AND APPARATUS.

The general rules for safety are the same as Rules 3 to 8.

Switchboards.*

(See also Rules 59 to 68 and 76 to 81.)

10. Switchboards* shall consist of a substantial framework of iron pipe, angle irons, or bar iron, on which shall be mounted a panel or panels of incombustible, non-absorbent insulating material that is mechanically strong and has insulating qualities suitable for the voltage* at which it is used.

41. The panels of insulating material may be omitted if each piece of equipment carried on the switchboard* is provided with an individual base of insulating material of the character specified for the panels and of adequate dimensions, or has its current-carrying parts mounted on similar insulation self-contained in the equipment, which shall be especially designed for mounting on iron-pipe, angle-iron, or bar-iron frameworks.

42. A passageway not less than 3 ft. wide shall be provided in front of low and medium voltage* switchboards*, and a similar passageway behind such boards if there are connections that can not be manipulated or repaired without going behind the switchboard.

43. Where the potential* of the power supply exceeds the limits of medium voltage* there shall be no unprotected,* live,* high-potential* metal work on the front of the switchboard within 7 ft. of the floor, and the space provided for passageways in front and behind the switchboard shall be not less than 4 ft., clear of all apparatus.

44. Conductors shall not cross the passageways back of switchboards* except below the floor or at a height of 6½ ft. above the floor.

45. The space behind underground high-voltage* switchboards* shall be kept locked if there are unprotected* terminals or conductors back of the switchboard.

46. There shall be provided for each generator an ammeter of suitable capacity, and for all generators a voltmeter that by closing a switch or manipulating a plug connection can be connected to any generator.

Electric Ventilating Fan Equipment.

Housing and Power Supply.—See Rules 27 to 29.

Capacity of Motors.—47. Motors that operate ventilating fans shall be of sufficient capacity to drive the fan at the maximum speed of the motor under normal conditions of service without overloading.

Control of Motors.—48. Non-automatic motor-controlling appliances that are used with motors that are not self-starting shall be so arranged that the motor will be disconnected automatically from the supply circuit in case the power supply fails.

Electric Hoisting Equipment.

Shaft Hoist.—49. All electrically operated shaft hoists that are used for handling men shall, if not provided with a mechanical overwinding device, be provided with an approved* electrical device that will prevent overwinding at the man landing.

50. Shaft hoists shall have a hand brake that will keep the hoisting drum under the control of the operator. This brake shall be provided with an automatic trip or release that will apply the brake in case the power supply fails.

51. Hoists used for handling men shall be so arranged that the speed shall not exceed the legal rate of hoisting when men are being hoisted. If hoists are designed to operate in balance the driving motor shall be of sufficient size to hoist a full load of men, in case of emergency, in an unbalanced condition.

52. All electrical safety devices shall be tested at the beginning of each shift, and a record of such tests shall be made and signed by an authorised person* and kept on file at the mine.

Slope Hoists.—53. All electrically operated slope, tail-rope, or endless-rope hoists in mines shall be fitted with adequate controlling devices of approved* design.

Underground Motors other than Locomotives.

See Rules 3 to 9, and "General Rules of Safety for underground stations,*" and Rule 38.

General Construction.—54. Motors for use in damp places shall have approved* moisture-resisting insulation.

55. The terminals of motors that operate at potentials* exceeding the limits of low voltage* shall be protected* from accidental contact by insulation or by grounded* coverings. Motors that operate at voltages exceeding medium potential* shall have their terminals entirely within the motor frame or bedplate or an approved* conduit box.

Explosion-Proof Motors.*—56. Explosion-proof* motors shall be such motors as have explosion-proof* casings approved by the Bureau of Mines as permissible for use in gaseous mines.

Portable Motors.*—57. The motors and controlling appliances of portable* pumps, hoists, and similar portable* apparatus shall be securely mounted on a common base with the machine that is to be operated. All wiring between the motor and the controlling appliances shall be carried in metallic conduit, and the controlling appliances shall be enclosed in a metallic casing. The use of conduit will not be required if the controlling appliances are mounted upon the motor frame in an approved manner.

58. Motors and other motors that shall be provided where the cable

one of the terms and expressions been defined in order to avoid confusion. The terms so defined shall be marked with an asterisk (*) in the text.

† Bureau of Mines Technical

enters the frame of the machine with an approved* means for preventing abrasion of the insulating covering of the cable. An insulating clamp placed within the frame, or protected by an approved* metallic covering, shall be provided for taking all mechanical strains upon the cable. (See also Rule 119.)

Control.—59. Every stationary motor* and every portable motor* used underground, except mining machines and drills, shall be protected, together with its starting device, by a fuse in each conductor leading to the motor or by a circuit-breaking device in at least one conductor of direct-current motors and in each conductor of alternating-current motors, and by switches arranged to cut off entirely the power from the motor. The above devices shall be installed in a convenient position in sight of the motor or in sight of the equipment that the motor operates. The controlling appliances of stationary motors,* except the controllers of hoists and similar equipment, shall be mounted upon a switchboard.*

Resistances may be mounted upon a separate metallic framework.

60. Underground motors that operate ear or coal-handling equipment shall be provided at a point near such equipment with a switch or other means for disconnecting the motor from the power supply.

61. Underground motors used to drive booster or auxiliary fans shall be so designed or equipped that they will start automatically when their circuits are connected to the power supply.

62. All non-automatic, current-limiting starting devices, except those used with mining machines, drills, locomotives, and hoists, shall be provided with a no-voltage release.

63. Electrically operated mining machines and drills may be protected by a single fuse and need not be equipped with a line switch if an approved* current-rupturing device is installed at that end of the trailing cable which is nearest to the power supply. If a hook is used for this purpose it shall be provided with an insulated handle of approved* construction. If cable reels are used they shall be provided with an approved* means for opening the circuit under full motor load. (See also Rule 123.)

64. All insulating material used in connection with starting resistances shall be non-combustible. This includes the insulation of wire used for the internal wiring of resistances.

65. All switches shall be so installed that they cannot close by gravity.

66. Every underground stationary motor* of 100 brake horse-power or over shall be provided with a suitable meter to indicate the amount of load on the machine.

67. All wiring between motors and their controlling appliances shall be insulated.

68. Overload release devices on starting rheostats and compensators will not be considered as taking the place of circuit breakers if such devices are inoperative during the starting of the motor. If automatic starting devices are used they shall be enclosed in a fire-proof enclosure, or mounted upon a metallic framework clear of all combustible material.

Locomotives.

69. Electric haulage by locomotives operated from a trolley wire shall not be permitted in any gaseous place* in a mine.

Wiring.—70. The wiring on all locomotives shall be of ample size to carry the current, and shall be insulated with rubber or varnished cloth, covered with a double braid, and where space permits shall be encased in approved* metallic conduit, with the exception that any wires that are subjected to high temperatures shall be covered with flame-proof material.

Headlights.—71. A headlight shall be placed on each locomotive. If are headlights are used, an approved* switch shall be provided that will allow the motorman to turn the lights on or off without leaving his seat.

Sand Boxes.—72. Each locomotive shall be provided with sand boxes large enough to contain an ample supply for the run or until such time as the supply can be replenished.

Gathering Locomotives.—73. Gathering locomotives may be operated with a single-conductor trailing cable if the track is thoroughly bonded; otherwise double-conductor trailing cable must be used.

74. The trailing cable of gathering locomotives shall be provided with an approved* insulated hook or other device for making connection to the trolley wire, and if a double-conductor cable is used a similar hook or device shall be provided for making connection to the track rail.

Storage Battery Locomotives.—75. Storage battery locomotives may be used in gaseous places* in a mine if the locomotives have been approved as explosion proof* by the Federal Bureau of Mines.

Underground Transformers.

See "Underground stations,*" and Rules 80 and 81.

DIVISION 4.—CIRCUITS AND CONDUCTORS.

Protection and Control.

Protection of all Circuits.—76. All circuits shall be provided with current-rupturing devices of such capacity, and so installed that the current in any part of the circuit can not exceed the carrying capacity of that part as defined by Rule 16.

*Protection of Circuits Leading Underground from Generating Stations.**—77. Every direct or alternating current circuit leading underground from generating stations* or substations* and operating at a potential* not exceeding the limits of medium voltage* shall be provided above ground with a switch in each conductor and an automatic overload circuit breaker in at least one conductor (the underground side), in the case of direct-current circuits, and in each conductor of alternating-current circuits with trip coils in at least two phases. Each such circuit shall be provided with a suitable ammeter. Where the load on the circuit does not exceed 50 kilowatts, or where it can be

shown that the maximum short-circuit current can not exceed 500 amperes, the circuit may be protected by a switch in each conductor provided with National Electric Code fuses of proper capacity and no ammeter need be provided.

78. Every alternating-current feeder circuit leading underground from a generating station* or substation* and operating at a potential* exceeding the limits of medium voltage* shall be provided at the generating* or substation* above ground with a disconnecting switch and an oil-break switch in each conductor, such oil-break switch or switches to be equipped with an automatic overload trip having a trip coil in at least two phases. Each such circuit shall also be provided with a suitable ammeter.

Protection of Bore-Hole Transformers† Installed on the Surface.—79. Circuits entering bore-hole transformers shall be protected at generating* or substations* as prescribed in Rule 78, and shall be protected at the transformer with an oil switch or with approved* air-break switches and fuses. Circuits leaving bore-hole transformers need not be provided with either switches or fuses if these are installed at the places where power is used underground.

Protection of Underground Transformer Circuits.—80. All transformers shall be equipped with automatic current-interrupting devices in at least the primary side of the transformer; and also in the secondary side of the transformer if the current-interrupting devices in the primary are not readily accessible from the transformer.

81. When the potential* of circuits entering or leaving underground transformers exceed the limits of medium voltage,* current-interrupting devices shall consist of an oil-break switch in each conductor, and each switch shall be provided with an automatic overload trip.

82. When the potential* of circuits entering or leaving transformers does not exceed the limits of medium voltage,* their protective devices may consist of an oil-break switch, as described above, or of a knife switch and automatic circuit breaker in each conductor, except that approved* fuses may be substituted for circuit breakers.

Maximum Resistance of Circuits.—83. The resistance of any circuit shall not be so great that complete short-circuit at any point will fail to operate the current-rupturing device that protects the circuit.

Installing of Surface Circuits.

Surface Transmission Lines.—84. Power wires shall not be placed on the same cross arms with telegraph, telephone, or signal wires. When placed on the same pole with such wires and below them the distance between the two inside pins of each cross arm carrying power wires shall not be less than 26 in.

85. Transmission lines operating at potentials* in excess of 5,000 volts shall not be placed on the same poles with telephone circuits that are or can be connected underground unless the telephone lines are provided with approved* protective devices that are capable of preventing the higher voltage from entering the underground telephone circuits.

Surface Trolley Lines.—86. All surface trolley lines shall be kept at least 6 ft. above the top of the rail, and shall be protected* at all regularly provided crossings by a guard that will prevent men from coming in contact with the wire either directly or by bringing tools in contact with the wire.

87. That part of the trolley circuit used for surface operations shall be so arranged that it can be entirely disconnected from the power supply without cutting off the current inside of the mine or interfering with the operation of other apparatus not a part of the trolley system.

88. Trolley wires shall not be smaller than No. 0 B. and S. gauge copper wire or No. 4 B. and S. gauge silicon-bronze wire, and shall withstand easily the strain put upon them when in use.

89. Trolley wires shall have double insulation from the ground unless an approved* single insulator is used. In wooden pole construction the pole will be considered as one insulation.

Methods of Carrying Circuits Underground.

Suspension in Shafts.—90. All power conductors installed in shafts shall be covered with approved* insulating material throughout or protected* in an approved manner, and shall be firmly fastened to or suspended from properly supported insulators, unless the conductors are sheathed with lead or enclosed in conduit. Conductors used as returns in shafts for ground return* systems shall be supported on insulators, but need not be covered with insulation.

91. Shaft cables that are so constructed that the whole or any part of the cable is not self-sustaining shall be supported in an approved* manner at such intervals as may be necessary to prevent the occurrence of undue strains in sheath, insulation, or conductors.

92. Shaft cables shall be so placed or protected that they are not liable to injury from falling material.

Suspension in Boreholes.—93. All power conductors installed in boreholes shall be covered with insulation and supported in an approved* manner that shall prevent the occurrence of undue strains in sheath, insulation, or conductors.

94. Telephone or signal wires shall not be installed in the same borehole with power wires unless either the signal or the power conductors in the borehole are encased in metallic coverings that are permanently grounded.*

Entrance of Conductors Through Drifts or Slopes.—95. Low and medium voltage* power conductors in drifts or slopes may be installed bare, but shall be carried on suitable insulators securely fastened to the sides or roof of the entry. If the drift or slope is used for travelling, the conductors shall be protected* as required in Rule 102.

† A borehole transformer is a transformer installed out of doors on the surface near the borehole through which the secondary circuit enters the mine.

Installation of Underground Power Circuits and Conductors.

96. All joints in wires shall be made electrically and mechanically efficient either by the use of an approved* mechanical connector or by soldering.

97. Underground conductors will not be considered as shock proof* unless they are encased in metallic covering that is thoroughly grounded.*

98. Low and medium voltage* conductors shall be carried at least 6 in. from the trolley line, and on the nearest rib side of it, and shall be supported on insulators of an approved* type. When the height of the entry does not exceed 5 ft., the insulators shall be placed not more than 20 ft. apart, and as much closer as is necessary to support the wires properly.

99. If the height of the entry is more than 5 ft., the insulators shall be placed not more than 30 ft. apart, and as much closer as may be necessary to support the line properly.

100. High voltage* conductors shall be carried in metallic coverings, and shall be installed in an approved* manner, with special reference to the conditions under which they are installed.

101. The negative or return wire of grounded* systems shall be treated in exactly the same manner as the positive or live* wire, and afforded the same support and insulation.

102. All conductors in travelling ways, except haulage roads used for travelling (see Rule 13) and medium voltage* conductors in room entries shall be protected* throughout that part of the entry that is used for travelling, unless the conductors are at least 6½ ft. above the rail, in which case protection* will be necessary only at those points where men are required to work beneath the conductors or pass under them. The insulators may be supported directly from the roof or side, or may be attached to timbers not less than 3 by 4 in. in size, or may be secured to steel mine timbers. The insulators shall be placed so that the height of the conductors above the bottom will be comparatively uniform.

103. All conductors shall be strung with the least practicable sag between the supporting insulators, and shall be maintained in this condition and kept from contact with rock, coal, timber, or other non-insulating material.

104. All main conductors shall be sectionalised by knife-blade lever switches at points not more than 2,500 ft. apart.

105. If there are gaseous places* in the return air courses of a mine, electric circuits shall not be carried in such air courses.

Branch Conductors.—106. Branch conductors shall be supported and maintained in the same manner as main conductors, and given the same protection.

107. At the point where branch circuits leave the main circuits there shall be placed a switch that will cut off all current from the branch circuits.

108. The conductors of branch circuits for operating mining machines shall be not smaller than No. 4 B. and S. gauge copper wire. The conductors of pump circuits shall be not smaller than No. 8 B. and S. gauge.

109. Where wires pass through partitions or wooden or other brattices they shall be protected with porcelain tubes held in place with tape or thoroughly cemented in place so that they cannot move.

110. Entries or passageways in which wires are installed must be kept sufficiently free from rock, slate, or other material to permit ready access to the wires at all times.

Room Wiring.†—111. In gaseous places* rooms shall not be wired, and in non-gaseous places all room wiring shall be treated as a branch circuit and equipped at the room entrance with switches or some other device that will entirely disconnect the wiring when not in use.

Trolley Wires.—112. Trolley wires shall be of hard-drawn copper not smaller in size than 1/0 B. and S. gauge, and shall be securely supported on approved* hangers, which may be attached directly to the roof or securely fastened to timber or equivalent.

113. The height of trolley wires above the top of the rail shall be made as uniform as practicable, and shall in no case be more than 20 per cent. above or 20 per cent. below the average height.

114. Trolley wires shall be placed at least 6 in. outside of the rail, kept in as straight a line as possible, and installed on the side of the entry opposite from shelter holes or travelling way or space.

115. On straight runs the hangers shall be placed not more than 20 ft. apart where the height of the roof above the track is 5 ft. or less and not more than 30 ft. apart where the roof is more than 5 ft. above the track. On curves the hangers shall be placed so close together that the trolley wire at any one hanger may be entirely disconnected without exposing the locomotive runner to danger of contact.

116. Underground trolley lines shall be sectionalised every 2,500 ft. by placing in the line a switch by which the line can be entirely disconnected from the power supply. All branch trolley lines shall be provided with a frog at the point where they leave the main, and also with a switch installed at or near the frog, by which the branch can be disconnected from the main.

117. Trolley wires that are less than 6½ ft. above the top of the rail shall be protected* at all points where men are regularly required to work or pass under them and at all points where men may come in contact with the wires.

Bonding.—118. The tracks of all main haulage systems that use a rail return shall be bonded at every rail joint, and cross bonding shall be placed at intervals not exceeding 200 ft. Special provision shall be made for bonding around all switches, frogs, or openings in the track so as to ensure a continuous return.

Trailing Cables.—119. Trailing cables for portable machines shall be specially flexible, heavily insulated, and protected with extra stout braiding, hose pipes, or other effective covering. (See also Rule 74.)

† The Bureau recommends that rooms be not wired.

120. Each trailing cable in use shall be examined daily by the machine operator for abrasion and other defects, and he shall also be required to observe carefully the trailing cable while in use, and shall at once repair any defect or report it to the person in charge of electrical equipment.

121. In the event of the trailing cable in service breaking down or becoming damaged in any way, or any person receiving a shock from it, it shall be at once put out of service. The faulty cable shall not again be used until it has been repaired and tested by an authorised person.*

122. The trailing cable shall be divided at the motor, but only for such length as is necessary for making connection to the motor, and the cable, with its outer covering complete, shall be clamped securely to the motor frame in such a manner as to protect the cable from injury and to prevent any mechanical strain being borne by the single ends that make electrical connection to the motor.

123. In gaseous places* in a mine, a fixed terminal box shall be provided at the points where trailing cables are attached to the power supply. This terminal box shall be explosion-proof* and shall contain a switch and fuse in each conductor of the circuit. The switch shall be so arranged that it can be operated only from without the box when the box is completely closed, and the switch shall also be so constructed that the trailing cables cannot be attached or removed when the switch is closed.

*Lighting Circuits in Non-Gaseous Places.**—See also Rules 137 to 139, 141, and 143.

124. Lighting wires shall be attached to power wires by soldering or by fastening under a set screw in a lug attached to the trolley hanger, or by such other devices as will prevent the wires from becoming loose.

125. All wiring shall be supported on non-combustible, non-absorptive insulators, which shall separate the wires by at least an inch from the surfaces wired over. Wires of opposite polarity shall be kept at least 5 in. apart.

126. No wires smaller than No. 14 B. and S. gauge shall be used for lighting circuits in non-gaseous places.

127. When the ground is used as a return for lighting circuits the return wire shall be attached to the track by bonding to the rail or by attachment to regular bonding in an approved* manner. This ground connection shall be made of not less than No. 8 B. and S. gauge copper wire, which shall be buried below the surface and carried to the side of the entry and thence on porcelain insulators to the roof or a point at least 5 ft. above the track.

Lighting Circuits in Gaseous Places.†*—See also Rules 140, 142, and 144.

128. The potential* of lighting circuits in gaseous places* shall not exceed the limits of low voltage.

129. Lighting circuits in gaseous places* shall consist of conductors enclosed in a metallic sheath permanently grounded* or of insulated wires completely enclosed in metallic conduit permanently grounded* and sealed.

130. The circuits shall be run from the outside with all switches and protective devices on the surface, or by using switches, fuses, or circuit breakers enclosed in explosion-proof* casings situated underground, or by ventilating with fresh air the place where the switches and fuses are installed.

131. If the circuits are run from the outside with the controlling devices installed on the surface, the conductors leading underground shall be not smaller than No. 8 B. and S. gauge, and each circuit shall be provided above ground with a suitable ammeter.

132. Each circuit shall have a double-pole switch and fuses or circuit breakers in the case of two-wire systems, and a three-pole switch and fuses or circuit breakers in the case of three-wire systems.

133. The fuses or circuit breakers shall be designed or arranged to operate when the allowable load is exceeded by 25 per cent.

134. No wire smaller than No. 12 B. and S. gauge shall be used in lighting circuits in gaseous places* except for the leads of weatherproof sockets, and these shall not be less than No. 14 B. and S. gauge.

135. In case distribution is made from a point underground, the distribution switches and fuses shall be mounted on a non-combustible panel mounted in a metal cabinet and fitted with a hinged door. This cabinet shall be used whether explosion-proof* switches are required or not. The cabinet shall be fitted with a door properly hinged so that it will close tightly and shall be provided with a fastening that will hold the door securely in a closed position.

136. Flexible lamp cord connections are prohibited, except for portable lamps,* as covered by Rule 145.

† The Bureau of Mines recommends that in mines in which firedamp is given off, or is liable to be given off, in dangerous quantities, the use of lighting circuits be confined to those entries and places that are ventilated by intake air currents which have not passed by or through abandoned or active workings, except that a lighting circuit may be used in a shaft or slope bottom ventilated by a return air current, in which the percentage of methane does not exceed 1 per cent.

(To be continued.)

American Coal Exports.—According to advance figures of the United States Department of Commerce, the exports of bituminous coal from the United States in April last amounted to 1,389,757 tons, valued at 4,672,975 dols., as compared with 1,247,178 tons, valued at 2,924,759 dols. in April 1916. For the 10 months ending with April 1917, the exports were 15,411,505 tons, valued at 42,569,705 dols., as compared with 14,704,075 tons, valued at 36,288,471 dols. for the 10 months ending April 1916. In April last, 586,415 tons of anthracite, valued at 3,421,544 dols., were exported, as compared with 218,982 tons, valued at 1,163,775 dols., in April 1916. For the 10 months ending with April 1917, 3,603,952 tons, valued at 20,232,326 dols., were exported, as compared with 2,913,259 tons, valued at 15,295,940 dols., for the 10 months ending with April 1916.

THE DOWN DRAUGHT SMOKELESS BOILER.*

By A. BEMENT.

The Hawley down draught furnace has two fire-grates: the upper composed of pipes, which are connected to the boiler, and through which water circulates; whilst the lower is an ordinary grate, which may be a shaking grate or not. The fire is on the upper water grate, and burns downward. Fresh coal is placed on the top of the fuel bed, and the volatile gases which are distilled from it must pass, together with the air for combustion, down through the incandescent portion of the fuel bed, where complete combustion is assured, because the volatile combustible matter and the air are forced together during their passage through the hot zone. A considerable quantity of live coal falls from between the water bars on to the lower grate, where they are burned; all the volatile having been distilled from them, they, of course, do not smoke. The ashes also fall from the upper on to the lower grate.

The theory of the down draught furnace has certain advantages, inasmuch as when properly applied and operated it is the best of all coal burning methods, is absolutely smokeless, using any coal, gives no clinkers, and produces most economical combustion.

The requirement for efficient combustion of bituminous coal is that the volatile matter be thoroughly mixed with the air at high temperature. This occurs with the down draught principle, as the volatile which is distilled from the upper layer of freshly-ignited coal must pass in many finely divided streams between the incandescent coals in the bottom of the fire. At the same time, the air must take the same path, with the result that it is brought intimately and immediately in contact with all the volatile carbon, oxidising it to carbon dioxide, which is symbolised as CO₂. This performance differs from that of an automatic mechanical stoker, with which coal is supplied at a uniform rate, and from which the combustible gas rises in the form of masses of flames, which must be kept hot by means of a combustion chamber until their combustion is completed. Thus the stoker does not produce immediate complete combustion at or in the fuel bed, the burning of the gases being a supplemental or secondary performance.

The second advantage, that of smokelessness, is a feature that must be considered seriously in connection with the mode of firing. If properly fired, there can be no smoke, but it may easily be so fired that it will smoke outrageously. As the fire lies quietly on the upper grate, it burns absolutely without smoke. The fuel bed, however, after a time becomes caked and fused together, with the result that the rate of combustion drops below requirements. When this occurs, the fire should be loosened up, by running a long slice bar under the fire, along the water bars, clear to the back of the furnace. The bar should then be pressed down just enough to prise up the fuel bed, sufficient to crack the caked masses just enough to open air passages, but not enough to disturb the condition of the fire. This slicing should be extended across the furnace till the entire bed has been freed and made porous. The insertion of the slice bar will cause some incandescent coals to fall down to the lower grate, where they will be burned later. The slice bar will also dislodge the accumulated ash, which will drop to the bottom of the grate. After the slicing is finished, the hot coals on the bottom grate will rest in irregular piles. These should be levelled off with a rake or hoe, so that the fire on this grate will be perfectly level and uniform. After this has been done, the fuel bed on the top grate should be replenished by the addition of fresh fuel, which will complete full cycle of operation. The frequency of these cycles will depend on the load on the boiler. When much steam is required, they should be produced at correspondingly frequent intervals; when little steam is needed, at correspondingly long periods.

Having described proper firing, it is necessary to explain how the furnace may be, and is often frequently improperly fired. Often the slice bar is only run part way back, then the fire is much broken up and turned upside down on the front, with the result that much green coal falls to the lower grate, where it lies in piles, and, burning there, makes much smoke, while the back of the fuel bed, not being disturbed, cakes up and at the same time allows the ashes to accumulate, which cause the fusing into clinkers. This results also in reducing the capacity of the furnace and producing a mass of clinkers, which must be dug out sometimes with much labour. In other instances, the entire fire is violently sliced, the fuel bed from front to back turned upside down, with the result that much green coal drops to the lower grate, producing a great quantity of smoke. Sometimes the fuel bed is not sliced at all, or, if it is, only at long intervals. The result of this is that the fire seals up, clinkers form and cover the water bars, till not enough steam is made to satisfy demands. Then fresh coal is shovelled on the lower grate, and the furnace is operated the same as any plain grate. It is under this latter condition that enormous volumes of smoke are made.

Ability to use any kind of fuel that may be available is always desirable, especially under present conditions, and particularly so under conditions that will exist in the near future. This is a strong point of the down draught furnace. It can use bituminous, lump, egg, mine-run or screenings successfully, as well as semi-bituminous, all on the top grate in the regular way. Coke may be used as well as coal. Anthracite may be burned on the lower grate if it is not too fine for the upper fire, as it does not smoke. Under the best conditions, the fire door for the upper grate is closed tight. The best size of bituminous coal is large nut. The second choice is egg or small nut. The third choice is lump. The fourth choice is mine-run. Clinker trouble is always an evidence of bad

* Black Diamond.

With proper manipulation, no clinkers are formed on the top grate, even with the dirtiest of fuel. If the fire is properly sliced, all the ash is removed and fall to the bottom grate, where it is removed. Some extent fuse together in small clinkers, but these are readily removed, as this fire is easily cleaned.

The down draught fire is very easily cleaned. As all the ash falls to the bottom grate, it may be raked out without in any way disturbing the main fire, which is on the water bars above. The best method of cleaning, however, is to remove a portion of the ash each time the fuel bed is sliced. Just before slicing, the small clinkers should be raked out from the bottom grate, and a portion of the ashes may also be removed. The remaining ashes and fire should be well spread and levelled. Then when the top fire has been sliced, the hot coals which have fallen from the top fire should be well spread and levelled. If all the ashes are cleaned off, too much air will flow through the bare grate and reduce the efficiency. So it is best to maintain a thin bed of ashes to exclude this excess of air.

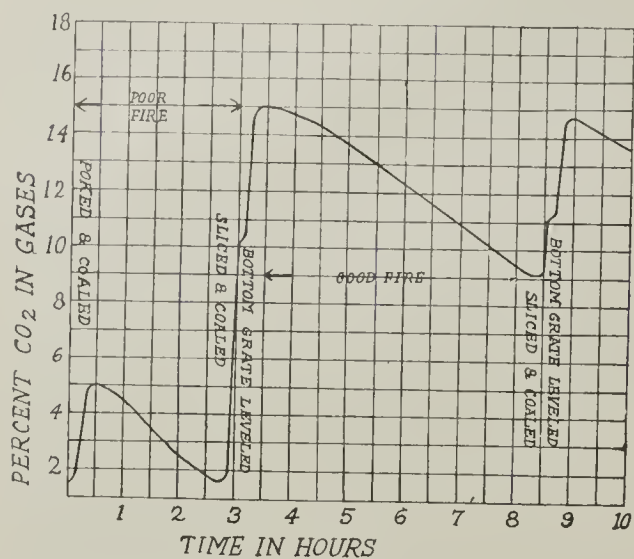


FIG. 1.

The control of the air supply is one which has the most important bearing on economy. Out of the circa 21 per cent. of oxygen in air, three parts are used for combining with the hydrogen in the coal, and there remain 18 parts for the carbon. If analysis shows 18 per cent. CO_2 , we know immediately that we have used all of our air in combustion. This would be a perfect condition, the maximum efficiency of combustion, which could be no better. If, however, analysis shows 9 per cent. CO_2 , we know that air is in excess by 100 per cent. If we get 4.5 per cent. CO_2 , we know that we have supplied four times the air needed, or 400 per cent. If 2.4 CO_2 , eight times, or 800 per cent.

In a boiler, practically all the heat which does not go into the boiler escapes in the hot gases to the chimney. Therefore, if we use eight times as much air as necessary, we have eight times more gases to go to the chimney; consequently eight times as much heat wasted. The diagram (fig. 1) contains a curve illustrating heat losses to the chimney for different percentages of CO_2 . It shows that when CO_2 gets down to about 1.5 per cent., the coal being burned does no work at all. An extreme condition, of course, but one which for comparatively short periods often exists.

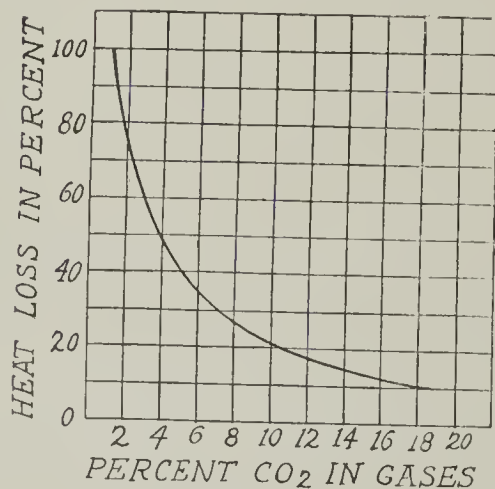


FIG. 2.

To secure the best results, a sufficiently thick fire must be maintained on the upper grate, to ensure that there shall always be an ample supply of combustible to satisfy whatever amount of air may flow through it. In this way the fire bed becomes a fuel magazine, always ready to respond to any demand, or to lay semi-dormant.

The proper thickness of fire depends on the size of the coal. Screenings, being a small fuel, make a compact bed, consequently it need not be very thick. Lump coal being a large fuel, the fire must be very thick, or else air will flow through the spaces without coming in contact with burning fuel. Mine-run coal, composed of both large and small sizes, should be maintained at a thickness midway between that for lump and screenings. Holes should never be allowed to form in the fuel bed. The fire on the bottom grate should be kept level and uniform.

The draught opening at the fire door of the upper grate should be adjusted to give the capacity required. The draught door below the lower grate should be adjusted to give only sufficient air to uniformly burn the fuel. If too much draught is allowed, the fire will burn away, and leave a bare grate. If draught is too little, the fire will accumulate on

The manipulation of draughts, together with the stack damper, either by hand or automatically to correspond with the load on the boiler, will always give an economical and satisfactory result if the fire is kept at suitable thickness and in proper condition.

The effect of good and bad firing is illustrated by the curve of CO_2 in fig. 1, showing combustion with different kinds of firing over a period of 10 hours. At the start, CO_2 was 1.5; a little careless poking and coaling caused it to rise to 5. That it went no higher was because there were holes in the fire and the bottom grate was not levelled, with the result that in less than three hours CO_2 had dropped again to a point at which no steam was produced in the boiler. This interval on the diagram is indicated as poor firing. The heat loss for different periods is shown by the second diagram (fig. 2).

At the end of the three-hour period, after some clinkers had been removed from the bottom grate, the fire was properly sliced and cooled, which resulted in a rise of CO_2 to 10. The coal on the bottom grate was levelled and draughts set which put it to 15. After which combustion proceeded for about six hours, at which time it had dropped to 9 per cent., when the process was repeated. This shows good firing, with an average of 12 CO_2 and an efficiency of 82 per cent., while the poor condition averages 3 CO_2 , with an efficiency of about 35 per cent.

COAL CONCRETED FROM DUSTS OR ASHES.*

By R. GOULBURN LOVELL.

There are three methods of making the fuel, described in the author's previous paper†. Two of them (A and B) may be termed dry processes, and employ as aggregates ashes and coal dust, these being sifted to remove the fine dust which is of little or no value. The coarse aggregate, composed of all between $\frac{1}{4}$ and $\frac{1}{2}$ mesh, is dried, sprinkled with a special sugar-waste solution and again dried. The fine aggregate is taken from the coal-cellular dust, only that which passes $\frac{1}{4}$ -inch mesh being used. These two bases should be intimately mixed with the matrix or binder, in any suitable utensil, or by hand.

TABULATED ANALYSES.

Name.	No.	Volatile matter.	Coke.	Ash.	Fixed carbon.	B.T.U.'s of bases.	B.T.U.'s of component parts.	Percentage of raw material as finished fuel.	B.T.U.'s of resultant fuel.
Anthracite dust	64 An. B.	13.26	84.92	12.16	72.76	—	12,775	91.38	12,570
" " Bases	73 An. C.	5.78	91.77	6.42	85.35	13,660	—	—	—
" " Bases	68 An. P.B.	13.57	84.38	21.52	62.86	—	12,027	99.02	11,870
Anthracite and peat	69 An. P.C.	5.45	91.63	6.20	85.43	13,690	—	—	—
" " Bases	69 An. P.C.	23.82	74.04	20.76	53.28	—	8,272	92.80	8,150
" " Bases	69 An. P.C.	17.34	76.57	15.22	61.35	7,650	—	—	—
" " Bases	69 An. P.C.	22.7	75.39	22.98	52.41	—	8,280	96.55	8,170
Ashes and peat	66 A.P.B.	17.41	76.71	15.31	61.40	7,830	—	—	—
" " Bases	66 A.P.B.	21.16	77.10	51.42	25.68	—	6,786	98.22	6,690
" " Bases	74 A.P.C.	12.41	85.32	56.18	29.14	5,340	—	—	—
" " Bases	74 A.P.C.	80.23	67.20	42.38	24.82	—	6,520	98.25	6,435
Ashes and coal dust	62 A.L.B.	16.29	81.21	48.78	32.43	6,360	—	—	—
" " Bases	62 A.L.B.	15.44	83.95	27.57	56.38	—	9,041	98.05	8,910
" " Bases	72 A.L.C.	5.17	92.78	35.96	56.82	8,890	—	—	—
" " Bases	72 A.L.C.	16.86	82.13	38.64	43.49	—	8,094	97.14	7,980
Kent coal dust	59 S.B.	5.15	92.75	56.20	56.55	8,870	—	—	—
" " Bases	59 S.B.	29.32	69.54	21.30	48.24	—	11,422	98.35	11,350
" " Bases	58 S.C.	25.22	73.41	20.20	53.21	11,870	—	—	—
" " Bases	58 S.C.	30.83	67.53	24.86	42.67	—	10,375	99.58	10,230
Kent coal dust and washings	60 S.B.	25.22	73.41	20.20	53.21	11,870	—	—	—
" " Bases	60 S.B.	18.26	80.96	59.14	21.82	—	5,669	98.62	5,580
" " Bases	61 S.C.	11.52	87.64	65.68	21.96	4,440	—	—	—
" " Bases	61 S.C.	19.98	79.15	57.72	21.53	—	4,400	93.33	4,980
London Coke	57 L.B.	11.62	87.49	64.90	22.59	4,460	—	—	—
" " Bases	57 L.B.	21.40	77.69	23.96	53.73	—	11,261	96.10	11,110
" " Bases	71 L.C.	8.20	89.95	17.94	72.01	11,620	—	—	—
" " Bases	71 L.C.	15.43	83.10	30.29	52.81	—	10,107	98.86	9,980
" " Bases	71 L.C.	8.12	89.99	17.88	72.11	11,640	—	—	—

Note.—The percentage of raw material in the resultant fuel should be observed.

Up to this point A process and B process are exactly the same. Process A is employed wherever the sun has much value, or where heating-chambers are available. The mixed aggregates and binder have in some cases a small quantity of creosote oil added, placed into moulds, and allowed to concrete, the time, of course, varying with the amount of heat available. The fuel, when cold, is emptied out of the moulds, broken up, and is hardened by exposure to the atmosphere.

With process B, the creosote oil, if used, is placed in a pan, the mixture of bases and matrix is added and placed upon a fire and stirred until a temperature of about 120 degs. Fahr. is obtained, when the whole is emptied into any mould, such as an old pail or bath. In a short time it is cold, and is emptied out, broken up, and allowed to harden.

Process C is a wet process in which there is no need to dry the aggregates. They are mixed as before, but with a different matrix mixture; the creosote oil, if used, being added and well mixed and the whole then moistened with the solution until a consistency of mortar or concrete is obtained. It is then emptied into shallow moulds, or between sheathing boards, and dried by exposure, but with protection from the wet.

In all three processes the character of the matrices varies with the character of the aggregates, and the different aggregates have to be treated in different methods. It is usually found that in most cases the smoke of the resultant fuel can be diminished by an increase of the remaining ashes; in the case of furnace fuels the clinkering can by this means be diminished. This method of concreting fuel dispenses with any kind of pressure beyond a slight tamping into moulds.

Process A is more particularly suited to climates favoured with a succession of sunshine, or to industrial concerns having ovens or heating-chambers where the

moulds and their contents could remain for twenty minutes or half an hour. For low-grade cokes, coals, or bar ashes process A is the best method.

Process B is suited for any form of rotary asphalt plant, either fixed or movable. Many road construction firms have plenty of these portable heaters, which are possibly unemployed owing to the war. These could be taken to any dumps of coal slack, coke dust, or cinders, and very quickly transformed into a good fuel.

For all materials high in carbon but low in volatile matter, process B is the best method.

Process C is the cottager's process of producing coal in his own back yard. Of course, it would be better for a community to send its ashes and dusts to a central depot, and there have it done under proper supervision, but there is nothing to prevent an isolated individual or firm from utilising their waste materials by this process.

The ordinary form of concrete-mixer could be taken to any dumps of waste material in the same way as the ordinary asphalt-mixer can be employed as before described. For high-grade cokes, high-grade bituminous coals, or a mixture of the latter with ashes, peat, sawdust, etc., process C is the best method.

The following tabulated statement shows the analyses of seven different types of fuel made under the three processes, together with the calorific values of their component parts. The thermal values were determined by the Mahler bomb calorimeter.

The resultant fuels will light from the sticks, incandescence and flare. This is, perhaps, more remarkable in the case of anthracite dust. There are many collieries where fine coals are produced to-day in abnormal quantities, due to unusual friability, as, for instance, the Kent coal shown in the tabulated statement, the percentage of slack being over 70 per cent. of the total; but, by the process described, fuel can be economically made equal in value to the large coal worked in the same seams. By utilising this mine to its full extent, the Coal Controller's problem of transport in Kent and Sussex would be very much diminished.

The briquetting method of utilising coal slack requires a pressure of 200-1,500 atmospheres, the construction of costly machinery and plant, and the slack has to be transported to the briquetting factories. The concreting process, on the contrary, enables the simple machinery and plant to be taken to the dumps of slack, thus saving

at least one lot of handling and transportation. The concreted fuel is manufactured *in situ*. Further, it is submitted a better fuel is produced—one which lights from the sticks, incandescence and flares. The rough, fractured surfaces not only help in the ignition, but having more the appearance of Nature's coal, they help in stimulating the confidence of the purchaser.

It is even suggested that on board ship the bar-ashes from the furnaces and the coal dust from the bunkers can be easily concreted into fuel with a calorific value of about 11,000 B.T.U.'s.

Irish Peat Deposits.—The Fuel Research Board, with the sanction of the Committee of the Privy Council for Scientific and Industrial Research, has appointed a Committee of Enquiry into the utilisation of Irish peat deposits. The following appointments have been made to the Committee: Sir John Purser Griffith, M.A.I.M.Inst.C.E. (chairman), Prof. Hugh Ryan, M.A., D.Sc., F.I.C., Prof. Sydney Young, D.Sc., F.R.S., Mr. George Fletcher, Prof. Pierce Purcell, M.A.M.A.I., Assoc.M.Inst.C.E. (secretary). All communications should be addressed to the secretary, the Peat Enquiry Committee, University College, Dublin.

Transvaal Coal Combine.—The Johannesburg correspondent of the *Financial Times* cables (July 20) that Henderson's Transvaal Estates has concluded an agreement for the purchase of the Rand Selection Corporation's (late Transvaal Coal Trust) coal interests, consisting chiefly of the Oogies Colliery. It is proposed immediately to form a new company, to be known as the Tweefontein United Collieries, with an initial capital of £130,000, and eventually to absorb the Tweefontein Colliery and Henderson's Colliery adjoining. The output of the pits will be allotted on the basis of the existing trade of 100,000 tons per month. A year's time is allowed in which to complete the necessary arrangements. The Transvaal Coal Owners' Association agreement has been renewed for a period of five years.

* From paper read before the Society of Architects on July 26.
† Colliery Guardian, June 8, 1917, p. 1077.

MINERS' FEDERATION CONFERENCE.

The annual conference of the Miners' Federation of Great Britain was opened in the Central Hall, Glasgow, on Tuesday, the 24th inst., under the presidency of Mr. ROBT. SMILLIE.

In his inaugural address, the PRESIDENT said that the Federation had urged again and again that the mines should become public property owned by the nation, and worked in the interest of the nation, but the Government had only taken over control of the output. It was necessary something should be done by the Government so as to avoid a repetition of the shortage of coal among the poorer classes last winter.

Wages.

In taking over the control of the mines the Government had had to enter into arrangements with the employers which had not yet been made clear to the general public; but he understood that, under certain limitations, the mine owners would be secured of their pre-war profits whatever the price of coal might be. That condition removed the general wages question from the haggling of conciliation boards, and put the onus on the Government of being responsible for the general wage rate of the men. As the Government had guaranteed the owners pre-war profits, the miners, as the most important partners in the industry, were entitled to be placed in an equal position to the employers in that respect. That point had not yet been raised by the men. He did not think he could say more on that matter than that the Government were particularly desirous that anything which might lead to a stoppage should be arranged by the Coal Controller and his Board before a rupture took place. The miners had already given a pledge to the Government, and they would not fail to assist the Coal Controller in that direction, short of compulsory arbitration, which they would not have. The miners were not now discussing an increase in wages from a selfish point of view. They recognised that because they were powerful and well organised they could, at any time they wished, force an increase in wages. They knew they had that power. They did not desire to use it in the present crisis. They had abstained from forcing on the employers or the Government any unreasonable claims. Supposing the miners and other organised branches of industry were able to increase their wages up to the limit of the increased cost of living it would only make the position of their fellow workers in other industries worse than ever. They would prefer that the cost of living should go down rather than wages should go up. Their claim was indeed a belated one. It ought to be remembered that in many districts, in spite of the fact that they were called agitators, they had been doing all they could to hold their people back against claims for an increase of wages. One of two things must happen, either the cost of living must be reduced or else wages must go up.

Industrial Unrest.

There had been during the war considerable industrial unrest, and the Government had wisely appointed a Commission to enquire into the real cause. In the admirable summing up of the reports of the various Industrial Commissions made by Mr. George Barnes, they would find there was not a suggestion that either agitators or German gold was responsible for the unrest.

On the motion of Mr. J. MCGURK (Lanarkshire), seconded by Mr. WINSTONE (South Wales), a vote of thanks was accorded to Mr. Smillie for his address.

On the motion of Mr. T. GREENALL (Lancashire), a vote was passed condoling with the family of the late Ald. Wm. House, vice-president of the Federation.

Demand for Increased Wages.

At the afternoon sitting, which was held in private, the conference instructed the executive to formulate an immediate demand for a general increase of 25 per cent. on the present rate of wages for the whole Federation to meet the high cost living.

Nationalisation of Mines.

Wednesday's session opened with a resolution in favour of the nationalisation of mines.

Mr. JAMES DOONAN (Scottish Miners) proposed, "that the mines and minerals of the country should be owned and controlled by the State, and that the executive should press for its realisation." The workers desired that the change should be brought about in a way which would not risk the charge of confiscation, and proposed to purchase out the present owners by a system of payment spread over a number of years.

Mr. W. RICHARDSON (Durham), who seconded, believed that the chief advantage of nationalisation would be to the consumers.

Mr. W. WHITEFIELD (Bristol) said that the consuming public would not permit prices to be played with once the mines were nationalised. Therefore, he hoped by that time the miners would be in a position to enforce all reasonable and just claims of labour.

Mr. CAIRNS (Northumberland) supported the proposal by reason of the economic waste of coal under the system of working the pits by private owners, whereby millions of tons of coal were left unworked.

The resolution was carried.

Old-Age Pensions.

Mr. S. ROEBUCK (Yorkshire) moved that the Federation press the Government to increase old age pensions to not less than 10s. per week, and reduce the age limit from 70 to 60 years.

Mr. L. SPENCER (Nottingham) said the Nottinghamshire Miners' Association was to-day supplementing the State pension by a pension to their aged members to the extent of £8,000 a year, and their members were contributing 1d. a week to give a further 2s. 6d. to all their aged members.

Mr. S. FINNEY, M.P. (North Staffordshire) remarked that in his district they were paying old age pensions of 6s. a week at 60 years under certain conditions, and when the men reached the age of 70 and applied for their State old age pensions they often had their pensions reduced in amount.

The resolution was carried.

Industrial Housing Problem.

The Yorkshire Miners' Association had a proposal instructing the executive, in view of the great shortage of working-class houses and the consequent menace to the health of the people, to urge the Government to secure adequate house accommodation by making it imperative for the local authorities to carry out suitable housing schemes to meet the needs of their areas, failing which the Local Government Board be compelled to carry out the work.

Mr. POTTS, in moving the resolution, said that to meet the housing needs of the country would involve an expenditure of £250,000,000 sterling. The grant of £4,000,000 made by the State was absolutely of no value.

After remarks by several speakers on the bad housing accommodation in various districts and the consequent high infantile mortality, the resolution was carried.

Eight Hours Day for Surface-men.

Mr. W. CARTER, Nottingham, moved that an attempt should be made to have the Coal Mines (Eight Hours) Act amended to apply to all persons working in and about the mines, and to allow every person not less than half-an-hour for meals in each working shift. In Nottinghamshire they had obtained by arbitration an eight hours day for several grades of surface workers.

Mr. CAIRNS (Northumberland) pointed out that in Northumberland many of their men only worked 6 to 7½ hours a day, and he protested against any resolution for a universal eight hour working day.

The resolution was carried.

Holidays to be Paid for.

The Derbyshire Miners' Association brought forward a proposal that all workers in or about mines who made not less than 250 attendances in the year be allowed one week's holiday, to be paid for by the employer.

Mr. DYACK (Cleveland) said that several of the Cleveland companies were paying their workmen for a week's holiday each year.

Mr. S. ROEBUCK (Yorkshire) asked that the 250 attendances should be deleted from the resolution. In the Doncaster coal field, where the men worked under high temperatures, they could not make such an attendance with the conditions under which they worked.

The attendance requisite for a holiday allowance having been deleted, the resolution was carried.

Uniform Rates of Wages.

At the private session, the South Wales miners succeeded in passing a resolution that the miners should take steps to abolish piecework and establish uniform rates of wages.

Stowing Small Coal.

On the motion of Mr. GEORGE BARKER (South Wales), it was decided to bring before the Coal Control Board the enormous national loss caused by the practice of stowing small coal in the workings, with a view of making arrangements for securing that all coal produced should be sent to the surface.

THE AMERICAN COAL TRADE.

At a conference of some 400 bituminous coal operators in Washington, which ended on June 28, it was unanimously agreed to fix the maximum price of 3 dols. per ton for bituminous coal at the mine. Profit of jobbers was to be limited to 25c. per ton. These prices were not to apply on existing contracts or in the export trade, though some Government action on this latter is expected shortly. The agreement naturally caused a violent decline in quotations in the spot market—says *Coal Age* (July 7)—even though Secretary of War Baker issued a statement on June 29 repudiating any confirmation from Government sources of the maximum 3 dols. price fixed at the conference, on the ground that it was exorbitant, unjust, and oppressive. The bituminous market has consequently been completely upset, and the entire situation now hinges entirely on the future action of the Government; in the meantime the trade is marking time, pending further developments. Buying has practically ceased, while receipts at tidewater are increasing and the average detention at Hampton Roads has been substantially reduced. The fact that contracts were exempted from the price limitation arrangement will undoubtedly be a factor in increasing deliveries on these, even though the controversy over the maximum price continues. Another factor in the situation that may be of considerable importance is the diverting of a great many orders to bituminous companies because of the scarcity of anthracite. It will be especially interesting to see how the situation works out for Pocahontas and New River interests. The 3 dols. f.o.b. mine price fixed by the conference was for net tons of 2,000 lb., or 3.35 dols. per gross ton of 2,240 lb., the latter being the spring contract price and the basis on which a very large coastwise tonnage was sold early in the year. In effect, then, it is a scaling down of spot prices to the season contract level of 4.85 dols. f.o.b. Hampton Roads. On commercial coal, therefore, at tidewater, the Pocahontas and New River factors are not likely to be caused any particular embarrassment should this price hold; but there will be more serious effects probably on deliveries to the West, where lucrative prices have prevailed all season. Philadelphia shippers insist that if the car supply had been at all adequate, there would never have been any occasion for any price fixing. The claim is justly made that even with restricted labour conditions they are unable to make the most of the men in the mines. At the present time the bituminous trade is somewhat shaken, as all seem to feel that if the present arrangement falls there will surely be action of some kind taken. Prices per ton f.o.b. cars at mines are: Georges Creek Big Vein, 6 to 6.25 dols.; South Fork Miller Vein, 6 to 6.25 dols.; Clearfield (ordinary), 5.75 to 6 dols.; Somerset (ordinary), 5.75 to 6 dols.; West Virginia, Freeport, 5.25 to 5.50 dols.; Fairmont gas, lump, 5.75 to 6 dols.; Fairmont gas, slack, 5.25 to 5.50 dols.; Fair-

mont lump, ordinary, 5.50 to 5.75 dols.; Fairmont mine-run, 5.25 to 5.50 dols.; Fairmont slack, 5.25 to 5.50 dols.

At Baltimore, the following is what coals are selling for while the Government officials haggle over what the rate is:—Georges Creek Tyson, 5.50 dols.; Somerset, 5.25 dols.; Quemahoning, 5.50 dols.; Clearfield, 5 dols.; Freeport, 4.75 dols.; Fairmont gas, three-quarter, 5.25 dols.; run-of-mine, 5 dols.; slack, 5.25 dols. Coal men here have shown a spirit of willingness to co-operate with the Government plan, while doubting its feasibility. Many say that a 3 dols. maximum would curtail production at a time when coal is badly needed. In the middle of other complicated figuring, the trade here on July 1 faced a change in freight rates. Fairmont and West Virginia coals generally take an all-rail route of 2 dols.; with 1.75 dols. for tide-water harbour coal, and 1.48 dols. for outside the capes, the last being the same as formerly, and the first two a 15c. advance. All other coals, such as Somerset, Myersdale, etc., come under an all-rail rate of 1.75 dols., 1.50 dols. for tidewater, and 1.23 dols. outside the capes, the last being unchanged from the old rating. West Virginia coke is advanced to 1.75 dols., and Connellsville coke to 1.95 dols.

In the anthracite market the aggressive action of the Federal Trade Commission in the matter of prices is creating a general feeling that there is little likelihood of excessive prices being permitted. The current month is regarded as the crucial point in the trade; the assurances of plentiful shipments last month were not made good, and if this proves to be the case the current month also, the trade will go into the winter business with meagre stocks. The prices per gross ton f.o.b. cars at mines for line shipment are as follow:—Broken, 5 dols.; egg, 4.25 dols.; stove, 4.50 dols.; nut, 4.60 dols.; pea, 3.20 dols.; buck, 2.90 dols.; rice, 2.40 dols.; boiler, 2.20 dols.; barley, 1.90 dols.

Freight rates for export coal show very little change; very few charters were affected, and none of any importance reported. Quotations on coal by steamer to Europe are:—West Coast Italy and Marseilles, about 100 dols.; Spain (Atlantic), 30 to 36 dols.; Spain (Mediterranean), 32.42 to 38.40 dols.

MINERS' WAGE BONUS DEMAND.

The question whether the wage proposal of the Miners' Federation of Great Britain for a further bonus of 25 per cent. on actual wages to the million men and boys employed in the British coal fields will be settled by the Food Controller or the Coal Controller, has been the subject of eager discussion among the delegates to the Federation conference.

In his presidential address, Mr. Smillie said the miners had abstained from putting forward any unreasonable claims, and they would prefer that food prices should go down rather than wages should go up; but one of those two things must happen.

The opinion of the best informed among the delegates is that the war bonus application will go through the usual course of discussion, negotiation, and arrangement. They consider in the existing war conditions there is unlikely to be such a fall in food prices as would satisfy the men, and cause them to withdraw the application. Indeed, food prices in mining districts are generally higher than elsewhere, owing to the prosperity of the coal mining industry and the high wages which are now earned as compared with pre-war earnings. In the Scottish coal field, the daily fixed wage is now 10s., as compared with 7s. when war was declared. In Lancashire, which may be taken as typical of the English coal fields, the fixed minimum wage is now 9s. 5d. per day, as compared with 7s. 1½d., and most of the earnings are well above this figure. In Nottinghamshire, the pre-war figure of 8s. 3d. is now 11s.; and the figure for Yorkshire is exactly similar. In Northumberland, the wage of hewers at the outbreak of war was 7s. 9d.; it is now 11s. 5d. In the South Wales coal field, the pre-war wage was 7s. 1½d., and is now 10s. 10d. The wage rates given are for coal hewers, and represent the amounts which have to be paid if the workman fails to earn that amount on contract; but in most cases actual earnings are well above the stated figure. The wages paid for surface men and for day wage men are lower than for the coal-getters.

The important question to the country is: What does the application for a 25 per cent. advance on actual wages mean in money value? It is a conservative estimate to say that an advance on this basis would mean an average addition of 10s. per week to the whole of the workmen employed in the British coal fields. The most recent Home Office figures show that the number employed has again passed the one million, so that the war bonus asked for, if conceded, will mean an addition of £500,000 a week to the wage bill of British collieries.

Holland's Fuel Supply.—Holland is already taking steps to prevent a recurrence next winter of the suffering occasioned by a lack of coal during the past winter. The Royal Coal Distribution Bureau, established several months ago to oversee the distribution of coal to the more important industries, is to be supplemented by the establishment in each commune of a fuel commission, which are to commence active work immediately under the respective burgomasters. Their first report will show the requirements of each commune as calculated from the census of industrial plants (using under 240 tons per year) and the Distribution of fuel according to immediate requirements commenced on May 1. Hitherto the Royal Coal Distribution Bureau has concerned itself only with the distribution of coal to large industries of coal, briquettes, and coke. It will now supervise the distribution of all other kinds of fuel, including gas works coke, turf, and turf briquette.

CURRENT SCIENCE AND TECHNOLOGY.

Coal and Coke.

According to Fischer and Rüst (*Stahl und Eisen*, cited in *Gas World*) the traces of arsenic present in coal, lignite, and bituminous shales are derived from pyrites, marcasite, and mispickel (arsenical pyrites). H. Reinsch has found in a sample of soot, besides iron, manganese and copper, a small trace of arsenic. In Saarbrück coal, Danbrée found 0.003 per cent. of arsenious acid, while O. Simmersbach confirms the statement that arsenic is always present in Westphalian coal, gas coal from the Heru and Gelsenkirchen district, and coking coal from Recklinghausen and Gladbeck, the quantity being always below 0.001 per cent.

In the coking chamber the arsenic chiefly volatilises as As, but may in part be converted by the oxygen present into arsenious and arsenic acids. These two compounds vaporise at about 218 degs. Cent., and therefore volatilise. Arsenic acid, however, is fixed by iron oxide, the resulting compound being stable at the temperature of carbonisation. We thus get varying quantities of arsenic in the coke from coals containing that element. In some varieties there is none present, more especially from a badly sealed oven, and in other cases there are distinct traces, especially when the iron and lime contents of the coal are high. The lime promotes decomposition of the pyrites, so that the arsenic, on account of its great affinity for iron, combines with the iron.

Belgian and Saarbrück coke, according to Schinz, contains arsenic. Dr. McGowan tested four English metallurgical coals from the Midlands and four Yorkshire gas coals, finding traces of arsenic in every case. Tests carried out in the coking industries laboratory of the Technical High School, Breslau, gave the following values for the arsenic content of various coals:—

	Per cent.
1. Westphalian coal	Test 1 ... 0.001
2. Do. do.	Test 2 ... —
3. Rheinland coal	— ... 0.002
4. Upper Silesian coal	— ... —
5. Lower Silesian coal	— ... —
6. Saar district coal	Test 1 ... —
7. Do. do.	Test 2 ... 0.0052
8. Saxon coal	— ... —
9. American beehive oven coke...	— ... 0.0037

The arsenic was in each case estimated by the method of Archbutt and Jackson.

Picric Acid from Coke Ovens.

Mr. T. B. Smith (*Gas World*) considers that as picric acid is a nitration product of phenol, which is entirely obtained from coal tar (either synthetically from benzol or from the treatment of the carbolic oil fraction of tar), and as coke oven plants contribute most largely to the national output of tar, this acid can be looked upon as one of the future by-products of the coke oven industry. Although at the present time the manufacture of the acid is mainly in the hands of the independent tar distillers, many coke oven plants are now equipped with modern tar distilleries, and it may be assumed with confidence that in the near future the more enterprising coke oven manager will count picric as one of his finished products.

At the present time, the acid is manufactured on a large scale by very distinct processes. The first consists of the nitration (in a slight excess of nitric acid, and also in the presence of an excess of sulphuric acid) of phenol-sulphonic acid, the latter being obtained by the action of sulphuric acid upon phenol at a temperature of 100 degs. to 110 degs., until the odour of phenol has completely disappeared and the reaction product is completely soluble in water.

The second method, of quite recent origin, starts with chlor-benzol as the base, this being dinitrated to dinitro-chlor-benzol, which is then separated from the spent nitrating mixture. The chlorine atom is replaced by the hydroxyl group by heating with caustic soda, and the resulting dinitro-phenol is further nitrated to the tri-nitro derivative. The chlor-benzol is fairly cheap to manufacture, especially if use is made of the chlorine produced by the electrolytic alkali manufacturing process. Although this method holds out a complete process for the manufacture of picric acid synthetically from benzene, it does not appear to have been accepted so readily as the older method.

Potash from Felspar.

In the *Canadian Chemical Journal*, May 1917, Mr. D. I. Benham describes a process used by the National Potash Corporation of Toronto in extracting potash and felspar. The process, which was worked out by Allan Grauel, of Kitchener, Ont., consists in heating to a high temperature in a blast furnace, 110 tons of a mixture of felspar, coal, calcium chloride, and limestone. The limestone is used to render the slag fluid, while the chlorine of the calcium chloride combines with the potash, forming potassium chloride, which distils over at the temperature of the blast furnace into a condenser where it meets a current of steam, in which it dissolves. By a process of evaporation and crystallisation of the solution thus obtained, the salt is obtained in a high state of purity.

It was found possible, with proper preparation of the charge, to drive off, under the most favourable conditions, over 90 per cent. of the total potash content in the felspar, which ranges from 8 to 14 per cent. K_2O . The present percentage of collection of the vapours is not entirely satisfactory, however, and improvements are under way on this feature of the process. A satisfactory process for disposition of the residue containing the potassium salts after separation of the gas condensing and filtrating has been worked out, and is being tried to centrifugal treatment and evaporating pan, 12 x 60 ft. by 1 ft.

The gas treating equipment consists of a chamber through which the volatilisation products pass and precipitated with steam. For the

present, only potassium chloride will be produced, but satisfactory experiments have been conducted in the manufacture of caustic potash, for the production of which the company expects to have its first unit with a capacity of 20 tons a day in active operation shortly.

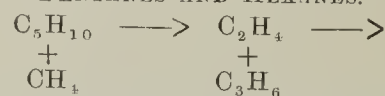
It is stated to be possible to adapt the process and the equipment so as to utilise cement marl as a raw material instead of felspar, where the latter is not readily obtainable, and it is also possible to utilise either rotary kilns or blast furnaces of a certain type for releasing the potassium fumes. In operating the blast furnace the slag is converted into pipes, tiles, and paving bricks, being poured direct from the furnace into the moulds. A peculiar feature connected with the burning of felspar, for which no reason is yet revealed, is the fact that all the potash content does not volatilise at the same degree of temperature. A certain percentage is released at, say, 900 degs. Cent., more at 1,000 degs., and so on until the last of it is finally driven off at about 1,600 degs.

Notes on Crude Benzol.

At the last meeting of the London section of the Society of Chemical Industry, Dr. P. E. Spielmann described some recent work carried out in collaboration with Mr. G. Campbell Petrie, on the examination of crude coke-oven benzols. They find that if 100 cu. ft. of crude benzol is distilled from a flask, the amount obtained up to 90 degs. Cent. can be made proportional to the quantity of benzene present, and that from 90 degs. to 120 degs. proportional to the quantity of toluene in the sample. Another method yielding more accurate results, is to distil at least a litre over a Young 12 pear head, and to note the rise of temperature for every 5 or 10 per cent. When the results are plotted as curves, it is found that the horizontal distances below the 5 per cent. mark and the point where the curve cuts the 92.5 deg. Cent. line give a close measure of the percentage of benzene present; and a similar close estimation of the toluene present can also be made. It is also believed that an equally simple estimation of paraffin can be made.

The fact that during the distillation of coal a low temperature favours the production of paraffin, and a high temperature that of aromatic hydrocarbons, is considered to establish the connection between the various substances found according to the following scheme:

PENTANES AND HEXANES.



naphthenes (cyclic hydrocarbons) \longrightarrow higher benzene homologues \longrightarrow lower benzene homologues \longrightarrow benzene \longrightarrow (diphenyl) \longrightarrow naphthalene \longrightarrow anthracene \longrightarrow carbon and gas.

It may, therefore, be expected that the amount of loss on acid-washing will be inversely proportional to the quantity of aromatic substances present, and that the quantity of benzene and toluene found will be inversely proportional to one another. Very few of the crude benzols examined conformed to the general definition, that they should distil over up to 170 degs. Cent., most of them containing a considerable proportion of naphthalene; and therefore the fraction up to 170 degs. Cent. obtained in the laboratory was taken as representing a normal crude benzol. If the quantities of benzene, toluene, and xylene found in the fraction up to 170 degs. Cent. be plotted against the loss on acid washing of this fraction, it is seen that the two main constituents do actually occur in their inverse connection with one another; and when these are added together and combined with the figure of xylene, the total aromatic substances in that fraction show a remarkably constant inverse relationship with the acid washing.

Cracking Petroleum in the Liquid Phase.

In a paper presented in the petroleum session of the Kansas City meeting of the American Chemical Society, Mr. Roy Cross recites the following advantages obtained from cracking petroleum at low temperatures (300-400 degs. Cent.) in the liquid phase: A product of superior quality; a higher yield of refined gasoline; a selective action on the oil or heavy portion of the petroleum with freedom from further cracking of the portion in the vapour phase; automatic removal of the gasoline from the sphere of action as fast as it is formed; high economy of heat; deposition of the carbon in the suspended condition in the oil and not on the walls of the heating tubes; high oil capacity with small dimensions of plant; perfect control of temperature; rapid and complete absorption of heat from the furnace; and possibility of operating either intermittently or continuously. The disadvantage in cracking the oil in the liquid phase is the high pressure required for maintenance of equilibrium and the attendant danger of failure of apparatus.

In consideration of the temperatures at which cracking of oil takes place and in consideration of the vapour pressure developed by gasoline and other light hydrocarbons at the temperature of cracking, it appears that the optimum method of operation for converting heavy oil to gasoline in the vapour phase is to maintain a pressure of 30 atmospheres or 450 lb. per sq. in. and a temperature of not over 400 degs. Cent. If it were possible to lower the temperature for rapid conversion by means of a catalytic agent, then, of course, the pressure necessary for operation would be considerably lowered. In practice, heating would be done in a tube furnace with rapid circulation of oil from and to a vapour chamber, which also serves as a chamber for the separation of carbon.

Various mechanical arrangements could be used that would be satisfactory. The tubes should be so designed that they will sustain the pressure at the actual firebox temperature used regardless of the temperature of the oil. Assuming that a temperature

of 800 degs. Cent. is attained in the firebox, then the tubes should be of 4 in. inside diameter and $\frac{1}{2}$ in. walls. This would give a factor of safety of over 200 per cent., since steel at a temperature of 800 degs. Cent. has an elastic limit something greater than 5,000 lb. per sq. in. At 800 degs. Cent. such a tube would fail at 1,250 lb. pressure.

The design of the parts not exposed to the heat of the furnace would be comparatively simple, since they would be subject only to the temperature of the oil or vapour which in no case should exceed 400 degs. Cent.

MIDLAND REAFFORESTING ASSOCIATION.

The report of the association for 1916 states that during the year 18 new members were elected, 4 died, 9 resigned, and 4 were struck off for non-payment of subscription as provided by Rule 3. There were on December 31, 1915, 420 members, and the number on December 31, 1916, was 421. The organising secretary, Mr. Antrobus, having been called up for military service, Mr. Martineau has taken over the duties for the present, and plans which depended upon the presence of the secretary have had to be re-cast. Planting has been out of the question, and even necessary repairs have had to be postponed.

The Botanical Section (K) of the British Association has had under consideration the utilisation of waste land of all kinds, and at Newcastle the whole question was reviewed in a series of papers, each dealing with some particular class of waste land. Mr. Martineau, the hon. secretary, read a paper on "Pit Mounds: the Progress Made in South Staffordshire Towards their Afforestation and the Prospects of Future Success." A *précis* of the group of papers has been issued by the British Association, and should prove very helpful to all owners of pit mounds or other waste land, as well as to those who are engaged in advocating more thorough utilisation of waste ground. Prof. Augustine Henry, of the Royal College of Science, Dublin, has arranged to deal at some length with the pit mound question in the Chadwick lectures in London. He proposes to take his examples chiefly from the Rowley and Old Hill district, and to use the school plantations in particular.

The growth of trees in the association's plantations is in many cases remarkable, but nowhere more so than at Black Wagon (Old Hill). A careful series of measurements was therefore made on October 23, 1916, by the pupils of Wright's Lane Council School, under the supervision of the headmaster, Mr. A. E. Evans. The trees were planted in 1907-08, and have therefore had nine seasons' growth. They were nearly all two-year transplants when set out. The following are average measurements taken October 23, 1916:—(a) Poplar, black Italian, north-east side, 19 ft.; (b) birch, north-east side, 15 ft.; (c) black alder, north-west side, 17 ft.; (d) black alder, on top of mound, 15 ft.; (e) birch (planted 1910 in loose burnt shale), south-west side, 4 ft. There are also at base of mound a few sycamores of 15 ft. The tallest poplar measures 22 ft. 5 in. The tallest birch 17 ft. 10 in. The tallest alder 20 ft. 4 in. There is still fire in one part of the mound. At one point the temperature at the depth of 18 in. was 116 degs. Fahr., the surface temperature at the same time being 54 degs. Fahr. Some black poplars have been planted round the hot area that their behaviour may be noted. It should be noticed in connection with these measurements and observations that Mr. Evans speaks highly of the educational usefulness of the practical work which his pupils have been able to do. And it may therefore be hoped that the plantations adjoining the numerous schools of the Rowley Regis education authority will all, as they grow, become equally serviceable to the teachers. At Doulton-road Council School measurements were made by the pupils under the supervision of the headmaster, Mr. J. C. W. Teague. He, like Mr. Evans, speaks well of the plantation from an educational point of view, and it is strictly a school plantation, and only contains some 500 trees. The trees were planted on November 29, 1909, and the average measurements on October 4, 1916, were:—(a) Poplar, black Italian, 19 ft.; (b) birch, 12 ft. 6 in.; (c) ash, 14 ft.; (d) sycamore, 11 ft. 6 in. The poplars have done remarkably well. The tallest is 21 ft. 6 in., and the average girth at 3 ft. from the ground is 14 in.

NEW PIG IRON REGULATIONS AND PRICES.

The Ministry of Munitions state that in some papers the table relating to malleable pig has been printed in a misleading manner. All the prices for both "refined" and "cast direct" come under the one heading of "Hæmatite pig iron—malleable." In some papers, however, only the first two lines of the table were included under this heading, and the remaining four lines were given under a separate paragraph, thereby implying that this latter group of four prices does not relate to malleable quality.

The Controller of the Foreign Trade Department has issued a new list of additions to the statutory list of firms of enemy nationality or enemy association with whom persons in the United Kingdom are forbidden to trade. Copies of this list can be obtained, at a trifling cost, from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C.

Referring to the appeal recently issued by the Controller of Coal Mines to the gas industry, urging the substitution of water gas for coal gas to the greatest practical extent, with a view to effecting coal economy, certain factors have since arisen which require a reversal of this policy, and with a view to securing the maximum quantity of coal tar products, the Minister of Munitions now urges that all carbonising plants at gas works be worked to the fullest extent, before any water gas, carburetted or uncarburetted, is manufactured at all. The Controller of Coal Mines, who is aware of the altered circumstances, will co-operate with the Ministry of Munitions in this matter, and will give instructions for all necessary coal to be delivered to gas works for carbonising purposes.

LAW INTELLIGENCE.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.—July 20.

Before Mr. Justice EVE.

Alleged Trespass by Neighbouring Colliery.

Eastern Valleys Black Vein Colliery Limited v. the Field Colliery Company Limited.—Mr. Clayton, K.C., for the applicants, said the motion was for an order that the defendants should forthwith give an inspection of their mines and plans in pursuance of an order already made.

Mr. J. G. Wood, for the respondents, said the affidavits only reached his clients in Cardiff the previous day, and he asked for an adjournment. Mr. Clayton said this was a question of trespass by one mine into another, and the letting in of water. The plaintiffs had left a solid block of coal to prevent water coming in to their mine, and the defendants had cut through that block of coal and let in the water, which was coming through freely. When the plaintiffs attended for inspection in accordance with the order of the court, the respondents would not let them make a proper inspection. The respondents were ordered to produce plans, but they only produced a tracing, and only a portion of that. The matter was very urgent by reason of the water coming into the mine.

His lordship said the respondents must have an opportunity to reply, and ordered the motion to stand over for a week.

Before Mr. Justice ASTBURY.

Wallsend Slipway Company: Alteration of Articles.

Appearing in support of a petition by the Wallsend Slipway and Engineering Company to alter the articles of association for the enlargement of the scope of their business, Mr. Jenkins, K.C., stated that the capital of the company was about £300,000 in preference and ordinary shares. It was a very prosperous company, and one of the largest engineering works in the country. They now desired to enlarge their sphere of activity, and to become mechanical and general engineers, iron masters, steel makers, and to carry on business as restaurant keepers in connection with their works.

The petition was unopposed, and his lordship made the order asked for.

KING'S BENCH DIVISION.—July 26.

Before the LORD CHIEF JUSTICE and Justices RIDLEY and ATKIN.

Coal Mine Ventilation.

Wilson v. Hall.—Mr. Branson, who appeared in support of an appeal from a decision of the Morpeth justices who had dismissed an information under the Coal Mines Regulation Act, 1911, said the respondent in the case was John Hall, manager of the Woodhorn Colliery, near Morpeth. The summons against him was taken out under subsection 1 of the Act in question, which provided that any owner or manager should be held liable if it was proved that an accident in the mine was due to faulty ventilation brought about by causes over which the owner or manager had control. On August 13 last, there was an explosion at the mine, resulting in loss of life. On the Saturday before the accident the fan was stopped for repairs, and the compressors were stopped for the week-end in accordance with the usual practice at this mine. The fan was re-started on the morning of the 13th, when a party of men went down to do something to the roof. Whilst they were under the surface, the explosion occurred, and not a single man of the party escaped. The magistrates, when the case was before them, came to the conclusion that the explosion was primarily due to the absence of two firemen, and that in consequence there was an insufficient head of steam to keep the ventilating fan working properly. They refused to hold the manager responsible for the absence of these men, and dismissed the information. He contended that the defendant was in fact liable in that he had permitted the week-end stop of the compressor, which allowed gas to accumulate.

Mr. Lowenthal, for the respondent, said this point was not raised before the magistrates. There was no evidence that gas had accumulated, and the sole question determined by the magistrates was as to the responsibility of the manager for the absence of the firemen.

After further argument, the court dismissed the appeal on the ground that the case now argued was not before the magistrates. It was unnecessary in these circumstances to decide the matter on points of law.

APPEAL COURT OF SCOTLAND.

Mining Royalties and Excess Duty.

Inland Revenue v. Murray.—The case for the appellant, Maj. Murray, who is proprietor of minerals at Cowie, Wester Greenyards, and Polmaise, Stirling, the first two being leased to the Alloa Coal Company, and Polmaise to Alexander Russell Limited, was that in both leases the rents or royalties stipulated for, varied according to the price of minerals when these exceeded the fixed rents named in the respective leases. The rents paid for the first and second accounting years were, for 1914, £17,512; and for 1915, £21,849. The rents received by Maj. Murray for the two pre-war years selected by him in terms of the Act for purposes of comparison were, for 1912, £12,407; and for 1913, £18,199; average, £15,303. The amount of excess mineral rights duty claimed by the Crown was £5,865, being 50 per cent. for 1914 and 60 per cent. for 1915 of the difference between the pre-war standard and the rents actually received in these accounting years. The appellant contended that the amount should have been £4,065. The referee, however, upheld the contention of the Crown, that under the Act the proper method was to take the output of coal in the accounting years and apply to that output the royalties that would have been payable at the prices of the coal in the selected pre-war years. The difference between the figure so arrived at and the sum actually received in the accounting years was the figure on which the excess mineral rights duty fell to be based. As to the alleged inequity of the Crown method of making the assessment, the Crown maintained that according to the terms of the statute the actual rental in the pre-war years was not taken into consideration, that the only question was the question of the rate of royalty, and that where that rate

had been increased by the raising of the prices of coal, the Government were entitled to their proportion of the increase irrespective as to whether the output of minerals, and consequently the gross rent drawn by the proprietor, had in point of fact increased or diminished.

The decision of the referee was upheld by the court, who refused the appeal, finding no expenses due to either party.

THE GERMAN COAL AND IRON TRADES.

We give below further extracts from foreign periodicals that have reached us, showing the course of the coal and iron trades in Germany:—

German Bar Iron Association.

At a meeting of German Bar Iron Manufacturers at Düsseldorf, it was decided to form an association to include makers of bars, hoop iron, and universal iron, and to continue in existence until the end of the war, at least.

The Coal Supply Question.

A committee of the Reichstag has resolved to press for an increase in the production of coal and the rapid preparation of a plan for its uniform distribution, particularly with a view to ensuring the provision of adequate supplies to municipal gas and electricity works, so that the populace may have available gas for cooking. It was also decided to ask for the supplies of coal for domestic purposes to be maintained and distributed in accordance with a general system of rationing.

The Brown Coal Market in Mid-Germany.

During May the demand increased, and showed considerable improvement in comparison with the previous year. Generally speaking, the supply of wagons was ample, and overtime and Sunday labour were found to be necessary in the Halle district. In Niederlausitz the mines and briquette works were mostly as busy as in the previous month, but in some cases business was rather slack, though overtime still had to be worked.

It is reported that the business of H. V. Heldmann, of Hamburg and Altona, which formerly did a large trade in imported British coals, has been purchased by Hugo Stinnes, who has already bought up a number of coal firms in Hamburg and Harburg.

Ruhr Coal Market.

During the month of June the prevailing discrepancy between demand and supply continued, for though the output was improved, the requirements for urgent purposes, the railways in particular, more than kept pace with the advance. The necessity for taking any kind of coal that can be got is entailing considerable waste of fuel, because the sorts most suitable for particular grades cannot be obtained, and more coal has to be burned to get the same results. The same applies to the use for coking of small coal, which could be more advantageously employed in briquetting—for which purpose there is abundance of pitch available. Up to the present, there has been no opportunity for gas works and domestic consumers in large and medium towns to get in any winter stocks; and electric power stations have been getting supplies from hand to mouth only. Complaints are made about the delays in forwarding waterborne coal, it being stated that large Rhine barges have to wait for days in the Ruhr harbours for loading, the arrangement whereby the Westphalian pits have to send a certain proportion of their output to these harbours having been disregarded. The tipples are only at work part of the time, and there is much delay in getting up-river craft through the Rhine-Herne Canal. Consequently, South Germany is extremely short of fuel, and any slight disturbance, such as a shortage of wagons, or a drought, would render the situation acute. The Rhine was in good condition for traffic throughout the month, so that large craft were able to proceed as far as Mannheim with full loads, and the usual barges could get up to Basle; but though somewhat larger shipments were made than in the previous month, the supply proved still quite inadequate. The chief cargoes consisted of large coke. Pits on the Rhine-Herne Canal were able to load barges up promptly, but, as already mentioned, there was great delay in getting through to the river.

The Rhenish Coal and Shipping Company.

This company, whose offices are at Mülheim-Ruhr, has increased its capital, owing to new regulations for coal trading companies, from 17,660,000 mk. to 31,510,000 mk. The company is entitled to erect establishments of all kinds likely to further its legitimate ends, and to participate in other similar undertakings.

Coal Syndicate and Output.

At its last meeting, the Syndicate decided to remove the existing restriction of output (80 per cent.), because the permitted figure had never been attained, and the fixing of an arbitrary limitation was capable of giving those outside the industry an impression as though the producing capacity of the pits was being hampered. The chairman (Dr. Kirdorf) spoke of the pressing demand for coal, and urged the coal owners to do their utmost to increase the production. Much had already been done, in the last two months, in this direction, in spite of all the numerous difficulties, but still the demand could not be met by a long way.

Coal Cards.

Coal cards will be in force in Berlin after August 15, and fuel will thenceforward be rationed strictly according to the size of consumers' premises. Sales are meantime being rigidly controlled. Those who are at present without any coal may between now and August 15 purchase $\frac{1}{2}$ cwt. Owners of flats who furnish central heating to tenants may purchase and store 50 per cent. of last year's total consumption. Factories will be rationed on a slightly more liberal basis. Hospitals, schools, bakeries, and Government offices are not subject to any reduction.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—July 16.

Coal Distribution.

Mr. WILKIE asked the President of the Board of Trade if he would state the methods being adopted for appointing local committees for the distribution of coal; whether he was aware that at Portsmouth no representative of the working classes had been appointed on the committee for that town; and whether he would take steps to secure the addition of a Labour representative.

Sir A. STANLEY, in reply, stated that the mayors of all the principal towns in Great Britain received a letter from the Controller of Coal Mines, dated May 25, asking them to organise a local committee for the distribution of coal during the coming winter. The suggested constitution of such a committee was as follows: The mayor or deputy, the chief constable, two coal merchants, one representative of each railway, one representative of each canal, and a secretary. The railway and canal representatives to act in an advisory capacity only. A letter suggesting Labour representation was sent to each mayor or deputy at a subsequent date. At Portsmouth there were now two Labour members on the local committee.

Central (Ireland) Railways and Arigna Minerals Bill.

Mr. KENNEDY asked the Chief Secretary for Ireland whether he had received a resolution from the Bawnboy Rural District Council, and passed unanimously on July 9, demanding the passage of the Central (Ireland) Railways and Arigna Minerals Bill; and was he aware that this Bill would, if passed, relieve the ratepayers of the Bawnboy Union very substantially in respect of the Cavan and Leitrim light railway guarantee, and enable Arigna coal to be greatly cheapened and secure a much larger output.

Mr. DUKE replied that he had a copy of the resolution referred to. The question of the development of the Arigna coal field was at present engaging the attention of the Coal Controller, with whom he was in communication.

July 19.

Arigna Mineral Development.

Mr. SCANLAN asked the Chief Secretary for Ireland (1) what steps the Government intended to take for the development of the coal and iron mines at Arigna, and whether they were in a position now to state when they would construct the line of railway from Arigna to Colooney; and (2) the President of the Board of Trade whether the coal and iron mines at Arigna were recently inspected by a representative of the Controller of Mines; if he would indicate the nature of the report received on the result of this inspection; and what steps the Government proposed to take to work the minerals at Arigna.

Mr. G. ROBERTS, in reply, stated that the Controller of Coal Mines had obtained a report by an expert upon the mines at Arigna, and that the President of the Board of Trade was at present in consultation with the Chief Secretary thereon.

July 23.

Coal Distribution.

Mr. GILBERT asked the President of the Board of Trade whether he proposed to submit his proposed scheme before publication to a further conference of local authorities in the Metropolitan area; and, if not, would he consider the desirability of obtaining the help and support of local authorities.

Mr. G. ROBERTS replied that the Controller of Coal Mines had circulated a draft of his scheme for coal supply in London to local authorities for their suggestions and observations. He was desirous of having the support of all concerned, and relied upon their help to make a success of his scheme for the distribution of coal during the coming winter.

July 24.

Fireclay.

In reply to Mr. MACCALLUM SCOTT, who asked what were the circumstances in some areas in Scotland which necessitated the fixing of a maximum price of 22s. per ton for ground fireclay, in view of the fact that one of the largest producers of ground fireclay had offered to supply it at 11s. per ton; whether the Director would withdraw his notice to the trade of April 30 last, and fix the price at 11s. per ton; and whether, after the Ministry had fixed a maximum price of 22s. for ground fireclay, all consumers were at liberty to purchase from the firm which offers at 11s. per ton, Sir WORTHINGTON EVANS (Parliamentary Secretary to the Ministry of Munitions) said he had nothing to add to the answer given on July 4 last, except that careful consideration had been, and would continue to be, given to any facts including the cost of production affecting the general body of producers, and that he was not prepared to withdraw the notice to the trade of April 30 last. The maximum of 22s. per ton did not necessarily mean that that was the actual dealing price; in fact, purchasers could buy, and were buying, it at a much lower figure.

Scottish Timber Supplies.—In the annual report of the Board of Agriculture for Scotland for 1916, it is stated that the feature of the year's work in connection with forestry has been the extended use of native timber. The work of organising supplies of home-grown timber in Scotland fell to the forestry branch of the Board, and the question of pitwood supply and demand has been receiving the close attention of a special committee representing the various interests. The requirements of the Scottish collieries alone have been approximately estimated at 300 million lineal feet per annum, and as it is apparent that the output of the collieries must not be diminished, it may not be inappropriate to consider how far at least this item of consumption can be continuously met from home sources. The amount of foreign pitwood imported into Scotland during 1916 was about 100,000 loads, or 5,000,000 cu. ft. This is less than one-fourth of the normal import. It has been stated that existing crops in Scotland could probably supply from 25 to 30 per cent. of the ordinary annual consumption of pit timber in the coal mines of Scotland. It is also reckoned that 14,000 acres, producing at the rate of 1,500 cu. ft. per acre, would give at the end of the rotation 21,000,000 cu. ft., which, if the pitwood be taken as averaging $3\frac{1}{2}$ in. in diameter, would give the 300 million lineal feet annually required. At the rate of 1,500 cu. ft. per acre would produce the annual requirements of the collieries at a rate of 5,000 acres a year on a 40-year period. This would mean that in four years' time an area of 20,000 acres would have been planted, and that in 40 years the requirements of the collieries could be supplied with pitwood grown in Scotland. Unfortunately, owing to the scarcity of labour, the task of reforestation in Scotland on a large scale cannot now be undertaken.

CONTENTS.

ARTICLES:—	PAGE
Output and Industrial Fatigue	163
Unrest Commission	163
100-yearly Index	164
ARTICLE:—	
Coal and Shipping	153
Ireland's Coal Supplies	155
Safety Rules for Electrical Equipment in Coal Mines	156
The Down Draught Smokeless Boiler	157
Coal Concreted from Dusts or Ashes	158
The American Coal Trade	159
Miners' Wage Bonus Demand	159
Midland Reafforesting Association	160
New Pig Iron Regulations and Prices	160
The German Coal and Iron Trades	161
Texture of Fireclays	164
South Wales Mining Timber Trade	168
Labour and Wages	168
Coastwise Shipments in June	171
The Freight Market	171
Open Contracts	174
Abstracts of Patent Specifications Recently Accepted	174
New Patents Connected with the Coal and Iron Trades	176
Publications Received	176
REPORTS OF MEETINGS:—	
Miners' Federation Conference	159
THE COAL AND IRON TRADES	164-168
The By-Products Trade	166
The London Coal Trade	167
The Tin-plate Trade	167
CURRENT SCIENCE AND TECHNOLOGY	160
LAW INTELLIGENCE	161
PARLIAMENTARY INTELLIGENCE	161
NOTES FROM THE COAL FIELDS	169
COAL, IRON AND ENGINEERING COMPANIES	171
MONTHLY LIST OF RECENT COAL LITERATURE	172
MISCELLANEA:—	
American Coal Exports	157
Irish Peat Deposits—Transvaal Coal Combine	158
Holland's Fuel Supply	159
Scottish Timber Supplies	161
Iron Ore Developments in the Midlands	171
Coal in Switzerland	172
Wigan and District Mining College	174
Promotion of British Trade Abroad	176

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LONDON, FRIDAY, JULY 27, 1917.

The London coal market shows very little change. The demand is unusually strong. Better supplies are reported at many of the depots, and strenuous efforts are being made to fill up all cellars, etc., for the coming winter. The cartage and delivery problem is very acute. Very little coal can be spared for stocking at the depots. Hard steam coal and baker's nuts are exceedingly scarce.

The market in Northumberland is almost at a standstill; owing to shortage of tonnage many collieries are only working short time. Lancashire, Yorkshire and Midland markets report an increasing demand for almost every class of coal, household orders being very numerous. Advices from Humber ports indicate good business with France, but neutral orders are slow. Values are firmly held for all kinds. The demand for South Wales qualities does not improve, and quiet conditions prevail. Many stoppages at pits are reported.

The Scotch trade is very quiet all round, the inadequacy of local outlet and the curtailment of export trade holding out no prospects of improvement. The position in Ireland is practically unaltered.

The freight market has been dominated by shortage of tonnage; on north-east coast even French Atlantic fixtures have been few. South Wales reports rather more charters, mostly for French Atlantic ports. Neutral rates are higher.

At the annual conference of the Miners' Federation held at Glasgow during the week, the executive were instructed to formulate an immediate demand for a general increase of 25 per cent. on the present rate of wages for the whole Federation, to meet the high cost of living. Other resolutions passed were in favour of State-ownership and control of mines and minerals, abolition of piecework in mines and the establishment of uniform rate of wages, no more storing of small coal underground, immediate steps to improve working-class housing accommodation, better educational facilities for workers' children, old age pensions of 10s., commencing at 60 years of age, pensions for mothers, and larger pensions for soldiers, sailors, their dependants, and crippled or incapacitated fighters.

The meeting of the Coke Oven Managers' Association (Midland Section) will be held in the Grand Hotel, Sheffield, to-morrow (Saturday) at 2 p.m., when Mr. E. Kilburn Scott, A.M.I.C.E., M.I.E.E., will read a paper entitled, "Manufacture of Ammonium Nitrate by Electric Power at Coke-Oven Plants." The visit to the By-product Coking Plant of the New Monckton Collieries Limited is cancelled.

Maximum Output and Industrial Fatigue.

A SMALL pamphlet, recently reprinted by the Labour Co-partnership Association from their journal *Copartnership*, embodies a series of articles by Prof. H. J. SPOONER, on "Industrial Fatigue in its Relation to Maximum Output."* This subject has been much debated of late, both in connection with munitions work and also in its relation to the general problem of reconstruction after the war. It is clear, however, that the discussion of the question has not yet been by any means exhausted, and the additional light thrown upon it by Prof. SPOONER is deserving of close attention, especially by those employers who are endeavouring to arrive at the scientific principles governing the efficiency of their workmen. It is especially unfortunate that the latter have become, rightly or wrongly, suspicious of any attempts to increase the output. It is not necessary to consider the truth or otherwise of the complaint of Mr. BARNES that in the stress of competition piece-work earnings have tended to slide downwards to what had previously been a time-work wage. The important fact to bear in mind is that the suspicion exists, and is so deeply rooted in the men's minds, that this question has become one of the most serious causes of difference between employers and the trade unions. What has to be considered, therefore, is the best way to eradicate this prolific source of discord. Mr. CLYNES, who writes a foreword to the above-mentioned pamphlet, says that it will be difficult to diminish, not to say dispel, these natural impressions to which a few generations of industrial experience have given rise. We are inclined to think, however, that this feeling has been engendered not only by experience, but also by the deliberate distortions of some Labour agitators. Of course, experience is a factor, for few would claim that no employer has been guilty of cutting piece-work rates. But it is only one factor, and probably not even the chief factor in the question. There is possibly also a great deal of truth in Mr. BARNES' contention that it has almost been an article of economic religion that a workman's earnings should be limited by precedent. And thus a vicious circle is set up, and the workman will not increase his output because the employer will not raise the pay.

It is clear that if this vicious circle is to be avoided some better basis of remuneration than precedent must be discovered. Prof. SPOONER's articles appear to be helpful towards this end. We shall all agree with his contention that output is not necessarily proportional to the hours of work. We would go even further, and would say that the curve of output plotted against time has a maximum point, which is generally discoverable if all the factors are known. Prof. SPOONER helps us to get this knowledge. It will be remembered that the same subject has recently been investigated by a committee of the British Association, and by a committee appointed by the Minister of Munitions. We have also had the valuable investigation undertaken by Prof. A. F. STANLEY KENT, and published as a Home Office Blue Book a few months back.

One great point is to be noted in all these investigations, and that is the close agreement that has been found to exist between the results of quantitative experiments and observations, and the acquired experience of those industrial managers who have studied the question. Sir ROBERT HADFIELD states, in another foreword to this pamphlet, that it has been found a decided advantage in his establishment to maintain a vigorous 48 hours' working week. Here practice and theory agree.

Dr. PARKES, many years ago, investigated the number of foot-pounds of work a man is capable of performing. The same question has been examined by others, and the results show that for men accustomed to heavy manual work, 300 foot-tons is an

average daily output, while 400 foot-tons is a day's work.

This method of investigation, however, has no practical use in these days of labour-saving machinery, because the employment of machinery introduces new factors into the problem. Mere muscular fatigue is no longer the dominating feature. If work could always be expressed in foot-pounds of energy, or in ergs, or any other definite units, it would be a simple matter to arrive at an inflexible piece-rate basis of remuneration. But fatigue is not a mere physiological effect, it is also psychological, and there is no known method of reducing both to a common measure.

Prof. SPOONER discusses the question from many points of view. As an example, we may refer to what he says about the science of shovelling. Many years ago TAYLOR found by experiment that a first-class shoveller can do his best day's work when the load on the shovel is about 21 lb. The inference is that shovels of different sizes should be provided for different materials. Upon the question of restriction of output, he believes the root cause is the fear of unemployment. He thinks that men would not oppose speeding-up methods if they could be freed from the anxiety of being thrown out of employment—and probably there is a great deal of truth in this view. The best workers aim at securing permanent employment with prospects of promotion. Mobile labour is a source of economic loss, and one of the problems of scientific management is the reduction of wastage due to what is called "labour turnover." Amongst the methods of accomplishing this end, Prof. SPOONER mentions particularly welfare work and education. He briefly summarises the elements of scientific management, as laid down by the late F. W. TAYLOR, but, although this system has been largely adopted in the United States, it has not found universal favour in Great Britain, chiefly on the score that it is too mechanical and loses sight of the human factor. This, however, is too large a question to discuss in this column.

We recommend industrial managers to ponder Prof. SPOONER's remarks, which are the result of much careful study of the problem of work.

Industrial Unrest Commission.

THE Commission of Inquiry into Industrial Unrest, appointed by the PRIME MINISTER on June 12, has completed its work and presented its report in the brief period of approximately six weeks. This remarkable achievement may possibly be ascribed to the wisdom of the decision to break up the work of the Commissioners into eight sections, each dealing with a particular area. We have thus eight reports instead of one, but Mr. BARNES has compiled an admirable summary of the conclusions arrived at, and finds a striking agreement to exist as to the main causes of unrest in the different districts. It is satisfactory, also, to note that the several Commissions have found evidence of a strong feeling of patriotism both amongst employers and employed throughout the country, and a disposition to recognise the difficulties of the situation brought about by the unprecedented circumstances which confront the nation.

In every case it appears to be agreed that the main cause of unrest is to be attributed to the increased cost of living, which has grown at a greater rate than the advance in wages. It is also complained that the distribution of food supplies is unequal. There is a feeling in the minds of the men that certain sections of the community have been profiteering, and that the whole of the rise in prices of some essential commodities has not been one of the inevitable results of the war.

Like many other social questions, this is a matter not very easy to prove. Probably there is a certain amount of justification for the belief prevalent in the minds of the working man. When he sees, for example, his tobacco and beer rising in cost far beyond the permissible increase due to Excise, he is confronted with a perpetual source of irritation, which by its mere psychological influence, warps his judgment with regard to other things. If women-folk, also, have been equally disturbed by the distribution of sugar, the local supply of which was at once seized upon by unprincipled tradesmen as a lever for levying a mail upon their necessitous customers. We take these three commodities, beer, tobacco and sugar, as

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... because they are the most flagrant, they appeal so forcibly to the working class. There has been no real change in any of these articles, and the Government has not admitted the force of the working man's point of view by relaxing restrictions in the case of beer, by remitting half the proposed increase of tax in the case of tobacco, and by promising a more equitable distribution of sugar.

It is not, however, necessary to argue about the justice or injustice of the working man's complaint. What we have to deal with is the fact that the feeling of discontent is present in his mind, and that its main cause is the undisputed fact that the purchasing power of his wages is decreasing owing to the upward tendency of prices. For those who have to live upon weekly earnings lying near the margin of a mere subsistence wage, this is unquestionably a serious matter. And it is not to be permanently remedied by an increase in wages. This would merely involve the country in a vicious circle, and would lead to an aggravation of the evil. It has been suggested that the proper remedy is to fix maximum prices, and for the Government itself to bear any losses that may thus be caused to the various trades concerned. The question, however, is one for Lord RHONDDA's consideration, as he alone is in a position to know the facts. We would, moreover, urge the importance of steering clear of any narrow views upon the question of the working man's needs. There is a suspicion that too ardent advocates of temperance reform have done more harm than good for the cause they have at heart by their endeavour to promote abstinence from liquor as a necessary war measure. The Commission's reports in several areas point out that this has been a marked cause of irritation and unrest. Here, again, it is not necessary to dilate upon the moral aspect of the question. We have merely to accept the facts disclosed—viz., that restrictions on liquor are resented by many of the working classes.

Leaving aside these gastronomic causes of dissatisfaction, the reports show that there is also a feeling of annoyance with regard to restrictions of personal freedom arising from the provisions of the Munitions of War Acts. Coupled with this there has arisen a want of confidence in the Government with respect to the restoration of trade union privileges after the war. It is said that this feeling has been emphasised by the omission to record changes of working conditions under Schedule II., Art. 7 of the Munitions Act. We must confess to a feeling of surprise that any grievance should be felt under this head, in view of the repeated assurances both of the Government and of employers that no compulsory surrender of privileges has ever been contemplated.

It is impossible to pass without comment the conclusion in the South Wales report that there is in that area a lack of communal sense, accompanied by a break-away from faith in Parliamentary representation. This is a matter which cannot be adequately discussed without a decided break in what has been—perhaps too euphemistically—termed the party truce. The country is at war, and a coalition Government is endeavouring to preserve the liberties of nations from Teutonic aggression. If the workmen of South Wales think that this time of crisis is fitting for raising such issues as these, which can scarcely be claimed as helpful towards winning the war, we can only say that they do not even remotely realise the position in which the nation finds itself to-day. There are several other points in the reports which have obviously only a secondary bearing upon the main questions involved in this investigation. Most of them are minor grievances which, where genuine, are capable of adjustment in due course, and we do not doubt that they will receive proper consideration from the Government departments concerned.

The recommendations of the Commissioners appear in most cases to be practicable and reasonable in their scope. Many of them, such as food prices, industrial councils, increase of output, housing, agricultural wages, are even more so. The relations of the working class are involved in the suggestions for closer contact between workmen and employers already in the process of being carried out, and to the mutual satisfaction, it is to be hoped, of the parties concerned.

Attention should also be given to the opinion expressed by the Commissioners that there is need of better organisation among the trade unions. We believe this question merits even greater consideration than is here suggested, and it is surprising that no recommendation with regard to it has been made. The only hope for better relations between employers and employed in the future depends upon rigid discipline within both the trade unions and the employers' associations. That discipline has been conspicuously lacking in recent labour troubles. There are too many references to "scraps of paper" in these reports, and guarantees of some kind or another must be provided before any new system can be expected to work smoothly.

Upon the whole, the results of this enquiry must be regarded as satisfactory, and hopeful for the future work of the Reconstruction Committee. The reports themselves will be of the greatest value in the important task which that Committee has undertaken. They seem to bring us appreciably nearer to that realisation of the labour point of view which has been too conspicuously absent from discussions of the problems concerned. It is a matter for mutual congratulation that the points in dispute are not more serious and irreconcilable than are here indicated.

Our Half-yearly Index.

Owing to the continued stringent restrictions on paper supplies, we have decided not to insert the usual Supplementary Sheet, containing Title Page and Index to Vol. CXIII., in the whole of this issue. This, however, has been printed, and will be forwarded, post free on application, to any subscriber desiring it, on receipt of a post card addressed to our publishing offices, 30 and 31, Furnival-street, Holborn, E.C. 4.

THE TEXTURE OF FIRECLAYS.

In a paper read before the annual meeting of the Society of Chemical Industry, Messrs. W. C. HANCOCK and W. E. KING stated that as most clays can be easily disintegrated by boiling with water, and separated into portions of specified average size of grain, the determination of texture in raw material is simple. In the fired material the individuality of the finer grains has probably disappeared through intimate coalescence or initial fusion. The texture of fireclays can apparently be determined only by the microscopical examination of thin sections or polished surfaces.

Stourbridge fireclay was separated by elutriation into the usual "clay substance," "silt," "fine sand," and sand, the last of these being subdivided into two grades. The finest fraction resulting from elutriation was subdivided by a special sedimentation process. Some of the liquid containing the finest particles in suspension was evaporated to dryness and the residue weighed, and in another portion the particles were left to settle, collected, dried and weighed. The evaporating process gave a material very seriously contaminated by the mineral matter dissolved in the tap water used.

Comparing the chemical composition of the fractions and of the original clay, and also the corresponding rational analyses, it becomes evident that the finest grained fraction is mainly composed of clay substance, and that the quartz tends to accumulate in the coarser fractions. Comparative tests were made for plasticity, and also for air-shrinkage and fire-shrinkage, but as regards shrinkage of the test pieces of the finest grained fraction no reliable readings could be obtained owing to excessive warping. The fraction with size of grain next to the finest required most water for moulding, and gave the largest air-shrinkage and fire-shrinkage, which have minimum values in test pieces made from the fraction with the next larger grains. Further work is in hand.

In the discussion, the president, Dr. CARPENTER, spoke of the difference in procedure of manufacturers here and abroad and in the systems adopted to arrive at the finished article. The method here had been to take clay from the mine and, after weathering, mix it with a certain amount of grog, and that was the end of it. The German idea was to arrive at what the ultimate composition should be, and the raw material for building up was verified by experiment and experience in order to provide the required final composition. In that way they had produced goods which competed with goods here, although they did not possess, in their own country, the necessary materials. The article produced in this way was, for practical work, better than anything the British manufacturer had been able to produce. The latter had now altered his methods, but as yet had not succeeded in making articles as good as the German, though doubtless he would eventually achieve success.

The workmen's section of the Coal Conciliation Board for England and North Wales has passed a vote of condolence with Sir Thos. R. Ratchiffe-Ellis on his bereavement.

Coal Freights to Norway.—Shippers of coal from Hull are paying as much as 145 kr. freight per ton to Christiania, and 150 kr. to Copenhagen or Bergen, which at the present rate of exchange is nearly £9 per ton for coal which costs from 20s. to 28s. per ton f.o.b. A cargo of 2,300 tons lately shipped to Christiania cost something over £3,000, but the freight agreed upon with the owner of a neutral vessel amounted to approximately £20,000 in addition.

THE COAL AND IRON TRADES.

THURSDAY, JULY 26.

Scotland.—Western District.

COAL.

Conditions in the Scotch coal trade are quiet all round, and prospects of an improvement are not encouraging. During the past week markets have been quieter than ever, owing to the holiday influence. In the west of Scotland district the majority of the pits have been practically idle, and operations have not yet been fully resumed. Shipments amounted to 106,405 tons, against 117,416 in the preceding week and 121,087 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	26/-28/
Ell	26/6-28/	26/6-28/	27/-30/
Splint.....	28/-30/	28/-30/	35/-40/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The majority of the Scotch ironworks have now resumed operations, though it will likely be the end of the present week before employment is full. War demands admit of little delay, and it is not anticipated the holidays will be unduly prolonged. All grades of pig iron are wanted at once, and makers have very full order books, hæmatite bulking largely. Values are practically unaltered. Monkland and Carnbroe f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. All descriptions of finished iron, too, are eagerly wanted, and manufacturers have their hands full. Prices remain on a very high level, and are likely to go higher.

Scotland.—Eastern District.

COAL.

In the Lothians coal trade there is still a lack of business in all directions, and broken time is prevalent. Supplies are in excess of demands, owing to the inadequacy of the local outlet and the curtailment of the export branch. Shipments were 17,507 tons, against 20,710 in the preceding week and 51,107 tons in the same week of last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	35/-38/
Secondary qualities.....	25/6	25/6	35/-36/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The situation in Fifeshire is also very depressing, and a considerable amount of idle time is being experienced. Export restrictions have played havoc with local business, which was largely composed of shipments. Clearances amounted to 24,320 tons, against 25,623 in the preceding week and 49,314 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	45/-48/
Unscreened do.....	24/-25/	24/-25/	40/-42/
First-class steam coal.....	28/	28/	40/-42/6
Third-class do.	24/	24/	32/-34/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 148,232 tons, compared with 163,779 in the preceding week and 221,508 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

There has been no improvement in the volume of tonnage available for the purposes of individual exporters, and, indeed, even the quantity of shipping for official requirements has shown a very considerable falling-off. The result is that, at the time of writing, many collieries have found themselves unable to continue their output, whilst others are only working short time. Business in the coal market is almost at a standstill. A good many orders are in circulation, and, were vessels obtainable, shipments would be very brisk. As things are, however, all descriptions of fuel are very plentiful at minimum scheduled prices, and the quantity despatched is relatively very small. Excepting that special smithy sorts are quoted at 30s. per ton and that gas coke has receded by from 1s. to 2s. on the week, there is no alteration in prices, figures remaining at rock-bottom. Second-hand holders have received official intimation that they must not persist in their offers of discounts on the minimum rates, and there is now no indication that any rebates are being suggested. A few small orders for coal, to be fulfilled when transport facilities offer, are stated to have been booked from Scandinavian consumers. The Norwegian State Railways are enquiring for best steams, delivery over the ensuing two months, and tenders are returnable immediately.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	40/
Do. Tynes (Bowers, &c.)	29/6	29/6	45/
Secondary, Blyths	25/6	25/6	37/6-40/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	37/6-40/
Unscreened	23/6-25/	23/6-25/	30/ -37/6
Small, Blyths	20/	20/	27/6-30/
Do. Tynes	18/6	18/6	25/ -27/6
Do. specials	20/6	20/6	30/ -32/6
Other sorts:—			
Smithies	25/ -30/	25/	35/
Best gas coals (New Pelton or Holmside)	25/	25/	35/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	33/ -34/
Special gas coals	26/6-30/	26/6-30/	37/6
Unscreened bunkers, Durhams	24/ -25/	24/ -25/	33/ -36/
Do. do.			
Northumbrians	24/ -25/	24/ -25/	32/6-35/
Coking coals	24/ -25/	24/ -25/	33/ -34/
Do. smalls	24/ -25/	24/ -25/	32/
House coals	28/6-30/	28/6-30/	45/ -50/
Coke, foundry	42/6	42/6	45/ -47/6
Do. blast-furnace	42/6	42/6	40/ -45/
Do. gas	29/ -30/	30/ -32/	32/ -34/

Sunderland.

COAL.

The coal market business is of the scantiest description, and the position is extremely dull and unsatisfactory: difficulties have arisen over the Coal Controller's regulations; this, with the extreme shortage of tonnage, has naturally contributed to curtail business. The collieries are still badly off for prompt turns, some of them being almost in *extremis* and likely to lose a good deal of time this week. Apart from one or two Norwegian orders, neutral business has hardly been in evidence. Market values are quite nominal and unchanged at the usual scale prices. The Norwegian State Railways are enquiring for their usual quantity of 18,500 tons of steam coal, to be delivered during August and September. Tenders will, of course, be based on the new schedule prices.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	37/6
Secondary do.	23/6-25/	23/6-25/	33/6
House coals:—			
Best house coals	30/	30/	45/
Ordinary do.	28/	28/6	35/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	42/6
South Hetton do.	28/6-30/	28/6-30/	42/6
Lambton unscreened	24/	24/	34/
South Hetton do.	24/	24/	33/6
Do. treble nuts	20/	20/	35/
Coking coals unscreened	25/	25/	33/
Do. smalls	25/	25/	32/
Smithies	25/	25/	34/6
Peas and nuts	24/6-26/	24/6-26/	36/
Best bunkers	25/	25/	36/
Ordinary bunkers	24/	24/	32/6
Coke:—			
Foundry coke	42/6	42/6	47/6
Blast-furnace coke (dld. Teesside furnaces)	28/	28/	28/
Gas coke	30/	32/	35/

Chartering continues in a state of stagnation for want of tonnage, and extravagant freights are offered for neutral ports without avail.

Middlesbrough-on-Tees.

COAL.

Conditions in the coal trade show no improvement. Signs of removal of the deadlock which has been experienced since the control arrangements have been in vogue, are not yet forthcoming, and the market is dull and featureless. Enquiry is very limited, and new miscellaneous business is scarce. Colliery positions are unsatisfactory, and it is reported that a considerable amount of time is being lost. Best Durham gas coal is 25s., and second quality is 23s. 6d., whilst Wear special coal ranges from 26s. 6d. to 30s. Unscreened Durham bunker coal remains at 24s. Household coal is unaltered. Coking coal is fairly well taken up at rates recently named. Coke is rather quiet in regard to exports, but home trade is fairly active, and local demand is still heavy. Prices are well maintained, though supply is more than ample. Patent oven and beehive quality stand at 42s. 6d., and gas-house coke is quoted 29s. to 30s. Descriptions needed for the blastfurnaces continue to find a ready market at full rates, average kinds commanding the fixed maximum of 28s. at the ovens, and qualities low in phosphorus selling at the limitation figure of 30s. 6d. at the ovens.

IRON.

There is little new to report of the pig iron industry. So far as Cleveland pig is concerned, the supply is very plentiful. Recently, home demand has been on only a very limited scale, consumers being well covered for this month, but with the August allocations at hand, and resumption of operations at consumers' works north of the Tweed, after the Scottish holidays, much briskness is looked for, and the next few days promise to be characterised by very considerable activity. A fairly good and rather extending foreign business is reported. For home consumption No. 3 Cleveland, No. 4 foundry and No. 4 forge were all quoted 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. As to east coast hæmatite iron, demand is quite as insistent as ever, both for home use and for shipment abroad. Official organisation continues to assure adequate supplies to customers reachable by rail, and to leave some little surplus available for sale for export; but, whilst a few home transactions are recorded from time to time, obstacles difficult to overcome still hamper foreign sales, and new business with the Continent is very small indeed. Meanwhile, however, fairly good shipments to our Allies are understood to be going steadily forward in fulfilment of running contracts. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France, and 142s. 6d. for export to Italy. The various branches of the finished iron and steel trades present no new features of moment. Producers are stated to be

working at very high pressure to cope with heavy Government requirements for the large demands of the shipyards, so that surplus material available for sale in the ordinary way of business is very limited indeed. Quotations all round keep strong.

Cumberland.

COAL.

There is very little alteration to report in the condition of the coal industry in this district. Some of the collieries that cater for local works needs are still fairly busy, but requirements, even in the home market, are not now quite so large, and the demand all round is not so firm as it was some time ago. In some of the home branches business is a shade easier, and orders are not so plentiful, but the clamour for works and gas coal on coastwise account is undiminished, and Irish customers are still able to take all the supplies that are available, providing they can be shipped. One of the pits was idle on Monday, but the remainder are all working full time, and sufficient coal is now being raised to satisfy the needs of all important consumers to the full. Manufactory fuel for local use is fairly active, and a big portion of the output is still earmarked for consumers on work of national importance; but even in this branch the pressure of demand is not quite so keen as it was. There is no improvement in the house coal trade, and business at the depots is duller than ever this week. Some coal is still being imported from collieries on the east coast, but it is mainly for export and use at the by-product coke ovens. From the new Order it appears that Cumberland will not be allowed to send any coal outside of the district, but it may receive supplies from Northumberland and Durham. Whether it will affect the Irish market remains to be seen, but it is hoped that the shipping trade will be allowed to continue. Engine fuels are firm, and gas coal for local consumption is in fairly steady request. The shipping trade is exceedingly brisk, and during the week 21 vessels have sailed with coals, all for Irish ports. The demand for all sorts except house coal for Ireland is firm, and although more coal is now available for shipping, it is still impossible to cope with all the business coming in on coastwise account. The shipments for the week have amounted to 4,315 tons compared with 2,680 tons last week, and 5,105 tons at the corresponding period of last year. The largest consignments have been for Belfast, Dublin, Larne, Londonderry, and Carrickfergus. Coke makers are very busy, and all the ovens of the county are in full blast. All the make of local coke is being absorbed at the ironworks in West Cumberland. There has been no change in either home or export quotations. Best coal at the pits is obtainable at 23s. 4d. per ton, and best export coal is 19s. 6d. per ton, f.o.b. Works fuel is 20s. per ton, and best gas coal is 20s. per ton delivered in the district. House coal delivered at Maryport is from 27s. 6d. to 28s. 4d. per ton. Other current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " ...	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	25/	25/	25/
Bunkers (mixed nuts and steam coal) (coastwise) Do. (foreign)	30/	30/	30/
Best coal for gasworks ...	21/6	21/6	21/6
Best washed nuts for gas-works	25/	25/	25/
	20/	20/	20/
	19/	19/	19/

IRON.

Greater activity than ever prevails in the Cumberland and North Lancashire hæmatite pig iron trade, and both the iron and steel industries are being subjected to heavy pressure to cope with the enormous claims which are being made upon them. Requirements of both special and ordinary iron are still greater than can be fully satisfied. Makers have sufficient orders on hand to keep them exceedingly busy for months ahead, and so much is now required for Government work, that little or no outside business can be accepted. Sensible relief would be afforded in a somewhat stringent situation by the lighting of additional furnaces, but, owing to shortage of labour and raw materials, it may be some time before production can be increased. There are 30 furnaces in blast in the whole district and all the output is going into immediate consumption. Users in Scotland and the Midlands are taking the bulk of the special and semi-special iron, and a big proportion of the make of ordinary Bessemer iron is being absorbed at the steelworks in the district. Prices are unchanged at the maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., while warrants at cash are idle at 115s. per ton. Special iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton f.o.t. The demand for ferro-manganese is very strong, but at the moment makers have little or none to offer for prompt delivery. The steel trade is exceptionally brisk, and all the mills at Barrow and Workington are working at top pressure, but only Government work is being executed. The iron ore trade is as brisk as ever, and the demand for local ore is very keen. Production is still inadequate for all requirements, but as the Ministry of Munitions has now taken over all the mines in Cumberland and the Furness district, it is fully anticipated that a further effort will shortly be made to secure a very substantial increase in the output. There has been no alteration in prices.

South-West Lancashire.

COAL.

The inland demand for household coal continues unabated, most of the tonnage going into stock mainly at consumers' residences, little of it as yet being put upon the

floor at the various wharves and depots. With the shipping, requirements for general bunkering are only moderate, in fact enquiry has been dropped of late. Admiralty requirements, however, are maintained. Supplies on the whole are not too plentiful, and is only here and there that there is surplus coal to dispose of. In slacks the little tonnage that is at liberty is caused by the temporary cessation of work first at one town and then another, consequent upon the annual holidays, and as a rule there is no difficulty in disposing of it in some fresh direction for the short time that the surplus is available.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/ -22/	21/ -22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/ -20/	19/ -20/	19/ -20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds.
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—	—	24/6-25/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds.

* As per official list.

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. The Coal Transport Order figures largely on the horizon. House coal continues in good demand. Engine fuel, including slack, is a little easier, through holidays. Shipping coal is still in good call. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/ -23/	22/ -23/	22/ -23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/ -18/6	18/ -18/6	18/ -18/6
Furnace coal	17/6-18/	17/6-18/	17/ -18/
Bunker (f.o.b. Partington)	—	—	25/ -26/
Best slack	16/ upwds.	16/ upwds.	16/ upwds.
Common slack	14/6 upwds.	14/6 upwds.	14/6 upwds.

* As per official list.

IRON.

There is nothing fresh to report with reference to the state of trade in this district. All works are engaged on war material, deliveries and prices being controlled entirely by the Ministry.

Yorkshire and Derbyshire.

Leeds.

COAL.

Although not so many London and Hull representatives as usual were on the Yorkshire Coal Exchange on Tuesday, the attendance was about an average. The smaller number present from a distance was probably accounted for by the nearness of the holidays, as well as by the tightness of the market in regard to supplies, it being impossible to purchase coal of any description for prompt delivery. Conversation was almost exclusively centred round the distribution scheme, the details of which are absorbing a good deal of attention on the part of coal owners and factors alike, especially in view of the recent modification in regard to Lancashire, now divided into two sub-areas, east and west, the former a restricted area and the latter prohibited so far as Yorkshire coal is concerned. In most quarters this development appears to have come as a surprise. It is stated, however, that a number of emergency certificates enabling supplies to go to important munition works in the prohibited sub-area of Lancashire have already been issued. With regard to other directions, representatives on the market from Sheffield expressed great concern that under the scheme as drafted supplies from the Derbyshire coal-field are cut off from Sheffield, and it is understood that steps are being taken with a view to securing special consent to enable Derbyshire coal to be dealt with at Sheffield. Colliery agents reported that the output is well maintained, full time being the rule, and generally speaking the attendance of the miners is satisfactory. The question of house coal is a cause of considerable unrest in many instances, however, arising mainly out of the difficulty of delivery, especially where miners reside, as many do, three or four miles from the pits. The demand for coal of every description shows no abatement. House coal was in especially keen request, both for local consumption and for London and the south. Merchants in London and beyond are getting fairly good supplies, but there is such an insistent demand that they are not able to secure very great stocks in readiness for winter, although some progress in this respect is reported to have been made recently. The bulk of the business is for stocking purposes at the larger residences, the retail trade being only quiet. A fair amount of coal is being sent coastwise, as contractors are getting rather better supplies. Freights are unsettled and vary considerably, but handy-sized boats have been booked within the last few days at 17s. 6d. Goolle to London. In the West Riding markets there is a big demand for best qualities of house coal, far beyond the abilities of the collieries to cope with. Supplies of secondary qualities are coming to hand a little more freely, however. Pit prices for the West Riding, stated with the reservation that they and other quotations in the appended list are more or less nominal, are as follow:—Haigh Moor selected, 21s. to 22s.; Silkstone best, 20s. to 21s.; Silkstone house, 18s. to 19s.; other qualities, 17s. to 18s. So far as open market business is concerned, there is nothing doing in gas coal, the collieries is concerned, there is nothing doing in gas coal, the collieries having nothing to spare. The bulk of contracts have now been renewed on the lines recently indicated. slacks are still on offer in fairly plentiful quantities. other qualities of manufacturing fuel are very eagerly washed nuts in particular are very eagerly sought. The shortage of coking smalls is such that collieries are coking plants continue to be compelled to use small supplies by crushing large coal. Coke is a little more plentiful, but this is accounted for by the fact that the two smelting furnaces in the district have had to temporarily suspend operations through accidents.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

Business in every branch of the iron trade is good, and all the works of the district continue to be actively employed.

Nottingham.

COAL.

In every branch of the trade an active tone prevails. There is no apparent reduction in the demand for domestic fuel. Local merchants continue to receive a fairly good number of orders from householders who are getting in supplies for winter use, and although sales are limited at the landsale depots, as has been the case for some weeks past, the demand is exceptionally strong for the time of the year. There is still a good deal of pressure on collieries by merchants for fuller contract supplies. Any class of households are readily accepted by merchants who are anxious to secure a little surplus stock, the sustained demand of the past two months having given them little opportunity of placing fuel in reserve for winter requirements. With regard to steam coal, the output is readily absorbed by firms engaged on war work and the railway companies, many ordinary users finding it difficult to obtain an adequate supply of those grades they particularly prefer. There is a decided scarcity of nuts and cobbles. Slacks of most descriptions are in good request. Coke is in strong demand. Nearly all the gas coal available is required for fulfilling contract obligations.

Prices at pithead.

	Current prices.	L'tst week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/-	17/-18/-	15/6-16/6
Best hard coals.....	16/9-17/6	16/9-17/6	17/-17/6
Secondary do	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/-	12/-13/-	12/-13/-
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/-	11/-	11/-

Leicestershire.

COAL.

A very important and valuable concession has been granted by the Controller of Coal Mines to the collieries in this district, whereby the south-western counties (No. 13 district) will now be included in the areas to which household can be forwarded under the new scheme; no alteration, however, will be made in the areas to which steam and manufacturing coal can be forwarded. This means that the west of England, where a large connection has been built up by many years of effort, will be preserved for Leicestershire household. This concession will prevent a very great dislocation of trade, which has proved of great value to all concerned, and the inclusion of this area will remove a great cause of anxiety to colliery managers. The conditions are of the most strenuous character, and efforts are being made to prevent the further calling up of men of long experience and skill whose services are considered essential, especially in view of the further responsibilities being thrown on the clerical staffs. The preferential deliveries to London and district are still fully maintained, and there is an extremely heavy demand for all classes of household, as well as deep and main cobbles and nuts and small nuts for mechanical stokers. Country coal merchants are getting fuller deliveries, but they are at once absorbed in meeting orders which are long over due, and the stocks in reserve at the coal yards are still very much under the average. Public institutions are pressing for large supplies to safeguard their winter needs. There are no stocks of any kind at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	16/6-18/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-16/
Deep screened cobbles ...	16/- 17/-	16/- 17/-	16/- 17/-
Deep large nuts	16/- 16/6	16/- 16/6	16/- 16/6
Bakers' nuts	15/- 15/6	15/- 15/6	15/- 15/6
Small nuts.....	14/6-15/-	14/6-15/-	14/6-15/-
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/- 12/3	12/- 12/3	12/- 12/3
Small dust	6/- 7/-	6/- 7/-	6/- 7/-
Main nuts for London kitcheners	13/6-14/-	13/6-14/-	13/- 13/6
Stearns, best hand picked	14/- 14/6	14/- 14/6	14/- 14/6
Stearns, seconds	13/- 13/6	13/- 13/6	13/- 13/6
Main cobbles for kitcheners	13/6-14/-	13/6-14/-	13/6-14/-
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

**South Staffordshire, North Worcestershire
and Warwickshire.**

Birmingham.

COAL

There is no modification in the general conditions of the trade. There is still an active run on house coal, and merchants find themselves considerably in arrear with their deliveries to the public. Steams and all kinds of industrial fuel generally are in heavy demand. Output is well maintained, but supplies are inadequate, and consequently there is hardly anything on the open market. The new distribution scheme continues to provide matter for discussion. One interesting point has been raised here, although, of course, its application will be general. In cases where the usual supply field have been cut off by the scheme, the arrangement now is that equivalent supplies shall be obtained within the distribution area. The proposal put to the Controller was the other way about—namely, that the merchant should continue to draw from the old sources of supply, and that he should be provided with new customers near at hand for this particular coal, the idea being to save re-shuffling of wagons. This, however, was not accepted.

and in either case the consumer is not affected, except in so far as he will not be able always to get the coal he formerly used. Good results, generally speaking, are expected from the scheme.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

Insistent pressure for Government requirements remains the salient feature of the iron and steel industries. In some branches, small rounds, squares, and flats, &c., price takes a secondary place to delivery, consumers being willing to pay quite a reasonable premium to get supplies. The basis for three-eighths sizes is firmly established at £16 15s., but substantial premiums are paid for special sizes if there is an assurance of delivery. A licence is now required for export of this material. Makers say they have to pay as much as £12 6s. to £12 10s. for their puddled bars, one of many circumstances which make for enhanced prices of the finished iron. Business is very strong for marked and merchant bars, and output is pledged as far ahead as producers care to go. Values are maintained at the full maximum level. Similarly in the pig iron branches, more business is offered than furnace owners feel justified in accepting. An important addition is likely to be made to the production of iron ore in the Midland district by the operations of the Northamptonshire Ironstone Company at Bigfield. They have secured the right of quarrying an additional 1,000 acres, including workings at Priors Marston, Warwickshire, and a light railway gives connection with the Stratford and Midland Junction Railway. Galvanised sheets are £28 10s. for 24-gauge, and £28 15s. for open-annealed qualities. Business is small, and a Government licence has to be obtained for spelter before orders can be accepted. In the steel branches, plates are in demand for boilers and bridges, and talk is heard of plate mills which were recently put to the rolling of sheet steel being again diverted to the output of plates.

Forest of Dean.

COAL

A very firm tone continues to prevail in the house coal trade of this district, there being a strong market for all the qualities produced. Considering the temperature the demand is much above the average, and it is evident that the tonnage despatched is not all going into immediate consumption. The inland merchants are still heavy buyers, whilst cargo orders are very plentiful. The slack quality has been hanging lately, and the price has had to be reduced. Steam qualities are in heavy demand, all the collieries being inundated with orders.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	13/6	16/6	15/
Steam coal:—			
Large	20/ -21/	20/ -21/	18/ -19/
Small ...	17/	16/ -17/	16/ -17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

Messrs. W. Wade and Son report that a fair average amount of house, steam and gas coal is being received but stocks are, generally speaking, very light. Some amount of anxiety is being felt as to future supplies, when the pressure of the autumn demand is experienced, as the quantities contracted for are much below the average, while the nature of the re-allotments remains unsettled regarding the substitution of coal for the contracts that had been effected in the now excluded areas. Some coal from the West Coast is still being imported by sailing colliers.

THE BY-PRODUCTS TRADE.

Tar Products.—No fresh developments are reported from London or provincial markets. Pitch maintains a strong position, but manufacturers are not inclined to accept orders, and prefer to await developments. Prices for gas works products have ruled as follow:—Gas works coal tar, 20s. to 21s. 6d. Pitch, east coast, 16s. 6d. to 17s. 6d. per ton; ditto, west coast, Manchester, 15s. 6d. to 16s. 6d.; ditto, Liverpool, 16s. 6d. to 17s. 6d.; ditto, Clyde, 17s. to 18s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in hulk, north, 6½d. to 6½d. Solvent naphtha, naked, north, 1s. 8d. to 1s. 9d. Heavy naphtha, north, 1s. 2d. to 1s. 3d. Heavy oils, in hulk, north, 3½d. to 4½d. Carholic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—Good business is still being done on agricultural account at official rates. The exports of sulphate of ammonia for June are returned at 1,645 tons, the f.o.b. value being £33,951, equivalent to approximately £20 12s. 6d. per ton. For the half-year just ended, the shipments aggregate 36,511 tons, compared with 127,880 tons in 1916, and 159,976 tons in 1915. Exports are, of course, now controlled mainly through an official committee.

COAL.

The scheme for the further control of the distribution is taking further shape, and collieries are busily engaged in preparing the necessary returns which will provide data for the district committees who are endeavouring to watch all interests relative to fair deliveries. It is inevitable that several contracts for this area will have to be transferred, but, speaking generally, there will not be a big alteration so far as the immediate district is concerned. The export to the Allied countries is more extensive, but otherwise there is not a big tonnage going abroad. The output, however, presents no difficulty in regard to disposal with the continued heavy demand for home purposes. The diversion of tonnage continues to cause considerable trouble, but it is now recognised that appeals to the collieries are of no avail with the pits adhering to the orders of the authorities. The tonnage required by the railway companies and for Admiralty purposes forms a big bulk of the output, and there is no need to offer any tonnage of large steams on the open market. Steam nuts are unobtainable for other purposes than that of the munition and other engineering concerns. The anxiety of home gas concerns regarding contract deliveries of fuel is still existing, owing to the fact that in the majority of cases the stock of fuel is unequal to the heavier demand for gas ahead. Though ordinary slacks are again more freely offering, the scarcity of slacks suitable for coke making is again evident, and the lack of supply prevents anything like the maximum output of furnace coke so much pressed for. The position relative to house coal is unaltered, with the demand for London maintained on such a heavy scale. Complaints of the lack of adequate supplies to other areas are still rife, though it is expected that the trouble will be adjusted before long. Values remain firm, but are of a nominal character, about as follows :—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	20/- -22/	20/- -22/	20/- -22/
Best Barnsley softs.	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/- -17/6	17/- -17/6	16/6-17/6
Best house nuts	16/- -17/	16/- -17/	16/- -17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals.....	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts.....	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts.....	16/	16/	16/
Furnace coke.....	25/8	25/8	25/8

Hull.

COAL.

The position at the Humber ports has not undergone any radical change since last report. Shipments to France and Italy keep well up to recent average, and there is a very pressing demand from French importers, who are anxious to secure every available ton to alleviate the stringency in the coming winter. A fair amount of tonnage is engaged in this trade, and apparently sufficient to deal with the present volume of export. Neutral trade continues very dull and absolutely featureless, foreign importers not yet having adapted themselves to the new regulations as to price, etc., governing our dealings with them—in addition to which they are still confronted with the utmost difficulty in chartering steamers. Supplies of coal *via* rail and river from the collieries are fairly good, and are readily absorbed. Large steams and best qualities generally continue firm at the limitation level for Allies, while in other foreign business to non-scheduled ports the official minima are nominally current value.

Chesterfield.

COAL.

There is an ever-increasing demand for coal of every class. Orders for house coal are numerous, and are coming to hand steadily day by day. Fuel for manufacturing purposes continues in great requisition, nuts and cobbles being very urgently needed. Slack for steam raising sells less readily placed. There is coal, and gas companies continue to supply. There is a steady call for coke for engineering purposes, but there is rather a shortage of railway companies in obtaining coke doing in Derbyshire coal for the purpose of being unobtainable. The coke is in a very active position, the demand for every active.

THE WELSH COAL AND IRON TRADES.

THURSDAY, JULY 26.

North Wales.

Wrexham.

COAL.

The coal trade of this area has remained steady during the past week. All the pits have worked full time, and have had no difficulty in disposing of the whole output. It is, however, likely that the tonnage will be adversely affected shortly. It is understood within the next few weeks the coalfields of Denbighshire and Flintshire will have to release 500 single young men between 18 and 25 years of age for the army. There is only a moderate demand for house coal for immediate delivery, but merchants are anxious to fix contracts for delivery during the coming autumn and winter. Some merchants state it is difficult to get as much as they require, owing to higher prices being obtainable for fuel for other purposes such as shipment, etc. There is a heavy demand for steam coal by railway companies, and no doubt these contracts will be largely affected when the coal transport reorganisation scheme comes into operation. A goodly tonnage is also required for munitions and other Government controlled works within the area. Enquiries are fairly numerous for coal for shipment at the Mersey ports. The new arrangement made some few weeks ago whereby dock labourers of military age had either to find a regular employer or be drafted into the army, apparently is working satisfactorily, but the nominal dock labour population of 28,000 has been reduced to about 20,000. In regard to gas coal, the gas companies are pressing for supplies before the new scheme is put into force, as, naturally, they are desirous of securing as much as possible of the same kind of coal as they have been using for years past; this will enable works which will have to obtain supplies of coal from other districts to get some reserve of coal until they get accustomed to carbonising the new kind of coal. Nuts, as usual, are rather scarce, as a much less quantity is made now than formerly. Still, there is a certain tonnage available for gas-making, which is quickly disposed of under existing contracts. Slack is fairly plentiful, but there is no difficulty in disposing of the output without having to resort to stacking. There is little or no change in prices of any kind of coal. The prices to merchants for house coal range from 21s. to 23s. per ton at pit, and at the retail depots these coals are quoted at 27s. 6d. to 30s. Large steam coal is offered at 20s. to 22s. per ton, and bunkers obtain similar figures and sometimes a little more. Gas coal contracts are being fixed at last year's prices on a basis of 19s. to 21s., and nuts at 18s. to 20s. Slack is listed at 12s. to 14s., while gas coke is making 21s. 8d. to 25s. at the gas works. The following is a complete list of prices for the week:—

Prices at pit f.o.r.:—	Current prices.	L'st week's prices.	Last year's prices.
Best house coal	21/-23/	22/-23/	—
Secondary do.	20/-22/	21/-22/	—
Steam coal.....	20/-22/	19/-20/	—
Gas coal	19/-21/	19/-20/	—
Bunkers	20/-22/	19/-20/	—
Nuts	18/-20/	18/-19/	—
Slack	12/-14/	12/-14/	—
Gas coke (at works).....	21/8-25/	21/8-23/4	—
Prices landsale:—			
Best house coal	27/6-30/	27/6-30/	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

Though there was a fair arrival of tonnage during the past week and the collieries were employed with more regularity than for some weeks previously, there is still a good deal of coal in stock and the market was very inactive, especially in view of the fact that there is great uncertainty as to the classification scheme of the coal control. From these causes prices have not undergone much alteration. Small coal was almost a glut in the market and met with a scant enquiry. There is little change in house coal and patent fuel prices. The subjoined quotations approximate as nearly as possible to the prices in the list and classifications recently issued under the Coal Control Scheme, but there have been variations from the list:—

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	30/	27/-29/	37/-39/
Western-valleys, ordin'y	29/	24/6-26/	37/-38/
Best Eastern-valleys ...	29/	23/6-24/6	35/-36/
Secondary do.	28/	19/6-21/	33/-35/
Best small coals	21/6	14/6-16/	25/-26/
Secondary do.	20/	9/-12/	23/-24/
Inferior do.	18/	6/-8/6	19/-20/
Screenings	23/	15/-17/6	25/-26/
Through coals	27/	19/-21/	24/-26/
Best washed nuts.....	30/	—	28/-30/
Other sorts:—			
Best house coal, at pit...	33/	25/-26/	24/-26/6
Secondary do. do. ...	30/9	22/-23/6	22/-24/
Patent fuel	32/6	30/-32/6	50/-51/
Furnace coke.....	47/6	—	51/-52/6
Foundry coke	47/6	—	61/6-62/

* Nominal.

IRON.

There is little fresh to report in the iron and steel markets. A good deal of negotiation about wage rates has been going on of late, and, happily, it has ended amicably. There is still a large output, especially on Government account. Pitwood arrivals have been about an average, prices ruling from 58s. to 62s. 6d.

Cardiff.

COAL.

There is still no improvement in the general position, and the market is practically at a standstill. Tonnage arrivals over the week-end were rather more satisfactory, but the great bulk of the tonnage being requisitioned for Admiralty or Government purposes, there was only a very moderate margin for ordinary requirements, and, as in previous weeks, there was little demand for secondary or ordinary grades of coal. Stocks continue to be excessive, and as the

shortage of wagons becomes daily more acute, a number of collieries were unable to resume operations on Monday owing to the scarcity of empties. No information has yet been received as to the classification scheme, and the delay is not only embarrassing but is causing considerable irritation. Further regulations have been received from the Controller with regard to the supply of bunker coal, but it is difficult to find two men who will agree to place the same construction on the various clauses. The ship-brokers hold the view that the new regulations will have the effect of practically eliminating them as a factor of the export trade, and the Chamber of Commerce on Wednesday passed a resolution with unanimity that the shipbrokers should be protected with regard to remuneration in the same manner as the coal owner and exporter. In the multiplicity of forms and orders and regulations it is extremely difficult to realise the exact position, and when it is stated that there are a dozen committees sitting almost daily on different phases of the trade, it is easy to appreciate the general tone of dissatisfaction and discontent which prevails. Chartering last week was on rather a more liberal scale, the amount of tonnage taken up being 20,690 tons, compared with 7,400 tons in the previous six days. Of this quantity over 15,000 tons were fixed on Friday and Saturday. A meeting of Admiralty colliery salesmen has been held to consider contract prices for 1917. The Government have offered an increase of 2s. to 3s. per ton on the prices previously paid, but in view of the extra cost of production, increased wages, and other incidentals, this offer was not considered satisfactory, and the opinion was freely expressed that the Government rate should approximate the old limitation schedule. Representations have been made to this effect, and the Admiralty have been requested to receive a deputation on the subject. Up to the time of writing, however, no reply had been received. All business is being done on the basis of the new fixed rates, subject to revision when the classification scheme has been officially sanctioned. Owing to the shortage of wagons, the pitwood market is easier, French fir commanding not more than 60s. to 62s. 6d. per ton.

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	40/-42/6
Seconds	30/9	30/9	38/-40/
Ordinary	30/	30/	36/-38/
Best bunker smalls	23/	23/	26/6-27/6
Best ordinaries.....	21/6	21/6	25/-27/
Cargo qualities.....	20/	20/	21/-22/
Inferior smalls	18/	18/	20/-21/
Best dry coals	30/	30/	35/-36/
Ordinary dries	28/6	28/6	33/-35/
Best washed nuts	30/	30/	35/-38/
Seconds	28/6	28/6	33/-36/
Best washed peas.....	27/6	27/6	31/-34/
Seconds	26/6	26/6	30/-32/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	39/-40/
Western-valleys	29/	29/	37/-38/
Eastern-valleys	29/	29/	33/-35/
Inferior do.	28/	28/	30/-32/6
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	38/-40/
Through-and-through	—	—	33/-35/
Small	26/	26/	32/-33/
No. 2 Rhondda—			
Large	27/	27/	33/-35/
Through-and-through	25/	25/	27/-29/
Small	20/	20/	24/-25/
Best patent fuel	30/	32/6	50/-52/6
Seconds	—	30/	48/-50/
Special foundry coke	47/6	47/6	62/6-65/
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	50/-52/6
Pitwood (ex-ship)	60/-62/6	57/6-62/6	44/-47/

* Nominal.

IRON.

There is little change to report. All blast furnaces and works are operating at high pressure and outputs generally are maintained at the top level. The tin-plate trade continues firm, although the shipments last week showed an appreciable diminution they only amounted to 6,363 boxes against 16,308 boxes received from works, leaving 94,872 boxes in stock compared with 84,427 boxes the previous week and 132,506 boxes a year ago. Production was below the average, chiefly owing to the difficulty of obtaining bars for which there is a very heavy demand for munition purposes. Makers have full order books, but owing to the uncertainties of supplies they are declining further business. For certificate work Bessemer standard cokes are firm at 36s. to 37s., whilst free parcels are readily snapped up at 43s. to 44s. per box. Steel bars are nominal, and the same applies to pig iron, the whole output of which is strictly controlled. In the galvanised sheet trade there is no change. Spelter works continue busy, the price being £54 per ton for prompt and £50 for October delivery. Iron ore supplies are satisfactory, although the returns show a decrease on imports of 17,000 tons. Scrap metals are unaltered.

Swansea.

COAL.

Last week the returns of the trade of the port were unfavourable, and considerable decreases were shown both in the exports of coal and patent fuel compared with the previous week. The shipments amounted to 55,557 tons. There is no improvement to report in the anthracite coal market this week, and there are large stocks of large coal and duff on hand. Machine-made sizes continued active, and some qualities were unobtainable. Steam and bunkers were slow. Prices were on schedule levels.

Llanelli.

COAL.

The market has been rather quiet during the past week owing to the easy tonnage position. Stocks of many qualities have accumulated, and, until there is a more ample supply of tonnage, both buyers and sellers will experience difficulty in giving clearance to orders. Collieries are experiencing many idle days through lack of empty wagons, and this is causing a shortage in supplies of some kinds. Large anthracite coals are very slow, and little

business doing. Stocks on hand are very low. Machine-made qualities are, on the other hand, in short supply, and buyers find it difficult to obtain full supplies of these qualities. Culm is fairly steady, but duff is in short supply. Steamers are offering freely, and buyers experience some difficulty in securing supplies of all grades. Throughs are easy, and smalls very slow.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	30/-32/
Seconds	29/	29/	27/-29/
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	25/6-27/6
Machine-made cobbles.....	42/6	42/6	36/-38/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-32/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm.....	13/	13/	13/-13/6
Red Vein culm	11/	11/	—
Breakers duff	10/	10/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	37/-38/
Seconds	27/	27/	—
Bunkers through	25/	25/	27/6-31/
Smalls	19/	19/	20/-22/
Bituminous:—			
Bituminous through ..	27/	27/	—
Smalls.....	24/	24/	—
Coke-oven coke.....	47/6	47/6	27/6-29/6

THE LONDON COAL TRADE.

THURSDAY, JULY 26.

In the London coal market very little change is noticeable. The demand is exceedingly strong, and the supplies are not equal to the demand. In many directions, however, there is a perceptible improvement in the supplies coming forward, and as the actual consumption is at its minimum during the present warm weather, so far as the household qualities are concerned, there is an appreciable disposition to cope with the orders on hand for stocking purposes. The large number of orders from the general public show in an unmistakable way the desire on all sides to get in a good supply in anticipation of the winter, and as the loaded wagons arrive they are dealt with immediately, as far as the capacity for loading up and delivery at the various depots can be regulated. Collieries are offering in the open market a little more freely, but for the most part their contract obligations prevent them from accepting only a minute proportion of the orders offering, and in a large number of instances colliery representatives report that they have strict instructions not to accept any orders unless from contractors to whom a monthly quantity is due. Factors also have recently declined booking any further orders, as they find their books are congested with unexecuted orders, and unless their sales are curtailed they fear a hopeless mass of coal on order, with little chance of its being delivered. The Controller's strict oversight of all excess profits has stamped out all speculative operations, and factors are largely confined to the regular traders whom they have supplied for many years past. The new regulations effectively prevent the trucks changing hands so frequently as in the years gone by. A fair quantity of "emergency" coal has been brought forward, and it is understood that still more of this coal, which usually found its way to Ireland and other remote places, will be brought into the London area; but prices and other matters are still in a state of uncertainty, and merchants are ordering the coal entirely dependent upon the Controller's opinion as to what the price shall be. A good deal of it seems to be the North Staffordshire quality, and of very good quality, but others are not so suitable for the house coal market. The bulk of this "emergency" coal comes through shippers using the Liverpool district. Seaborne prices are usually higher than the ordinary railborne prices, and as the London merchants are tied down to the Price of Coal (Limitation) Act, and must deliver to the public at fixed prices, there is some doubt as to what the prices chargeable will be, but the Controller may safely be trusted to fix an equitable and fair rate. Reports seem to point to a larger tonnage being available for London under the new scheme, but fears are entertained that the West of England will run short. The seaborne market has been fairly good, and the demand is strong. Contract cargoes returned as arriving in the River Thames for Monday's market numbered 28, and nine for Wednesday. Freight rates are still quoted at 18s. from the Humber to London, but vessels are scarce. Hard steam coal and large nuts are very difficult to obtain. The new scheme of the Controller is still largely under consideration, but meanwhile every effort is being pushed forward to get the cellars and outhouses practically filled in readiness for the winter supply, so that the outlook for the poorer neighbourhoods and for the weekly supply to flats and other houses where there is not any great capacity for storing coal, is much more favourable than during the cold weather of last winter. The delivery trade is exceptionally brisk, and unfortunately this gives very little opportunity for the merchants to put much coal on the ground up to the present.

THE TIN-PLATE TRADE.

It is becoming extremely difficult to do business. Works are all behind with deliveries, owing to the shortage of steel and labour, and the hot weather is, of course, retarding the output. Where quotations are obtainable at all, about 36s. for 1C 14 x 20 cokes f.o.b. Wales is about the figure asked, but unrestricted sizes are not obtainable for more money; 41s. and upwards is being asked for perfects or wasters. An Order, however, published by the Ministry fixing a maximum price for tin plates, and it is also reported that the permission for the sale of certain sizes without restriction has been cancelled, but that holders of such sizes can deliver their present stocks without restriction for the home market until August 31, 1917, after which date this concession will be withdrawn.

THE IRISH COAL TRADE.

THURSDAY, JULY 26.

There is much the same as during recent weeks, but being provided for as largely as possible, while coal is to be had at present prices. Quotations remain unchanged, as follow:—Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; slack, 35s.—all less 1s. per ton discount. Irish coals at Castlecomer Collieries, co. Kilkenny, are:—Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d.—all at the pithead. Coals from the Wolfhill Collieries, Queen's County, are:—Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.r. Athy, on the Great Southern and Western Line. The Dublin labourers who were engaged last week by the National Service Department to assist in the construction of the Wolfhill-Athy railway, have since struck work, and have been replaced by local men. During the past week 69 coal vessels arrived in the port, the total quantity of coal discharged upon the quays being 26,000 tons, as compared with 32,308 tons the week previously. Last week the Lord Mayor presided over a final conference between representatives of the Dublin Coal Merchants' Association and the Irish Transport and General Workers' Union, when conditions were settled upon for the discharge of coaling vessels at the port of Dublin. The agreement stipulates that a 400-ton cargo must be cleared in 10 hours; a 500-ton cargo in 12 hours; and a 600-ton cargo in 14 hours. Overtime rates are: From 10 to 12 p.m., 1s. per hour; between 12 midnight and 6 a.m., 1s. 6d. per hour. A favourable report has been given by a department expert who recently visited the Kill coal mine in county Cavan. Coal from the pit galleries has been tested, and has given complete satisfaction.

Belfast.

There is still a good demand from the inland districts for Scotch coal, and a fair supply to meet this. Local consumers continue to lay in stocks of house coal, in view of a possible shortage of English quality. Prices are unchanged, viz.: Best Arley, 43s. 6d. per ton; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Scotch, 39s. 6d.; Orrell slack, 39s. 6d.; coke, from about 40s. to 48s. per ton. Irish coal at Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton, and 30s. per ton delivered in Belfast. From July 1 to 14, the total number of coal-laden vessels entering the harbour was 128.

SOUTH WALES MINING TIMBER TRADE.

Home-Grown and Foreign Supplies.

For the week ending July 20, the total quantity of mining timber imported from abroad amounted to 13,167 loads. Of this quantity, 7,440 loads were received by the Pitwood Committee of the Admiralty collieries, and the balance to other importers. The actual consignments were as follow:—

Cardiff (Barry and Penarth):—

Date.	To—	Loads.
July 14—F. R. Howe	1,680
.. 16—Franklin Thomas	625
.. 16—Lysberg Limited	2,400
.. 16—Morgan and Cadogan	636
.. 16—Matthew Thompson	720
.. 18—Lysberg Limited	1,680
.. 18—Budd	325
.. 19—Blane, Wright and Martinez	1,560
.. 20—Lysberg Limited	3,360

Total 12,986

At Swansea, 181 loads were received from France. There were no imports at either Newport or Port Talbot.

Out of the total received, 9,807 loads came from the French ports, and the rest—3,360 loads—from Portugal. Little new business was done, as the bulk of the imports were on old contracts. One or two sales were made, and these, being affected by the shortage of wagons in South Wales, were carried through at price concessions. Market quotations were as low as 60s. per ton, owing to the fear of incurring heavy demurrage charges. The production of coal has been upon a poorer scale during the past fortnight, owing to the irregularity of colliery working consequent upon the shortage of wagons following the scarcity of available vessels. The outlook in this respect is none too bright, and with the decrease in coal output is a lessened demand for mining timber.

Foreign Imports.

A total of 70,000 tons of French and Portuguese wood is allowed to be imported this month into South Wales and Monmouthshire, of which the agents supplying the Admiralty collieries will receive 43,750 tons, and the Pitwood Importers' Association 26,250 tons. This latter quantity has to be allocated to about 20 importers in proportion to their imports during 1914 and 1915. A difficulty has been met with in allocation, for some importers are only entitled to a quantity which would be too small to import individually. The members of the association, therefore, have made an equitable system of adjustment, but the difficulties in this respect will be much more pronounced in October, when 20 firms have to participate in the small allowance of 15,000 tons. The scheme of allocation has been financed by the creation of a fund made by a call of 1d. per ton on all imports received. The pitwood importers are loyally abiding by the scheme, and are endeavouring to deliver the wood to their clients at as low a figure as is possible. Some difficulty has been met by colliery companies which prefer to import direct rather than through the medium of the Pitwood Committee of the Admiralty collieries. At the outset of the scheme, the Pitwood Importers' Association allowed these collieries to import under their general licence received from the Controller. This, however, penalises the importers proper, inasmuch as the quantities taken by the colliery firms have to come out of the quantity allowed to be imported by the association. The importers therefore are receiving less all round as a consequence of the courtesy extended to those collieries who import direct. It is expected, however, that the collieries concerned will see the matter from the viewpoint of the pitwood merchants, and make such equitable consideration as will satisfy their continuing to import.

Home-Grown Timber.

Correctly ascertaining the amount of wood being utilised by the collieries is the first step. The Coal Owners' Pitwood Committee give this information away, as they should. The secretary of the committee (Finlay Gibson) states that deliveries are being made rapidly, and greater efforts have resulted in

transport being speeded up. The imports from Ireland continue upon a good scale, and these find a ready market. They are clean and straight, and cut to the colliery requirements. Imports from Cornwall and Devon have also been good, the timber giving satisfaction. There is, however, a large amount of wood being sent to the collieries which is of irregular diameter. Some of the wood is much too thick to be handled with facility, and complaints have been made by timbermen. In one or two cases, large diameter wood has been split, but timber foremen are not enamoured of this idea, their complaint being that splitting greatly reduces the strength of the prop.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The hauliers in Beddwellty Colliery claimed half-a-turn pay for working quarter-turn, and this led to a day's stoppage. When their representatives waited on the colliery agent, he insisted upon the men returning to work before he considered the matter; and this requirement they decided to comply with.

Owing to a dispute affecting hauliers in part of the Marine Colliery, a meeting of Ebbw Vale miners discussed the difficulty, and it was by a margin of only 20 in a gathering of 800 that they resolved to continue work. Since then, an interview with Mr. F. Mills, the general manager, who promised to investigate the complaint, has brought about a settlement.

A mass meeting of the miners employed at Blaenavon Collieries, Monmouthshire, was held on the mountain-side on Sunday, to consider the position of 30 colliers against whom summonses which had been issued for alleged breach of contract were returnable at the local police court on Tuesday. It was decided that the men employed at all the local collieries should not proceed to work on Tuesday and this resolution was carried out. The alleged breach had relation to one of the provisions of the Minimum Wage Act. It appears that a collier who had not paid his helper the full minimum wage rate had not been pressed by his employers to do so, with the result that about 30 miners who worked in his district would not proceed to work on May 19 as a protest. The employers consequently sued for damages, claiming £1 6s. against each man. The result of the police court case was that the magistrates decided a breach of contract had been committed and called upon each defendant to pay £1 towards the damages.

Officers of the Monmouthshire Eastern Valley Miners District have received the encouraging report that the dispute which has been looming large at Cwmbran Colliery in consequence of the improper treatment of boy helpers, who have not been paid the minimum wage rates by their "butties," is likely to be amicably settled, the delinquent colliers having agreed to carry out the provisions of the Act. This decision was reached at a mass meeting. If the helpers are paid retrospectively from the time the deficiency in their wages commenced—and they would appear to have a legal right to demand it—some of them will have substantial amounts to draw.

There is no prospect of an early settlement of the price-list dispute at the Elled Colliery, Pontypool, which has led to a continuous stoppage of work since June 30, when the notices tendered by the workmen to terminate contracts expired.

North of England.

Representatives of the Northumberland coal owners conferred on Saturday last with delegates of the county miners, deputies, mechanics and engineers, with reference to the men's suggestion for a more equitable distribution of work amongst the collieries of the county, so as to prevent the continuance of the present state of affairs, in which the miners in one district are fully employed whilst in others there is not enough work to go round. The owners stated that they had collected data from the various collieries, and would consider the matter at a subsequent meeting, after which a further conference will be held. The men suggest a deputation to the Coal Controller on the subject.

The executive committee of the Northumberland Miners' Association has informed the branches, especially those near to factories, that it is informed that men working short time at the pits may find work, on the days the pits are idle, at such factories, if they desire such work.

A mass meeting of Chopwell miners last Saturday carried a resolution to the effect that the time has arrived when the sources of profiteering ought to be stopped, and that the first charge upon the mining industry now should be the payment of a wage that will ensure the miners something more than a mere subsistence; also that any system of control of mines should give the men the same rights as the present owners have.

After the annual meeting of the Cumberland Coal Trade Conciliation Board, last week, an ordinary meeting was held, at which several important matters were under consideration, some of which will eventually be referred for settlement to the neutral chairman.

A lengthy discussion took place on the following programme of demands by the miners:—(1) That the starting wage for boys of 14 years be 1s. 9d. per day standard rate, 14½ years 1s. 11d., 15 2s. 1d., 15½ 2s. 3d., 16 2s. 6d., 16½ 2s. 9d., 17 3s., 17½ 3s. 4d., and that when 19 they be paid the prevailing wage for the class of work to which they may be sent. (2) That 1s. per day advance be given on all standards above 3s. 4d. per day. (3) That screen women be advanced 6d. per day on the standard rates. (4) That apprentices be paid at the rate of 1s. 6d. per day standard, plus percentages, when they first start, and receive 4d. per day per year for the first three years and 6d. per day per year until they complete their apprenticeship. (5) That all surface workpeople, not manipulating coal, cease work at noon on Saturdays. Finally, it was agreed to refer the questions to a joint committee to report to the Conciliation Board on July 23.

The men employed at some of the by-product coke ovens in Cumberland have sent in a demand for an increase of 25 per cent. in their wages. A 4 days' notice has been posted at one of the plants, and the matter has been considered by the Cumberland Coke Conciliation Board, but no decision has yet been reached. It is understood that another meeting of the Board will be held shortly.

A meeting of the Cumberland Coal Trade Conciliation Board was held at Workington on Monday, Mr. R. Steele, president, presiding. Meetings were arranged for the settlement of several matters in dispute, and terms were agreed upon for the resumption of work at Wellington Pit, Whitehaven, and St. Helen's No. 2 pit. At St. Helen's the men resumed work on Tuesday.

Federated Area.

At meetings of colliery firemen held last week end in the Wigan, Leigh, Bolton and Manchester areas it was reported that the Lancashire and Cheshire Colliery Firemen's Association, which has lately been strengthened by the addition

of many new members, has decided to apply for an advance of 20 per cent. upon current rates. At meetings of miners held on Monday night in the Manchester district it was stated that the miners of Lancashire and Cheshire in common with those in other federated areas were applying for further increases in wages.

The miners employed at the Hulton Colliery Company's (Bolton) new collieries at Cronton, near Rainhill, came out on strike last week. For some time past they have complained of the preference shown to imported men. On Tuesday, last week, a man remained away from work, and upon returning found that another man had been put in his place, upon which the other men, to the number of about 200, "downed" tools.

The use of the fork appears to be causing further unrest among the miners of Brodsworth Colliery, Doncaster. At a mass meeting just held a resolution was passed declining to acknowledge the fines inflicted by the colliery company upon men detected using the shovel for coal-filling purposes. It was reported that three men had been given notice. The meeting declared that if these notices are not withdrawn serious trouble will ensue. It was reported that some months ago an agreement between the men and the company was arrived at by which fines inflicted were to be set aside for charitable purposes. The miners contend that this agreement has not been adhered to.

It is hoped that a stoppage of work at Bullcroft Colliery, in connection with the threatened trouble of the surface-men, may be averted. Recently the surfacemen asked for more money and gave in their notices, to expire on Saturday, July 7. Several conferences have, however, been held, and pit-head meetings took place. It was eventually decided that notices be suspended until July 28, and there are indications that a settlement will be arrived at in the meantime.

Scotland.

A dispute affecting the drawers at Dixon's Colliery, Wilsontown, Lanarkshire, has arisen about the scale of payment offered by the manager for extended drawing roads, but an amicable arrangement is expected. There have been no disputes at this colliery for 12 years.

At Clyde Colliery, Hamilton, a tonnage rate dispute is pending, and an arbiter has been appointed.

Questions affecting the men employed at the Dumbreck Coke Ovens and By-product Works, Kilsyth, belonging to Messrs. Wm. Baird and Company, have been discussed in London by the Coal Controller along with Sir Richard Redmayne. The employers were represented by Messrs. J. T. Forgie and Mark Brand, and the workers by Messrs. John Robertson, Wm. Webb and Hugh Murnin. Claims were put forward as follow:—(1) Eight hours working day; (2) time and half for all work done between 6 p.m. on Saturday and 4 a.m. on Monday morning; (3) 1s. per day of an advance. As there was a discrepancy in the respective statements put forward, the Coal Controller asked for verified data. This is being forwarded, and he is expected to give a decision on an early date.

At Easterhill Colliery, Tolleross, the men complain that they are not being paid the rate fixed by an arbitration which took place some time ago. Negotiations are pending between the representatives of the workmen and the employers.

A dispute regarding tonnage rates has arisen at Skellington Colliery, Larkhall, it being represented that there is a difference of 1½d. in the rates paid in two similar sections. The union has decided that if satisfactory rates are not paid, a strike will be declared in the section affected.

At Mount Vernon Colliery, Lanarkshire, the manager has taken over a section of places at present being worked by a contractor. The men object to the transition without having received timely notice, and in the circumstances the manager has agreed to postpone the date of the change.

At Barbauchlow Colliery, West Lothian, a section of the miners put forward the claim that owing to altered conditions they were unable to earn fair wages. An offer by the manager to increase the tonnage rate by threepence per ton has been accepted as satisfactory.

Negotiations are in progress regarding the wages and conditions of the ironstone miners in Ayrshire.

Grievances are reported from the South Ayrshire collieries, Dailly. One is that men are not permitted to transfer from one pit to another, and this is represented as a distinct hardship.

Trouble has broken out at Messrs. Howie's Greenhill Pit, Crosshouse, Ayrshire, because of an alteration in methods of payment. Formerly, the men were paid so much per ton on coal and so much per ton on clay. Lately, however, the seams have become abnormal, and a considerable amount has had to be given as oncost to make the men up to a proper wage. The manager proposed to give a higher tonnage rate and get rid of the oncost, but the amount offered did not give satisfaction. Negotiations with a view to an amicable adjustment of the points in dispute are still in progress.

Many are the reasons put forward as to the source of labour unrest. A committee of Kirkcaldy Town Council gives as a reason that a large number of able-bodied single miners are exempted from military service, whilst older and married men who could efficiently work the mines have difficulty in earning sufficient to provide for their families.

In Fifeshire for some time past the surface workers at the collieries have been dissatisfied with some of their conditions of work. It is understood that negotiations are now in progress for the calling of a joint conference of coal owners and workers' representatives to have matters complained of considered.

The threatened strike at Lochgelly has been averted. The trouble arose over the employment of a large number of non-unionists. The officials of the union interviewed Mr. Pave, manager, whereby an arrangement was come to in which the trouble of non-unionism will be overcome.

Iron, Steel and Engineering Trades.

In their half-yearly meeting, held at Ebbw Vale, on Saturday, the South Wales Iron and Steel Workers' Sliding Scale Committee resolved to make a strenuous effort to secure cessation of work at one o'clock on Saturdays.

As the result of an application by roll turners under the Ebbw Vale Company, they have been awarded 10 per cent. advance on the rate of November last, this making a total of 22½ per cent., such increase to be regarded as war wages, and recognised as due to and dependent on the existence of the abnormal conditions now prevailing. The men are recommended to take advantage of an offer to be placed upon the sliding scale now operating for other grades of the company's employees.

The notices to strike which had been given by the men at Cumberland iron ore mines expired on Saturday, but as the Government has decided to take over the mines, the men's leaders have agreed to postpone the strike for a week, pending a conference with the Government officials.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Holidays in August — Serious Outlook Upon "Combing Out"; Unrest Among the Men — Colliery Hospital Opened at Aberdare—Important Recommendations by Industrial Unrest Commissioners Affecting Coal Mining—South Wales Miners for France—Linking up Electrical Supply—Danger of Small Coal in the Workings—Pontypool Hospital Finances.

It has been resolved by the executive council of the South Wales Federation that three days' holiday shall be taken by the miners, commencing the first Monday in August.

The Conciliation Board has had before it the scheme for providing additional men from the collieries for the Army. It is jointly signed by Sir Thos. R. Ratcliffe-Ellis for the Mining Association, and by Mr. T. Ashton for the Miners' Federation of Great Britain, and has received the approval of the Controller. The owners' representatives suggested the establishment of a joint committee for carrying out the scheme; but the workmen's representatives, who had only that morning received the proposal, wished first to take it into consideration; and therefore the decision on the matter was postponed. The executive council of the Federation met on Friday of last week to take the scheme into consideration. It was decided to call a special conference of the whole coal field on August 2, when a resolution will also be proposed calling on the Federation to take action to ascertain the opinion of the organised labour movement of this country on the question of peace, with the intention of afterwards approaching the working classes of the belligerent countries on the subject.

Complaint is made that the miners' leaders are seriously hampered in their efforts to assist the country by blunders made by the recruiting authorities in carrying out undertakings given in the recent arrangement for "combing out" men who have entered the mines since outbreak of war. According to a statement issued by Mr. Vernon Hartshorn, men who have done two years' service at the front and returned to the mine are being called up as having entered since the outbreak of war, and so have others who are time-expired or have otherwise been discharged. This is done, it is alleged, notwithstanding the fact that these men have been in the mines since they were boys, and only left to go to the Army when war broke out.

Mr. J. Winstone, acting-president of the South Wales Miners' Federation, was one of the deputation which waited upon the Coal Controller from the Labour Party War Emergency Committee to urge upon him the adoption of measures which would prevent coal retailers from exploiting the poorer classes in respect of house coal supplied during next winter. The Controller stated that instructions to local authorities would be issued that they should lay in stocks of coal for the winter months for retailing to the poorer classes; and that he would make an effort to ensure that the local authorities were supplied direct from the collieries, committees being formed to secure equitable distribution.

The executive committee of Llanerch Explosion Fund held its annual meeting, when it was stated the fund was being depleted at the rate of £700 per annum. Seven dependants with average age of 74, and 20 widows with average age of 62, were still recipients of benefit, and the widows were given 5s. war bonus, making 15s. a week. It was decided to increase the annual donation to the Miners' Permanent Fund from £250 to £300. Last year's outlay was £926 to beneficiaries and £250 to the Permanent Fund.

At Cilfynydd, an inquest was held as to the death of a man in Albion Colliery. He had been two years in the Army, won the D.C.M., was wounded, and discharged; and the evidence showed that he was found lying in such a position between the rails as to suggest that the trams had passed over him.

The colliery area of which Aberdare is the centre has been provided with a much needed hospital, thanks largely to the efforts of Mr. C. Kenshole and the generous aid of coal owners, who have united with the workmen in carrying through the scheme. Until a short time ago, Lady Bute maintained a cottage hospital, having done so for over 30 years; but the needs of the district entirely out-grew that provision, and Mr. Kenshole became chairman of a provisional committee which made appeal to the colliery proprietors with such gratifying response that the Powell Duffryn Company contributed £5,000, the Bwlfa Dare Company £3,000, the Cwmaman Company £500, Mr. D. R. Llewellyn £500, with other donations from coal owners which totalled £8,000, and speedily put the project into full view of realisation. The miners had been for seven years subscribing 1d. a week for provision of a hospital at Aberaman, and they decided to support the new scheme; and they will in future, by their levy, provide annually for maintenance, the Powell-Duffryn and Cwmaman men £3,700, and the Aberdare section £1,700.

There is every prospect of a good number of unemployed anthracite miners from Wales accepting an early engagement in the French mines. The men's agent (Mr. J. D. Morgan), with other British representatives, who, as stated last week, paid a visit to France in order to enquire into conditions, reports having received all necessary information from the trade union of the French miners, and having ascertained that the presence of the British workers would be welcome. The need of France for heavier coal supplies, the practical impossibility of increasing British exports owing to lack of ships, and the desirability of finding work for the colliers who are idle here, combine to make the proposed migration of labour agreeable. In the Brierley district, a large number of men are wanted. At first, British immigrants would be sent to the Marne Colliery, where earnings range to the equivalent of between 8s. and 9s. per day, with free house and free coal. Several collieries were visited by the deputation, who are loud in praise of the pithead baths, the colliery hospital maintained by employers, and the general working conditions. After the first batch of British miners have gone across, the idea is that several hundreds should follow within a few weeks.

The pluck and daring of colliery rescue parties is not always recognised as it should be; but the coroner who enquired into the death of a miner at Gorseinon on Friday of last week, took occasion to comment eulogistically upon what he described as the splendid work of the rescue party there engaged. They had laboured for five hours under a roof which threatened them with the same fate as the deceased.

From the station, at Treforest, of the South Wales Electrical Power Company—now worked by a consumers' organisation composed of colliery representatives—current is supplied to several of the local mines; and this fact gives special importance to the proposals which are being submitted separately to the Cardiff and Newport corporations at the present time. Following upon the action of the Board of Trade committee which investigates the question

of electricity supply in order to secure cheaper production and economy in fuel, the 29 authorities of South Wales have held meetings, and Mr. Ellis, electrical engineer of the Cardiff Corporation, has been appointed chairman of a local committee. It is suggested that Cardiff should be linked up with Newport and the South Wales Electrical Power Company; and Mr. Ellis was on Friday of last week authorised by the Corporation committee to prepare an estimate of the cost of cables, etc., for linking up, and to investigate what advantages would be derived. The Newport Corporation engineer is preparing a similar report. Subsequently, the local authorities and public companies will be invited to send representatives to a conference, the idea being to provide for future requirements at the lowest cost.

Mr. F. L. Davis, with Messrs. Evan Williams and T. Nicholas, and the coal owners' secretary, (Mr. Gibson) represented South Wales in the conference which the Coal Controller had with the consultative committee of the Mining Association; and they took the opportunity of also laying before him the views of local owners as to the rates of payment which should be observed by the Ministry of Munitions and the Railway Executive on account of wagons commandeered for use on the return journeys.

Among the very important items submitted for consideration to Cardiff Chamber of Commerce are the directions of the Coal Controller as to the collieries, the extent to which merchants in France and Italy retain for their own profit the reductions in prices and freights made by the British for consumers' benefit, and the multiplicity of forms required by the Government departments.

A report has been presented to the miners' executive council concerning employment of foreigners in two local collieries, the allegation having been that the employers did not comply with the agreement that foreigners were not to be re-employed. Mr. Winstone expressed the opinion that the re-employment of the two men in question should be allowed, and this opinion was accepted.

Limitation of the supply of steel is said to be mainly the cause of the further decline in tin-plate operations. Only about 200 mills are working, a decline of 30 since the end of May; and comparing with nearly double the number 12 months ago. Scarcely one-third of the mills are going, many of these not making full time.

Corpl. Deas, of Porth, has been killed whilst assisting a wounded comrade at the front; and the Military Medal awarded for his gallantry has been forwarded to the widow. He formerly worked in the Lewis-Merthyr Collieries, and was a member of the rescue team who gave an exhibition before King George during his visit to the Rhondda.

In a recent compensation case at Tredegar County Court, it was stated that plaintiff, a lad, was put to attend at the furnace door, opening it every five minutes; but because of smoke went to the back of the furnace to pull a chain that worked the damper, and was struck on his head by a rod, which inflicted serious injury. For the defendants, the Ebbw Vale Company, it was contended he had no right to go to the chain—that therefore the injury had not arisen in course of his employment. It was alleged also that he was actually swinging on the chain. Judgment was given in favour of the company.

The shareholders of the International Coal Company, at a special meeting held on Monday in Cardiff, marked the close of the recent disagreement by ratifying a provisional agreement which had been entered into by the directors. The selling agency of the output from the company's collieries is therefore transferred to Messrs. Lysberg. This undertaking now comes into association with the Cambrian group.

In the course of their report, the Commissioners appointed to enquire into industrial unrest in Wales and Monmouthshire lay stress upon the need for better housing conditions, and they suggest that membership of a trade union should be compulsory. The references to the colliery circumstances include a statement that hostility to capitalism is part of the political creed of the majority of trade unionists in mining; and that unless employers are prepared to meet the men part of the way disaster will overtake the industry in South Wales; for nearly all movements initiated by the Federation during recent years are directed towards the overthrow of the capitalist and the establishment of a new industrial order under which the wage earners will have a greater measure of control and a larger share of the produce. Until recently, political action to this end was most popular; but industrial action is now in the ascendant. There is lack of confidence in Government action. Employers are more emphatic than the men in their condemnation of Government interference; and the coal owners allege that the chief cause of trouble in the coal field has been the action of the Government in assisting the men to break their agreements, for the men collectively never broke their agreements until the Government first interfered in 1915. The Commissioners distinguish between advocates of different modes of procedure, and state that whereas those who prefer the political method seek to bring about State ownership, another section advocate gradual absorption of the profits of the coal owners, thereby gradually eliminating them, so that hereafter the trade unions shall control the industry. The Commissioners—Mr. Lleufer Thomas, stipendiary magistrate of the Rhondda district; Mr. Thomas Evans, director of the Ocean Coal Company and the Barry Railway Company, etc.; and Mr. Vernon Hartshorn, miners' leader; with Mr. Edgar Chappell as secretary—recommend that the worker should be more closely identified with the industry in which he is engaged; that by a scheme of industrial councils the employers and workmen should be associated in control, and that workmen should have an equal voice as to dismissal of an employee; also that other industries as well as mining should have the benefit of shorter hours of labour such as are imposed in the Eight Hours Act; and that the Government should take over all foodstuffs landed in the country, in order to bring about reduction in prices.

The decrease in Swansea trade was again marked last week, shipments of coal reaching only 46,957 tons, and of patent fuel only 8,600 tons.

It is stated that statutory effect is to be given to the arrangement come to between the Coal Controller and the Mining Association in respect of the collieries which are taken over. The difficulties which have become manifest, and the objections raised, especially the fact that terms have not been disclosed, although so long a time has elapsed since control was established, have apparently brought about a decision to solve the problem by legal enactment.

A striking statement was made on Monday in Cardiff by the chairman of the Status Investment Trust, which holds securities mainly in local enterprises. He said that they knew South Wales to be at present an entirely different district as far as wealth was concerned from what it was 20 years ago. The position when the war ended would be that the whole of their principal colliery, shipping, and other concerns would have plenty of cash and Government securities available for carrying out development work which had been delayed by the war, and South Wales would take a leading part in that development.

More than 2,000 subscribers co-operated in the presentation of silver plate with an illustrated album, which was made last Saturday to Mr. M. Falcon, who for many years was chief colliery manager under the Ebbw Vale Company.

In addition to the demand for a general 25 per cent. increase "on present earnings" which has been decided upon at the annual conference of the Miners' Federation of Great Britain, in Glasgow, it has to be noted that a proposal from South Wales is designed to abolish piecework and establish a uniform rate of wages.

Mr. Beasley, general manager of the Taff Vale Railway, has now retired from that position, his resignation having been accepted on Tuesday at a meeting of directors, who unanimously elected him to a seat on the board, and appointed him deputy chairman. Mr. T. E. Harland, superintendent of the line, also tendered his resignation, which was accepted with expression of the directors' regret.

At a meeting of the Cardiff and Bristol Channel Pit-wood Importers' Association, held on Monday last, it was unanimously decided that allocations from the general licence issued by the Controller would be given only to those who imported French and Portuguese wood in 1914 and 1915.

The South Wales Miners' Federation is making representations to the other coal mining districts as to the necessity of taking immediate steps to bring before the Coal Control Board the national loss caused by the practice of stowing small coal in the workings, with a view to making the necessary arrangements for securing that all coal produced in the mines shall be sent to the surface. They point out the waste of a potentially valuable commodity, and the danger which the practice of leaving small coal underground involves to the safety of the mine.

A fatality at the Big pit, Blaenavon, Monmouthshire, led to a discussion at the inquest on Wednesday as to whether or not a systematic usage of flats to support the roof would have prevented a fall of 10 yds. (length) of earth. Witnesses declared that in the circumstances flats would not have prevented the accident. Despite the fact that no direct evidence could be offered as to how the fall occurred, it was surmised that the victim (Edward Chalenger, 32, a collier) struck a timber set on the roadside whilst throwing back coal from the sides to the top of the road, ready for filling, and thus dislodged the roof, under which he was at once completely buried. Verdict, "Accidental death."

The miners of the Eastern Valley district of Monmouthshire, having expressed dissatisfaction with the prevailing system of paying compensation apportionments to beneficiaries through county court registrars, are considering the advisability of appealing to the authorities that locally Mr. James Winstone, J.P., acting-president of the South Wales Miners' Federation; Mr. Alfred Onions, treasurer; and Mr. W. L. Cook, Blaenavon, an executive member, should be appointed trustees to receive and disburse compensation moneys in the same way as the county court registrars do now, but more expeditiously. It may be stated, however, that there is very little probability of a change of system taking place. The great majority of miners recognise that their leading representatives have quite enough work on hand already; they appreciate that county court registrars are independent persons; and they also feel confident that the grievance issuing from the dilatoriness in paying out could be removed if the depleted staffs of county court offices were re-strengthened.

Mr. John Rosie, J.P., Pontypool, who presided on Saturday at the annual speech day at West Monmouthshire School, Pontypool, took advantage of a timely opportunity by referring to the fact that no mining scholarship existed in relation to the school, and he suggested to Mrs. W. P. James, Abersychan, who distributed the prizes, and who has intimately identified herself with colliery undertakings, that she should mention the matter to local owners, with a view to an annual mining scholarship being presented.

Six months ago the executive board of the Pontypool and District Hospital reported to the subscribers that they had overdrawn on the bank to the extent of £1,100 odd. An appeal was made to colliery workers for an extra penny a week, as the result of which the indebtedness incurred has been entirely discharged. Mention must be made of the fact that the colliery proprietors of the district voluntarily undertook to subscribe a reasonable proportion of the sum required as a basis of encouragement for their employees.

Several summonses were heard at Blaenavon Police Court on Tuesday against workmen who were alleged to have stolen property belonging to their employers, the Blaenavon Company Limited. John Seaward, engine driver, who said he was 50 years of age, and had been in the employ of the prosecutors since he was 17 years of age, pleaded guilty to stealing a number of tools valued at 30s., and he was fined £5. Richard Jenkins, a labourer, was fined £3 for stealing two pieces of war material (steel).

Northumberland and Durham.

Contributions to Aged Mine Workers' Homes Associations—Better Postal Facilities for Annfield Plain Desired—Dissatisfaction with Redistribution Proposals.

Second-Lieut. E. W. Pyle, of the Northumberland Fusiliers, who prior to joining up was associated with the Bedlington Coal Company Limited, is in hospital suffering from slight gas poisoning, but is progressing favourably.

The Coal Controller has been asked to assist the Annfield Plain Urban District Council in its endeavours to obtain a later despatch of letters from either Annfield Plain or Dipton, in view of the fact that local colliery companies are very much inconvenienced by the curtailment of postal facilities.

The Castle Eden magistrates fined Cecil Riddle, 21, and Cuthbert Reardon, 20, putters at Easington Colliery, 20s. each for having gone to a part of the mine other than that in which they were working. Frank Shipley, 15, was fined 20s. for having been asleep in the mine at Easington. It was stated that he was in charge of a telephone box, and, being asleep, failed to receive a proper signal, with the result that two sets of wagons came into collision, and damage to the amount of £30 was done.

Mr. John Hudson, under-manager of Cambois Colliery, who has retired after 40 years' service with the Cowpen Coal Company, has been presented by his friends at the colliery with a wallet of Treasury notes and a walking stick.

The Duke of Northumberland, unveiling a war shrine at Shilbottle Colliery last Saturday, stated that 174 of the 320 men employed at the colliery at the outbreak of war had joined up; 26 of these had been killed in action.

The Wansbeck Labour Representation Committee has decided to push forward with the appointment of a temporary candidate, who, in all probability, will be William Straker, corresponding secretary of the Northumberland Miners' Association. Some dissatisfaction exists amongst Ashington miners with the prospect of such a redistribution proposal. Ashington will be taken out of the Wansbeck Division and put into the Blyth Division, an arrangement which is not relished by many Ashington miners, who regard the prospective Labour candidate for

very much more in accord with their views than the respective Labour candidate for Blyth. Mr. Wright, of Blyth, who has lived in retirement for many years, has been appointed manager of the Blyth and Dudley Collieries, in succession to Mr. J. C. Doyle, who has joined the Forces.

Mr. Percy Braidford, who has been awarded the Military Cross, is the third son of Coun. William Braidford, junr., of Rowlands Gill, manager of the Lintz and South Garesfield Collieries, and, until he joined the Army, was serving under his father at these collieries.

Sir Lindsay Wood, Bart., and Mr. W. O. Wood, who recently, by reason of non-attendance, forfeited their seats on the River Wear Commission, have been re-elected as representatives of the local coal owners on that body.

The miners associated with the Ashington group of collieries have decided not to hold a Flag Day this year on behalf of the Northumberland Aged Mine Workers' Homes Association, on account of the multiplicity of engagements into which they have already collectively entered. In order, however, that the funds of the association shall not suffer, they have voted thereto the sum of £100.

Moving that a committee of the Board should be appointed for the purpose of formulating a plan for supplying coal at a minimum cost to householders in receipt of parish relief, Mr. J. C. Doyle informed the Newcastle Guardians that the poor had no coal cellars, although some had to live in them. Mr. Wright, seconding the motion, stated the recipients of parish relief had not enough money to buy coals at their present exorbitant price. The motion was agreed to.

The late Sir Chas. Stamp Milburn, whose death we recorded last week, has left £15,750 to local charitable institutions, including £1,500 to the Northumberland and £1,000 to the Durham Aged Mine Workers' Homes associations.

The funds of the Durham Aged Mine Workers' Homes Association have been augmented by the following donations: Messrs. Pease and Partners Limited, £100; Messrs. John Bowes and Partners Limited, £50; Lord Durham, £25; Messrs. Jas. Johnson Limited, £10; Maj. J. Hunter, £10; the Carterthorne Colliery Company Limited, £3 3s.; and the Harperley Collieries Company Limited, £3 3s.

When the death of Edward Coulson, 65, deputy overman at Bebside Colliery, was enquired into, it was stated that deceased sustained an injury to his hand whilst hewing coal. He worked for about another week, and then became ill, and died. Asked by the coroner whether it was usual to hew coal at Bebside, a witness explained it was a case of emergency to get a coal cutter to work. Medical evidence was given that deceased was suffering from a "beat" hand and from pleurisy, which later developed into double pneumonia; a post-mortem examination revealed extensive septic or blood poisoning in both lungs. The hand, on incision, showed inflammation under the skin, but there was no perceptible injury. The pressure of the pick would drive the germs of the inflammation under the skin, and the fact that deceased had not hewed coal for so many years would render him more susceptible. Deceased died from septic poisoning, the direct result of the injuries received to his hand in the pit. A verdict in accordance with the medical evidence was returned.

At Snuderland County Court, a claim for compensation was made by the widow of Walter Chappell, who was employed as a hewer by the Wearmouth Coal Company Limited. It was contended that the man slipped on some loose coal whilst at work and ruptured an ulcer in the stomach, which resulted in his death. After hearing evidence, however, Judge Bonsey decided that the man's death was not due to the accident, and the claim consequently failed.

Prosecuting Benjamin Sugden, 22, putter, for having filled coal off the wallside in Murton pit, Mr. W. H. Bell, in asking that the maximum penalty be inflicted, informed the Seaham Harbour magistrates that the colliery roadways were constructed and timbered to bear a certain strain. The roadway in question was designed and timbered for 6 ft. in width. Owing to the practice of filling coal off the side, the roadway was now 15 ft. in width, leaving only 4 or 5 ft. of supporting coal between the roadway and an old working. About a week after the date of the offence, part of the wall collapsed owing to the amount of coal taken out. Mr. E. S. Wood, manager of the colliery, stated that defendant had been previously fined for a like offence, and other workmen had been fined by the colliery. A fine of £5 was inflicted. At the same court, Ralph Holmes was fined 40s. for having wilfully damaged a telephone in Murton Colliery.

At a meeting of acting under-managers of Northumberland and Durham, held on Saturday, July 21, at Newcastle, it was decided to form an association of under-managers on similar lines to that of colliery managers. With that object in view, it was further decided to adjourn the meeting until August 25, when the same will be advertised, and all under-managers in the two counties will be invited to attend.

The local inspectors of mines connected with the 13 collieries held their third yearly meeting at Flint Hill: Rowlands Gill, Lintz, Hobson, South Garesfield, Victoria Garesfield, South Medomsley, Delight, East Pontop, South Pontop, Tanfield Moor, Tanfield Lea, Beamish Air, and West Shield Row. The report and balance-sheet were both of a most satisfactory character, a gratifying feature being a considerable increase in membership. The following were re-elected as the executive for the next 12 months: Mr. Vernon Richards, Annfield Plain, chairman; Mr. William Cant, Burnopfield, secretary; and Mr. John Bird, Lintz, treasurer.

Mr. Charles Edward Hunter, of Hill Hall, Epping, formerly of Selaby, near Darlington, a Deputy-Lieutenant and magistrate for Durham, chairman of the Houghton Main Colliery Company and the Mauvers Main Collieries Limited, and a director of the Deane Valley Railway Company, left estate of the value of £250,000.

In Northumberland it has been agreed by the coal owners and miners that the most expeditious way of complying with the new scheme of recruitment of colliery workers, to which the Coal Controller has assented, is to utilise the machinery already in existence—namely, the central and local committees who have to deal with absenteeism. The executive committee of the Northumberland Miners' Association has sent out an instruction to its members that the absenteeism committee at each colliery should at once get to work, and, as soon as the colliery manager has made out his list, according to the instructions contained in the circular (clause 3), should not include in their opinion, for family or other reasons, any one who is included in the list in order to see that there is no one left out who should be included.

Northumberland.

The Board has definitely decided to take iron ore mines in Cumberland and the

Furness district immediately, and accordingly the mines will be under the control of the Government for the period of the war. It is understood that the Ministry of Munitions will review the whole position without delay, and it is stated that they are already in favour of allowing holiday for three days on August 6, 7, and 8.

At an inquest at Workington on the death of an apprentice coal hewer, named Ernest McVay, who died from injuries received at the Buckhill Colliery, the jury found that death was due to a fractured spine, occasioned by an accidental fall of stone. The foreman added that they were strongly of opinion that the working place was insufficiently timbered, and that the supervision generally had been very lax.

Mr. Thos. Ramsay, son of Mr. J. W. Ramsay, of the Phoenix Engineering Works, Whitehaven, has been gazetted second-lieutenant in the Northumberland Fusiliers. He joined the Border Regiment (the "Pals") on September 14, and was for 17 months in France, and escaped without a scratch.

The following appointments in connection with the Cumberland Coke Conciliation Board have been made for the ensuing year:—President, Mr. McCowan, Whitehaven; vice-president, Mr. H. Green, Siddick; neutral chairman, Canon Sutton; joint secretaries, Messrs. John Hodge, M.P., and T. P. Martin.

Mr. John Wharton, engineer and proprietor of Wharton's Iron Foundry, Maryport, has been appointed a member of the Maryport Urban District Council.

Yorkshire.

Every effort is being made to induce the miners of Yorkshire to abandon the practice of ceasing work when a fatality occurs in the pits. Some measure of success has already been obtained, but old customs and observances, it is found, die hard. Last week a miner, named Patton, was killed in the Denaby Main Colliery through being run over by corves. At the inquest, the manager of the mine, Mr. H. W. Smith, referred to the conduct of the men with reference to the accident. They worked 16 hours, and then they shut down the colliery for 16 hours. At the Cadeby Main Colliery, controlled by the same company, a system had been adopted of working continuously after a fatality, the men making a grant to the bereaved family out of their wages, which grant was supplemented by the colliery company. In view of the demand for coal for the nation, Mr. Smith expressed regret that the Denaby men do not follow this example.

Slacking on the part of miners in the Yorkshire coal field continues. The colliery companies, when prosecutions have been instituted, have hitherto claimed only half damages, 10s. per day. It was stated at the Doncaster Police Court last Saturday, however, when five men from the Maltby Main Colliery were charged with neglecting their work, that in future the full damages of 20s. per day would be claimed by the colliery company. In the case in question, one man had been absent 11 days, another eight, two 14, and one 17. They had been repeatedly warned, and had no excuse. Each defendant was ordered to pay 10s. per day and the costs.

The South Yorkshire Coal Supplies Committee, of which Mr. F. J. Jones is chairman, and Messrs. Parker Rhodes and Company the secretaries, desire to intimate to all owners of works in the South Yorkshire district that so far as their supplies of coal may be subject to re-arrangement under the Coal Transport Reorganisation Scheme, the committee will give the most careful consideration to their requirements, and will do all in their power to provide, both as regards quality and quantity, the fuel necessary for the uninterrupted carrying on of such works.

Lancashire and Cheshire.

The Lancashire and Cheshire Colliery Firemen's Association convened a special delegate meeting at Manchester to consider, among other matters, the present payments under the Workmen's Compensation Act. Mr. Millar, the president of the association, was in the chair, and there was a full attendance of delegates from the whole area. After thorough consideration, it was decided to send written communications to the Home Office and to the members of Parliament for the constituencies in Lancashire and Cheshire, expressing the view of the association that the present rates of payment under the Workmen's Compensation Act should be increased.

Southport Coal Central Committee have recommended the Town Council to purchase 10,000 tons of coal and stock it for winter shortage.

Mr. Thomas Greenall, J.P., president of the Lancashire and Cheshire Miners' Federation, is mentioned as the probable Labour candidate for the proposed new Farnworth Parliamentary Division.

The Bolton Corporation have under consideration a scheme for the rationing of the citizens of Bolton in the matter of coal during the next winter months.

The Earl of Ellesmere, Hulton Colliery Company, and the Pilkington Colliery Company are about to adopt electricity on a more extensive scale at their various collieries.

An important development, especially in view of the ban on petrol, is promised in motoring by the projected use of common coal gas for running petrol vehicles. The gas is carried in collapsible bags, and used by adoption of the carburetter. A scheme is now before the Bolton Corporation Gas Committee, to whom reports on the subject have been submitted by the borough treasurer and gas engineer.

North Wales.

At Mold County Court on Tuesday last, David Edwards, collier, suffering from an injured spine as the result of an accident on June 9, 1914, whilst employed at the Mold Collieries, was awarded £250; and John Roberts (17) was awarded £175 in respect of an injury to his arm through an accident at the same colliery 18 months ago.

Notts and Derbyshire.

The magistrates at Mansfield, Notts, ordered a collier to pay £5 10s. for culpable neglect of work.

The Midlands.

The question whether overtime is voluntary or compulsory upon colliery surface loaders was decided by the South Staffordshire stipendiary. Nineteen surface loaders were summoned by the Earl of Dudley for neglect of work at the Baggeridge Colliery. It was claimed that the duty of the defendants as surface loaders was to remain, if required, at the expiration of their ordinary shift, in order to complete the unloading of tubs, and so avoid congestion of the pit bank and lack of tubs for the miners underground, which would seriously affect the output. The surface loaders were paid for this work according to the extra time they were engaged. The defendants had done this work for years without any question, but some few weeks ago they agitated for an increase of wages. Representatives of the firm and the men's leaders met in conference, but a general advance in wages was not conceded, the firm agreeing to consider any particular case on its merits.

Defendants continued at work until July 4, when they gave 14 days' notice to leave their employment, but they immediately ceased to unload any of the tubs after the time of the ordinary shift. The result was that on the following day and on July 6 there was a decrease in the output to the extent of 531 tons. The foreman at the colliery admitted that when the shift was over, if he needed additional work to be done, he asked a certain number to stay, and they usually arranged among themselves as to whose turn it was. The stipendiary decided that as there was not a sufficiently definite contract for there to be any breach of it, the verdict must be for the defendants.

A point of some importance has been raised in the Warwickshire district concerning the new coal distribution scheme. It has clearly been the aim of the Controller to create as little disturbance of the existing trading system as is consistent with the object of the scheme, and it is not unlikely that some modifications will be effected in the light of representations which are being made. It must have happened in a great many cases that a barrier is now placed between the consumer and his usual source of supply, particularly where it has been necessary to draw the dividing line right through the coal fields. Certain of the Warwickshire merchants have proposed to the Controller that instead of pursuing in this part of the kingdom the general arrangement, viz., that in such cases the merchant is to receive from sources within the distribution area a supply equivalent to that which he has hitherto imported, the process in the Warwickshire coal field shall be exactly reversed. The suggestion which has been submitted to the authorities is that the merchant should adhere to the existing source of supply, and be provided with new customers near at hand for such of the coal as he has been sending across the lines now interposed. This, it is claimed, would save a great deal of re-shuffling of railway wagons, and would be conducive to smooth and efficient working of the new Order. While hopes are entertained that the Government reorganisation may have permanently beneficial results, it is widely held in this part of the kingdom that business will in the main revert to old channels when the present stress is passed. Detailed examination of the project is fixing attention on many practical points, which are being urged upon the further consideration of the controlling officials.

Kent.

For Dover hospital funds, East Kent miners have raised £51.

Over 2,800 tons of coal were raised from Tilmanstone Colliery last week, and nearly 3,000 tons from Snowdown Colliery.

Sanction has been granted for the export of some thousands of tons of Kent coal to France, and the first half-dozen shiploads have already been despatched. The coal which is being sent is from the Tilmanstone mine, and a good proportion consists of washed nuts, the remainder being the ordinary Beresford seam coal as raised. There is a great similarity between the Beresford coal and much of the coal raised by the French people from the North of France collieries prior to the German occupation, so that there are greater facilities for using this type of fuel there than was the case in Kent in the early days of the working of the local collieries, alterations having to be made to some of the furnaces for the purpose of getting the best out of this coal.

The sections which were opened for traffic last year of the East Kent Light Railways, built in connection with the collieries, are doing a very steady traffic in coal and farming produce, and the passenger traffic is also growing. We understand that, in spite of the present unfavourable conditions, the railways are paying their way, so that their prospects as the collieries develop after the war may be looked upon as quite promising.

Scotland.

Alien Miners and Military Service—Edinburgh's Winter Coal Supplies—Holidays Affect Burntisland Export Figures.

The announcement that a convention has been made between the British Government and the Provisional Government of Russia regarding the exchange of men of military age for service either in their own country or in the army of the country in which they reside, affects a considerable number of men in the county of Lanark who are commonly described as Poles and Lithuanians. These men are mostly congregated in the parishes of Hamilton, Bothwell, Dalziel, and the Monklands, and are employed principally in the mining industry. As members of the Lanarkshire Miners' Union, they pay their dues punctually and regularly, and when trained to coal-getting they speedily become good workers. As it is provided that any Russian of military age who has not applied to return to Russia by September 19 shall have the right of appeal to a tribunal for exemption from military service on any of the grounds open to British subjects for claiming exemption, the colliery tribunals may be called upon to consider applications for the exemption of such of the Polish community as are miners.

John Fraser, explosives storekeeper, Newmains, admitted before Sheriff Sheehan in the Hamilton Sheriff Court on Friday of last week that he issued two detonators to an unauthorised person in Murdostoun Colliery, Cleland. A fine of 15s., or 10 days' imprisonment, was imposed. At the same court, Francis O'Connor, miner, Cleland, was fined £2, or 10 days' imprisonment, for having concealed a number of detonators and a quantity of gelignite in an unauthorised place in the same pit, and having failed to return them at the close of his shift.

A meeting of the committee appointed with the view of securing adequate coal supplies for the poorer classes of Edinburgh during winter, was held in the City Chambers on Friday of last week. Some of the members advocated the acquisition of large stocks of coal, so that any deficiency of supply might be guaranteed against; while, on the other hand, it was urged there was no necessity for that course. The present difficulty was the probable want of labour for delivery of the coal. It was ultimately decided before coming to any decision on the matter to ascertain how coal merchants in the city stood as regards supplies.

An explosion of gas, resulting in the death of three miners and serious injury to a fourth, took place in No. 1 Conldhome pit, Kilmarnock, belonging to Messrs. J. and R. Howie. The accident occurred through an accumulation of gas in a seam which had been opened up recently, but which had at the present been abandoned. The workers were engaged lifting rails and other plant from the abandoned workings.

At one of the large collieries in Fife preliminary operations are being carried out towards the erection of a large electric generating power plant. This plant will be one of the many which will be required to meet the increased demand for this power in the county as soon as the war is over.

In sealing off underground fires in the Dysart Main seam, Balgonie Colliery, flue dust with water at a very high

pressure is forced in between the retaining brick walls. This flue dust, the management find, is much better than sand. Being forced in at such a pressure, the dust has the peculiar properties of setting to the hardness of cement, and offers greater resistance to the roof pressure, which tends to displace the stoppings. This dust is likewise ejected into any cracks in the strata which would tend to admit air to the fire.

A shale miner was brought before Sheriff Macleod in Linlithgow Sheriff Court for contravening the Explosives in Coal Mines Order, in so far as he failed to see that all persons in the vicinity had taken proper shelter while firing a shot, whereby a workman was injured by a piece of flying shale. Accused, in evidence, stated that he shouted to his fellow workers, asking if they were clear, and on their answering "Yes" he set off the shot. Although this procedure may be the general practice, the Sheriff stated that the Act required the firer of shots to see that persons had taken proper shelter.

Owing to the holidays at the mines which lasted the whole week, the export of coal from Fife fell to a very low figure. At Burntisland, the shipment was only 74 tons, as against 21,010 tons in the same week last year.

COASTWISE SHIPMENTS IN JUNE.

According to the returns issued by the Commissioners of H.M. Customs and Excise the following quantities of coal were shipped coastwise from the United Kingdom during June:—

From	Total cargo.		Total bunker.	
	1916.	1917.	1916.	1917.
	Tons.	Tons.	Tons.	Tons.
Bristol Channel ports	117,915	107,657	10,062	8,495
North-western ports	265,166	229,583	45,575	39,299
North-eastern ports	483,773	586,011	34,249	22,622
Humber ports	76,969	35,705	8,340	4,245
Other ports on east coast	3,352	1,090	5,522	2,926
Other English ports	3,550	4,840	2,353	2,658
Total from England and Wales	950,725	964,916	106,101	80,245
Ports on east coast of Scotland	43,029	59,649	7,776	6,698
Ports on west coast of Scotland	158,750	171,478	16,000	21,957
Total from Scotland	201,779	231,127	23,776	28,655
Irish ports	—	—	2,719	1,970
Total from United Kingdom	1,152,504	1,196,043	132,596	110,870

The destination of cargo shipments was as follows:—

To ports in	June 1916.	June 1917.
	Tons.	Tons.
England and Wales	665,451	760,181
Scotland	56,093	25,626
Ireland	430,960	410,236

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

Cardiff Collieries Limited.—The directors have declared an interim dividend at the rate of 10 per cent. per annum on the ordinary and preference shares, less tax, payable on 25th inst.

Consett Iron Company Limited.—Final dividend on the ordinary shares of 5s. 6d. per share per annum.

Consett Spanish Ore Company Limited.—Final dividend of 1s. 6d. per share.

Cortonwood Collieries Company Limited.—Interim dividend of 5 per cent. actual, free of tax.

Crompton and Company Limited.—The directors have found it necessary to postpone the issue of the accounts for the year ended March 31, pending the settlement of various matters connected with the control of the business under the Ministry of Munitions Act. The profits, however, justify the recommendation of a dividend at the rate of 5 per cent. per annum on the ordinary shares.

Dorman, Long and Company Limited.—The report for the year ended September 30 last shows a profit for the year, after providing for estimated tax liabilities, of £406,680. The balance brought forward was £128,654, making £535,334. During the year the directors paid an interim dividend of 4 per cent. on June 14, a final dividend of 4 per cent. on December 19, a bonus of 6 per cent. on December 19, set aside for redemption of 5 per cent. debentures £20,960, for general reserve £100,000, for depreciation £50,000, and £143,694 was carried forward. Owing to the confusion arising from the various financial measures passed by Parliament, the company's liabilities are still unsettled, but the accounts provide a sum which, it is believed, will fully cover all demands likely to be made. Good progress was made with the new steel plant at Redcar, and steel was produced in February of this year, three furnaces being now at work. A scheme is pending for the fusion of the interests of the Channel Collieries Trust Limited and the Kent Collieries Limited by the formation of a new company.

East Indian Coal Company Limited.—The report for the half-year ended April 30 last states that, after making the usual allowance for the depreciation of buildings, plant, and machinery, and writing £5,000 off development account, there is a profit of £8,121, which with £2,617 brought forward makes £10,738. The directors recommend a dividend of 8 per cent., less income tax, making 16 per cent. for the year, and that the balance, £1,138, be carried forward. The output was 305,634 tons, as compared with 329,055 tons for the corresponding half-year.

France (William), Fenwick and Company Limited.—An interim dividend on the ordinary shares at the rate of 5 per cent., together with a bonus of 5 per cent., payment to be made on September 1, on which day the dividend upon the preference shares for the first six months of the current year will also be paid.

Furness, Withy and Company Limited.—The report for the year ended April 30 states that the profits, including the balance brought forward, and after providing for excess profits duty, amount to £1,182,845. The directors have transferred £350,000 to depreciation account, augmented the trades contingencies fund by a further allocation of £200,000 (making £700,000) and the total reserves (£1,500,000), a further £40,000 has been appropriated for

division among the masters, officers, and engineers of the fleet on the termination of the war, making £70,000, and recommend a bonus of 10 per cent., free of tax, on the ordinary shares, which will represent a total distribution for the year of 20 per cent. (10 per cent. having been paid as dividend), free of income tax. In respect to the current financial year, warrants for the quarterly dividend on the ordinary shares at the rate of 10 per cent. per annum, free of tax, will be posted on July 31. A controlling interest has been acquired by the company in the Prince Line Limited, with a fleet of 38 steamers.

Gas Light and Coke Company Limited.—Interim dividend at the rate of £3 14s. 8d. per cent., compared with £4 1s. a year ago. The accounts show a loss of £2,856 on the Treasury undertaking, deducting which there remains net earnings to credit of light and power undertaking of £9,616. These profits have been dealt with as follow:— Payments of unsecured creditors, £5,219; amount set aside to meet liabilities incurred in respect of accident damages, £773; and interest on second series of debentures, £3,624.

Graham's Navigation (Merthyr) Collieries Limited.—An interim dividend at the rate of 10 per cent. per annum, less tax, in respect of the half-year ending June 30 last has been declared, payable on 27th inst.

Greenwood and Batley Limited.—The net profits for the period from July 12, 1915, to March 31, 1917, were £119,242, after providing for debenture interest and anticipated liability under the Finance and Munitions Acts, and writing down war capital expenditure, and £7,906 was brought forward. A final dividend of 15 per cent. is proposed on the ordinary shares, adding £45,000 to the depre-

Total cargo.		Total bunker.	
1916.	1917.	1916.	1917.
Tons.	Tons.	Tons.	Tons.
117,915	107,657	10,062	8,495
265,166	229,583	45,575	39,299
483,773	586,011	34,249	22,622
76,969	35,705	8,340	4,245
3,352	1,090	5,522	2,926
3,550	4,840	2,353	2,658
950,725	964,916	106,101	80,245
43,029	59,649	7,776	6,698
158,750	171,478	16,000	21,957
201,779	231,127	23,776	28,655
—	—	2,719	1,970
152,504	1,196,043	132,596	110,870

ciation fund, and £13,000 to the reserve. Shareholders' attention is drawn to a private and confidential communication, signed by the board, dealing with the re-election of retiring directors. The previous accounts covered a period of three months and 11 days, and showed net profits of £47,226, while for the financial year 1914-15 net earnings were £68,395; for 1913, £24,166; and for 1912-13, £15,275.

Lancashire and Yorkshire Wagon Company Limited.—The report for the year ended June 30, 1917, states that after deducting what is required for the replacement of capital invested in wagons, depreciation of fixed plant, tools, etc., and the interim dividend for the half-year ended December 31, 1916, there remains a balance of £10,890, which it is proposed should be dealt with as follows:— £5,000 to the payment of a dividend at the rate of 10s. per share, and £2,000 to the payment of a bonus of 4s. per share, less income tax, for the half-year ended June 30, and the balance of £5,640 to be carried to next year's account. The total amount written off for depreciation to date is £40,073, while the reserve account now stands at £10,000.

Scottish Wagon Company Limited.—Interim dividend at rate of 7 per cent. per annum, less tax, on fully-paid and partly-paid shares, same as last year.

Scott (Walter) Limited.—A final dividend of 10 per cent. on the ordinary shares, making 15 per cent. for the past year, is recommended. The distribution for 1915-16 was also 15 per cent., while 7½ per cent. was paid on the ordinary shares for 1914-15, and 5 per cent. for each of the two preceding years.

United Alkali Company Limited.—Interim dividend of 1s. on ordinary shares, the same as a year ago.

Walker (C. and W.) Limited.—An interim dividend on the ordinary shares of 10 per cent. per annum, free of income tax, has been declared, the same as last year.

Warner and Company Limited.—The report for the year ended June 30 last states that the profit amounted to £23,427, which with the amount brought forward makes £24,181. It is proposed to pay a final dividend on the ordinary shares at the rate of 17½ per cent., less income tax, making 22½ per cent. for the year; also a bonus of 3s. 6d. per share, less tax; to place to depreciation (property, plant, etc.) £1,000, depreciation (investments) £1,113, special reserve to provide for contingent losses on Continental stocks, debts, and bills £2,500, and to carry forward £1,366.

Wood (Edward) and Company Limited.—The directors regret that they are unable to submit the accounts at the meeting, owing to the fact that the amount payable to the Ministry of Munitions in respect of the excess profits and munitions levy has not yet been determined. The turnover of the company during the last 12 months has been considerably larger than in previous years, and it is proposed to pay a dividend of 10 per cent. on the ordinary shares (making 15 per cent. for the year), less tax.

NEW COMPANIES.

Brittona Chemicals Limited.—Private company. Registered office, 43, Spring-gardens, Manchester. Registered July 16. Nature of business indicated by title. Capital, £5,000. Directors to be appointed by subscribers. Subscribers: J. Blakey and J. Blakey, junr.

Bye-Products Finishing Syndicate Limited.—Private company. Registered July 16. Nature of business indicated by title. Capital, £6,000. Directors: T. E. Briggs, C. J. Ritchie, and T. Taylor.

Chown (W. R.) and Company Limited.—Private company. Registered July 18. To carry on business of general engineers. Capital, £14,000. Subscribers: R. T. Perry, A. Pasche, Q. R. Chown, and C. Freeland.

Complete Gas Combustion Limited.—Private company. Registered office, Vickers' House, Broadway, Westminster. Registered July 19. Nature of business indicated by title.

Capital, £1,000. Directors to be appointed by subscribers: E. Bonns and A. E. Littlewood.

E. M. P. Engineering Company Limited.—Private company. Registered office, 50 and 52, Drury Lane, London, S.W. Registered July 18. Nature of business indicated by title. Capital, £10,000. Directors: G. Bunbury and E. A. Enever.

Frost Patent Engine Syndicate Limited.—Private company. Registered office, Grosvenor chambers, Lichfield-street, Wolverhampton, Stafford. Registered July 16. Nature of business indicated by title. Capital, £1,500. Directors to be appointed by subscribers. Qualification of directors, 100 shares. Subscribers: E. Harris and S. Hamen.

Godsell (Lewellin) Limited.—Private company. Registered July 14. To acquire and take over as a going concern and carry on the business of colliery agents and coal merchants. Capital, £4,000. Subscribers: Rosa Hannah Doughty Godsell, R. Elleray, and W. T. E. Elleray.

Notts and Derbyshire Pitwood Association Limited.—Registered as a company limited by guarantee with 90 members. Each member (individual, firm, or company) owning a colliery or collieries is liable in the event of winding-up for £2 for every 1,000 tons of coal raised at such colliery or collieries in the 12 months ending the preceding Dec. 31. Each other member is liable for £1 only. Objects: To buy, sell, grow, fell, cut up, prepare for use, handle, import, export, and distribute pitwood and other timber and wood (home-grown or foreign), pit props, etc. The first directors are: H. J. C. Bishop, Manor House, Ilkeston; W. Charlton, The Poplars, Hasland, Chesterfield; T. D. Hancock, Bag-nall House, Bagnall-road, Nottingham; J. P. Houghton, Carr Bank, Mansfield; W. B. M. Jackson, Walton Lodge, Chesterfield; T. G. Lees, Newstead Colliery, near Nottingham; H. E. Mitton, Colliery Offices, Codnor Park, near Alfreton; J. A. Taylor, Manor House, Mansfield Wood-house, Notts; J. T. Todd, Pendean, Blackwell, near Alfreton. Solicitor, C. F. E. Smith, Mansfield, Notts.

U. K. Minerals Development Limited.—Private company. Registered July 18. Nature of business indicated by title. Capital, £2,000. Subscribers: H. Warner and A. Mills.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

THE FREIGHT MARKET.

Tonnage shortage has dominated the outward freight market this week, and the tale of fixtures, especially at northern ports, has been exceedingly small. On the north-east coast, even French Atlantic fixtures are few, the local committee at Newcastle having little tonnage for allotment. Business with neutral markets has been done on the basis of 140s. for Bilbao or Santander from the Tyne, and 160s. to Port Said—very high rates, indicating substantial advances on recent ideas of freight charges. Coastwise, London has been fixed for at 16s. Scandinavian business is at a standstill, with 200 kr. for suitable Norwegian ports. At South Wales, rather more charters are reported, mostly for French Atlantic ports at standard rates. Neutral rates show substantial advances. Thus, from Cardiff, Barcelona has been fixed for at 220s., and Bilbao at 125s. Were boats available, a good deal of business with Spanish ports at such figures would be obtainable, for the pressure of orders is considerable. At the Humber, the enquiry, especially for French and Italian ports, is good, but business is blocked by tonnage shortage.

Homewards, the River Plate is quiet, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. At the United States, coal freights from Virginia are steady, at 125s. to Buenos Ayres, with 30 dols. quoted for Rio discharge. Net form business is well maintained at 180s. from Northern Range to United Kingdom, with 200s. for France. Northern Range to West Italy is rather dearer at 32s. 6d. on heavy grain basis, with a like quotation for shipment from the Gulf to France, and the steady quotation of 35s. for Gulf-Mediterranean business. At the Far East, Kurrachee to United Kingdom is still quoted at 250s. Bombay to United Kingdom is steady, at 320s., but for West Italian discharge the current quotation is 380s., as against 425s. last week. Calcutta to Genoa on jute basis is firm, at 285s. Madras Coast to Marseilles with kernels is steady, at 500s. Rice ports have Saigon to France quoted at 500s. Tonnage is in considerable demand at the Mediterranean ore and phosphate ports.

Tyne to Boulogne, 650, 45s.; coke; Bilbao, 4,000 and 4,500, 140s.; Calais, 450, 45s.; coke; Dunkirk, 450, 45s.; coke; London, 1,500, 16s.; Port Said, 7,000, 160s.; and Santander, 3,000, 140s.

Cardiff to Barcelona, 2,800, 220s.; Birkenhead, 400 and 440, 12s. 6d.; Bilbao, 2,000, 125s.; Caen, 800 and 650, 48s., neutral; Gibraltar, 1,000-1,500, 87s. 6d.; 500; Havre, 1,700, 22s. 6d.; 1,700, 21s. 6d.; Rouen, 1,400, 1,800, and 1,500, 48s. 9d., neutral; 1,600 and 1,550, 25s. 3d., patent fuel; St. Malo, 800, 45s., neutral; and St. Nazaire, 1,800, 29s.; 4,800, 61s. 6d., neutral.

Swansea to Caen, 900 and 800, 48s., neutral; 900 and 990, 24s.; Dublin, 400 and 700, 18s.; Rouen, 1,300 and 1,500, 48s. 9d., neutral; 3,300, 24s. 6d.; 3,300, 23s. 6d.; 1,650 and 1,800, 25s. 3d., patent fuel; St. Malo, 880, 45s., neutral; and Irvine, 700, 18s.

Newport to Caen, 1,300, 46s. 6d., neutral.

Middlesbrough to Alexandria or Port Said, 2,500, 190s., part cargo.

Port Talbot to Barcelona, 2,800, 220s.

Sir F. H. Dent, of the South-Eastern and Chatham Railway, has been elected chairman of the General Managers' Conference at the Railway Clearing House for 1918.

Iron Ore Developments in the Midlands.—In addition to the extensive operations which the North Oxfordshire Ironstone Company are commencing to the north-west of Banbury, the Northamptonshire Ironstone Company are busy getting iron ore at Bigfield, the output being over 500 tons a day. The company have secured the right of quarrying an additional 1,000 acres, which includes workings at Priors Marston, Warwickshire, and a light railway gives connection with the Stratford and Midland Junction Railway. The workings are near the surface, and the quality of the ore. The development of the iron ore making satisfactory progress at Charwell, Northamptonshire, where the Parkgate Ironstone Company, of Rotherham, have secured the lease of an ironstone area of the neighbourhood. A railway line is being constructed to the Charwell Station on the Great Central Railway. The ore here, too, is of good quality.

THE COLLIERY GUARDIAN

MONTHLY LIST OF RECENT COAL LITERATURE

I.—General.

- Experiment and Work of an Industrial Research Laboratory. E. A. Hunger. "Ind. Man.," June, p. 371; 11 fig.
- Coal Wastage. F. S. Peabody. "Can. Min. J.," June 1, p. 237.
- The Testing of Lubricating Oils. H. K. Moore and G. A. Richter. "Metall. Chem. Eng.," June 15, p. 692; 3 fig.
- Lubrication of Mine Machinery. J. A. Boyd. "Bull. Can. Min. Inst.," June, p. 554.
- The Coal Fields and Coal Industry of Japan. "Eng.," July 7, p. 18.
- The Importance of Coal in War. D. H. McDougall. "Colliery Guard.," July 6, p. 28. (Presidential address before Min. Soc. Nova Scotia.)
- Fuel Economy. "Colliery Guard.," June 29, p. 1212. (From paper read by J. A. Robertson before Incorp. Assocn. Munipl. Engin.)
- Problems of the Canadian Mining Industry. W. J. Dick. "Colliery Guard.," July 6, p. 17. (From paper read before Can. Min. Inst.)
- The Lubrication of Mine Machinery. J. A. Boyd. "Colliery Guard.," July 6, p. 20. (From "Bull. Can. Min. Inst.")

III.—Geology.

- Natural History of Coal. "Sc. and Art Min.," July 14, p. 570.
- Geology of the Forest of Dean. Dr. T. Groom. "Iron Coal Tr. Rev.," July 20, p. 61. (From paper read before Forest of Dean branch Natl. Assocn. Colly. Mgrs.)

IV.—Mine Surveying.

- Filing Survey Data at Mines. R. S. Schultz, junr. "Coal Age," June 23, p. 1071; June 30, p. 1116; 9 fig.

VI.—Working of Minerals.

- Anthracite Coal Stripping near Scranton and Wilkes-Barre, Pennsylvania. T. F. Kennedy. "Coal Age," June 2, p. 944; 7 fig.
- Stripping Overburden. J. B. Warriner. "Iron Coal Tr. Rev.," July 6, p. 5; 5 fig. (From paper read before the Amer. Inst. Min. Engin.)

VII.—Boring, Shaft Sinking, and Tunnelling.

- Lubrication of Rock Drills. C. C. Phelps. "Can. Engin.," June 21, p. 525; 7 fig. (From "Eng. Min. J.")
- Underground Churn Drilling. G. N. Bjorge. "Coal Age," June 30, p. 1110; 3 fig.

VIII.—Explosives, Blasting.

- Explosives. Vol. II. Properties and Tests. By Arthur Marshall. $9\frac{1}{2} \times 7\frac{1}{2}$, ix. + 384 pp. Churchill. £3 3s. (two volumes).

IX.—Timbering, Packing, etc.

- Some Theories on Mine Subsidence. J. F. K. Brown. "Coal Age," June 2, p. 950; 12 fig.
- Subsidence Resulting from Mining. L. A. Young and H. H. Stoek. "Colliery Guard.," June 29, p. 1214; 3 fig.; July 6, p. 18; July 13, p. 66. (From "Univ. Illinois Bull. 91.")
- Root Principles of the Law of Subsidence. "Colliery Guard.," July 20, p. 117.

X.—Surface Arrangements.

- Steel Tipple of the Valley Camp Coal Company. "Blk. Diamond," June 2, p. 455; 1 fig.

XI.—Winding and Haulage.

- Development of Storage Battery Locomotives. G. W. Hamilton. "Blk. Diamond," June 2, p. 456.

XII.—Signalling.

- Underground Signalling Bells. L. Fokes. "Iron Coal Tr. Rev.," July 6, p. 1; 5 fig.
- Risk of Gas Ignition by Underground Magneto Telephones. L. Fokes. "Iron Coal Tr. Rev.," July 20, p. 60; 2 fig.

XIII.—Lighting.

- The Colour Temperature of Illuminating Gas Flames. E. F. Kingsbury. "Jl. Frankl. Inst.," June, p. 781.
- Dangers Accompanying Use of Carbide. J. R. Allardyce. "Coal Age," June 30, p. 1108.

XIV.—Ventilation.

- Improvements in Hot Wire Anemometers. "Jl. Frankl. Inst.," June, p. 783.

XV.—Mine Gases, Testing.

- Method of Determining Gas Density. "Jl. Frankl. Inst.," June, p. 767. (From U.S. Standard Technol. Paper 94.)
- The Bigger Mining Accidents. "Colliery Guard.," June 16, p. 1026; 1 fig.
- Gas and Gas Detection. "Colliery Guard.," July 6, p. 17.

XVII.—Explosions.

- The Herrin Mine Explosion. "Coal Age," June 16, p. 1038; 1 fig.

XVIII.—Mine Fires.

- Methods of Dealing with Gob Fires. S. J. Bridges. "Iron Coal Tr. Rev.," July 20, p. 66; 6 fig.
- Spontaneous Ignition of Colliery Refuse Heaps. "Colliery Guard.," July 6, p. 20.
- Spontaneous Combustion in Coal Mines. R. Gascoyne. "Colliery Guard.," July 13, p. 68. (From "Coal Age.")

XIX.—Rescue and Ambulance.

- Rescue Apparatus in Mines. "Eng.," July 6, p. 1; 6 fig. (From U.S. Bureau Mines Techn. Paper 82.)
- Rescue and Recovery Operations in Coal Mines. J. W. Paul. "Colliery Guard.," July 13, p. 76. (From "U.S. Bureau of Mines Handbk.")

XX.—Drainage, Pumping, etc.

- Mine Drainage by Air Lift. S. H. Brockunier. "Coal Tr. Bull.," June 15, p. 36. (From "Eng. Min. J.")

XXII.—Briquettes.

- Utilising Coal Mine Waste in the Pacific North-West. "Colliery Guard.," June 29, p. 1216. (From "Puget Sound El. J.")

XXIII.—Coke Ovens and By-Products.

- Nitric Acid from Coal Gas: The Häusser Process. "Times Eng. Suppl.," June 29, p. 128.
- Coal Gas from Motor Vehicles. "Times Eng. Suppl.," June 29, p. 129.
- The Design and Lay-Out of a Modern Coking Plant. E. M. Myers. "Gas Wld." (Coking Section), July 7, p. 11. (Paper read before Coke Oven Mgrs. Assocn., Westn. Sectn.)
- Picric Acid as a Future By-Product of the Coke Oven Industry. T. B. Smith. "Gas Wld." (Coking Section), July 7, p. 10.
- Theory of the Coking Process. "Gas Wld." (Coking Section), July 7, p. 18; 3 fig. (From "Jl. Frankl. Inst.")
- Recent Developments in the By-Product Coking Industry of Japan. T. Kurahashi. "Metall. Chem. Eng.," June 15, p. 700; 1 fig.
- The Complete Gasification of Coal. A. Naumann. "Gas J.," July 10, p. 67. (From "Chem. Z.")
- By-Product Coking. By G. Stanley Cooper. $8\frac{1}{2} \times 5\frac{1}{2}$, 174 pp. Benn Brothers, 7s. 6d. net.
- Physical Conditions Relative to the Heating of Regenerative Ovens. D. Bagley. "Iron Coal Tr. Rev.," July 20, p. 55; 6 fig.
- Silica Refractories. J. S. McDowell. "Iron Coal Tr. Rev.," July 20, p. 63; 1 fig. (From paper read before Amer. Inst. Min. Engin.)
- Future Lines of Advance in Coking Practice. G. E. Foxwell. "J. Soc. Chem. Ind.," May 31, p. 525. "Gas J.," June 19, p. 579.
- Experiments in Low-Temperature Distillation. "Colliery Guard.," July 6, p. 29; 1 fig. (From "Stahl u. Eisen.")
- Sands Used in Metallurgical Practice. P. G. H. Boswell. "Colliery Guard.," July 20, p. 113. (From paper read before Soc. Chem. Ind.)
- Low-Temperature Carbonising and Some Products. R. Maclaurin. "Jl. Soc. Chem. Ind.," June 30, p. 620; 4 fig.
- The Maclaurin Low-Temperature Process of Carbonisation. "Gas Wld.," July 7, p. 4; 1 fig.
- Observations on Crude Coke Oven Benzol. P. E. Spielmann and G. C. Petrie. "Jl. Soc. Chem. Ind.," June 7, p. 538.
- The Thermotechnical Importance of the Recovery of By-Products from Producer Gas (Die wärmetechnische Bedeutung der Gewinnung der Neben-erzeugnisse aus Generatorgas). "Stahl u. Eisen," June 7, p. 538.
- On the Conditions Governing the Formation of Coke (Sur les conditions de formation du coke). G. Charpy and M. Godchot. "Comptes Rendus," June 11, p. 906.

XXIV.—Fuels, Testing, etc.

- Combustion of Powdered Coal. T. J. Drakeley. "Sci. and Art. Min.," June 30, p. 549.
- Tar Oil Fuel and Diesel Engines. G. Porter. "El. Rev.," July 13, p. 30. (From paper read before Diesel Engine Users' Assocn.)
- Arsenic in Coal and Coke. "Gas Wld." (Coking Section), July 7, p. 9. (From "Stahl u. Eisen.")
- Pulverised Coal and its Efficiency. "Coal Tr. Bull.," June 15, p. 53.
- The Chemistry of Coal (Die Chemie der Kohle). Prof. Dr. F. W. Hinrichsen and S. Taczak. Third edition of Muck's "Chemie der Steinkohle." W. Engelmann. Leipzig, 1916. 522 pp.; 11 fig.
- Coal Analysis and a New Method of Examining Coal (Ueber Kohlenanalysen und eine neue Form der Kohlenuntersuchung). H. Gröppel. "Chem. Zeit.," May 26, p. 431; 6 fig.

- Chemistry Applied to Fuel Practice. "Colliery Guard.," July 20, p. 117.

XXV.—Steam Engines and Boilers: Gas Engines.

- The Down Draft Smokeless Boiler. A. Bement. "Blk. Diamond," June 2, p. 452; 2 fig.
- The Heat Efficiency of Engines. D. Penman. "Sc. and Art Min.," July 14, p. 577. (From paper read before the Beath Scient. Soc.)
- The Hydraulic Regulator Controlling Steam-Driven Exhauster Engines. E. Davies. "Gas J.," July 10, p. 63.
- The Latent Heat of Steam. F. B. Aspinall. "Engin.," July 6, p. 3; 1 fig.
- The Latent Heat of Steam. Second Article. F. B. Aspinall. "Eng.," July 13, p. 25; July 20, p. 47.
- Steam Turbines. By James Ambrose Moyer. $9 \times 5\frac{3}{4}$, xi. + 468 pp. Third edition. New York: A. Wiley. London: Chapman and Hall. 16s. 6d. net.
- The Use of Waste Gases for Steam Generation. J. B. C. Kershaw. "Eng.," July 13, p. 27.
- Utilisation of Exhaust Heat from Internal Combustion Engines. "Eng. Rev.," July 16, p. 8; 11 fig.
- Large Steam Turbine Plants. "Eng.," July 6, p. 19. (From paper by J. A. Stevens before Natl. Assocn. Cotton Mfrs.)
- Mechanical Stokers at Collieries. "Colliery Guard.," July 20, p. 109; 3 fig.

XXVI.—Compressed Air.

- Compressed Air: Production and Types of Compressors. C. L. Hubbard. "Ind. Man.," June, p. 393; 17 fig.
- Saving by Scrapping Air Compressors. S. W. Symons. "Compr. Air Mag.," June, p. 8387.
- Graphic Solutions of Some Compressed Air Calculations. C. W. Crispell. "Colliery Guard.," July 6, 116; 4 fig. (From "Trans. Amer. Min. Engin.")

XXVII.—Electricity.

- Dielectric Losses in Insulating Materials. C. E. Skinner. "Jl. Frankl. Inst.," June, p. 667; 41 fig.
- Electrical Engineering Practice. By J. W. Meares, Electrical Adviser to the Government of India, assisted by R. E. Neale. Third edition. $8\frac{1}{4} \times 5\frac{1}{4}$, xxi. + 642 pp. Spon. 25s. net.
- Conductivity of Earth and Metallic Sheathing. S. Simon. "Sc. and Art Min.," June 30, p. 548.
- Power Station Centralisation and Inter-Linking. J. P. C. Kivlen. "Iron Coal Tr. Rev.," July 6, p. 10. (Paper read before the Assocn. Min. Elect. Engin., W. Scotld. branch.)
- Westinghouse Turbo-Alternators. "El. Rev.," July 20, p. 52; 13 fig.
- Electric Supply to Collieries. G. S. Corlett. "Trans. Mechester. Geol.," June, vol. 35, pt. 3, p. 98; 4 fig.
- Safety Rules for Electrical Equipment in Coal Mines. H. H. Clark and C. M. Means. "Colliery Guard.," July 20, p. 111. (From "U.S. Bureau of Mines Techn. Paper 138.")

XXVIII.—Surface Transport and Storage.

- Locomotive Coaling Plant at Carlisle. "Engin.," July 6, p. 18; 5 fig.
- Mechanical Handling of Material and its National Importance During and After the War. By George Frederick Zimmer. With 134 illustrations and 10 colotype plates. $10 \times 6\frac{3}{4}$. Crosby Lockwood.
- Forth and Clyde Ship Canal. "Eng.," July 13, p. 42; 2 fig.
- Lump Coal Storage and Reclaiming Plant. H. M. McFarland. "Coal Age," June 23, p. 1068; 5 fig.
- Coal Handling Plant on the Panama Canal (Les installations pour le transbordement et l'emmagasinage du charbon aux extrémités du canal de Panama). A. Dumas. "Gen. Civil.," June 9, p. 365; 8 fig.
- Coal and Shipping—18: Coal in the East Indies. F. J. Warden - Stevens. "Colliery Guard.," June 29, p. 1209; 4 fig.

XXIX.—Sanitation, Diseases, etc.

- Design of Buildings in Mining Towns. R. H. Hamill. "Coal Age," June 16, p. 1045; 4 fig.

Coal in Switzerland.—In consequence of the shortage in fuel, coal researches have been carried out everywhere in Switzerland, but according to the report of two geologists, very rich deposits may be found on the French frontier near Porrentruy (Canton Berne), with a boring of about 100 m. "At this point," says the report, "the stratification is normal, and the depth of the carboniferous stratum can be determined with comparative certainty," and it gives details of local examination, also comments on the escape of waters due to mining operations. Several societies have signified their wish to subscribe capital to form a company for working a concession. The anthracite of Valais has a heating power of 3,000 calories, which can be utilised for domestic purposes. Some 21 mines are now about to be worked—an Anglo-Swiss company has already been started—and their equipment will be on the most up-to-date lines, with as little manual labour as possible.

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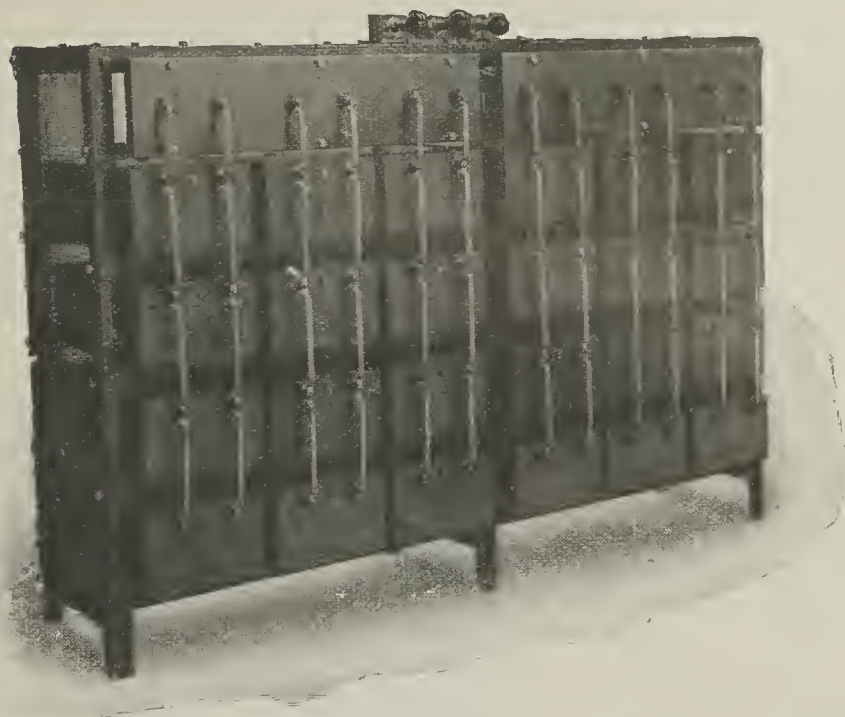
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TO COLLIERY ENGINEERS

And all whom it may concern.

Helsby Static Condensers

(Patents Nos. 22139/05 and 14817/14).



A serious problem confronts the users of alternating current for power purposes in the loss of plant efficiency due to the low power factor consequent on the amount of inductive machinery in circuit, which inevitably causes heavy losses in the system, poor regulation, and undue limitation of the output of generators.

The above illustration shows a 1,200 microfarad condenser designed to improve the power factor of a 90 kw. load from 0.5 to 0.9 on a 550 volt 50-period 3-phase circuit.

The dimensions of the condenser are 6 ft. 6 in. long by 4 ft. 10 in. high by 2 ft. in depth.

If, as is pretty certain, you are working at a low power factor, you can, by the use of this device, OBTAIN A MUCH LARGER OUTPUT FROM YOUR PRESENT GENERATORS.

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CONTRACTS OPEN FOR COAL AND COKE.

Advertised in this issue received too late
on in this column, see LEADER and LAST
pages.

BLACKBURN, AUGUST 3.—The Electricity Committee is prepared to receive tenders for the supply and delivery of steam coal for the twelve months ending August 31, 1918. Specifications and forms of tender may be obtained on application at the Electricity Works, Jubilee-street, on and after Saturday, July 21, 1917. Sealed tenders, endorsed "Steam coal" and addressed to the Chairman of the Electricity Committee, will be received at the Town Hall up to mid-day Saturday, August 4, 1917.

FOLKESTONE, JULY 30.—The Folkestone Corporation invite tenders for the supply of 500-1,000 tons of coal, to be delivered to Folkestone Junction Station before December 31, 1917. Tenders to be sent to the Town Clerk, at the Town Clerk's Office, Folkestone.

KEIGHLEY, AUGUST 3.—The Electricity Committee are open to receive prices for the supply of best slack and small slack of good quality, free from dirt, the best slack to be about 1½ in., and the small slack from ¾ in. to ¾ in. The total contract will be for about 12,000 tons, which will be split up between several collieries, and prices are to be submitted based on a six-monthly or twelve-monthly period. It is proposed to try sample trucks of the coal offered. The latest date for receiving offers and prices will be August 3. It is proposed to commence the new contracts about the middle of September. Any further particulars may be obtained on written application to the borough electrical engineer and tramways manager, Power Station, Coney-lane, Keighley.

WARRINGTON, AUGUST 14.—The Electricity and Tramways Committee invite tenders either for part or the whole of 7,500 tons of slack, to be delivered at the Electricity Works, Howley, Warrington, during six months commencing September 10, 1917, to be delivered in accordance with the conditions of specification, copies of which can be obtained from F. V. L. Mathias, borough electrical and tramways engineer, Howley, Warrington, on payment of one guinea, which will be returned on receipt of a bona-fide tender. In the alternative the Committee invite tenders either for part or the whole of 15,000 tons of slack, to be delivered during the 12 months commencing September 10, 1917. Tenders, addressed to the "Chairman of the Electricity and Tramways Committee, Town Hall, Warrington," must be sealed with wax, and endorsed, "Tender for slack," and delivered not later than 12 o'clock noon, on Tuesday, August 14, 1917. The lowest or any tender will not necessarily be accepted.

Abstracts of Contracts Open.

ASHFORD.—400 tons of kitchen coal. Quotations to Messrs Frank Davis and Company, timber merchants, Ashford.

ASHTON-UNDER-LYNE.—Coal for Corporation. Tenders (local merchants) to Borough treasurer, Town Hall.

CLYDEBANK, AUGUST 1.—House coal and best single or double nuts for Renfrew and Clydebank Joint Hospital Board. Forms from Mr. J. Hepburn, Municipal Buildings, Clydebank.

EXETER, JULY 31.—Steam coal, anthracite, house coal, and coke (year's supply) for City Council. Forms from Mr. H. Lloyd Parry, Town Clerk's Office, Exeter.

LANCASTER, JULY 30.—Coal and slack (six, nine, or 12 months' supply) for Electricity Committee. Forms from Mr. J. B. Patterson, Electricity Works, Marton-street, Lancaster.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport, Isle of Wight.

The date given is the latest upon which tenders can be received.

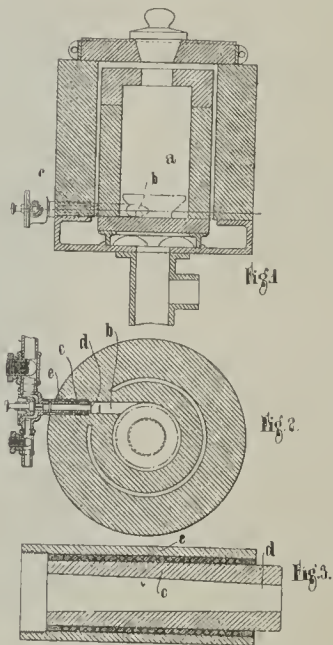
The Minister of Munitions has taken possession of all iron ore mines in the counties of Cumberland and Lancashire, under Regulation 966 of the Defence of the Realm Regulations.

The offices of the Department of Scientific and Industrial Research (including the Fuel Research Board) have been removed to 15, Great George-street, Westminster, S.W. The telegraphic address is "Resciendus, Parl., London," and the telephone No. Victoria 7940.

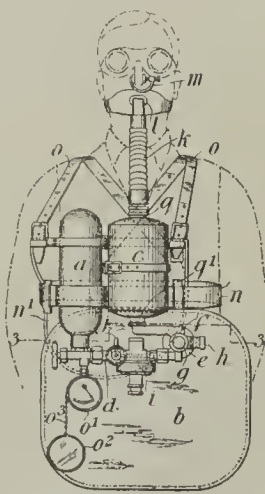
Wigan and District Mining College.—The following candidates, after examination by the Wigan and District Mining and Technical College under section 15 of the Coal Mines Act, have been awarded the colliery firemen's certificate:—E. Alker (Billinge), J. Ashcroft (Hindley Green), R. Ashton (Leigh), G. Baldwin (Wigan), W. Ball (Skelmersdale), P. Balshaw (Westhoughton), J. Banks (Atherton), E. Beddard (Goose Green), S. Belcher (Leigh), J. Blackledge (Higher Ince), W. J. Bradbury (Westhoughton), W. H. Brett (Farnworth), A. Brinkman (Lower Ince), M. Clemson (Worsley Mesnes), G. Collier (Aspull), T. Collins (Hindley Green), J. Connolly (Bolton), W. Corner (Chequerbent), J. A. Doxey (Chequerbent), O. Duffey (Abram), W. Fairhurst (Bamfurlong), R. Farri-mond (Standish), A. Fisher (Wigan), J. Fisher (Newtown), J. Fisher (Hindley), W. Flavel (Lower Ince), R. Gaskell (Upholland), E. Gee (Hindley Green), F. Green (Pemberton), S. Green (Haydock), E. Griffiths (Bamfurlong), G. Grimshaw (Orrell), E. Halliwell (Billinge), W. Hutton (Westhoughton), J. Hodgkinson (Wigan), J. Hodgkinson (Atherton), J. Holbrook (Westhoughton), J. Hurst (Leigh), T. Hurst (Daisy Hill), J. Irvine (Newtown), J. Kenyon (Pemberton), E. Lancaster (Platt Bridge), W. Lea (Hindley Green), J. Littler (Billinge), W. Lowe (Orrell), P. McKeon (Wigan), J. Milligan (Wigan), J. T. Morrey (Coppull), J. Moore (Billinge), B. Neary (Astley), W. O'Brien (Standish Lower Ground), W. O'Neill (Wigan), J. W. Ormslaw (Bickershaw), A. Pennington (Orrell), J. Pennington (Orrell), W. T. Pepperell (Lower Ince), J. Phillips (Hindley Green), J. Philpott (Ashton-in-Makerfield), D. Potter (Newtown), T. Pulford (West-billinge), G. Seddon (Abram), T. S. Smith (Coppull), F. Taylor (Ashton-in-Makerfield), J. Turner (Pemberton), J. Unsworth (Lower Ince), J. Whitter (Crooke), C. Wil-mott (Lamberhead Green), and J. Wood (Coppull). Shot-firers' certificates have been awarded to J. Carpenter (Standish) and A. E. Coppull.

ABSTRACTS OF PATENT SPECIFICATIONS
RECENTLY ACCEPTED.

106546. *Improvements in Furnaces Heated by Gaseous Combustion.* A. C. Ionides, junr., 34, Porchester-terrace, London, W.—This invention consists in a furnace of the type in which a nozzle tube of refractory material is preferably by tapering provided with a mouthpiece adapted to produce a high velocity jet of mixture, which enters the chamber in which combustion takes place by way of a port of such greater cross sectional area and length that the mixture traverses said port as a self-contained jet, without substantial contact with the walls thereof, and there is no impingement of the jet within a substantial distance of the termination of said port. Figs. 1 and 2 show a sectional plan and elevation of a furnace according to this invention, which may or may not be provided with the separate combustion chamber shown in dot and dash lines. The furnace chamber *a* is provided with one or more tangential admission passages *b* leading into the furnace chamber *a* or into a separate combustion chamber where one is provided, as shown in dot and dash lines. In a furnace chamber of, say, for example, 6 in. in diameter, the admission passage or passages *b* may be about 1½ in. in diameter, and the nozzle tube *c* which enters the passage may have a mean diameter of ¾ in., being tapered to the mouthpiece or point of maximum velocity, as shown, and the reduced end *d* extending into its admission passage to a point approximately 4 in. from the nearest point of entrance of the passage into the furnace, thus ensuring that the nozzle mouthpiece or point of maximum velocity is at such a distance from the zone of impingement of the mixture on the surface of the combustion chamber that the radiation or other transmission of heat to the nozzle shall be insufficient to cause back firing behind the nozzle mouthpiece. The nozzle tube *c*, which is preferably constructed of a refractory or like heat resisting material, is under ordinary conditions generally connected to the gaseous fuel supply, such as a mixing device of the type described in one or other of the patent specifications before referred to, by means of an encircling tube *e*, which projects outside the outer casing of the furnace, and into which the refractory nozzle tube is tightly jointed by means of suitable material. According to the present invention, the tube *e* may be extended as a sleeve, surrounding the refractory nozzle tube, so that the nozzle mouthpiece projects only, say, about ½ in. from the metal sleeve, the nozzle tube being tightly packed into the sleeve by means of a wrapping of asbestos cord or like heat-resisting material. Under the foregoing conditions, the metal connecting tube will act to conduct away quickly the heat from the neighbourhood of the nozzle mouthpiece, and thus assist in preventing it from being transmitted to the fluid passing through the nozzle, or the refractory nozzle tube may be surrounded by any special form of metallic heat conducting sleeve arranged to secure the same result. Other means for protecting the incoming gaseous fuel from the heat generated in the combustion chamber may also be provided in combination with the other features without in any way departing from the spirit of this invention. (Four claims.)

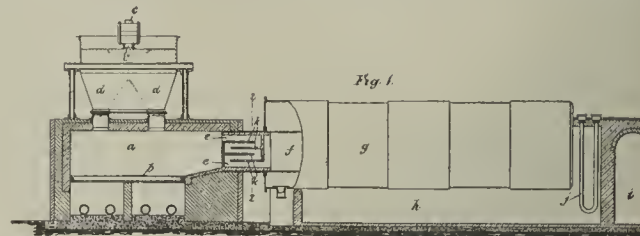


106695. *Improvements in Self-contained Breathing Apparatus.* R. H. Davis, 187, Westminster Bridge-road, London.—The present invention comprises an improvement in the construction of the regenerating or carbonic-acid gas absorbing chamber which is of that type wherein the exhaled breath in part passes through the purifying medium and in part over or in surface contact therewith, and the invention further comprises an improved construction of apparatus as a whole of which the improved regenerating chamber forms an element. In the diagram *a* is the oxygen supply cylinder, *b* is the breathing-bag, and *c* is the regenerating device, these three units or elements of the apparatus being connected respectively to the branches *d*, *e*, and *f* of the four-way fitting *g*, the fourth branch *h* of which is furnished with a relief-valve by means of which the interior of the breathing-bag *b* can be placed in communication with the atmosphere for the purpose of permitting the escape of any excess of oxygen from the latter. The branch *d* of the four-way fitting is furnished with a reducing valve *i* which is fitted with the by-pass passage *j*, the object of which by-pass is to enable gas to be delivered directed to the breathing-bag *b* from the oxygen cylinder *a*, in the event of the reducing-valve *i* failing to act from any cause. The passage *f* connecting the four-way connection *g* with the regenerating cylinder *c* is extended so that the said chamber *c* is brought into a line with the wearer's mouth. *k* is the breathing-tube which is furnished with a mouthpiece *l*, designed to be strapped around the mouth of the wearer, whose nostrils are closed by means of the clip *m*. *n* is the waist-belt, which is secured to the canvas or like backing-piece *n'*, upon which the several parts of the appliance are mounted, and *o* are the shoulder straps which, at one end, are connected to the upper part of the said backing piece *n'*, and which then cross one another and pass over the shoulders of the wearer and are connected at the other end to the back of the waist-belt *n*. *o'* is a pressure-gauge which indicates the pressure of oxygen in the cylinder *a* and *o''* is a protecting cover for the said pressure-gauge, the said cover being fitted inside with a mirror which permits of the wearer reading the gauge by the reflection of the dial thereof; this cover *o''* is shown connected to the gauge *o'* by a chain *o'''*, but it may be hinged thereto if preferred. The expired breath



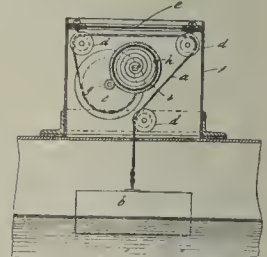
of the user flows down the breathing tube *k*, enters the chamber *c* through the inlet *q*, and then flows through the same, a portion only being enabled to pursue the direct path from the inlet *q* to the outlet *q'* by reason of the obstruction caused by the perforated baffle-plate *r*, which deflects the major portion so that it flows laterally of the said plate, and so comes into contact with a large surface of the absorbent material, with which the chamber *p* is filled. (Three claims.)

106707. *Improvements in Furnaces for Steam Generators.* G. E. Heyl, King's House, Kingsway, London, W.C.—This invention relates to furnaces of steam generators for burning low-grade fuel of the kind in which means are provided for absorbing objectionable products of com-



bustion. The object of the present invention is to provide an improved arrangement whereby steam generators may be heated by sulphur-containing fuels, such as oil shale, without the combustion products therefrom injuriously affecting the furnace or flues, boiler tubes, or other metallic heating surfaces or other metallic parts of the boiler. In the figure, *a* is a furnace having a grate *b* of large area. This furnace is fed with broken shale by means of an overhead conveyor *c* (shown in transverse section), which supplies the shale to a pair of hoppers *d*, whence, in a controlled manner, the shale falls into the furnace *a*. The furnace *a* communicates by means of a pair of flues *e* with the cylindrical furnace flues *f* of a Lancashire boiler *g*. The boiler *g* is of the usual construction, being set as usual with an external flue space *h* leading to a main flue *i* common to a series of boilers. *j* represents the usual superheater. So far the furnace and boiler is of ordinary construction, such as used for a garbage destructor. According to the invention, a series of supports for sulphur-eliminating agents are arranged in the flues *e* between the furnace *a* and the boiler flues *f*. In the present example, these supports consist of a plurality of shelves *k* over which the furnace gases sweep during their passage from the furnace *a* to the boiler flues *f*. As shown, the shelves *k* act as baffles to provide a tortuous course for the furnace gases intended to cause them to impinge upon and sweep over the chemical reagents supported by the shelves *k*, and by their reaction therewith to become more or less freed from sulphur compounds. The sulphur-eliminating agents may consist of iron scrap, or a mixture thereof with ferric oxide to absorb any sulphuretted hydrogen which may not have become burnt. Steam may be supplied directly or indirectly to the flues *e* to provide an aqueous vapour to assist the reaction with the ferric oxide. The shelves *k* may be in the form of grids. (Two claims.)

106753. *An Improved Float Gauge for Indicating the Quantity of Liquid in a Tank.* P. J. Damir, 26, Abinger-road, Deptford, S.E., and F. Braby and Company Limited, 352-364, Euston-road, London, N.W.—The float is attached to a tape marked with a scale and wound on a spring drum, so that it is always in tension. As the float moves with the varying level of the liquid the tape is wound upon or unwound from the spring drum, and the scale thus moves relatively to a fixed mark. In order that the tension on the tape may remain approximately constant, it is preferable that the spring which turns the drum to wind the tape should drive an axle separate from and in gear with that of the winding drum, and so that the necessary revolutions of the winding drum require only about one revolution of the spring axle, whereby the spring is not stressed beyond the limits within which its tension is substantially constant. The tape *a*, attached at one end to the float *b* and at the other end to the winding drum *c*, may be of metal or textile material; it is marked with suitable units, say gallons, and travels over pulley *d*, two being so placed that a portion of the path of the tape is parallel to a window *e* in a casing *f* enclosing the winding mechanism, and preventing communication between the atmosphere and the interior of the tank through the slot in the top of the latter necessary for passage of the tape.



The axle of the drum *c* carries a fast pinion *g* in gear with a toothed wheel *h* fast on the axle of a spring drum *i*, the ratio of this gear being selected for the purpose already indicated. The window *e* is covered with suitable transparent material, such as glass or mica. The number of gallons of oil in the tank is read on the tape with reference to a pointer carried by a slotted plate fixed in position by a screw in the slot. By loosening the screw the plate can be shifted to set the pointer as may be necessary to compensate for variation in the depth of immersion of the float should the specific gravity of the liquid in the tank vary. The float may move in a guide tube, not shown in the drawing. By means of suitable gearing the travel of the tape may be recorded by a counter. For example, the axle of the drum *c* may extend through the side of casing *f* and turn through a pawl and ratchet any known suitable counter mechanism; accordingly as the pawl is operative when the tape is being wound on the drum or unwound from the drum, the total quantity of liquid run into the tank or withdrawn therefrom may be recorded. (Four claims.)

106775. *Apparatus for the Conversion of the Waste Products of Coal.* A. E. Shill, S. Diggle, 5, Plantain-place, Long-lane, London, S.E., and G. B. Scott, 410, Brixton-road, London, S.W.—This invention relates to a process and apparatus for affecting the combustion of the fugitive waste or by-products which emanate from the fire when coal or like fuels are employed for heating purposes, said apparatus being easily affixed to existing boilers or furnaces without alteration or mutilation thereof. In the diagram at a suitable position behind the fire a funnel *A* is placed, the inlet or mouth of which is the same size and shape as the flue *F* or chamber wherein it is fixed. The outlet of the funnel *A* is of a suitable less dimension so as to contract the volume of smoke, thus directing same into a smaller central area. At a suitable distance from this funnel *A*, and in the direction in which the smoke is to be conveyed, is another funnel *B*, the inlet or mouth of which is of a larger size than the outlet of the first mentioned funnel *A*, and the outlet of the second funnel is loosely connected

TRADE

The Pulsometer

MARK.

Steam Pump

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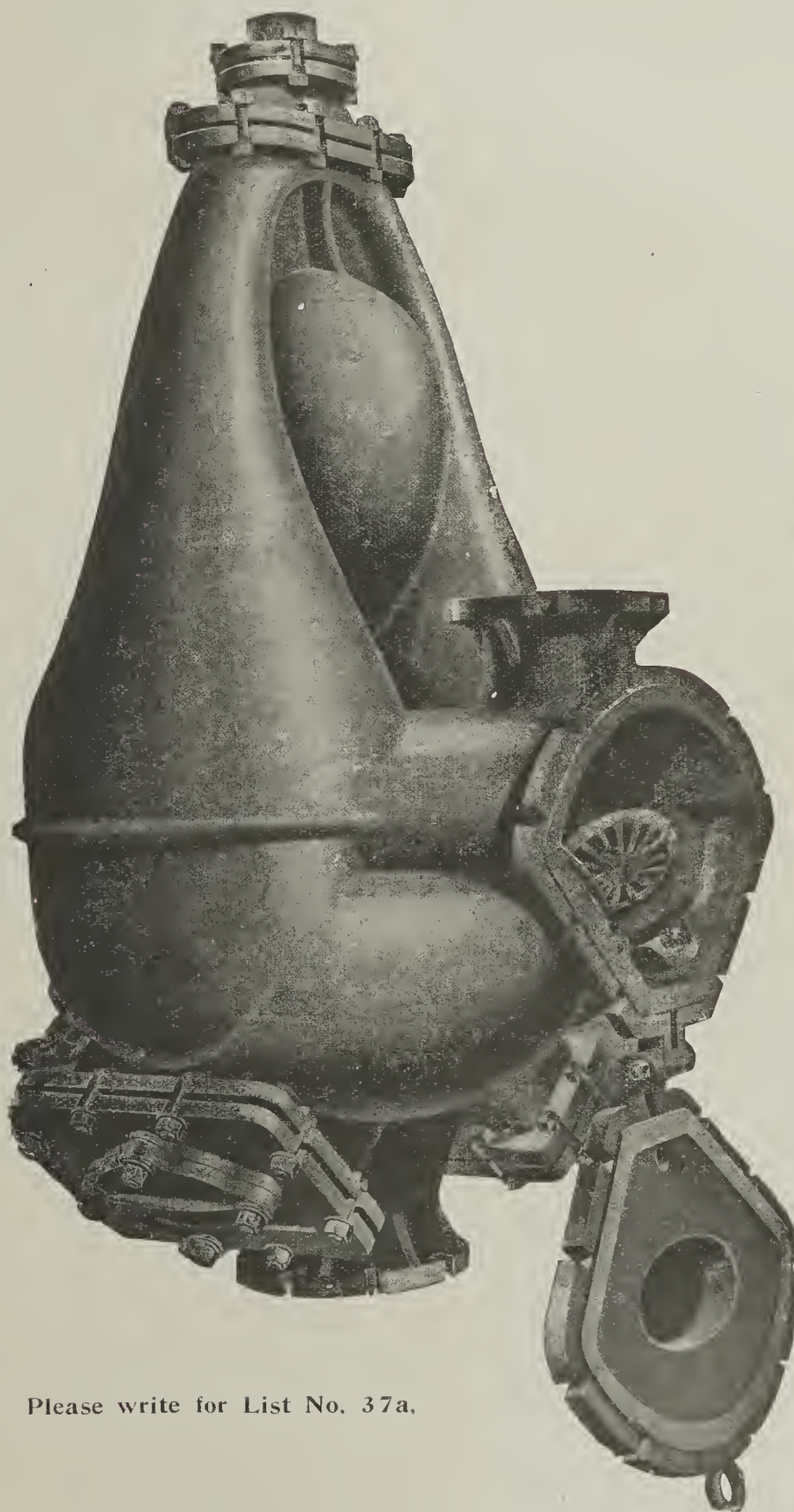
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Industrial Unrest in Wales and Monmouthshire

The following is taken from the report of the Commissioners for No. 7 District:—The members constituting the panel for Wales and Monmouthshire on the Commission of Enquiry into Industrial Unrest, appointed "to enquire into and report upon industrial unrest and to make recommendations to the Government at the earliest practicable date," consisted of Mr. D. Llenfer Thomas, Mr. Thomas Evans, and Mr. Vernon Hartshorn. After a review of some of the chief industries in Wales and their distribution, including a consideration of physical and geographical conditions and their influence on the industries of South Wales and on social conditions, the Commissioners deal with the fact of unrest. They say that a considerable amount of unrest existed in South Wales for some years previous to the war, and the unsatisfactory relation existing between employers and men frequently manifested itself in disputes, many of which attained serious proportions. As a result of these conflicts a somewhat bitter antagonism has grown up between employers and workers in certain industries, and this has to some extent been fostered by extremists and tactless partisans on both sides. A sense of irresponsibility has thus been created, and the men have shown a tendency to strike on the slightest pretext, despite the advice of their accredited leaders. Such class antagonism has been especially pronounced in the mining industry, and in a much lesser degree in the transport industries. Amongst the reasons for the greater discontent manifested by miners as compared with other classes of workers may be mentioned the following:—

(a) South Wales coal, being of a specially superior quality, commands very high prices, and the men therefore believe that the industry can afford them a higher standard of living. The prices of small parcels of coal quoted in the Press give them an entirely erroneous view of the value of colliery produce as a whole, and they draw conclusions as to the disparity between the selling price per ton in such Press quotations and the amount paid to them for cutting—conclusions which a little investigation would show them are not warranted by the actual facts.

(b) During recent years there has been a pronounced tendency for colliery concerns to be amalgamated or interlinked together under the ownership of comparatively small groups of people. This tendency towards monopoly has aroused considerable alarm in the minds of miners, and many regard the combine movement as being directed towards their industrial subjugation.

(c) In the mining areas, practically the chief exceptions being at Ebbw Vale, Tredegar, Dowlais and on the seaboard in the Swansea district, coal mining is almost the sole occupation of the men. There is no variety of industries and no choice of occupation other than coal mining.

(d) There is a further fact, that most of the other industries of South Wales are situated in or near large towns—in places where intercourse with the inhabitants of such towns and participation in their public life and activities has an educative effect in correcting any excessive bias as to the importance or special grievances of their own industry, and provides a variety of interests other than those which are purely vocational or concerned with their own trade union.

The more or less chronic unrest which arises from the conflict between capital and labour and which is so characteristic of the South Wales coal field is at the moment not so very active. The working classes as a whole are strongly loyal and patriotic, and their belief in the national cause has been clearly demonstrated by the fact of the heavy recruiting that took place from their ranks during the early months of the war. The Commissioners are entirely convinced that there is absolutely no foundation for the allegation sometimes made as to the pro-German influences in engendering the unfortunate labour disputes that marred the peace of the coal field during 1915. That strike, and others which have occurred during the war period, are believed to be largely due to the suspicion that employers of labour were exploiting the national crisis for personal gain. It is the suspicion of profiteering also, especially as conducing to the rapidly-increasing cost of living, that mainly accounts for such acute manifestations of unrest as are now observable, and they are convinced that if this suspicion could be removed, and if food prices could be brought down to a reasonable level, no serious disturbance is likely to occur during the period of the war, though a grave view is taken as to the situation that is likely to develop immediately after.

Causes of Unrest.

As has already been pointed out, unrest has become almost a permanent condition in so far as the South Wales coalfield is concerned, and it is, therefore, necessary to consider causes other than those of a purely temporary character which at most have merely aggravated the position during the war. Thus the South Wales miners have for some years manifested a disposition to "down tools" on very slight grounds, but it must not for this reason be supposed that the disputes are necessarily of a trivial character. Often the immediate cause of an outbreak merely marks the culminating

point of a series of troubles, most of which in themselves are of trifling importance, but the cumulative effect of which in view of the unfriendly relations between both parties, constitute a serious menace to industrial peace.

The Commissioners desire strongly to emphasise the view that most of the disputes that have taken place during recent years in the South Wales coal field could and would have been avoided if both sides had approached one another in a conciliatory spirit, and it is their strong conviction that the first step towards industrial peace lies in a change of disposition on the part both of employers and men. From the evidence received from both sides they are led to conclude that the cleavage between employers and men is not sufficiently great, in spite of the bitter hostility often manifested by one side towards the other, to prevent more amicable relations being established, and we most earnestly hope, in view of the serious industrial situation that must be faced after the war, that both sides will make every effort to come together in a less antagonistic and more reasonable spirit for the purpose of considering the economic and other problems relating to the industry. If the representatives of both parties on the Conciliation Board of the coal field could meet together for the purpose of friendly discussion of any points at issue before formulating their respective policies, many disputes could be adjusted without much difficulty.

Of the permanent causes of unrest the following are classed as economic:—(a) While there has been an advance in money wages during recent years, more particularly since 1895, there has been a decrease in real wages, and concurrently with this there has been a steady movement for the raising of the standard of living which naturally necessitates an increase in real wages. Employers have, of course, resisted the demands of the workmen for wage increases for the reason that the concession of such demands tended to reduce the margin of profits or were not otherwise justified. This conflict of forces has resulted in a spirit of antagonism between capital and labour.

(b) The adoption by the workers of the principle that wages should be fixed on the basis of a satisfactory standard of living, and the advocacy of a still further view that even with the wage-rate based on the standard of living workers should also share in the prosperity of their particular industry.

(c) The adoption by a section of the workers of the theory that the restriction of output is in the interest of their class.

(d) The concession of wage advances to one industrial class has accentuated the disparity of wages between that class and a lower paid one in another industry or in another section of the same industry, and this has resulted in a demand by the latter for wage advances.

(e) The machinery for settling disputes and fixing rates of wages in certain industries has not always worked smoothly, and the delays that occur in the settlement of disputes tend to exasperate the men and cause them to resort to extreme measures.

(f) The refusal on the part of a small section of workers to recognise their obligation to join the trade union of their industry, though deriving the full benefit of all advantages gained through the union, is one of the most prolific causes of sudden stoppages and of threats to strike. The difficulty is especially pronounced in the coal mining industry of South Wales, but is not confined to that industry.

(g) Some of the employers, also, have occasionally manifested an unsympathetic attitude towards trade unionism, and this has confirmed the men's impression that the employers are hostile to them and their organization. Irritation is frequently caused also by the fact that facilities are rarely given by the employers to enable the unions to bring non-unionists into membership of their lodges.

(h) In addition to the above general causes there are a number of causes special to particular industries or groups of industries, such as the following:—

(1) In addition to lowness of wages, railway workers feel aggrieved at their long hours of labour.

(2) The casual nature of the employment of dock and wharf labourers and general cargo men produces an often paralysing uncertainty which tends to a certain irregularity of habits and to reckless and impulsive action.

(3) The employment on English ships of cheap Chinese labour, while British seamen are unemployed, is said to cause great indignation amongst sailors and threats of serious strikes are being freely made. The feeling with reference to this matter is intense, and is likely to lead to serious trouble—almost at any time—unless the matter is promptly attended to.

There are also social and political influences. Amongst the temporary causes of unrest due to war conditions may be mentioned the following:—

(a) The suspicion that a portion of the community is exploiting the national crisis for profit. This suspicion, rightly or wrongly, was one of the factors that brought about the South Wales strike of 1915. The allegations of profiteering were applied at first to

employers in various productive industries, especially coal mining and shipping.

(b) Lack of confidence in Government pledges generally. The view is also widely accepted that the Government has encouraged profiteering by their policy in respect of the Excess Profits Tax. The imposition of this tax instead of the prohibition of all war profits on commodities is regarded as tantamount to the Government's connivance with profiteering.

(c) In some industries inequalities of wages as between skilled workmen in cognate industries, or skilled and semi-skilled or unskilled workers, have been greatly accentuated since the war, and this has given rise to much discontent. The disparity, for example, is particularly pronounced in the shipyards, where ship repairers and boilermakers working on piece rates receive often three or four times the wages of equally skilled engineers. The high wages paid to boys, again, as compared with skilled men of many years' experience has induced considerable unrest.

(d) A condition of nervous strain produced by overwork, uncertainty as to coming-out, restrictions on liberty and the like, has also tended to ruffle the tempers of the men and to make them highly sensitive to real and fancied injustice. Similar nervousness on the part of officials, produced by over-inspection by Government Departments and the dislocation of industries, likewise re-acts on the men under their charge.

(e) A fruitful source of unrest also is to be found in the restrictions on individual liberty necessarily imposed, for the safety of the State, under the Defence of the Realm Act, the Munitions of War Act, and the Military Service Act. Amongst other causes in this group may be mentioned the following:—

(1) The imposition of military service and the coming-out from various industries. The actions of the recruiting authorities have not always been characterised either by discretion or justice.

(2) The suspension of trade union rules and practices, and the dilution of labour in various industries.

(3) Delays in securing awards relating to wages and other disputes. Numerous complaints were made under this head.

(4) The leaving certificate system.

(5) Prohibition of public meetings alleged unfair treatment of pacifists, and conscientious objectors, and sympathy with such people as have undergone terms of imprisonment for their principles.

(f) Dislocation of industry consequent on the war producing unemployment, e.g., in the anthracite and adjacent mining districts.

(g) Lack of co-ordination between Government departments.

An outstanding feature of the enquiry has been the unqualified hostility on the part of witnesses both on the men's and the employers' side to Government interference. This has arisen from two main causes:—

(1) The multiplicity of Government Departments dealing with labour and the lack of co-ordination between them.

(2) The delays that have arisen in the settlement of disputes by the Committee of Production and other Government bodies, and the interference of departments with settlements that have already been amicably arranged by employers and men.

Future Relations of Employers and Employed.

The Commissioners have come to the conclusion that, apart from the unrest, both acute and widespread, attributable to the high cost of living and the suspicion of profiteering in connection therewith, and the less vocal but very general disquietude springing from lack of confidence in Government pledges, together with the general tension and nervous strain produced by war conditions generally, there exists in Wales, to no appreciable extent, any purely temporary unrest to which temporary remedies can be applied. There does exist, on the other hand, a widespread unrest of a permanent and chronic character, and it is the Commissioners' duty to ascertain and recommend what measures, therefore, should be adopted for the removal not merely of the temporary, but also, and chiefly, of the fundamental and permanent causes of such unrest.

With reference to trade union policy in the coal field, there are two distinct and divergent movements—one for political action; the other for industrial unionism, and what is called "direct action" outside politics. Broadly speaking, there is a corresponding difference as to ultimate objects and ideals:—

(1) The believers in political action have generally looked forward to and advocated State ownership and control of the mines—as, indeed, also of the railways and land—and ultimately of the means of production generally. This was to be achieved by purchase, not by confiscation. A Bill for the nationalisation of the mines was drafted for and introduced into the House of Commons on behalf of the Miners' Federation of Great Britain. In this it was proposed that the interest on the purchase money should be borne by the State, the principal being repaid by the industry itself. The adherents of this view, once in a majority, may be described as Collectivists or advocates of State Socialism.

(2) Those who believe in "direct action" and industrial unionism are opposed to the nationalisation of

and to their control by the State, contend the transfer of ownership from the present State would not only not improve but actually worsen them by handing over the bureaucrats and by dragging the workers into the meshes of the "Servile State." They look not to the State as to the trade unions, and place more emphasis on voluntarism. They advocate a policy of gradually absorbing the profits of the coal owners, and thereby eventually eliminating them, the functions which they have hitherto discharged in managing and controlling the industry to be in time discharged by the miners themselves through their trade union. This school has gained considerable strength of recent years owing to the growing suspicion of Government action, and the belief that the miners can work out their own salvation. Its policy is summed up in the motto "The mines for the miners," as distinct from that of "The mines for the nation" or "The land (including the mines) for the people."

Here, however, comes a further divergence; one section, Syndicalists who have adopted Industrial Unionism, advocates a very drastic limitation, if not the elimination, of the political functions of the State, urging that the whole community should be organised industrially as producers, *i.e.*, in trade unions, and not politically, as consumers in the State; that the needs of the nation should be considered, and the means of supplying them agreed upon in a National Congress of all trade unions—a truly National Trade Union Congress. The other section, whose tenets are those of Guild Socialism, while aiming at the greatest possible freedom for the self-development of each industry by the workmen in that industry exercising complete control over it, nevertheless recognise the need of the State and of co-operation with it in developing the non-industrial life of the nation. In this latter case, the ownership of the mines would remain in the State, but it is not clear what the view of the Syndicalist section is in this respect.

These different schools of thought, and various blends and confusions of them, are found in the coal field. It would appear that the policy of the "Mines for the miners" (apart from any definite agreement as to the details of putting it into operation) is now so generally accepted by the miners' leaders, that its underlying principle governs all proposals and demands put forward on behalf of the men. A particular demand may appear to be fully justified on other grounds, but unless it harmonises with the ultimate ideal, or tends to facilitate the realisation of that ideal, it would not be put forward. The owners, conscious of this fact, regard each claim on the part of the workers and each concession made to them as merely a starting point for a further advance towards the ultimate goal of altogether eliminating the owners, who therefore resist each claim all the more strenuously.

With reference to the miners' strike after the expiration of the old Conciliation Board agreement in 1915, there is every reason to believe it to be the fact, that, far from allowing consideration of their ultimate aim to lead them to use the national crisis as a means of extracting better terms from the employers, the men were driven to strike by the belief on their part that the owners were "exploiting" the patriotism of the miners, believing it would inevitably prevent them from pressing home their claim by actually striking. It was this suspected exploitation of their patriotism for the gain of others, and not any lack of patriotism or of failure to appreciate the national difficulties, that caused them to strike.

The Commissioners refer to the spirit of antagonism that has sprung up—the hostility to capitalism and the employing class on the one hand, and the too prevalent hostility to trade unionism on the other. Theoretically, industry is carried on by the co-operation of capital and labour: in practice it is carried on by a system of checks and balances, one in which the equilibrium is easily upset by a little additional momentum on one side or the other. It often appears as if it were the resultant of the constant conflict of forces rather than of a co-operative effort. A new spirit of partnership is therefore essential. The precise mechanism of that partnership, especially its details, can be left to be invented and developed at a later stage under the influence of the new spirit. It must be a growth from within, not something imposed from without, and it will doubtless take different forms in different industries, and possibly in different localities also. But there should be a clear perception at the start of at least the leading principles on which that partnership or co-operation of the parties engaged in industry is to be based.

Two such principles appear to be fundamental:—

(a) That the present system should be modified in such a way as to identify the worker more closely with the control of the industry in which he is engaged.

(b) That every employee should be guaranteed what we may call "security of tenure"—that is, that no workman should be liable to be dismissed except with the consent of his fellow workmen as well as his employer.

Passing to the consideration of what machinery now exists for this purpose, and how it can be developed and improved, the report refers to the following:—

(a) Trade union and employers' organisations.

(b) Conciliation boards.

(c) Industrial councils.

(d) Enforcement of agreements.

(e) Equalisation of wages.

(f) Decasualisation of labour.

(g) A shorter working day.

(h) Improved housing conditions.

(i) Improved social facilities.

(j) Improved pre-war conditions.

(k) Improved military service Acts.

(l) Improved Munitions of War Act.

(m) Improved employment of discharged soldiers and sailors.

- (p) Pensions and separation allowances.
- (q) Improved Government machinery for the settlement of disputes.
- (r) Restoration of old income tax basis.
- (s) Amendment of Workmen's Compensation Acts.
- (t) Provision of employment in certain areas.
- (u) Redress of minor grievances.
- (v) Recommendations applicable to special industries.

Commissioners' Recommendations.

The recommendations of the Commissioners are comprehensive and very fully explained in the report. The following is a summary of the principal findings:

Food Supplies and Profiteering.

1. Immediate action to be taken by the Government to bring about a reduction in the cost of food, and to stamp out all profiteering in connection therewith.
2. All excess profits derivable from the sale and distribution of commodities for home consumption to be appropriated by the State.
3. The purchase by the Government, in so far as possible, of all imported food supplies in the country where produced and the conveyance thereof to this country in requisitioned ships.
4. The fixing by the Government of the prices to be charged by wholesale dealer, middleman, and retailer respectively in respect of each article of food sold in this country, as is already done in the case of cheese.
5. All war risks insurance in respect of food supplies brought into the country by the Government in requisitioned ships, as suggested above, to be henceforth regarded as ordinary war expenditure, to be met and provided for in the same way as all expenditure directly incurred in prosecuting the war, instead of being added, as is now believed to be the case, to the price of such food supplies.
6. In the event of its proving impracticable to bring about a substantial reduction in the cost of living, wages in all the lower paid industries to be increased proportionately to the increase in the cost of living.
7. That while all excess profits made out of the home consumer should be appropriated by the State, the Government should place no obstacles in the way of, but should in every way encourage, all such undertakings and commercial activities with foreign countries as are calculated to result in the bringing in of additional wealth into this country, such policy being deemed to be specially necessary in the shipping industry, with a view to the rehabilitation of our Mercantile Marine and the re-establishment of our commercial supremacy after the war.

Industrial Conditions and Organisation.

8. The modification of the present system of industry in such a way as to identify the worker more closely with the control of the industry in which he is engaged.
9. The guaranteeing of security of tenure to every worker by providing that he should not be liable to be dismissed except with the consent of his fellow workmen as well as his employer.
10. Every workman to belong to a recognised union of his industry, and this to be a condition of employment.
11. All employers, especially in large scale industries, to be similarly associated in an employers' association, or, if not, to be bound by the decisions of such association.
12. "One industry, one union" to be the ideal aimed at as far as practicable in all large scale industries, and especially in those of public utility, such as coal mining and the transport services. The prevention of all "poaching" on the part of competing unions.
13. Conciliation Boards to be established in all industries which do not already possess such boards, *e.g.*, in the spelter, copper, and chemical industries, for all dock labour, gas workers, municipal employees, in ship repairing, and in the baking industry.
14. The "speeding up" of the consideration and settlement of all disputes and differences by existing Conciliation Boards, and the improvement of their machinery wherever this is found necessary, *e.g.*, by the establishment of standing committees with executive powers that can promptly deal with disputes or difficulties.
15. The establishment of Joint Standing Industrial Councils, as recommended in the Report of the Whitley Committee, or the adaptation and extension of existing machinery (*e.g.*, Conciliation Boards and Works Committees) to enable them to undertake the duties suggested for such councils in the Report.
16. The removal, in so far as practicable, of all great disparities between the wages earned on similar work, and especially the abolition of sub-contracting wherever it is productive of such disparities.
17. An improvement in general conditions of work by means of greater attention to the health and safety of the workers, and the establishment of welfare institutions, *e.g.*, clubs and canteens, and the organisation of recreative facilities in connection with works and factories.
18. A reduction in the hours of labour in the case of railway men, spelter workers, and surface workers at collieries other than those handling coal.
19. The regularising of the hours of employment of dock labourers and ship repairers, partly by the interchange of any surplus labour between different firms.
20. The raising of the limit below which incomes should be exempted from the payment of income tax to £160 instead of £120 as at present.
21. The amendment of the Workmen's Compensation Acts by abolishing the maximum weekly compensation payable, and giving power to the courts to vary existing orders with a view to making them adequate to meet the increased cost of living.

Munitions of War Acts.

22. The abolition of leaving certificates.
23. The early dissolution of munitions tribunals and the repeal of the penal clauses of the Munitions of War Acts.
24. The acceleration of the settlement of all disputes in munition works and controlled establishments.
25. The substitution for the Committee of Production, in so far as Wales is concerned, of a Committee to be constituted of members possessing practical and intimate knowledge of the conditions prevailing in Welsh industries, and the conferment on such Committee of powers to enforce and put into operation all awards made by it.
26. The centralisation in the Ministry of Labour of the powers of the various Government departments now dealing with labour, and the delegation to the local representatives of that Department in Wales of larger discretionary powers to deal with matters promptly as they arise.
27. Whenever dilution is deemed necessary, the trade unions concerned to be first consulted.

Military Service Acts.

28. The exercise of greater care and discretion on the part of the military authorities in the medical classification and the calling up for service of unfit men and others in

low medical categories, and also in the "combing out" of married men before single.

29. The immediate repression of a too general practice on the part of medical boards to keep numbers of men herded together for long hours in a nude state, and in comfortable places, pending their medical examination.

30. The discontinuance of the unnecessarily harsh treatment often meted out to conscientious objectors, and especially the release from the obligation to military service of those who, by serving a long term of imprisonment or otherwise, have given adequate proof of the genuineness of their objection to such service.

31. To render it a punishable offence on the part of any employer or official to intimidate an employee by threatening to "release" him for the Army.

Separation Allowances and Treatment of Discharged Soldiers.

32. A revision of the scale of allowances to soldiers' dependants and widows, so as to have regard for the increased cost of living, and more speedy provision on the part of Pensions Committees for the training and employment of men discharged from the services.

Restrictions on Freedom and the Restoration of Pre-War Rights.

33. An emphatic declaration on the part of the Government of its intention to repeal immediately on the termination of the war the Military Service Acts, the Munitions of War Acts, and the Defence of the Realm Act, together with all regulations made thereunder, with a view to the complete restoration of the liberty of the subject.

34. A similar declaration that the Government will also on the conclusion of peace restore all trade union rights and privileges, except in so far as the unions themselves may otherwise desire.

35. The more judicious handling on the part of the police of all meetings organised and addressed by pacifists or others holding like unpopular views with reference to the war, so that the protection of the law may be equally enjoyed by all law-abiding citizens, irrespective of whether their views may be popular or unpopular.

36. The removal, partial or total, of the restrictions imposed on travelling, by means of increased railway fares, particularly with a view to enabling workers to take an occasional week-end or other holiday, accompanied by members of their families.

37. The abolition of the tax on all lower-priced tickets for entertainments, especially those organised for educational and non-profit-making purposes.

Special Industries.

Mining.

38. The appointment and dismissal in future of colliery firemen, examiners, and their deputies by joint committees of the management and the men.

39. The revision of old price lists with a view to the abolition of the "allowance" system.

40. The provision of direct payment in respect of small coal by the adoption of rates for "large" and "through" coal respectively.

41. Standardisation of rates of wages for colliery "officials," and the recognition of their unions by the employers.

Railways.

42. The extension as soon as circumstances will permit of the "track circuit" system over all railways.

Seamen.

43. The prohibition of the employment of Chinese on British ships.

44. Provision to meet circumstances of hardship in the case of the crews of vessels, torpedoed or otherwise destroyed or disabled, *e.g.*, the raising of the limit for insuring a sailor's outfit from £5 to £12, and the making of provision for the deposit of sailors' discharge books with the Board of Trade, giving each man instead a card with a copy of all essential particulars. Also the amendment of the Merchant Shipping Act, so as to entitle seamen to claim wages from the date of the sinking of their vessels to the date of their landing in the United Kingdom.

Housing.

45. Government assistance (including the necessary facilities and authorisation) to local authorities and other approved agencies for the immediate erection of a number of houses in certain areas where there exists an abnormal shortage, and the taking of measures, by the preparation of housing and town-planning schemes and otherwise, for the provision immediately after the war of at least 50,000 houses in Wales.

Educational.

46. The extension of the system of continued education for young persons between the ages of 14 and 18, and the widening of the scope of studies to include subjects bearing on the duties and privileges of citizenship and of right living.

47. The development of adult education by the establishment through the joint agency of the university colleges and of labour organisations, of classes in industrial centres in which subjects of general human interest may be studied in an impartial and systematic manner under expert guidance, whereby the relations of industry to the community, and the desirability of a broad and sympathetic outlook upon the complex factors of modern society may be adequately realised.

48. The provision of lectures, by arrangement with the university colleges or other independent bodies, to the employees and management of works and factories, dealing with the nature of the industry, the costs and methods of working, and such cognate subjects, as a basis for a mutually clearer understanding of the methods and conditions of employment.

Provision for Further Investigation.

49. Finally, the institution by the Government at an early date of a Royal Commission or other Committee of Enquiry to conduct a thorough investigation into the social and economic conditions of the South Wales coal field.

New Dunderland Company.—Arrangements for the provision of additional funds have been completed, and a contract entered into which has resulted in a sum of £85,000 being provided for the purposes of the Dunderland Iron Ore Company.

Agencies in France.—The *Board of Trade Journal* reports that an agent at St. Gratien (Department of Seine-et-Oise) wishes to represent United Kingdom manufacturers of plant for iron and steel works, and also a United Kingdom coal exporter. Particulars may be obtained on application to the Department of Commercial Intelligence, 73, Basinghall-street, London, E.C. 2. In making application the reference number (272) should be quoted.

PROPERTIES AND CHARACTERISTICS OF VARIOUS STONE DUSTS.*

By L. G. HILL, F.R.S.A.

Mr. Budge's paper on "Stone Dusting of Steam Coal Collieries,"† leaves very little doubt as to the value and practicability of the recommendations of the Explosions in Mines Committee, as set out in their Reports Nos. 5 and 6, and mentions that the ash content of coal dust can be very considerably increased by the use of exceedingly finely ground shale.

No. 6 Report of the Explosions in Mines Committee states that: "Any incombustible dust used in order to artificially raise the ash content of the dust on the roadways therefore should consist so far as possible of particles capable of passing through a safety lamp gauze," but the author desires to particularly call attention to the inefficiency of this lamp gauze test.

Of the six materials tested by the Explosions in Mines Committee, although all six passed 65 to 99 per cent. through the lamp gauze, only two exceeded 50 per cent. through a 200 × 200; the others only passed 4, 18, 31 and 42 per cent. respectively through a 200 × 200 mesh. So much for the laboratory test of specially prepared samples.

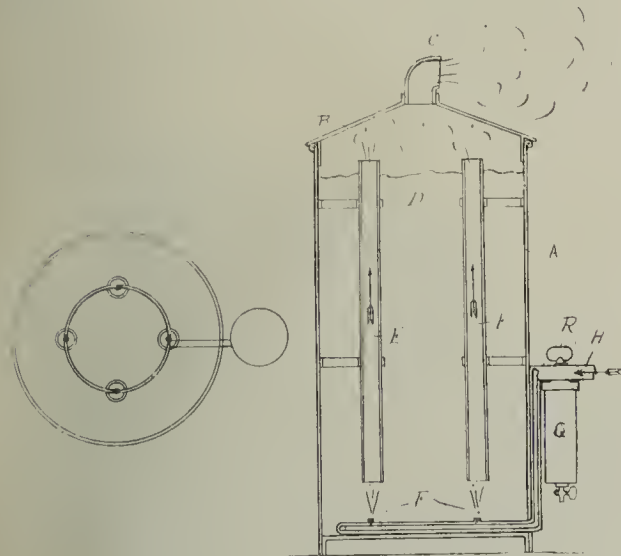


FIG. 1.—DUST DISTRIBUTOR.

The result, in actual practice, of depending on a lamp gauze test of efficiency as to fineness is much more startling. The following table gives the result of tests, made by the central executive of the Miners' Federation, of 10 samples of incombustible dust in actual use:—

District.	Percentages passed through				
	30-mesh.	60-mesh.	90-mesh.	100-mesh.	200-mesh.
1. Derbyshire.....	99.978	99.930	99.808	99.344	87.2
2. Yorkshire	89.053	63.532	49.168	45.054	—
3. Wales	99.632	99.432	95.324	92.284	83.3
4. Wales	99.532	99.052	93.800	89.572	83.5
5.	96.208	34.408	20.248	17.934	—
6. Lancashire.....	99.930	72.730	47.918	45.154	—
7.	62.060	49.214	41.490	39.836	—
8. Notts	94.068	72.812	48.708	43.948	—
9. Derbyshire.....	60.200	52.372	49.042	45.334	—
10. North Staffs ...	87.460	52.920	27.120	23.408	—

There are two cases, Nos. 7 and 9, which do not come up to the 30-mesh test, whilst of the other eight, only three—viz., Nos. 1, 3 and 4—provide 50 per cent. through a 100 × 100 mesh, and these three further pass 83 to 87 per cent. through a 200 × 200 mesh; of the remaining five the percentages through a 100 × 100 mesh are much below the 50 per cent. required. The author therefore considers that the lamp gauze test for fineness is inefficient.

Samples of stone dust Nos. 1, 3 and 4, which show considerably more than 50 per cent. passing through a 200 × 200 mesh, were prepared by the mill mentioned by Mr. Budge in his paper, viz., the Griffin mill. In some of the other seven cases, to obtain the same result in ash content of suspended dust it would be necessary to use quite ten times the quantity of stone dust that would suffice with Nos. 1, 3 and 4.

Volatile Matter and Silica.

The following analyses show the percentages of volatile matter and silica in the samples of stone dust referred to above:—

District.	Volatile matter. Percent.	Silica.	
		Free.	Combined.
1. Derbyshire	7.36	11.05	43.95
2. Yorkshire	7.18	11.86	40.38
3. Wales	8.40	15.30	40.80
4. Wales	11.45	10.50	40.46
5.	16.26	5.64	43.78
6. Lancashire	7.36	11.10	45.15
7.	8.26	14.20	34.24
8. Notts	7.54	19.06	38.24
9. Derbyshire	8.66	17.50	39.10
10. North Staffs	41.50	5.60	17.10

The occurrence of volatile matter suggests the presence of coal dust in the various shales or dusts used, and is probably unavoidable when dealing with dusts prepared from colliery shales, and only depreciates the efficiency of the dust to the extent of the percentage of volatile matter. It is comparatively a small matter except in the case of No. 10, which is flue dust; here of course the incombustible element is greatly reduced.

In the light of the Seventh Report of the Explosions in Mines Committee, which lays great stress upon the presence, in mine dust, of fine sharp edged particles of dust as a source of danger to the constitution of the miner, it is satisfactory to note that these ten samples of stone dust are reasonably innocent in this respect, showing that as a general rule colliery shales are suitable for this purpose.

* From a paper read before the South Wales Institute of Engineers at Cardiff, on Friday, July 27.

† Colliery Guardian, September 22, 1916, p. 548.

It is agreed that the finer the coal dust the more inflammable it is, and for this reason, probably, the Explosions in Mines Committee stipulate that stone dust shall be of a fineness so that at least 50 per cent. will pass through a 200 × 200 mesh.

The figures in the above table show that three collieries were using stone dust of which 83 to 87 per cent. would pass through 200 × 200 mesh, but that the several other collieries were very far removed from such efficiency. Now, very fine stone dust at all rich in carbonaceous matter is subject to the same tendency to combustion as equally fine coal dust, the extreme fineness in either case giving rise to the danger of combustion; and the author's own observations on the subject go to show the inadvisability of using limestone or flue dust.

Limestone has sufficient carbon, etc., to maintain combustion, as is shown by the common practice of burning limestone into lime with very inferior fuel. Should an explosion occur where limestone dust has been used as incombustible stone dust, the author submits that the limestone dust would certainly not reduce the heat generated by the ignition of the coal dust.

In experiments made by the author with dusts having a 200 × 200 standard of fineness all through, a stream of fine coal was blown through the flame of a Bunsen burner, and gave quite a pyrotechnical display of brilliant sparks. With colliery shale dust the display of sparks was much smaller, and evidently in proportion to the various percentages of volatile matter. Flue dust gave much the same results, viz., bright sparks in proportion to the estimated volatile matter; but limestone dust gave a considerably increased volume of flame, whereas fullers' earth reduced the apparent heat of the flame.

Whilst these observations were superficial, the author submits that the matter of the combustibility of fine limestone dust and flue dust deserves careful research.

Effect of Stone Dust on Miners.

Stone dusting experiments have been conducted for many years at Altofts without any ill effects on the respiratory organs, and many collieries in South Wales have been using stone dust for some little time without any complaints having arisen on this point. On the other hand, where flue dust has been adopted, there have in some instances been complaints. Flue dust causes irritation to the eyes both of man and horse, and the author would expect that limestone dust or any finely ground stuff from chemical waste heaps would be objectionable for the same and other reasons.

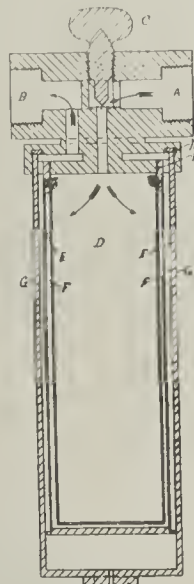


FIG. 2.—DRYER FOR COMPRESSED AIR.

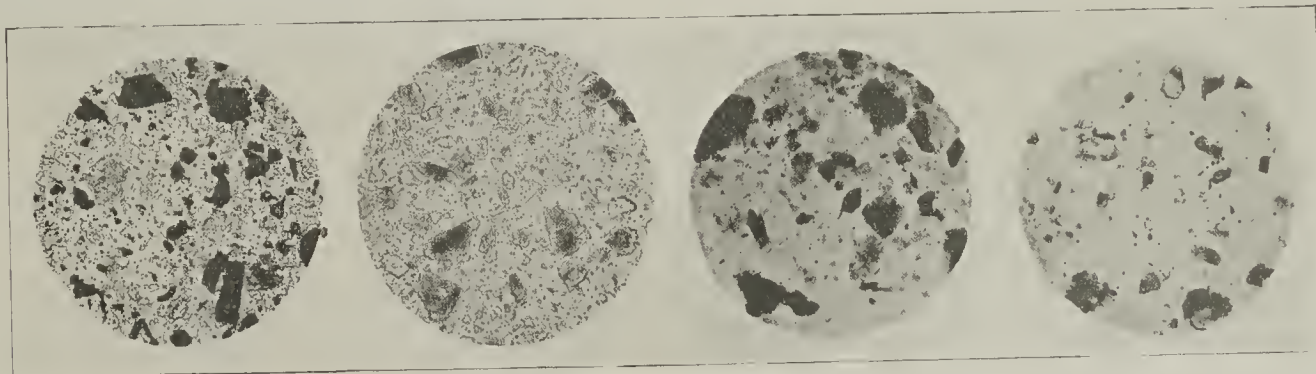


FIG. 3.
Floating coal dust
and fullers' earth in
equal proportion.

FIG. 4.
Free silica ground
in Griffin mill.
Particles crystalline.

FIG. 5.
Shale ground in
disintegrator.
Particles spheroidal.

FIG. 6.
Colliery shale ground
in ball mill.
Particles spheroidal.

Any siliceous stone or shale having a large percentage of free silica would be very dangerous to the respiratory organs, because silica is always sharp-edged, notwithstanding how finely the particles may be ground (fig. 4). Flue dust is also condemned in Dr. Haldane's report. Chemical refuse of any sort is objectionable because of its properties being unknown, and, whilst incombustible, it may contain very objectionable elements to bring in contact with the human body working under such trying circumstances of temperature.

Usually there is no need to go outside the colliery for suitable material—as most collieries have a suitable shale containing silica in more or less combined, and therefore unobjectionable, form, and a grinding plant on the system described by Mr. Budge will give at first hand a stone dust as finely ground as the fullers' earth supplied to the Explosions in Mines Committee.

The distributing of the stone dust should be effected by means of the ventilation current, which will carry the dust in to all parts of the mine (crevices as well as walls and roof) in the same way as it does coal dust. It is impossible to throw stone dust about by hand so as to form a continuous mixture of coal dust and stone dust. The stone dust may be disseminated by a distributor (fig. 1) operated by a jet of compressed air, the air being freed from moisture in a filter (fig. 2), so as not to convert the stone dust into mud. The stone dust is placed in a tank, whence it is aspirated by the compressed air, which delivers it to the colliery ventilating current, where it mixes with suspended coal dust, and is deposited with the latter. In this way deposits are produced on sides and roof timber, which will in time become almost unflammable.

Stone dust is efficient in dealing with coal dust explosions only in proportion to its fineness of division, and though up to the present "fullers' earth as supplied to the Explosions in Mines Committee" is the most

efficacious form of stone dust produced (of the finest fineness), colliery shale can be ground just as finely and is equally efficacious—subject to the percentage of volatile matter in the shale.

Magnification of the particles of different dusts, passed through a 200 by 200 mesh, shows that floating coal dust, coal dust (Griffin ground), fullers' earth, Powell Duffryn shale, and Yorkshire shale are angular in shape, and consequently as buoyant as floating coal dust; whereas those of coal dust (ball mill ground), colliery shale (ground in a disintegrator or ball mill), tend to be spherical in shape. Magnified specimens of these dusts are shown in figs. 3 to 6.

Many collieries in South Wales have used fullers' earth for two or three years. The practice of its application differs, in some cases a dressing being applied to the walls and timbers, and repeated when discoloured by the coal dust. For instance, Mr. Hutchinson stated during the discussion on Mr. Budge's paper that he had treated 1,800 yds. of roadway, and at the end of nine months the fullers' earth was still visible. At another colliery it is reported that fullers' earth lasts such a long time that it is not necessary to give frequent repeat orders. At Senghenydd fullers' earth has been used for about two years, and the orders recur at lengthening intervals. The same remark applies to Llanbradach, Celtic, Welsh Navigation, United National, Abercynon, Windsor, Burnyeat Brown's, and several others, satisfactory results being apparently obtained. As to cost of stone dusting, the author has calculated, from the report of the South Wales coal dust experiments, that if stone dust were continuously applied by means of his distributor, 1 lb. per minute per mile of roadway would be sufficient to raise the ash content satisfactorily in the dustiest mines referred to in that report. Mr. Budge's report on 12 months' working proves this figure to be very ample. His figure of 857 tons of stone dust over 22,830 yards of roadway works out at under ½ lb. per minute per mile, resulting in an increase of from 8 to 63 per cent. ash content. His figure of under 6 lb. dust per ton of coal output makes the cost of stone dust manufactured at the pit head about ⅓ d. per ton of coal.

Fullers' earth is more expensive owing to the present position of manufacture, but even fullers' earth imported in the rough state and ground at a pit head would cost under 1d. per ton of coal output, based on Mr. Budge's figures.

These figures show that stone dusting is a very economical proposition in comparison with the cost of watering, and if carried out by the continuous method proposed is more reliable, and the safety element becomes a matter of cumulative increase.

In conclusion, it may be stated that practice, on a commercial scale, as reported by Mr. Budge, confirms the recommendations of the Explosions in Mines Committee, that the exceeding fineness recommended by the Explosions in Mines Committee is attainable by adopting the same means or production that prevail at Aberaman—the same fineness is obtained in the same way at Denaby and Cadeby pits in Yorkshire and several large collieries in South Wales; that flue dust is objectionable; that colliery shale containing silica in a suitable form of combination (as distinct from free

silica) is available in most collieries, and only requires to be treated in the same way as the fullers' earth supplied to the Explosions in Mines Committee or the shale reported on by Mr. G. D. Budge, and that there is, therefore, no occasion to experiment with materials outside those of a suitable and safe character usually obtainable in collieries.

The Australian production of sulphate of ammonia last year is estimated at 7,214 tons, as compared with 6,503 tons in 1915.

Important American Coal Amalgamation.—The Pocahontas Fuel Company Incorporated (formerly Pocahontas Consolidated Collieries Company Incorporated) has purchased all the assets, business, and goodwill, and assumed all the liabilities of the Pocahontas Fuel Company, No. 1, Broadway, New York City. The Pocahontas Fuel Company Incorporated will be responsible to all parties with whom the Pocahontas Fuel Company, No. 1, Broadway, New York City, had business relations extending beyond May 31, 1917; and, on the other hand, all the rights of said Pocahontas Fuel Company are now possessed by the Pocahontas Fuel Company Incorporated, which has amended its charter to change its name to the Pocahontas Fuel Company Incorporated, and to enlarge the purposes and powers granted by its charter so that it may be able itself to do all the business which had formerly been done by itself—its sales agent, Pocahontas Fuel Company, No. 1, Broadway, New York—and by its navigation agent, Pocahontas Fuel Company Incorporated. The Pocahontas Fuel Company Incorporated will continue to operate the Pocahontas Fuel Company as heretofore, and will sell and ship, in place of the Pocahontas Fuel Company, the Pocahontas coal produced from the Pocahontas mines, under its brand "Original Pocahontas." First, the coal from this coal field were made by this company from its mines at Pocahontas, Virginia, in 1882, and it will continue to mine the same No. 3 vein and ship the highest grade of Pocahontas coal as in the past.

SOUTH WALES INSTITUTE OF ENGINEERS.

The annual meeting of the South Wales Institute of Engineers was held at Cardiff on Friday, July 27, Mr. H. G. BRAWN, the president, being in the chair.

At the invitation of the council, representatives were present from the South Wales Colliery Officials' Association, the Monmouthshire Colliery Officials' Association, and the South Wales and Monmouthshire Colliery Managers' Association.

The following new members were elected:—Messrs. Edward David, Aberavon, Glamorgan; Walter Dixon, Glasgow; F. L. Harry, Cardiff; J. Joiner, Newnham, Gloucestershire; W. M. Varley, M.A., D.Sc., Swansea.

Stone Dusting in Collieries.

Mr. L. G. HILL, F.R.S.A., read a paper on "Stone Dusting in Collieries: Some Observations on the Properties and Characteristics of Various Stone Dusts." (See page 205 of this issue.)

Discussion.

The PRESIDENT said Mr. Hill's paper was a fitting supplement to that of Mr. Budge on stone dusting in collieries.

Mr. W. W. HOOD said Mr. Hill had referred to the distance at which fullers' earth or stone dust was carried in the air current. What they were all striving for in their management of mines was safety at the working face. Could this be efficiently dusted? He knew it could not be watered.

Mr. H. W. HALBAUM said that there were still a few who believed that watering the coal dust in a deep hot mine was of material benefit, though personally he thought that water was a remedy only in such mines as, in the words of the Act, were "naturally wet throughout." Few men appeared to appreciate the immense drying power of the air current in a deep mine. He (the speaker) had constructed a formula for measuring this drying power, and had published it in *The Colliery Manager's Pocket Book* for 1917. The formula was based upon, and used in connection with, Glaisher's hygrometrical tables, and it proved that, in quite ordinary cases the drying power of a considerable air current in a hot and dusty mine was quite capable of carrying out of the mine a daily quantity of moisture equal to 30,000 or 40,000 gals. of water. In such a mine, therefore, for a watering system to be efficient, some 30,000 or 40,000 gals. must be distributed daily, and in many cases it was impracticable to distribute any such quantity. He invited the few surviving advocates of watering to consider that fact. Mr. Hill considered that the only really efficient means of distributing the stone dust was to utilise the power of the air current. That was the plan suggested in his (Mr. Halbaum's) paper on "The Automatic Distribution of Stone Dust by the Air Current," read before the North of England Institute in February 1914, and whereas he was slated then for his views, those of Mr. Hill now found acceptance. With regard to combustibility of limestone dust requiring further careful research, Mr. Hill's conclusions on that head were quite contrary to those arrived at by the American Coal Dust Commission, which pointed out that the limestone was highly hygroscopic. The question arose whether, in practice, this hygroscopic character of the dust might not compensate the laboratory results obtained by Mr. Hill. For example, the dust used by Mr. Hill might have been freshly made dust, and therefore had had comparatively little time to absorb moisture; whereas dust lying in the mine for some time might absorb such a quantity of moisture as to neutralise any natural inflammability entirely. The American Commission also suggested from the data of the resultant atmosphere, that under the action of the heat produced by the explosion, the limestone dust had set free a large quantity of occluded carbon dioxide, whose natural effect was to cool the atmosphere and tend to extinguish the fire. This raised an interesting issue as between the American Commission and Mr. Hill, and the question to be decided was whether CO₂ was the effect of explosive combustion, as implied by Mr. Hill, or whether it was due only to the expansion of gases which, previous to the explosion, were merely occluded in the dust, as implied by the American Commission. Mr. Hill had also considerably advanced their knowledge by illustrating the effect of different shapes of the particles of dust. That the size of the particles was of material importance was a point that had been referred to by Principal Griffith, and Prof. Louis had already raised the same point three years previously. Men engaged in mining were familiar with Atkinson's classic equation on ventilation, which showed that the resistance to the air current varied directly with the area of the rubbing surface, and this surface varied with the form of the solid body. The question of the buoyancy of similar solid figures of similar density was settled by the size of the particles. If, however, they considered particles which were dissimilar in shape, it followed that, taking a given mass of matter, the spherical form had the least buoyancy of all, simply because the mass of the sphere had the smallest possible surface of any solid geometrical figure of equal volume. Mr. Hill, therefore, by showing which sort of material yielded spherical particles only, and which sort yielded particles of a less symmetrical shape but of greater buoyancy, had made an important contribution to the settlement of the problem. Mr. Hill had also favoured them with samples of stone dust so finely divided by inexpensive means that, from the physical point of view, the samples did not differ from ordinary smoke. Mr. Halbaum felt proud of the part played by the engineers. On this particular point he was very vanguard of progress in the world at large that the one ideal means of distributing stone dust was by the means of the air current alone. The remaining was how to minimise the dust itself.

MR. GRIFFITH said it struck him that the best method of estimating the fineness of non-inflammable dust

would be by passing it through the current of air in the place where it was proposed to use the dust, and not by gauge or mesh. This seemed so obvious that probably it was already being done. As to the shape of the particles, there were certain physical effects produced by sharp surfaces, compared with spheroids, that could not be ignored. Moreover, it was possible in the laboratory to get inert matter so fine as to propagate an explosion.

The PRESIDENT said that watering in mines in South Wales was not done wholly with the object of safety from explosions from coal dust. He recalled the great dust clouds that were set up by journeys in these mines some 20 years ago; but by regularly watering the roads in small quantities the conditions were vastly different to-day. This state of things was almost a necessity in South Wales, quite independently of any consideration with regard to the danger from explosions. So that if they adopted stone dusting in their mines they would still require to water.

Mr. HILL said he proposed to reply more fully to the discussion for the *Transactions*, but he might now say that every colliery had its own shale that could be cheaply milled on the premises. He had dealt with fullers' earth chiefly because it was at hand. As to



FIG. 1.—DISCHARGING END-TIPPING WAGON.
(Locomotive Coaling Plant at Carlisle.)

the characteristics of limestone, this was a matter for the scientist. He knew that in the North of England people were inclined to use limestone wastes; but where they had suitable shale at their pits he did not think there was any reason to use materials such as colloids, or limestone, or calcium chloride—all comparatively expensive. As to the stone dust reaching the working face when distributed by the machine of which he had shown a model, he did not see why it should not.

Proposing a vote of thanks to the author of the paper, the PRESIDENT said, irrespective of whether

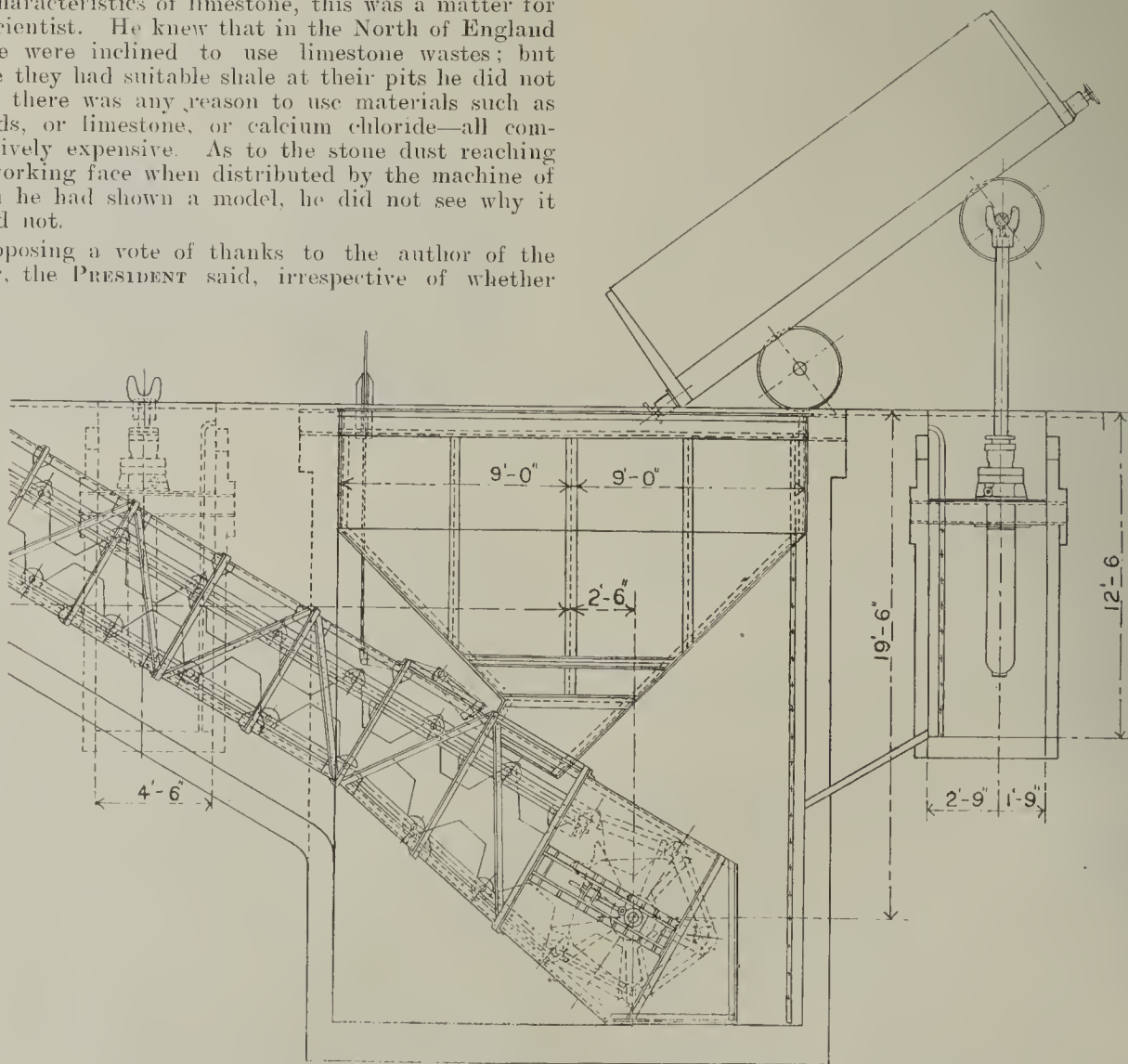


FIG. 2.—CROSS-SECTION THROUGH TIPPING MECHANISM AND COAL HOPPER.
(Locomotive Coaling Plant at Carlisle.)

stone dusting was a safeguard or not, Mr. Hill had given them a good deal of information upon the characteristics of various stone dusts.

Mr. W. STEWART, ex-president, in seconding, said the model exhibited by Mr. Hill showed a distributing apparatus that was a new departure, and was entitled to a practical trial. Whether the stone dust thus distributed reached the working face was also a matter for practical demonstration.

The vote of thanks was adopted with applause.

During July, a general average of 4.23 days per week, as compared with an average of 4.76 days per week in June, was worked by 60 Northumberland collieries.

LOCOMOTIVE COALING PLANT AT CARLISLE.

The London and North-Western Railway Company has recently erected at Carlisle a locomotive coaling plant, for the particulars of which we are indebted to Mr. C. J. Bowen Cooke, chief mechanical engineer of the line. End-tipping wagons (fig. 1) discharge the coal into a hopper below the ground level (fig. 2). The hopper is constructed of sufficient size (capacity 20 tons) to enable two qualities of coal to be mixed together. The wagons are tipped by two hydraulic rams, in the positions shown in fig. 2, so that wagons can be discharged from either end, whilst wagons with bottom doors can be placed immediately over the mouth of the hopper, and the doors opened. The rams, which are 6 in. in diameter, operate by means of a crutch at the upper end, which engages with one of the axles of the wagon.

From the hopper the coal is raised to the coaling tower by a bucket elevator (fig. 3), the top centre of which is 25 ft. above, and the lower centre 19½ ft. below, rail level. The elevator comprises 56 buckets, each with a capacity of one-third of a ton, and is driven at a speed of 28 ft. per minute by a 20 horse-

power motor (400 volts, 50 cycle, three-phase). At the tower the coal is discharged into a shoot, which delivers it direct to the tender of the engine alongside. The plant, which was manufactured by Messrs. Cowan, Sheldon and Company Limited, Carlisle, is operated by four men, and can handle about 450 tons of coal per hour.

Norwegian Railways Coal Contracts.—The State Railways contract allotments have now been made. In all, 18,000 tons of Durham and Northumberland steams have been booked, as follow: Horden, 4,000 tons, at 28s. f.o.b.; South Hetton, 4,000 tons, at 28s. 6d. f.o.b.; D.C.B. or Bentineck, 10,000 tons, at 29s. 2½d. The prices are all below the limitation figure for best steam coal.

THE MANUFACTURE OF NITRATE OF AMMONIA BY ELECTRIC POWER AT COKE OVEN PLANTS. *

By E. KILBURN SCOTT, A.M.I.C.E., M.I.E.E.

Owing to the scarcity of sulphuric acid, nitre cake has been tried for mixing with acid to make sulphate of ammonia, but it is hardly suitable, because of the considerable admixture of sodium sulphate, and the author proposes to show that makers of coke can easily turn their ammonia by-product into nitrate by means of acid of their own manufacture; also that by making their own acid they become entirely independent of the acid associations which have for so long controlled supplies in this country.

The nitric acid required for nitrate of ammonia may be very dilute—of, say, 25 per cent. to 33 per cent. strength—and it is easily and cheaply made from the air by electric power. The process is not new, because nitric acid has been made from air on a very large scale for many years in Norway, Italy and France. Further, one of the most striking scientific developments of the war has been the way in which Germany, by fixation of atmospheric nitrogen, has become entirely independent of Chili nitrate and of sulphuric acid.

Atmospheric nitrogen may be fixed in two ways:—*First*, as ammonia, and *secondly*, as nitric acid. In order to fully appreciate these methods it will be useful to set out in tabular form the various ways of making these two compounds.

Nitric acid can be made in any of the following ways:—

(a) The action of sulphuric acid on sodium nitrate or Chili saltpetre. This method is practically universal in this country.

(b) Fixation of atmospheric nitrogen by the direct process using electric arc flames. This method is employed on a very large scale in Norway, and is in use in Italy, France, Switzerland, Germany and Austria. A factory is to be built in Manchester.

(c) Oxidisation of ammonia in the presence of a catalyst by the process due to Prof. Ostwald. This method is employed on a large scale in Germany, and is also in use in Italy, France and Belgium. A small plant has been built at Dagenham Dock, in Essex.

When discussing the cost of nitric acid, one method is to assume it as of 100 per cent. purity, although in practice, of course, there is no such pure acid, and for the manufacture of most compounds, quite low percentage strengths will do.

When made from Chili saltpetre costing, say, £10 a ton, which was approximately the price before the war, the cost of pure acid may be taken at £20 a ton, or say about 2.15d. a pound. The price of Chili nitrate is now nearer £25 a ton, and as the cost of sulphuric acid labour, etc., has also gone up, the present cost of nitric acid must be upwards of £50 a ton.

In order to compare the cost of nitric acid as made by the direct arc-flame process, the author has taken the cost of electric energy at $\frac{1}{4}$ d. per unit, or about £4 a kw.-year of 8,000 hours. Assuming a yield of 200 grammes of 33 per cent acid per kilowatt-year, which is equivalent to 66 grammes of pure acid, the

of gas per ton, and assuming 50 per cent. surplus gas, there would be 1,800,000 cu. ft. of surplus gas per day. Large gas engines working on this gas have been found to use about 21 cu. ft. per brake-horse power per hour, so this quantity of surplus gas should develop:

$$\frac{1,800,000}{21 \times 24} = \text{about } 3,500\text{-horse power.}$$

which, with modern electric generators is equivalent to about 2,500 kw.

Power may also be obtained from waste heat ovens by using the steam in high-pressure steam turbines.

A battery of 50 waste heat ovens of, say, medium size Coppée type, will furnish enough waste heat to raise about 350 tons of steam per day in high-pressure boilers. If the steam is superheated, and used in modern steam turbines, a consumption of about 11 lb. of steam per horse-power per hour is attainable, and the power should therefore be:

$$\frac{350 \times 2,240}{11 \times 24} = \text{about } 3,000\text{-horse power}$$

which, with modern electric generators, is equivalent to about 2,000 kw.

According to Sir Wm. Garforth, much gas from coke ovens goes to waste, but whether that is so or not, it is clear that as modern coke ovens take the place of the old beehive type a great deal of power will be available. The same authority has said:—

The time has now arrived when coal should no longer be regarded simply as a fuel. Of the quantity carbonised, 5,000,000 tons a year were burned in "beehive" ovens without obtaining the recovery of by-products. This quantity alone represented a loss to the nation of 70,000 tons of ammonium sulphate, 250,000 tons of tar, and 12,000,000 to 15,000,000 gallons of benzol, all of which could be saved if the coal were distilled in retort ovens.

Cost of Power House.—When making estimates, it is convenient to take round figures whenever possible, so that the main points at issue may be quickly appreciated, and adjustments easily made to suit other conditions. Therefore although it has been shown that a battery of 50 coke ovens will give 2,000 kw. to 2,500 kw., the author proposes to give figures for a plant capable of generating 1,000 kw. and also for an electro-chemical factory to utilise that amount of energy. Readers must remember, however, that the larger the plant the lower the first cost per kw. installed.

For a total of 1,000 kw. the best size of generating unit to adopt is 500 kw., and it is advisable to have three such units, one of them being spare.

The following is the approximate cost of power-house plant for utilising coke oven gas in direct coupled gas engines:—

Three 500 kw. vertical type gas engines direct coupled to three-phase alternators complete with two motor-driven circulating water pumps for the engine jackets, compressed air starting equipment, also piping and valves; gas mains from ovens to purifiers and thence to gas engines, also the purifiers to rid gas of sulphur before passing it to the gas engines: cost £28,000.

The following is approximate cost of power-house plant for utilising waste heat to raise steam for turbines:—

Three 500 kw. steam turbo-alternators of Westinghouse or other good type, each complete with condenser, motor-driven extraction pump, valves and fittings, £20,000; also steam-raising equipment for above, consisting of boilers and superheaters, economiser, steel chimney, feed pump, steam and water piping, also gas mains from ovens to boilers, £9,000; total, £29,000.

It will be seen that for the size of power-house, the price is about the same for each kind of plant. For larger sizes the cost of a steam plant is lower than a gas engine plant, also the limiting size of a gas engine unit is about 1,000 kw. Steam turbine units can be built for practically any output, and the larger they are the better they work, and the lower the steam consumption.

Gas engines give high thermal efficiency, but unless precautions are taken they do not work well with coke oven gas, because of the snappy action due to high-percentage hydrogen.

Electric power-houses are now so standardised and the installation and running of same is so simple and straightforward that coke oven proprietors need not hesitate to instal their own plant. The author is sure they would find it more profitable to utilise the surplus gas or heat to make nitrate, etc., than to sell the gas, etc., for others to exploit.

Leaving a fair margin of profit, electric energy ought to be supplied from such a power-house at $\frac{1}{4}$ d. per unit. At this figure, 1,000 kw. for 8,000 hours a year would bring a return of

$$\frac{1,000 \times 8,000}{8 \times 240} = £4,166.$$

From this must be deducted the standing charges, labour and stores, and also any figure that the coke oven proprietor feels justified in fixing for the gas or waste heat. As he is selling to himself, it is merely a matter of book-keeping.

ELECTRO-CHEMICAL FACTORY.

The plant required to fix atmospheric nitrogen as nitric acid consists of:—Electric furnaces and boilers; switch gear and instruments; fans for air supply and circulation of gases; apparatus for cooling and oxidation of the gases; etc. Also the acid and alkali absorption towers or chambers, complete with acid elevators or *montejus* and distributors, etc.; reservoirs and mixing tanks; evaporators, crystallising and drying plant; etc.

Furnaces.—The furnace described below is that which the author has specially developed for the purpose. It differs from those in use abroad in that it contains three-phase unit, and as such it has certain advantages.

All the furnaces used abroad are of the single phase type, and therefore on a three-phase supply they have to be run in sets of three. There are certain disadvantages in working single phase, and a rough-and-ready analogy is to compare a single-phase and three-phase furnace to engines having a single crank and



FIG. 3.—ELEVATOR COALING AN ENGINE.
(Locomotive Coaling Plant at Carlisle.)

Ammonia can be made:—

(a) As a by-product in the manufacture of coke in regenerative and in waste heat ovens.

(b) As a by-product in the manufacture of lighting and heating gas, for town supply.

(c) As a by-product in the Mond process for production of power gas from slack coal.

(d) As a by-product in the application of the Mond process to the production of power gas from peat.

(e) As a by-product in connection with distillation of bastard and lignite coals.

(f) As a direct product by acting on superheated steam on calcium cyanamide, which latter compound is obtained by combining pure nitrogen with calcium carbide.

(g) As the direct product of the synthetic combination of pure nitrogen and of pure hydrogen in the presence of a catalyst, by the process due to Prof. Haber.

When ammonia is obtained as a by-product of the distillation of coal, the cost may be, as in the case of most by-products, only a little above the interest charge on the recovery plant plus the cost of operating same. It certainly is not correct to arrive at the cost of by-product ammonia by deducting the value from the market price of sulphate of ammonia. About £30 a ton or 3 $\frac{1}{4}$ d. per pound is quite high enough to take for the ammonia, but the proposal to make nitrate of ammonia at coke ovens would still be a good commercial proposition, if the ammonia was at a higher figure.

As a comparison it is of interest to determine the cost of ammonia made from calcium cyanamide. As the cyanamide and the carbide from which it is made require electric energy, clearly the rate for electric power is a factor. We may assume $\frac{1}{4}$ d. per unit, which for 8,000 hours a year is a little over £4 a kw. year and at this rate the cost of the cyanamide may be taken at £10 per ton. To produce one ton of ammonia requires about $4\frac{1}{2}$ tons of cyanamide, containing 18 per cent. of nitrogen, and therefore the cyanamide will cost £45. In addition there are certain other manufacturing costs, but to cut it short we will take a total of £50 a ton, or about 5 $\frac{1}{4}$ d. a pound.

It would be interesting to know the cost of synthetic ammonia as made by Haber's method from pure nitrogen and pure hydrogen; but although we can arrive at the costs of the two gases, the other data are not available, because the process is only in use in Germany.

*From a paper read before the Coke Oven Managers' Association (Midland Section) on July 28.

calculated cost of pure acid is about £13 10s. a ton, or 1.44d. per pound.

The oxidisation of ammonia into nitric acid depends on the cost of the ammonia, and if we take it at £50 per ton, as above mentioned, the cost reckoned as pure acid should be about £25 a ton. It is very doubtful however, if it can be made at this figure, owing to the lack of experience of the process and the very high cost of the catalyst—platinum, which has to be replenished from time to time.

We have now to consider the various methods for making the ammonia and the nitric acid into nitrate of ammonia, which are briefly as follows:

1. By direct mixing of strong ammonia with strong nitric acid made from nitrate of soda. This method is employed by Chance and Hunt.

2. By the reaction of sulphate of ammonia with calcium nitrate, or nitrate of soda. This method is employed by Brunner, Mond and Co.

These are purely chemical methods, whereas the two following depend on the use of catalysts.

3. By the combination of ammonia made from calcium cyanamide, with nitric acid made from the ammonia by a catalyst. This method is employed in France and Germany, and a factory has been built at Dagenham Dock, Essex.

4. By combination of ammonia made by the synthetic or Haber process, with nitric acid made by oxidation of ammonia by a catalyst. This method is employed on a large scale in Germany.

There is finally the purely electrical method with which the paper is mainly concerned, viz.:

5. By direct mixing of ammonia solution with dilute nitric acid of about 25 per cent. strength, made from air by the direct arc-flame process.

POWER FROM COKE OVENS.

The scheme proposed is that gas from regenerative coke ovens, or the steam raised by waste-heat ovens, should be utilised in an electric power house, built by the coke-oven proprietor, and some, if not all, the energy be employed for making nitric acid from air—this acid to be then combined with ammonia from the ovens to make nitrate of ammonia. In other words, the idea is that coke-oven proprietors should manufacture nitrate with home-made nitric acid, instead of, as at present, making sulphate with purchased sulphuric acid.

Power may be obtained by using the surplus gas from regenerative ovens in gas engines.

A battery of 50 regenerative ovens of, say, medium size Coppée type, will coke 360 tons of coal per day. Taking coal of average quality, containing 10,000 cu. ft.

the cranks. All electric motors are wound for three-phase because they are so much more efficient and every way than single-phase motors. So it is the same with electric furnaces.

The furnace has three triangular metal electrodes with intervening refractory material so that they form an inverted conical space having six sides formed. Air passes into this conical space, and when the furnace is working, the arcs which are struck between the electrodes where they are near together at the bottom are extended into flames by the flow of air.

The flames start and stop with each alternation of each phase, and there are thus always three flames working together so that, to the naked eye, the cone is completely filled. The three currents of the three phases react together and rotate very rapidly, the speed of rotation being governed by the frequency of supply, which is usually 50 periods per second.

As the particles of air pass upwards they come in contact with the rapidly rotating triple arc flames and the nitrogen and oxygen are caused to combine to form nitric oxide, or to employ an expression often used, "the nitrogen of the air is fixed."

The rotating triple arc flames of a three-phase furnace are a great advantage over the single flames of a single phase furnace, because all the air is enabled to come into contact with the flames. The single arc of a single-phase furnace can only exist in one plane, as it were, and consequently a great deal of air passes through such furnaces without coming in contact with the air arc.

The nitric oxide which is formed when air comes in contact with an electric arc has to be chilled rapidly, and for the purpose there must be a cooling zone in close proximity to the arc flame. Natural movement of the air removes the gas from the hot part of the flame, but a boiler is also used as the roof of the furnace to hasten the cooling. This is very effective by reason of the latent heat of steam.

Where the generating plant has a mixed-pressure steam turbine, steam from those boilers can be utilised in the turbine and the combination worked regeneratively. By so doing there is a gain of over 10 per cent.

After passing through the boiler, the gases flow through a heat exchanger and part of the heat is transferred to the air entering the furnace. It has been found advantageous to use as high a degree of preheat as possible—namely, over 250 degs. Cent.

By working the three arcs together in this way, it is possible to maintain a very high temperature, because the energy varies between 0.86 and 1.0. With three separate flames in three separate furnaces the energy in each must pass between 0 and 1.0 twice in each period.

There are greater radiation losses with three separate furnaces because of greater wall area, and requiring double the number of electrodes.

By combining three arc flames together, a balanced load is obtained automatically, because current is always flowing in one or other of the phases, thus enabling the arcs to maintain each other. This is good for the supply and regulation of power.

A feature of the furnace is the use of high frequency pilot sparks in the space between the electrodes where they are close together. These break down the air dielectric, and the electrodes can be placed at the best distance apart for the passage of air.

The recognised method of measuring the yield of a furnace is to find the output of dilute nitric acid which it gives in a given time for a given amount of electric energy. The acid is resolved into the equivalent amount of pure nitric acid of 100 per cent. strength, and the electric energy input to the furnace is measured in Board of Trade units, or kilowatt-hours.

Usual yields for single-phase furnaces are about 50 grammes per kilowatt-hour with 60 as a maximum. Careful tests carried out over a considerable period with the author's three-phase furnace have shown considerably higher yields.

Nitrate Plant.—The nitric oxide is transformed into nitrogen peroxide on cooling, and this in turn is converted into nitric acid in an absorption plant of some usual type. The resulting dilute acid is run into a closed iron tank containing ammonia solution in which the ammonia is at about 25 per cent. strength. Acid is slowly added to a large volume of liquor, and an agitator mixes them together, the heat of combination being carried off by cooling coils as well as by circulation of air.

The addition of acid continues until nearly all the ammonia is taken up, leaving a slightly alkaline reaction.

The ammonium nitrate solution is then run through a filter into vacuum pans, where evaporation is effected by steam coils at a pressure of 20 mm. of mercury.

When nearly all the water has been evaporated the solution passes into long troughs slightly inclined and subjected to a rocking motion. The nitrate forms into small crystals with no enclosure of liquor, and after the crystals have been dried in a hydro-extractor they are placed in bags or barrels ready for market. The nitrate is absolutely pure.

It has been mentioned above that the ammonia was brought up to 25 per cent. strength, and that concentration is absolutely necessary in order to reduce the water when the solution has to be carried any distance. Nitrate of ammonia can, however, be made with solution of much lesser strength; in fact, it has been demonstrated at Bristol that nitrate can be made direct from ordinary gasworks liquor by acting on it with dilute nitric acid. Of course, when made in this way the nitrate is not so pure as when made with concentrated ammonia and a great deal of evaporating plant is necessary.

ESTIMATE OF COST.

We will assume the electro-chemical plant is of such size as to produce 1,000 kw., the round figure above which a power-house will supply con-

veniently equipped with the three-phase motor, boiler, and instruments, fans, and apparatus for the collection of gases; apparatus for the collection of gases, also the acid and alkali chambers, complete with acid distributors; reservoirs and mixing tanks;

evaporators, crystallising and drying apparatus, etc. A convenient method of arriving quickly at an over-all price commonly used for electro-chemical plants, is to take a price per kilowatt. £8 is a fair price, so the total is £8,000.

The price of electrical energy is assumed at 1d. per unit, which is fair, because electro-chemical factories in this country have been supplied with electric energy at under that figure for many years.

The number of working hours in a year is—namely, 8,000—is convenient because it leaves a balance of 760 hours for overhaul time, etc., and thus less spare plant is required. It also allows for intermittent running off the peak in winter, if found necessary.

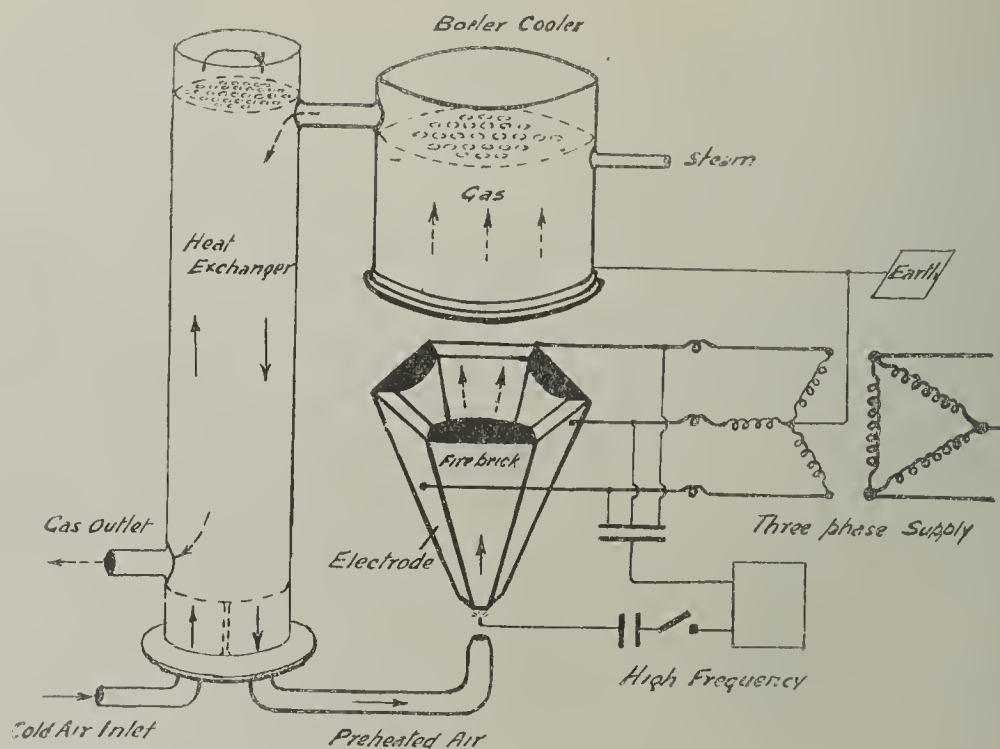
Depreciation on the electro-chemical plant may be taken at 10 per cent, this being sufficient to pay for a new plant in about seven years. It should be noted that a large proportion of the capital cost is required for absorption plant which is largely of brickwork, and for which the depreciation might be taken at 2½ per cent.

The yield of acid is reckoned at 1½ tons of 33 per cent. nitric acid per kilowatt year—that is to say, 1,500 tons from a plant utilising 1,000 kw. This is based on a yield of 66 grammes of concentrated acid, or 200 grammes of 33 per cent. acid per kilowatt-hour, thus:—

$$200 \text{ grms.} \times 1,000 \text{ kw.} \times 8,000 \text{ hrs.} \times 2.2 = 1,500 \text{ tons.}$$

$$100 \times 2.240$$

As a matter of fact greater yields are obtainable, but the above figure is sufficient for the purpose and to show the sequence of the calculations.



SKETCH DIAGRAM OF KILBURN SCOTT THREE-PHASE FURNACE.

Working Expenses.—Assuming the electro-chemical plant to cost £8,000, and to utilise 1,000 kw. for 8,000 hours per annum at 1d. per unit, the expenses are:—

Electric energy, $\frac{1,000 \times 8,000}{240 \times 8}$	£ 4,166
Depreciation 10 per cent. on £8,000	800
Salaries, wages, stores royalty, &c.	1,790
	£6,756

This, for an output of 1,500 tons, gives £4½ per ton of 33 per cent. nitric acid, the equivalent rate for pure acid being £13 10s.

For a plant to utilise ten times the amount of energy, or 10,000 kw., the cost should be much less, even taking the above figures for the yield.

The amount of ammonium nitrate that can be made by such a plant is shown by the equation and atomic weights thus:—

	$\text{NH}_3 + \text{HNO}_3 = \text{NH}_4\text{NO}_3$
With pure acid	17 ... 63 = 80
With 33 per cent. acid	17 ... 189 = 80

Inserting 1,500 tons of acid instead of the figure 189, we get 125 tons of pure ammonia plus 1,500 tons of 33 per cent. nitric acid gives 635 tons of pure ammonium nitrate.

As to the value of ammonia from the coke oven gas, the author takes the figure mentioned at the beginning of this paper—namely, £30 a ton, or 3½d. a lb. It is surprising how opinions differ on this simple matter. Many accept electrical calculations, which really do involve detailed consideration, and yet quibble as to the value of ammonia. As a rule they go wrong by taking the ruling price of sulphate of ammonia and deducing the price of ammonia from that. It is perfectly obvious that this is incorrect, because no one would make ammonia from such a finished manufactured product.

Cost per Ton.—The cost per ton may now be set out as follows:

1,500 tons of 33 per cent. nitric acid at £4½	£6,750
125 tons of pure ammonia ... at £30	3,750
	£10,500

As this produces 635 tons of ammonium nitrate, the calculated cost is therefore:—

$$\frac{10,500}{635} = £16\frac{1}{2} \text{ per ton.}$$

In addition to ammonium nitrate, there is also the sodium nitrate-nitrite. This may be assumed at 1-10th of a ton per kw. year, and it is readily saleable. It should be worth £1,500 a year.

Price.—Before the war, nitrate of ammonia made by the electric process in Norway, was sold in large quantities at £28 to £32 a ton. Properly speaking, there is no quotation now, because all the make is taken by the Government for explosives. Its minimum price may, however, be fairly taken at double the above figure.

What will happen after the war we cannot tell, but one thing is certain—namely, that the price per unit of contained nitrogen will be higher for nitrate of ammonia than any other nitrogen compound. This has always been so, because the combined nitrogen is 35 per cent.

Usual percentages of combined nitrogen are given in the following table:—

Name.	Symbol.	How obtained.	Usual per cent. of nitrogen.
Sodium nitrate	NaNO_3	From Chili	15½
Sulphate of ammonia	$(\text{NH}_4)_2\text{SO}_4$	By-product of coal	18
Calcium nitrate	$\text{Ca}(\text{NO}_3)_2$	Made by electric power	13
Calcium cyanamide	CaCN_2		18
Nitrate of ammonia	NH_4NO_3		35

As a means of transporting combined nitrogen from one part of the world to another, nitrate of ammonia is better than any other medium, so it is likely to always hold the field in the export market.

USES OF NITRATE OF AMMONIA.

Nitrate of ammonia is the principal ingredient of most safety mining explosives, the word "safety" being a relative term expressing the fact that they are safer than dynamite, etc. On the Continent, before the war, nitrate of ammonia explosives were considered so safe that they were carried on railways at ordinary rates. This, no doubt, had much to do with nitrate of ammonia explosives being adopted more quickly than with us, for our railway authorities have always insisted in charging at the high rates.

The British and certain other governments have passed regulations insisting on only safety or permitted explosives being used in mines. The more this idea extends the more nitrate of ammonia will be required.

Other uses of the nitrate are: in burster charges for shells; as an explosive for tree planting; and as a fertiliser.

Importance of Home Manufacture.—Before the war practically all the nitrate of ammonia used in this country for making safety explosives for mining, etc., was imported from Norway, which, considering the necessity for nitrate of ammonia, is another instance of the absurdity of allowing foreigners to control businesses important to the nation.

Norway had no coal from which to obtain ammonia, and so the ammonia had to be sent from England. Ammonia liquor was collected from gasworks and coke-oven plants, and concentrated to bring the ammonia up to 25 per cent. The solution was then railed to Hull, shipped in steel tanks to Skien in Norway, and carried a considerable distance up country to the air nitrate factory.

As the proportion of water was 75 per cent., the freight, calculated on the real ammonia in the solution, was naturally high. The cost of carrying steel tanks to and fro, and the heavy depreciation of them was also a great expense. Finally, the nitrate of ammonia when made was brought from Norway to this country, a great deal of it going to Nobel's works in Ayrshire.

Since the war, ammonia liquor has continued to be sent to Norway, and nitrate of ammonia brought back, but since the submarine menace this business has practically stopped. Ammonia is now being made in Norway by acting on calcium cyanide with superheated steam in autoclaves, but the Norwegians prefer our by-product ammonia as being cheaper.

Before the war Germany was the largest purchaser of Chili nitrate, taking twice as much as the next consumer, the United States, and over six times as much as this country. Now, Germany does not require any Chilean product, because immense plants to make nitrates from the air have been established. As a matter of fact, this air nitrate development ranks as the most remarkable scientific achievement of the war.

It will easily be seen that by making nitrates from air the Germans are at a great economic advantage, for our complete dependence on Chili nitrate means we have to pay large sums for the nitrate and for transport, insurance, etc. Also there is part of the immense national charge for protecting the sea routes by which we get it here. Large sums are also required for the pyrites, sulphur and for the plants to manufacture sulphuric acid with which to treat the nitrate.

The consumption of coal in Canada last year was 29,865,856 tons, of which the railways took over 25 per cent.

COKE OVEN MANAGERS' ASSOCIATION (MIDLAND SECTION).

At the meeting of the Midland Section of the Coke Oven Managers' Association, held under the chairmanship of Mr. G. CHRISP, at Sheffield on Saturday last, Mr. E. KILBURN SCOTT, A.M.I.C.E., M.I.E.E., read a paper entitled

The Manufacture of Nitrate of Ammonia by Electric Power at Coke Oven Plants.

The PRESIDENT, in introducing Mr. Kilburn Scott, referred to the value of his contributions to the subject of electro-chemistry, a subject which had unfortunately not received from such societies as theirs the consideration which it deserved. If they were to keep abreast of scientific progress in relation to their business they would have to give it more attention. Coke oven plants were ideally adapted for obtaining a cheap supply of power, and if there was anything at all in the synthetic production of ammonia or nitric acid, Mr. Kilburn Scott would, undoubtedly, make them familiar with the theory.

Mr. KILBURN SCOTT then read his paper, which is given on p. 207 of this issue.

DISCUSSION.

The PRESIDENT, in inviting discussion, said Mr. Kilburn Scott had opened their eyes to something they did not know of. His paper had been most interesting and of very high educational value.

Mr. B. W. HAIG said that Mr. Kilburn Scott had made a very good case indeed of what he set out to show. There were doubtless many coke oven installations in Yorkshire quite large enough to run successfully such an installation as had been described. The paper covered a very wide field, and there were certainly many points upon which they would like to hear a good deal more before they put themselves in the position of recommending their firms to embark upon so large a project. Mr. Kilburn Scott's remarks as to the comparative costs of power derived from steam and gas engines in themselves would have made a valuable paper, and he (Mr. Haig) wished he had come prepared with figures to suggest some questions on this matter. It was somewhat surprising to hear that colliery proprietors could value their power as nothing, in view of the fact that certain coke oven people were selling their gas at very good prices; and whilst he was not prepared with figures on which to challenge those advanced by Mr. Kilburn Scott, the production of power at $\frac{1}{2}$ d. per unit certainly struck him as a very low estimate indeed. It would have to be a very large unit in which the process could be profitably adopted. There would have to be highly skilled officials in the electrical department, in view of the danger of using such high voltages as suggested. Most coke oven plants would not at present have such men on their staff, and the amount put down for salaries and upkeep seemed to him to be on the small side. The technical descriptions given had certainly been most interesting, and it would be interesting to know if there was any such plant in existence in England which could be inspected. With regard to the purity of the product, some of them already made or were going to make concentrated ammonia liquor, and one of their troubles was to get rid of the sulphur compounds, and he was wondering whether they would have a very detrimental effect on the resulting ammonium nitrate. He presumed the sulphur would be precipitated and lower the quality of the ammonium nitrate, and possibly make it dangerous for use. In conclusion Mr. Haig formally moved a vote of thanks to the author.

Mr. G. A. HEBDEN said some eight or nine years ago he had a somewhat similar experience as that of which the author had spoken, in connection with calcium nitrate which his firm used to import from Norway and make into bicarbonate of ammonia, mixing the calcium nitrate and making pure ammonium nitrate with it, and he was surprised that the alkali people had not taken up such a simple process. He believed the calcium nitrate could be converted into ammonium nitrate quite easily, and the waste CO_2 utilised with ammonia to make ammonium bicarbonate. It would have been done in England but for the fact that the Norwegian people paid more for the ammonia, and it was still being sent out of this country. They were shipping ammonia of 900 specific gravity, 28.3 per cent.

The PRESIDENT asked if the electrodes in the arc flame furnaces described should be of any particular metal. Had the choice of any special material—aluminium, copper, etc., or any special alloy—any bearing upon the process? With regard to plants in course of erection he had heard from a friend that there was a plant of similar description working in South Russia. He would also like to know if there was any possibility of synthetic ammonia being produced by such a process.

Mr. KILBURN SCOTT, in replying to the discussion, agreed that a number of coke-oven proprietors were doing very well by the sale of the gas, but he thought it very likely that a number of the beehive type of ovens—of which there were, he believed, 16,000 in this country—would be done away with. In future coke would be made on a very much larger scale than at present, and the Government would surely compel the use of coal in this way and stop its being wastefully used, as at present, in boilers by direct burning. When new plants were put down and beehive ovens abolished there would be a tremendous amount of power, in the form of gas, available, and it was to utilise some of that gas that he had suggested the process described. Where coke ovens were near a town then doubtless it would pay them better to sell some of the gas for illuminating purposes, etc.; but a great many installations would be remote from such centres, and in such cases the better plan would be for coke-oven proprietors to establish their own power houses, make their own acid and produce nitrate. He believed that the only electric furnace at present producing nitric acid direct from air in this country was his own. A factory was to be built in Manchester, but it would be some time before that was completed. It was because the nitric-acid process had been hanging fire so long that he had taken the opportunity of putting

his views before such a society as theirs, and he was very glad there was such a society to receive the suggestion so sympathetically. With regard to the sulphur compound, the ammonia that went over to Norway had the sulphur carefully removed. Ammonium nitrate for making burster charges must be very pure, but when it came to be used for fertilisers and certain other purposes after the war, there could not be the need for such absolute purity. It could be made certainly without the high concentration needed (in order to save freight) in that now sent to Norway. The Norwegian calcium nitrate was made electrically, and some of it was converted into nitric acid in this country, and also used for making ammonium nitrate. If we had had the furnaces here, then this roundabout process would have been avoided. The trouble with nitric acid was that it could not be carried any distance, especially by sea. Ammonium nitrate would always have a big field for export, because it could more easily be conveyed in concentrated form—viz., with 35 per cent. of fixed nitrogen. It would in future be the standard method of carrying nitrogen from one part of the world to another. With regard to the president's enquiry as to the electrodes, these were made of aluminium alloy and copper alloy. The metal used certainly had a most important bearing. Some claimed that there was a catalytic action going on in the furnace, but the whole explanation of the formation of free nitrogen and free oxygen in the electric arc was obscure. Some chemists maintained it was purely thermal, but he was satisfied that this was not so, though a high temperature might be favourable to the yield. He believed it was due to the collision bombardment of electrons. Whilst he wanted to see the particular method to which he had devoted years of study given a fair trial, he was anxious that all processes should be tried, so long as this country would be placed in a better position to produce its own nitrate. The problem was being tackled in various places, but investigators were all working in their own separate pigeon holes, so that progress was slow. He pleaded for more sympathetic co-operation and encouragement on the part of the Government, as this was a matter of great national concern. It was time the country had at the heads of its technical departments men who understood the needs of the situation better than lawyers, medical men, &c., could be expected to. Germany put at the head of its Munitions Department the head of the biggest electrical concern in the world, and the result was that that country was now independent of Chilean nitrate.

The vote of thanks was seconded by Mr. J. T. PRICE, and heartily accorded.

LAW INTELLIGENCE.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.—July 26.

Before Mr. Justice SARGANT.

Mining Rights Decisions.

Judgment was delivered in the two actions, *St. Catherine's College, Cambridge, lord of the manor of Norton, against Frances Cassandra Dowager Countess of Rosse and others*, the successors in title of allottees of the waste of the manor; and the *Frank trustees, successors in title of the allottees of considerable parts of the waste of the manors of Norton and Askern, against St. Catherine's College, as lord of the manor of Norton, and Mappin's Masbro' Old Brewery Limited, of Sheffield, lord of the manor of Askern*. Both actions related to the effect of a private enclosure Act, passed in 1814, on the mines and minerals lying below the wastes of the manors of Norton and Askern. The Act was in the main an Act for enclosing and dividing the wastes of three commons, Campsall, Norton, and Askern.

His lordship held that the rights that were now claimed were incompatible with the rights given to the allottees under the Act in question and under section 14 of the General Enclosure Act, as incorporated in this Act. As regarded the first action, he dismissed it with costs, and as to the second action, he would make a declaration that the defendants were not entitled to sink pits, or let down the surface in the course of working the mines, and the plaintiffs would pay the costs of the issue as to ownership, and the defendants would pay the costs of the issue as to letting down the surface.

July 27.

Before Mr. Justice EVE.

Alleged Trespass by Neighbouring Colliery.

Eastern Valleys Black Vein Colliery Limited v. Elled Colliery Company Limited.—Application was made for an order that defendants should allow plaintiffs to inspect, also that defendants should clear away rubbish from old workings that obscured the view, and should pump from plaintiffs' mine the water which, it was alleged, came from the Elled workings, and was affecting plaintiffs' output to the extent of 100 tons per week. Counsel for defendants proposed that, as it had been suggested that defendants were trying to conceal whether there had been a trespass or not, an independent expert appointed by the judge should go down and make a plan and report as to the amount of inspection necessary for the purpose of the action. This proposal was approved by his lordship, and the parties agreed that an expert should be nominated by Mr. Hugh Bramwell or by the chairman of the Ebbw Vale Company; the case to stand over until the next sittings of the court.

July 31.

Enemy Coal Associations.

Petitions were heard for the confirmation of Board of Trade Orders for the winding up of the Anglo-Continental Coal Association Limited and the International Anthracite Steam Coal Association Limited under the Trading with the Enemy (Amendment) Act, 1916. The petitions were brought under section 1, subsection 7, of the Act in the winding up of the company. Counsel said the first company was incorporated in April 1907, with a capital of £10,000, and its registered office was in Hull. The Board of Trade made an Order on July 20, 1916, appointing Mr. Wm. Rose the controller in the winding up.

His lordship made the order in each case. A shareholder in both companies, who appeared in person, asked whether the Orders were made in the national interest.

His lordship said this was considered of Trade. The winding up of the company first for the allocation of the debts of the company, and secondly to enable the surplus assets to be distributed to the contributories. It was to the interest of the company that this should be done, as now that the business was gone, the company was merely a shadow.

INDIAN AND COLONIAL NOTES.

Africa.

Natal Coal Trade.—Owing to the improved condition of the coal bunkering trade, the collieries in Natal are enjoying a rich harvest, inasmuch as compared with December last year the average put top price has increased from 7s. 4d. to 10s. per ton. The output of coal, however, is slightly less than during the latter half of last year, but if the higher price is maintained it is certain to be reflected in a materially increased output of coal, especially in the Vryheid district, where several new collieries are being started. The Hlobane Colliery at Vryheid again headed the list of producing collieries in March, with an output of 36,274 tons. The Dundee Collieries were credited in March with an output of 34,270 tons, whilst the Natal Navigation Collieries occupied third position with an output of 29,462 tons. Durban Navigation came next with 22,967 tons, and low down the list is Glencoe Collieries with 13,661 tons, Natal Cambrian following closely behind with 12,754 tons. Tendega Colliery, the newest producer on the list, produced 9,690 tons, nearly reaching the Wallsend Colliery, whose output was 9,747 tons, whilst the Natal Steam came close up with 9,388 tons. The rest of the output was contributed as under: South African, 7,506 tons; Utrecht, 7,300 tons; Newcastle, 6,680 tons; Hatting Spruit, 6,287 tons; Elandslaagte, 4,303 tons; Fairleigh, 3,540 tons; Natal Ammonium, 2,698 tons; Vryheid Coke, 1,119 tons; and Dewar's Anthracite, 825 tons.

Canada.

Municipal Coal Yards.—The Ontario Legislature having passed an Act authorising municipalities to deal in food and fuel, many of the cities and towns of the province are preparing to establish civic coal yards to provide against the danger of a shortage of coal next winter. A similar measure has been passed by the Nova Scotia Legislature.

Wage Increases in Nova Scotia.—A Commission has awarded an increase of 12½ per cent. to all workmen of the Dominion Coal Company, in addition to 10c. a day increase to all who are receiving wages up to and including 2.50 dols. per day. The workmen of the Nova Scotia Steel and Coal Company asked for an increase of 30 per cent., and were awarded increases ranging from 5 to 15 per cent.

Natural Gas.—The total production of natural gas, according to the preliminary report on the mineral production of Canada for 1916, was 25,238,568 thousand cu. ft., valued at 3,924,632 dols., as compared with a production in 1915 of 20,124,162 thousand cu. ft., valued at 3,706,035 dols. The production by provinces was as follows: Ontario, 17,838,318 thousand cu. ft., valued at 2,730,653 dols.; New Brunswick, 610,118 thousand cu. ft., valued at 79,628 dols.; and Alberta, 6,818,131 thousand cu. ft., valued at 1,114,351 dols.

Mining Legislation in British Columbia.—Legislation of an important character, designed to advance the interests of the mining industry of British Columbia is proposed in a Bill that is to be submitted by the Government during the present session of the Provincial Legislature. In this Bill provision is made for a mineral survey of the Province, for aid to prospectors and miners, for the protection of wage-earners, and for the protection of investors. For the purposes of the mineral survey, the Province is to be divided into six sections, or "mineral survey districts," to each of which "a duly qualified engineer" is to be appointed "to be resident engineer" to undertake and carry on continuously a mineral survey of such survey district, and to assist, so far as practicable, miners and prospectors in that district. This includes giving information as to mineral indications and concerning ground open to location; by testing samples of mineral submitted to him; and, in general, by acting as adviser to prospectors. He is also required to report to the Minister of Mines on the desirability and approximate cost of constructing roads, trails, and bridges that, in his opinion, are needed to "render possible the development of any mineral resources." The Government, furthermore, is authorised under the provision of the Bill to undertake drilling or boring operations on behalf of claim owners under specified conditions. For the protection of investors, the following radical clause is incorporated in the Bill: "The Minister of Mines may, and each resident engineer shall, upon receiving notice of any advertised or intended sale of shares in any company or interest in any claim or mine or mineral property or interest whatsoever, upon statements or terms not in accordance with actual facts and conditions give such notices, either personal or public, as may be necessary to prevent any injury to investors, and every notice given under this section shall be absolutely privileged."

Cheap Coal for the West.—At a recent convention of the Manufacturers' Association at Winnipeg the important announcement was made by Dr. Rutten, of the Dominion Government's Research Council, to the effect that, by means of a process which has been discovered for treating lignite, Western Canada can within a very short time be assured of an abundant supply of good fuel at only two-thirds of the present price of anthracite.

Need for Using More Gas.—In view of the paramount importance of meeting the increasing need for by-products obtained from the carbonisation of coal at gas works, the Minister of Munitions wishes to impress upon those possessing gas burning appliances the desirability of using gas in preference to any other means of obtaining light, heat, or power. At present, an increased supply can be provided without difficulty, inasmuch as during the summer months gas undertakings generally are in a position to manufacture in excess of the ordinary requirements of consumers.

Coal Distribution Scheme.—The Coal Controller's scheme for the equal distribution of next winter's coal allows the following maximum scale of rations for the period from April 1 to September 30 the allowance will be 1-1½ the winter ration.

Size of house.	Coal
3-5 rooms	Up to 1 ton
6-7 rooms	Up to 1 ton 6 cwt
8-9 rooms	Up to 2 tons
10-12 rooms	Up to 2 tons 6 cwt
Over 12 rooms	Up to 3 tons

CONTENTS.

ARTICLES:—	PAGE
Nation and the War	211
Economy	211
Industrial Unrest in Wales and Monmouthshire ..	203
Properties and Characteristics of Various Stone	
Dusts	205
Locomotive Coaling Plant at Carlisle	206
The Manufacture of Nitrate of Ammonia by Elec-	
tric Power at Coke-oven Plants	207
South Wales Mining Timber Trade	215
Coal Concreted from Dusts or Ashes	216
Committee on Breathing Apparatus	216
Welfare of Workers in Factories and Workshops...	217
Labour and Wages	217
Open Contracts	220
The Mining Industry in Corea	220
The Freight Market	220
Abstracts of Patent Specifications Recently	
Accepted	222
New Patents Connected with the Coal and Iron	
Trades	224
Publications Received	224
REPORTS OF MEETINGS:—	
South Wales Institute of Engineers	206
Coke Oven Managers' Association (Midland Section)	
Miners' Federation Conference	209
Midland Institute of Mining, Civil and Mechanical	
Engineers	217
THE COAL AND IRON TRADES	212-216
The Tin-plate Trade	214
The London Coal Trade	215
The By-Products Trade	216
LAW INTELLIGENCE	209
INDIAN AND COLONIAL NOTES	209
PARLIAMENTARY INTELLIGENCE	216
NOTES FROM THE COAL FIELDS	218
COAL, IRON AND ENGINEERING COMPANIES	220
MISCELLANEA:—	
New Dunderland Company—Agencies in France ...	204
Important American Coal Amalgamation	205
Norwegian Railways Coal Contracts	206
Need for Using More Gas—Coal Distribution	
Scheme	209
Mine Managers' Examinations	212
Spanish Coal Production in 1916—South Wales	
Colliery Deal—Russian Loans to Coal Masters ...	217
National Association of Industrial Chemists	218
Coal Shortage in Denmark—Coal and Coke in	
Canada, 1917	220
Sulphate of Ammonia: United States Output	224

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AND

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LONDON, FRIDAY, AUGUST 3, 1917.

The London coal trade continues unusually brisk
Collieries are working full time, and the arrivals of
coal by sea and rail are satisfactory. Public orders
are given priority, and the delivery trade is exceed-
ingly active. Very little coal is on the ground at
the depots yet. Hard steams are scarce; slacks are
plentiful. The Controller's suggestions for rationing
coal is being freely discussed. Freights to London
are lower.

The Northumberland market shows no improve-
ment. General outside enquiries are small, and the
position of the collieries is unsatisfactory. Activity
is well maintained in Lancashire, Yorkshire and the
Midlands, a keen demand anticipating a smaller
output from the pits during the Bank holiday.
Larger steam sorts are strongly held. Humber
ports experience plentiful enquiries both for Allied
and neutral destinations. In South Wales anthracite
large kinds are unchanged, with not many orders
offering. The market for steam coals is inclined to
be irregular, owing to lack of tonnage, and supplies
of practically all qualities are obtainable for prompt
loading. House coals are in strong demand.

The Scotch trade remains dull and discouraging;
export business is at a low ebb, and there is a lack
of steadiness in the market generally.

A notable feature of the Irish trade has been
the number of steamers discharging coal direct into
railway wagons for country and commercial delivery.
Good supplies of Scotch steam coal are reaching
Belfast.

Shortage of tonnage is still the dominant feature
of the freight market. On north-east coast the
few fixtures made have been for French Atlantic
ports. In South Wales very high rates are offered
for vessels for distant destinations, but owners prefer
nearer points.

A meeting of Welsh miners' delegates at Cardiff
yesterday (Thursday) to consider the "combing-out"
scheme agreed upon by the Miners' Federation and
the colliery owners, decided to reject the scheme,
and to take a ballot as to the attitude to be adopted
should the authorities take any men for the Army
contrary to the above resolution.

The Commissioners on Industrial Unrest in South Wales, whose report has just been issued, draw attention to the gravity of the labour situation there, more especially in relation to events that may happen when peace is restored, and they recommend the institution by the Government at an early date of a special committee of enquiry to conduct a thorough investigation into the social and economic conditions of the South Wales coalfield.

The South Wales Coal Field Thirteenth Annual Summer Mining and Engineering School, organised by the Glamorgan Education Committee, will be opened on Monday next, August 6.

The annual general meeting of the members of the North of England Institute of Mining and Mechanical Engineers will be held in the Wood Memorial Hall, Newcastle on Tyne, at 2 o'clock to-morrow (Saturday). The following papers will be open for discussion:— "Further Notes on Safety Lamps" (by Mr. Simon Tate), "Some Practical Notes on the Use of Timber in Coal Mines" (by Mr. R. Lee, M.A. [Chin.], B.Sc.), "The Horsley and Nicholson Automatic Compound Syphon" (by Mr. G. R. Nicholson, F.I.I.), and the following paper will be read or taken as read: "Little Namaqualand and its Possibilities as a Copper-producing Country" (by Mr. F. W. Jenkins).

A BOOK has recently been written by **The Nation** Mr. W. C. DAMPIER WHETHAM, **and the War.** already well known for his scientific attainments, and in it, under the title of *The War and the Nation*,* he makes an attractive study in constructive politics. We make no excuse for drawing attention to this work here, because the subject touches very closely those large economic questions upon which depends the future of British industry. As the author remarks, the war has led to a widespread recognition that the economic theory of *laissez-faire*, on which for a century we have relied, is a dangerous guide in the present condition of the world. Mr. WHETHAM has a scientific mind, and he sees the dangers arising from the detached way in which many important questions are now being considered. He has, therefore, endeavoured to examine from a single point of view the whole subject of national organisation, at which many isolated committees and associations are aiming.

Mr. WHETHAM boldly attacks certain economic theories and conceptions which have long been prevalent. There has been, for example, much misconception about the feudal system. What is usually meant by this term, in modern thought, is that part of the feudal system which survived to modern times. One is apt to lose sight of the important fact that feudal restrictions had a real value in restraining class interests. The destruction of these safeguards led, in the author's view, to the evils of an uncontrolled commercialism. Thus, the essential idea of the feudal system was that the ownership of property involved corresponding obligations. It defined the rights and duties of every man, from the lord of the manor to the humblest cotter. No man could seek his individual profit if it conflicted with the interest of the local community. Paradoxical as it may seem, therefore, feudalism was pure and unadulterated Socialism. Step by step Mr. WHETHAM traces the process by which this system has been undermined. Whereas Governments in the sixteenth century aimed only at making the nation strong, even at the expense of the individual, "nowadays we are content that there should be plenty, and the individual is allowed to go his own way, even if, by doing so, he may weaken the power of the realm." It is admitted that in this way individuals grew rich and the nation became wealthy; but, on the other hand, this process did not promote either national strength, civil organisation, or an equitable distribution of the product of industry. The free activities of men under a *laissez-faire* policy, says Mr. WHETHAM with true mathematical insight, are not all of the same algebraic sign; and under the stress of competition, much energy is wasted in destructive action. Modern political economy, he claims, has been based upon the fallacy that national wealth and national welfare are identical.

Mr. WHETHAM develops these views with great skill, and it must be confessed that the standpoint which he takes, however startling it may appear, is

worthy of the most serious attention. He is not to be scared at the idea of socialism or nationalisation. He shows that these terms need not necessarily be associated either with confiscation or bureaucracy; but although much that he says upon this point must be accepted, we do not think that it will be everywhere admitted that the temporary nationalisation brought about by the war has tended to dispel all the objections which have been urged to universal State control. The war has undoubtedly taught us much. It has shown us the folly of restriction of output and the unpardonable fault of selfishness in every form. It has revealed weaknesses in our social, political and industrial machinery. It has emphasised the necessity of developing our national resources beyond any power of private and unassisted enterprise. It has also convinced us that the problem of heavy taxation will have to be solved in such a way as not to hamper industry. These things cannot be done unless all classes in the State are content to labour in peace, as in war, for the national welfare, without too much regard for what Mr. WHETHAM scornfully terms the miserable spirit of commercialism.

We have dwelt at some length upon these introductory remarks because they seem necessary to the proper understanding of the thesis which the author, who confesses to be an advocate of Constructive Toryism, seeks to propound. We regret that considerations of space prevent us from following him in the development of his views in their application to practical problems connected with the land, and the organisation of industry and commerce, where he is apparently not on such familiar ground. As an example we take his views upon the subject of coal, which betray an unscientific disposition to accept too freely the plausible arguments of one particular school of idealists. In using coal, he claims, the nation is living on its capital, and not on its income; those nations who control the available coal of the world will take the lead in industry. Following JEVONS, he assumes that after some two hundred years or so the wealth-producing powers of the nation will be adversely affected by the high price of coal. Coal mining is for us a key industry in its fullest sense. Coal should, therefore, be used in the best and most economical way. He illustrates the evils arising from inefficient working and insufficient capital, and points to the economies that could still be effected by a uniform large-scale management.

It is argued that State control alone will enable a systematic exploration to be made of new coal fields. Private owners, he says, being concerned only with net profit, may be tempted to work only the best seams in a wasteful way. Private interest, he maintains, has led to coal being often sold to foreign countries below its price in the London market. Accidents could be diminished, he thinks, by spending more money on safety appliances than the smaller collieries can afford. Then there are the losses in by-products, national assets of the first importance, arising from beehive coking, and wasteful use of raw coal generally. Proceeding to financial considerations, Mr. WHETHAM claims that by buying up the coal mines, and merging them into one national trust, the State could make a profit of about £3,000,000 a year, after paying 5 per cent. interest upon the capitalised value, assessed at £142,000,000, calculated upon a pre-war valuation.

All these arguments we have met before on many occasions. Mr. WHETHAM has evidently relied to a considerable extent upon the case recently presented on behalf of the Fabian Society by Mr. SIDNEY WEBB and others, in *How to Pay for the War*,* a book which we criticised at considerable length a year ago. While it may be admitted that a plausible case has been made out in many respects, and one that will appeal to the layman with some force, yet the conclusion is involved in numberless fallacies and assumptions. We will be content to summarise these by pointing to the specious methods which were adopted in the Fabian pamphlet and which appear to have been accepted wholesale by Mr. WHETHAM. The fallacy underlying the whole argument is the unwarranted assumption that State control is the one and only cure for all the evils that are claimed to afflict the coal industry. This conclusion may have some theoretical basis, but it has already been tried in practice and has not achieved the anticipated result. Mr. WHETHAM confesses that

many branches of industry—indeed the majority will best be left to individual enterprise and initiative. We believe that one of these is the coal industry.

Notwithstanding a divergence of opinion upon this point, it may be admitted that Mr. WHETHAM has written a striking and original book, which cannot fail to inspire those who read it by its breadth of view and the lucidity of its main argument. It is undoubtedly a book for the critical period through which we are passing. A very large part of it will meet the cordial approval of every true patriot, and in these times none other is of any account.

Coal Economy.

THE Fuel Research Board has undertaken an investigation of a technical character with reference to gas works practice in its relation to coal economy. The particular points to which attention will be given are the most suitable composition and quality of gas and the minimum pressure at which it should be supplied. It is satisfactory to note that the Board of Trade and other Government departments concerned in this question have realised the importance of obtaining more accurate knowledge of the best method of using coal in the gas retort, with a view to the adequate recovery of by-products and the minimum consumption of fuel. It serves to remind us that notwithstanding all that has been urged of late with reference to the general question of fuel economy, we are still far from the discovery of the most effective means of arriving at the desired end. Dr. CHARLES CARPENTER, in his presidential address at the recent National Congress of the Society of Chemical Industry at Birmingham, complained that the nation's youth had been developed as unsuccessfully as its coal resources; and Mr. H. HIRST, chairman and managing director of the General Electric Company Limited, alluded a few days ago to the barbaric waste of coal that is going on at the present time. These indictments are doubtless perfectly true; but the same may be said of many other branches of national economy. The real truth is that the question of the utilisation of fuel has assumed a new importance since the war. Not only is this due to the increased demand for by-products, essential to the maintenance of our supplies of munitions of war, but also to the more extensive use of coal in our factories and iron works, coupled with the difficulties of maintaining the output from the mines, and of distributing it to the districts where it is most needed. While, however, the urgency of coal economy must be admitted, it is not so certain that we can fairly apply such terms as barbarous and unscientific to methods of mining and using coal which have grown up *pari passu* with the progress of scientific knowledge. If we consider the question in its broader aspect, having due regard to general commercial and economic conditions that have prevailed since the discovery of the application of steam as a motive power, we shall find that there has been a steady and continual improvement in our methods of using coal, and all the methods now advocated by our most drastic fuel reformers will come in due course to their fruition, without any of the evils accompanying a violent industrial revolution.

Mr. HIRST, at the general meeting of the General Electrical Company referred to above, had some interesting things to say upon the changes that will come into operation after the war. He foresees, probably with a large degree of accuracy, that many questions which have hitherto been regarded as more or less visionary, are suddenly appearing within the realm of immediate practical politics. Amongst these he foreshadows the absolute certainty that our industries must modernise their methods and rejuvenate themselves in regard to the economic production of power and heat. It is probable that conditions, such as labour, transport and rolling stock, will continue to operate upon coal distribution in this country long after the war. No one imagines that on the signing of peace all these troubles are going to vanish as if by a magician's wand. It will be well, therefore, to take the long view, and to regard the possibility, if not the probability, that coal and coal mining will pass permanently into the possession of a State industry. It is not, of course, necessary to assume that State control will continue exactly in its present form; but it is more than likely that the Government will endeavour by all means in its power to promote the more economic use of coal. Amongst the most probable innovations which

* *The War and the Nation*, by W. C. D. Whetham, F.R.S. London: John Murray, 1917; price 6s. net.

* See *Colliery Guardian*, Aug. 25, 1916, p. 359.

foresees is a rapid development of the industry. This will possibly be brought about by the erection of some twenty large generating stations throughout the kingdom, whereby, after the consumption of by-products from the coal, both electricity and gas will be generated on the spot and conveyed by cables and pipes to the towns and centres of industry. The importance of such a step is manifest. Mr. J. W. KESTLER, chief engineer to the Metropolitan Water Board, has stated recently that the consumption of coal for pumping water in the London area amounts to 200,000 tons per annum, exclusive of coke and oil fuel. By electric pumping from a power station in the coal fields the use of this coal would be obviated, and the expenses of transport to London would be avoided. This is but one instance out of many. Mr. HIRST thinks that power could be produced in this country, thanks to its natural resources, more cheaply than in any other part of the globe, not even excepting the areas where unlimited water power is available.

Reverting to the subject of the gas industry, a wide vista of reform is opened by these possibilities. But we must repeat the view expressed above that these changes can only be brought about gradually and tentatively. Economic revolutions are always slow as measured by human time standards, however rapid they may appear to be in the light of history. The rate of progress in fuel economy will, of course, be vastly accelerated by the new conditions brought about by the war, and to the Fuel Research Committee will belong a larger part of the responsibility for the selection of the best road to pursue.

With regard to domestic economy, we do not think that the pace can be forced in this direction. The question is one that will largely solve itself by natural evolution. Schemes of coal rationing, such as the Coal Controller has in view for the supply of the London area during the winter, are prompted not so much from the motives of preventing extravagance as for the purpose of maintaining supplies for small consumers. In the meantime the gas companies will certainly be benefited by the experience of last winter, which taught householders the advantage of not being absolutely dependent on coal for heating purposes.

Mine Managers' Examinations.—The following is the list of successful candidates at the examination held by the Board for Mining Examinations on May 22 and 23:—For a first-class certificate of competency as manager of a mine: Messrs. R. Adams, G. I. Adkins, I. F. Allan, C. S. Anderson, J. P. Andrew, A. Baillie, J. E. Barker, S. H. Berry, W. Brazenall, H. Brown, R. Bryan, A. Butler, P. C. Clayton, D. Coatesworth, W. Corbett, J. Crawford, D. R. Davies, A. B. Dawson, T. H. Emmerson, H. Fawcett, W. Fenn, H. N. Forbes, R. Gray, G. Griffiths, A. Grimes, D. Haldane, W. B. Hanson, J. W. Head, W. Heys, J. B. Hockaday, C. Hughes, J. Hunter, R. Johnstone, G. Jones, Thos. Jones, T. Jones, D. McD. Kerr, D. Lavin, junr., A. Lester, T. Lund, M. J. McCartan, W. McFarlane, H. McLiver, R. McNeill, R. C. Morgan, G. Mullin, A. Nelson, J. Nicholas, J. K. Park, J. Peacock, L. O. Richards, W. D. Robb, T. Seaman, R. W. Sommerville, D. McC. Stoddman, J. Stoker, A. M. Stones, A. V. Tabor, S. Thomson, G. Turner, A. B. Underwood, E. E. Weaver, K. McL. White, C. Whitfield, J. H. Wightman, G. Williams, and C. W. Winfield.—For a second-class certificate of competency as under-manager of a mine: Messrs. C. Allen, J. E. Anness, C. Ashert, W. S. Bamford, C. H. Banson, J. Barr, T. Barton, H. Bates, B. Batty, Jno. Bell, Jos. Bell, T. Bloor, W. H. Boden, T. J. Bowen, S. Bratley, J. T. O. Brodie, G. Brown, J. Brownlow, F. M. Burdett, J. Burns, W. G. Burt, J. W. Busby, M. Callaway, W. H. Charity, J. T. Chester, B. J. Clarke, H. S. Clarke, W. Clarke, D. Cook, S. Coupe, W. N. Craig, J. Davies, J. O. Davies, R. G. Davies, W. Davies, C. Davison, R. H. Drury, W. P. Dunn, W. Dunsmuir, H. Elce, G. Elmy, W. J. Evans, J. Findlay, J. W. Fisher, H. Franklin, W. Gillespie, J. Glidden, J. Graham, W. Graham, D. T. Gray, G. Grundy, F. J. Hall, W. C. Hall, G. Hancock, T. Howard, D. J. Howells, T. Hyde, N. Irving, W. Jackson, J. Jenkins (Pontypool), J. Johnson, D. J. Johns, H. Kaye, H. C. Kelly, S. H. Kitto, D. Livingstone, G. Lloyd, C. H. Lucas, J. McCrae, R. McGillivray, F. McGowan, R. Macqueen, A. D. Marriott, C. M. Meeson, J. Milgrew, J. Moore, W. M. Morris, F. Mottershead, T. Murray, J. W. Nicholls, J. S. Ormiston, J. Park, J. Parkes, H. Parr, W. Pitchford, R. J. Potthecary, F. Pyle, H. H. Rawlins, B. J. Raybould, W. Renshaw, T. W. Richards, G. Riley, W. A. Rogers, B. N. Rycroft, J. Sharrock, J. Skelton, J. Smith, R. Smith, T. Sneddon, A. E. Svar, S. R. Stewart, J. Sturatt, H. Sutton, T. E. Tate, D. B. Thomas, W. Thomas, F. Turner, R. Vines, R. Walsh, D. T. Walters, S. Weaver, F. Wharton, J. W. Whittaker, A. Whittingham, T. S. Whittington, D. Williams, Lewis Williams, Luther Williams, M. H. Wilson.

For a certificate of qualification: Messrs. W. I. Adam, A. Bedd, M. Benson, A. H. Booth, T. Davies, H. P. Hamilton, H. J. W. Kent, J. G. Lander, G. Macdonald, J. E. Menzies, E. T. Potter, L. Sampson, E. Scarlett, J. S. Snedden, J. Taggart, D. J. Preharne, C. L. Waddell, W. L. Atkinson, A. T. Williams, and A. Winfield.

THE COAL AND IRON TRADES.

THURSDAY, AUGUST 2.

Scotland.—Western District.

COAL.

Conditions in the Scotch coal trade are still dull and discouraging, and there is a lack of steadiness in the market. The miners have had an unusually long holiday, but with the easier demand accumulations are not large. In the west of Scotland industrial requirements are still comparatively heavy but household demands are fewer, while the export trade is at a low ebb. Prices remain at fixed levels. The shipments for the past week amounted to 74,162 tons, compared with 115,259 in the preceding week and 128,259 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	25/-28/
Ell	26/6-28/	26/6-28/	26/-30/
Splint	28/-30/	28/-30/	30/-40/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The Scotch ironworks are again in full swing, and the second half of the year promises to be as intensely active as the preceding months. Government demands are even more insistent, and the supplies available for the ordinary consumer are becoming less and less. In pig iron some brands are now very scarce, and especially No. 1 foundry, which is practically unobtainable. Hematite is in steady demand, while the request for forge qualities shows no falling off. Prices are firm and unchanged. Monkland and Carnbroe f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmenington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Manufactured iron producers are as busy as ever, almost entirely on Government account. Machine tools and general engineers have plenty of good business on hand, while work on hand at the shipyards makes good progress.

Scotland.—Eastern District.

COAL.

Reports from the Lothian collieries are still unsatisfactory. Local requirements are quickly met, and with exports off, idle time is prevalent. Shipments amounted to 17,805 tons, against 17,507 in the preceding week and 37,393 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	34/-36/
Secondary qualities.....	25/6	25/6	34/-35/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

No change is apparent in trade conditions in Fifeshire, and here also a lot of time is being lost, while prospects of an improvement are not bright. Shipments were 33,858 tons, against 24,320 in the preceding week and 49,268 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	45/-48/
Unscreened do.....	24/-25/	24/-25/	40/-42/
First-class steam coal.....	28/	28/	38/-40/
Third-class do.	24/	24/	30/-32/6
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 125,825 tons, compared with 157,086 in the preceding week and 215,510 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

There has been no abatement in the tonnage shortage during the past week, and collieries find it exceedingly difficult to maintain anything like regular working in the absence of transport facilities. Many pits, indeed, have been laid idle for quite a considerable period now, and others are working only spasmodically. Naturally, those collieries which are most dependent on the export trade have suffered most heavily; thus, the Northumberland pits have been harder hit than those in Durham county. The scarcity of vessels is, however, a matter which is affecting practically every coal producer in both counties. In some instances matters have been mitigated by a brisk demand for special gas sorts and smithies for home consumption. These qualities of coal, indeed, are not over-abundant at present, but all other descriptions of fuel are in excessive supply at the bare minimum figures, and the amount of business transactable under the circumstances is exceedingly limited. There is a marked dearth of forward business.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	47/6-50/
Do. Tynes (Bowers, &c.)	29/6	29/6	47/6
Secondary, Blyths	25/6	25/6	40/-45/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	40/-45/
Unscreened	23/6-25/	23/6-25/	32/6-40/
Small, Blyths	20/	20/	30/
Do. Tynes.....	18/6	18/6	27/6
Do. specials.....	20/6	20/6	30/-32/6
Other sorts:—			
Smithies.....	25/-30/	25/-30/	35/
Best gas coals (New Pelton or Holmside)	25/	25/	35/-36/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	33/-34/
Special gas coals	26/6-30/	26/6-30/	37/6-40/
Unscreened bunkers, Durhams	24/-25/	24/-25/	33/-36/
Do. do. Northumbrians	24/-25/	24/-25/	32/6-37/6
Coking coals	24/-25/	24/-25/	33/-34/
Do. smalls	24/-25/	24/-25/	33/
House coals	28/6-30/	28/6-30/	45/-50/
Coke, foundry	42/6	42/6	45/-47/6
Do. blast-furnace	42/6	42/6	40/-47/6
Do. gas	29/-30/	29/-30/	32/-34/

Sunderland.

COAL.

The acute shortage of tonnage is unabated, arrivals over the week-end being on a disappointing scale, and with many of the pits still severely handicapped in consequence there is no change for the better in general market conditions. Steams of all grades are offered freely at official minimum prices. Gas coals are moderately active, but supplies being large the trend is easy. Bunkers are very inactive. Coke prospects are a little better, the home demands being strong, but the export trade is slow. No news has yet been received regarding the Norwegian State Railways contract.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	37/6
Secondary do.	23/6-25/	23/6-25/	34/
House coals:—			
Best house coals	30/	30/	50/
Ordinary do.	28/	28/	37/6
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	45/
South Hetton do.	28/6-30/	28/6-30/	45/
Lambton unscreened ..	24/	24/	34/
South Hetton do.	24/	24/	34/
Do. treble nuts	20/	20/	35/6
Coking coals unscreened	25/	25/	33/
Do. smalls	25/	25/	32/
Smithies.....	25/	25/	33/6
Peas and nuts	24/6-26/	24/6-26/	37/6
Best bunkers.....	25/	25/	35/
Ordinary bunkers.....	24/	24/	32/6
Coke:—			
Foundry coke	42/6	42/6	47/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	30/	32/6-35/

Firm standard figures are quoted in the freight market for limitation ports, and neutral shippers are prepared to concede very high rates; business, however, is slow in all sections, and irregularity still prevails in the coasting branch, and only 15s. is now indicated for London.

Middlesbrough-on-Tees.

COAL.

There is a very quiet feeling in the coal trade. Colliery positions generally are far from satisfactory, though some slight improvements here and there are noticeable; and it is some gratification to hear of a little better outside enquiry, principally on Scandinavian account. Tonnage supplies continue very irregular, due chiefly to detention of vessels in ports of discharge. Coal values keep at the official minimum. Best gas coal is 25s.; second quality, 23s. 6d.; and Wear special, 26s. 6d. Bunker coal is inactive. Unscreened Durham is 24s. Household coal is only in moderate request. Coking coal continues to be fairly well taken up at rates recently quoted. No new feature is perceptible in the coke position. Demand is very good, and prices are well upheld, the more than ample supply having no apparent weakening influence on values. Descriptions needed for the local blastfurnaces continue to command fixed maximum rates, average kinds realising 28s. at the ovens, and low phosphorus qualities selling at 30s. 6d. at the ovens. The price of both beehive and patent oven coke remains at 42s. 6d., and gas house coke is still quoted 29s. to 30s.

IRON.

Cleveland pig iron is quite plentiful, and as was anticipated the August allocations are on a liberal scale, and have resulted in much briskness on home account. Applications from customers north of the Tweed are considerably heavier than those of a month ago, and north of England requirements are about an average. In addition Continental demand is large, and with rather more tonnage coming along, some expansion of foreign trade is looked for. Quotations are steady and firm. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. There is little new to report concerning the east coast hematite branch. Conditions continue stringent, but careful distribution assures adequate supplies to home users, and still leaves a little iron available for sale to our Allies. A few home sales are being made, but it is very difficult to put through new foreign business, and export quotations are almost nominal. Under running contracts, however, fairly good shipments are being despatched to certain ports. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France, and 142s. 6d. for export to Italy. In the finished iron and steel industries Government requirements and needs of the ship yards still monopolise production, so that little opportunity occurs for the transaction of ordinary commercial business. Manufacturers are working at high pressure and quotations are very strong.

Cumberland.**Maryport.****COAL.**

The coal trade throughout West Cumberland is brisker this week than it has been for some time. Nearly all local users are stocking for the holidays, and requirements on home account have therefore been very much bigger than usual; but apart from this there has been a marked improvement all round during the last week or two, and in all branches except landsale, the demand for all classes of fuel is very much stronger. The home market is firmer; new business is coming in more freely, and the pits are scarcely raising sufficient to supply the wants of all users. There is a very strong enquiry for works fuel for export and home use, and some of the pits are so pressed with orders on local account that they are at present unable to deal with any export or outside business. House coal is in rather better request, but no very great improvement may be expected in this branch before the end of the month. Gas and locomotive fuels are a very steady trade, and there is a strong and growing demand for slacks, smalls, and all varieties of fuels for industrial purposes. Requirements for the iron and steel and other works are again increasing, and nearly all local consumers are needing bigger supplies. Most of the collieries are very fully employed, but production is not as big as it was some months ago. The cross-channel trade is very healthy, and there is a heavy demand for all kinds of fuel for the Irish market. Owing to the increased pressure in the home market, supplies for shipment are not quite so plentiful this week. The shipments have amounted to 2,200 tons, compared with 4,315 tons last week, and 5,130 tons at the corresponding period of last year. The imports have included a good cargo of pit timber from Dumfries for the local collieries. The shipments for the month have been 13,715 tons, compared with 14,620 tons for June, and 20,010 tons this time last year. The coke industry is busier than ever. All the local ovens are in full blast, and the entire production is going to the ironworks in West Cumberland. Prices of all sorts are firm but unchanged. Best Cumberland coal at the pit is from 22s. 6d. to 23s. 4d. per ton, with best washed nuts at from 20s. 10d. to 21s. 3d. per ton. Best shipping coal is 19s. 6d. per ton f.o.b., and best works and gas fuel is quoted at 20s. per ton, delivered in the district. Best bunkers are from 25s. to 30s. per ton. Best house coal delivered in the Maryport district is from 27s. 6d. to 28s. 4d. per ton. Other current quotations are as follow:—

	Current prices.	L't week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " ...	22/6	22/6	22/6
Do. double-berned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise)	25/	25/	25/
Do. (for foreign-going steamers)	30/	30/	30/
Bunkers (mixed nuts and steam coal) (coastwise)	21/6	21/6	21/6
Do. (foreign)	25/	25/	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

The west coast hæmatite pig iron trade continues in a remarkably active condition, the only change since last week being an increased keenness in the demand. Intense activity prevails in all departments, and the call for both special and ordinary iron is unprecedented. The chief feature of interest lies in the efforts which are being made to increase production. Smelters are doing their utmost, and there are a number of furnaces ready for blowing in all over the district, but they cannot be lighted until both labour and raw materials are more plentiful. When these are forthcoming, smelters will soon be able to take a big stride forward. The iron in stock in the public storing yards in Cumberland still stands at 430 tons. Prices are still at the maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton, f.o.t., with warrants at cash at 115s. per ton. Special iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton, f.o.t. The market for ferro-manganese is very firm, but stocks are scarcer and little is being transacted. The number of furnaces in blast remains unchanged, and all the metal that can be smelted is going into home consumption. Local steelworks are taking the bulk of Bessemer iron, but a small proportion is also going outside of the district. The entire make of special and semi-special iron is being consigned to approved users in Scotland and the Midlands for Government work. The steel industry is phenomenally easy, and all the plants at Barrow and Workington are engaged at their fullest capacity. Billets are in firm demand, but other commercial sorts are quiet. Heavy rails are quoted at £10 17s. 6d. to £11 10s. per ton; light rails, £14 to £14 19s. per ton; ship plates, £11 10s. per ton; boiler plates, £12 10s. per ton; and billets, £12 per ton. Engineering is brisk, and most of the shops are fully employed on Government orders.

South-West Lancashire. COAL.

No change is noted in the demand for house coal for inland use, orders coming in faster than they can be met. All depots are as busy as the supply and cartage power will allow them to be. General bunkering and export continue, on the whole, quiet, shipments being naturally limited by the scarcity of available tonnage, but notwithstanding this, there is not much spare coal about. Prices are in accordance with the Controller's conditions. In some odd cases lower than schedule rates have been quoted, but this may have been partly due to misunderstanding, and doubtful points in the instructions are being generally cleared up. In slacks much the same condition of things

prevails. There is a little dislocation naturally with town after town taking annual holidays, but nothing of any moment, and the temporary tonnage at liberty is absorbed in other quarters.

Prices at pit (except where otherwise stated).

	Current prices.	L't week's prices.	Last year's prices.
House coal:—			
Best	21/-22/	21/-22/	21/-
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds.
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	24/-24/6
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds.

* As per official list.

South Lancashire and Cheshire.**COAL.**

The Manchester Coal Exchange was well attended on Tuesday. There is little or no change in the general state of affairs throughout the district; the demand for house coal is still in excess of the supply. Fuel for industries is fairly plentiful, doubtless owing to the less requirements through the holidays. Shipping coal is in steady call.

IRON.

There was a good attendance on 'Change on Tuesday last. The state of trade still remains the same in this district. All works are engaged on war material, prices and deliveries being controlled by the Ministry.

Prices at pit (except where otherwise stated).

	Current prices.	L't week's prices.	Last year's prices.
House coal:—			
Best	22/-23/	22/-23/	22/-23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/-18/6	18/-18/6	18/-18/6
Furnace coal	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

Yorkshire and Derbyshire.**Leeds.****COAL.**

Except for the interest shown in the coal distribution scheme, the market on Tuesday was almost featureless. The attendance was less than for many weeks past, being strongly suggestive of the holiday season, although the number present was probably also affected by the increased difficulty of doing business in view of the unsettled feeling that exists arising from the coal distribution scheme. The latter was fully discussed, especially in relation to an official intimation which has been received by some firms, to the effect that the new scheme, so far as the supply of Yorkshire coal to Cumberland and the Furness district of Lancashire—Area No. 2—would come into operation on Wednesday this week, August 1, instead of September 9, as was expected from the previous announcement. Some collieries hitherto supplying this area with house coal have been notified that the tonnage is to be diverted to London. While it is understood that coal from Northumberland and Durham is immediately available to replace the Yorkshire supplies cut off from the Cumberland area, senders from this district do not appear to be able to ascertain, so far as Durham coal is concerned, particulars as to price, qualities, sizes, etc., and in consequence some concern is felt on that score. With regard to Northumberland supplies a little more is known, and one instance was mentioned on the market in which West Yorkshire small steam fuel is being replaced with large coal at nearly 4s. per ton more price and over 4s. per ton higher railway rate. It is recognised however, that so comprehensive a scheme must not be judged on details but as a whole, and there is a disposition to suspend opinion until the scheme is more fully developed. The collieries have had another good week in regard to output, and the supply of wagons is plentiful, there being an almost complete absence of complaints of slow running on the railways. In regard to demand, the market shows little variation. The pressure for house coal for London and the south is still very keen and strong. As the autumn approaches the concern of the merchants with regard to their inadequate stocks at the depots increases. Fairly good supplies are going from West Yorkshire, but merchants have still many stocking orders to clear off before they can do much in the

Current pit prices.

	Current prices.	L't week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	20/-21/	20/-21/	20/-21/
Walsend & London best	19/-20/	19/-20/	19/-20/
Silkstone best	19/-20/	19/-20/	19/-20/
Do. house	17/-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	23/-24/	23/-24/	23/-24/
Silkstone best	22/-23/	22/-23/	22/-23/
Do. house	20/-21/	20/-21/	20/-21/
Other qualities	19/-20/	19/-20/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	16/-17/	16/-17/	16/-17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/	15/-16/	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	17/-18/	17/-18/	17/-18/
Large double-screened engine nuts	16/-17/	16/-17/	16/-17/
Small nuts	15/-16/	15/-16/	15/-16/
Rough unscreened engine coal	15/-16/	15/-16/	15/-16/
Best rough slacks	14/-15/	14/-15/	14/-15/
Small do.	12/-13/	12/-13/	12/-13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

way of ground stocking on their own a coastwise branch there is not much doing, tractors' own boats, other business being mentioned as the freight from Goole to London, merchants are getting fairly adequate supplies of coal except the best qualities, for which there is plenty of demand. More or less nominally pit prices for the West Riding continue on the following level:—Haigh Moor selected, 21s. to 22s.; Silkstone best, 20s. to 21s.; Silkstone house, 18s. to 19s.; other qualities, 17s. to 18s. The call for gas coal, mainly on contract account, fully absorbs the output, and there is practically none to offer on the open market. Some shipment to France is taking place, but the quantity represented is relatively small. The position in regard to manufacturing fuel, both for the present and as to the outlook for the future, is regarded as satisfactory. The consumption is very heavy, especially of nuts, which are exceedingly scarce, and the better quality slacks, but small steam slacks are relatively plentiful, a greater quantity being offered on the market than for some time past. But coking smalls are quite unprocureable, large coal having to be crushed to enable furnace coke makers to keep pace with the demand for coke. Pit prices in the foregoing list are all more or less nominal.

Barnsley.**COAL.**

Almost without exception there is no change in the condition of business, which continues very active on settled lines. Arrangements still go on apace to bring business within the scope of the new conditions, and with the production apportioned in various directions there is little need to trouble about orders from the outside. The scarcity of fuel is indeed particularly marked, and collieries in this area still continue to have to meet sudden and substantial demands for various grades of fuel. The tonnage sent to either the Humber or the Mersey is almost entirely on behalf of the Allied countries or for Admiralty needs, and in the latter case tonnage of a substantial amount is called for. The home requirements, particularly for steam coal, are also of a very extensive character, and there is practically no fuel to offer in the open market. Collieries find it difficult, though the output is well maintained, to give anything like an adequate supply of steam nuts for the use of the munition firms and other engineering concerns, and still a good tonnage of large sorts has to be utilised instead. There is rather more enquiry for all classes of small steam fuel, particularly nut slacks—the need for fair stocks has not been overlooked, of course. The position in regard to gas coal is much the same, occasional improvement being obtained where contract deliveries have not been up to the schedule. In districts where there is a substantial use of gas for cooking purposes anxiety is felt with regard to stocks, and efforts are made to remedy these shortages. Ordinary slacks are being more freely taken, though there is no difficulty in procuring something like adequate supplies. The needs of the by-product plants for coking slack are a serious problem. All efforts are unavailing to give an adequate tonnage, and supplies have still to be taken for distant areas, and on the whole these are insufficient. The demand for house coal on behalf of London and the south is of a very extensive character, and permits of little fuel being sent to nearer areas, whose needs to lay in stocks are becoming increasingly pressing. The demand for furnace coke is again more active, and can hardly be fully met. Values continue to be nominal about as follow:—

Prices at pit.

	Current prices.	L't week's prices.	Last year's prices.
House coals:—			
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	16/6-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.**COAL.**

Very little is doing in the prompt market, but there is no pressure to sell, so great is the call upon output for official and home industrial purposes. Large steam hards, of which there is usually a surplus available for export, are being absorbed to an increasing extent by the Admiralty and the railway companies; while all kinds of manufacturing fuels and gas and house coals are in keen demand by home buyers. Neutral business continues to be held up by the lack of steamers, but it is doubtful whether in any circumstances neutrals will be able to get much satisfaction of their requirements from the Humber area. The demand from France is as keen and as urgent as ever, and all kinds of shipping are being utilised in the endeavour to supply our Allies' needs. Some cargoes are also going to Italy. Quotations are nominally the scheduled minima for neutrals, and the usual fixed prices are charged to France.

Chesterfield.**COAL.**

There is an all-round pressure for coal of every class, and considerable difficulty is experienced in obtaining adequate supplies. Consumers in the various areas are becoming increasingly anxious with regard to the probable effect of the new regulations as to distribution of coal. House coal continues in active demand and the call for this fuel will become more persistent as the year advances. Every quality of manufacturing coal is very urgently needed and munition works are clamouring for increased deliveries. Gas companies continue to press for supplies of gas coal. While the pressure for locomotive coal is not so great as it has been, railway companies are endeavouring to avail themselves of every ton of steam coal being offered. There is no change to report in regard to export trade, which remains in a very quiet state generally, and practically extinct so far as the export of Derbyshire coal is concerned. The coke market maintains a satisfactory position, the demand for all qualities being more than sufficient to absorb the entire production of the ovens.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Nuts	17/-	17/-	17/-
Slack	16/6	16/6	16/6
Nuts	16/-	16/-	16/-
Slack	15/-	15/-	15/-
Slack	12/6	12/6	12/6

IRON.

The demand for every class of iron continues on an extensive scale and the whole of the plant of the district is taxed to the utmost to meet customers' requirements.

Nottingham.

COAL.

There has been a somewhat heavier demand on local merchants during the past week in consequence of numerous orders from small householders who were anxious to get in supplies prior to Bank holiday. The position as regards the collieries shows little change, the pressure for deliveries of all qualities of households being maintained. Naturally the new coal distribution scheme is causing some inconvenience with reference to the arranging of a number of contracts, but when the collieries get accustomed to its operations, it is hoped it will contribute to a better distribution of supplies. Values display an all-round firmness. Steam coal continues in strong demand. The output of nuts and cobbles does not fully satisfy the demand, and as a consequence there is an increasing enquiry for larger sorts, a considerable tonnage of which is being taken by the railway companies. There is a slightly easier tone in the slack market just now, as the requirements of the textile trades are not heavy, but a good trade is being done in best and medium grades.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/-	17/-18/-	16/-16/6
Best hard coals.....	16/9-17/6	16/9-17/6	17/-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/-	12/-13/-	12/-13/-
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/-	11/-	11/-

Leicestershire.
COAL.

The pressure for deliveries is intensely keen, and there are large numbers of special orders coming to hand to meet exceptional circumstances. Many merchants in excluded areas are anxious to secure as much coal as possible before the closure is applied, in order that the dislocation of the sudden change may be modified to some extent. An enormous amount of extra clerical work is being thrown on the administrative staffs, and there are no signs of any relief in this direction in the near future. Large public works and institutions are becoming quite insistent in their demands for increased deliveries during August in order that resources may be accumulated against emergencies, but it will be difficult to meet these claims, the aggregate demand being much in excess of the output. Country coal merchants, as a rule, are getting fuller deliveries of any coal that becomes available, but this causes complaints that the coal is more difficult to handle when there is a very marked preference for the best. The bulk of the deliveries to country stations are very quickly absorbed, and stocks increase very slowly. There is a very active demand for all classes of household for London and district, and the preferential deliveries are well maintained. Both main and deep cobbles and nuts sell in large quantities, while bakers' nuts are a large turnover. Small nuts for mechanical stokers are a very sound business. It has been arranged that the pits will make holiday on August 6, 7 and 8, and it is hoped a prompt restart will be made on Thursday, the 9th. There are no stocks of any kind at the collieries. Prices at pit:—

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/-	16/6-18/-	16/6-18/-
Second, hand picked	15/6-16/6	15/6-16/6	15/6-16/6
Deep screened cobbles ...	16/-17/-	16/-17/-	16/6-17/-
Deep large nuts	16/-16/6	16/-16/6	16/-16/6
Bakers' nuts	15/-15/6	15/-15/6	15/-15/6
Small nuts	14/6-15/-	14/6-15/-	14/6-15/-
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/-	6/-7/-	6/-7/-
Main nuts for London:			
kitcheners	13/6-14/-	13/6-14/-	13/-13/6
Stearns, best hand picked	14/-14/6	14/-14/6	14/-14/6
Stearns, seconds	13/-13/6	13/-13/6	13/-13/6
Main cobbles for kitcheners	13/6-14/-	13/6-14/-	13/6-14/-
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire
and Warwickshire.

COAL.

The market for manufacturing fuels is as strong as ever. The chief demands on the collieries are for fuels to keep up supplies on munition works, and with the limited supplies

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/-	22/-	22/-
Do. seconds deep	20/-	20/-	20/-
Do. best shallow	19/-	19/-	19/-
Do. seconds do.	18/-	18/-	18/-
Best hard	18/6	18/6	18/6
Forge coal	16/-	16/-	16/-
Slack ...	11/6	11/6	11/6
		19/-	19/-
		18/-	18/-
		20/-	20/-
		16/-	16/-
	14/6	14/6	14/6

available there is little opportunity to increase reserve stocks, despite the fact that the pits are working regularly. Double-screened nuts are increasingly difficult to obtain; the rougher qualities of slacks are scarce, the smaller sorts being a little more abundant. Although the weather has been oppressively warm there is no diminution in the call for domestic fuel, and it is obvious there are still considerable quantities to deliver for winter stocks. The quantity on the open market is negligible. Prices are steadily held. The pits will be closed for three or four days next week.

IRON.

In view of the holiday next week, buying and selling has quietened down. At many works a fairly long stoppage is requisite by reason of the repairs that are necessary to machinery and furnaces. Conditions do not allow of much change in prices, but in branches outside official control there have been one or two alterations within the last few days. Mattress wire, for instance, has been advanced by £4 a ton, following one of £5 which was made in May last. The basis price is now £56 a ton. The material is in heavy demand for hospital beds. Then copper sheets, which have remained at £165 a ton for several months, have dropped by £5 a ton. The Government Departments have been the chief customers for this material for a long time, and it is understood they have now secured fairly good stocks. In other respects the situation has undergone no change or modification. Activity is maintained at a high rate, in view of unabated pressure of Government work, and merchant business is perforce neglected. The Wages Board return for May and June shows that the efforts that are being put forth to increase production are meeting with some success. The output of the 17 selected firms for the two months is up by fully 1,500 tons, the increase being mainly in bar iron, for which there is an insistent demand. The net selling price of bars has risen by 1s. 2d. a ton to £14 17s., and the average for all classes of iron by about 1s. a ton. It now stands at £15 6s., and, for the first time since April 1915, there is no advance in iron workers' wages. The restricted resources of the puddled iron industry are keenly felt, and prices are high, ranging from £12 5s. to £12 10s. There is no pig iron to be bought under the full maximum prices. Enquiry is heavy for all grades, and the resources of the furnaces are severely taxed. The rate of production of steel is satisfactory, although the mills are working under a great strain to cover essential needs. The material is wanted as soon as made, and there is practically none for private trade, with the exception of some shell discards. Even these are in moderate supply.

Forest of Dean.

COAL.

There is little or no change from the urgency which has characterised the demand for house coal during the past few months, and the collieries and merchants alike are unable to keep pace with the calls upon their resources. The enquiry from the inland merchants is still exceedingly keen, whilst the shipping business is as busy as possible. The pits are all engaged full time, and there are no stocks of any quality. The scarcity of supplies of steam and manufacturing fuel continues, and the enquiry generally is by no means adequately met.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/-	24/-	21/6
Forest	23/-	23/-	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/-
Rough slack	13/6	13/6	13/-
Steam coal:—			
Large	20/-21/-	20/-21/-	18/-19/-
Small	16/-17/-	17/-	16/-17/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE IRISH COAL TRADE.

THURSDAY, AUGUST 2.

Dublin.

Business proceeds upon much the same lines with regard to stocking for winter, but the actual amount of house coal being consumed is only very small. A notable feature has been the number of steamers discharging coal direct into railway wagons for country and commercial delivery during the past week or two, an indication that the inland trade is in a healthy condition. The restrictions as to the supply of many qualities of English coal still remain in force, but Scotch coal is plentiful, although steamers are scarce, and freights up to 12s. and 12s. 6d. per ton. This week's prices are as follow:—Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount. Irish coals at Castlecomer Collieries, co. Kilkenny, are:—Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d.—all at the pithead. Coal from the Wolfhill Collieries, Queen's County, are:—Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.b. Athy, on the Great Southern and Western line, which is now being connected with the mines by a link line.

Belfast.

Business in house coal continues to be about the normal, and the demand for Scotch coal for the inland trade is still good. Fairly good supplies of Scotch steam coal are now coming into the port. Prices of house coals stand as follow:—Best Arley, 43s. 6d. per ton; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Scotch, 39s. 6d.; Orrell slack, 39s. 6d.; gas coke, from about 40s. to 48s. per ton. Irish coal at Portrush, co. Antrim, 14s. per ton at Craigahulliar pits.

Liverpool.

The maximum price for coke tin-plates has been fixed at 30s. basis net f.o.t. at works, and for terne-plates 28s. basis, as and from July 19 last, but details as to extras and allowances have not yet been published. In the meantime, business is almost at a standstill, buyers and sellers alike not caring to commit themselves until they know exactly where they are. Stock holders are allowed until the end of August to dispose of their stocks of sizes which were released for unrestricted sale under Order April 16, 1917, after when this concession will be withdrawn.

THE WELSH COAL AND IRON TRADES.

THURSDAY, AUGUST 2.

North Wales.

Wrexham.

COAL.

There has been little change in the general state of the coal trade of this area during the past week, and the demand generally for all classes of fuel has been good. Some little difficulty is still experienced in regard to delay to wagons, but not to such an extent as to prevent full time being worked at all pits, and when the new scheme comes into operation next month things should be very much improved in regard to wagon delay. House coal has a steady sale, and it is anticipated that the month of August will be a busy one in the merchants' trade. Those who have hitherto dealt locally are fixing up contracts for the winter, and enquiries are coming freely to hand from those who have previously obtained supplies from other areas. Gas coal is pretty well in the same position as house coal. Gas companies are pressing for deliveries, and the whole output is quickly disposed of, both large coals and nuts, though the latter are somewhat scarce in these days. A large number of contracts within the area have now been renewed for another year on similar terms to the last contract, and it will not be a difficult matter to dispose of the tonnage which in former years has gone into other districts. Gas coke is still easily disposed of, and no stocks are held. There is no falling off in the demand for steam coal, this business being divided between railway contracts, Government controlled works, and shipping at Birkenhead and Liverpool. Slack continues to be fairly plentiful, but apparently it is not necessary to take any into stock. Prices remain unaltered. The prices which have ruled for house coal for some months past are the figures on which present commitments are made—viz., 21s. to 23s. per ton at pit for the best quality, 20s. to 22s. per ton for seconds, the retail prices being 27s. 6d. to 30s. per ton for best, and 25s. to 27s. 6d. per ton for second grade. The following is a full list of quotations of the past week:—

Prices at pit f.o.r.:	Current prices.	L'st week's prices.	Last year's prices.
Best house coal	21/-23/-	21/-23/-	—
Secondary do.	20/-22/-	20/-22/-	—
Steam coal.....	19/-22/-	20/-22/-	—
Gas coal	19/-21/-	19/-21/-	—
Bunkers	19/-22/-	20/-22/-	—
Nuts	18/-20/-	18/-20/-	—
Slack	12/-14/6	12/-14/-	—
Gas coke (at works).....	21/8-25/-	21/8-25/-	—
Prices landsale:—			
Best house coal	27/6-30/-	27/6-30/-	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

The market has been very dull and cheerless for the past week. There has been a fair arrival of tonnage, but sales have been considerably affected by the unfortunate stoppages of the mines of the Tredegar and the Ebbw Vale companies, which have greatly reduced the amount of coal going to the ports for shipment. There was, however, a great deal of coal in stock, and prices were therefore not much affected. There has been practically no change in any of the quotations for the week. Prospects of improvement are not great over the holiday period.

Prices f.o.b. cash 30 days.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Black Vein large...	30/-	30/-	37/-39/-
Western-valleys, ordin'y	29/-	29/-	37/-38/-
Best Eastern-valleys ...	29/-	29/-	35/-36/-
Secondary do.	28/-	28/-	30/-32/-
Best small coals	21/6	21/6	25/-26/-
Secondary do.	20/-	20/-	23/-24/-
Inferior do.	18/-	18/-	19/-20/-
Screenings	23/-	23/-	25/-26/-
Through coals	27/-	27/-	24/-26/-
Best washed nuts.....	30/-	30/-	28/-30/-
Other sorts:—			
Best house coal, at pit...	33/-	33/-	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/-
Patent fuel	32/6	32/6	47/6-50/-
Furnace coke.....	47/6	47/6	51/-52/6
Foundry coke	47/6	47/6	61/-62/-

IRON.

There is no noticeable change in the state of the iron and steel markets in this district. A very large output is still maintained on Government account. The tinplate trade continues to show increased activity.

Cardiff.

COAL.

For many weeks in succession there is little change to report, and the market continues stagnant. Arrivals of tonnage have been rather better, but, after the requirements of the Admiralty and the Allied Governments have been satisfied, there is little margin for ordinary purposes, with the result that business generally is almost at a standstill. Chartering last week, outside Government transactions, only amounted to 9,700 tons, a fixture that could have been completed by the smallest broker in half-a-day. So serious has the position now become that many firms have decided to practically close down. Owing to the drain of the military authorities staffs were at one time depleted to almost vanishing point, and the places of the men who had enlisted were filled by female clerks. The complaint now is that there is nothing to do even for this substituted labour, and in a number of instances principals make the statement that they could do their business with the aid of one clerk. This may be an exaggeration, but it indicates the position, and discloses the fact that there is practically nothing to do. With the exception of best Admiralties and superior seconds, which are reserved, coals of all grades are plentiful, and were it not for the fact that minimum rates had been fixed, quotations at the present moment would be at an exceedingly low level. As it is, there is not sufficient tonnage to dispose of the outputs, and stocks are accumulating in all directions. Some relief may be afforded by the holidays next week. The Coal Controller suggested that the men should take two days, but the miners decided to have a three days

stoppage. The owners took a complaisant attitude, and in view of the existing tonnage position conceded the three days. This will mean a diminution on the strain of organisation, as stocks will be absorbed, and there will be a probability of more regular working after the holiday week is over. Wagons will be liberated, pitwood supplies will come forward more quickly, and the general tendency will be to ease the tension which has prevailed for some weeks past. Reference was made some time ago to the scheme for pooling wagons. The idea was all right in principle, but in practice it has proved a failure, and a costly one too, in the case of certain collieries. Some of the better known concerns own a sufficient number of wagons to do all their business and cope with any emergency, but under the directions of the Transport Controller wagons have been diverted to such an extent that several collieries were unable to obtain possession of their own rolling stock, and had to work short time in consequence. There is a greater demand for rolling stock than ever, and yet the wagon builders, who are ready and willing to meet the requirements of the trade, complain that they cannot obtain the materials owing to the Government restrictions. There seems to be a lack of co-ordination and an absence of knowledge of the real conditions of the coal field. Such matters as these give rise to discontent not only among employers but also among the men, and there is a growing want of confidence in the controlling authorities. It is well that these questions should be ventilated, because it is possible that someone may be able to prescribe a remedy. At present the market seems to be completely disorganised. The classification scheme has still to see the light of day, and in many instances business is being done in the dark—"subject to revision when we know where we are." This position applies to all transactions outside contract work, and there is no indication at present of any improvement. Patent fuel is 30s. to 32s. 6d. nominal, and pitwood is rather firmer at 60s. to 62s. 6d. per ton. With regard to the latter, it is stated that July allotments were supplied in full, and prospects for August are on the same basis. The official returns of the Customs authorities show that during the month of June the coastwise shipments from the Bristol Channel amounted to 107,657 tons, against 117,915 tons in the corresponding month of 1916. Bunker shipments were 8,495 tons, compared with 10,062 tons in June 1916. Of the cargo shipments, Cardiff despatched 27,702 tons, Gloucester 25,426 tons, Newport 31,702 tons, Swansea 12,577 tons, and Briton Ferry 6,985 tons.

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	35/-37/
Ordinary	30/	30/	33/-35/
Best bunker smalls	23/	23/	27/-28/
Best ordinaries	21/6	21/6	25/-27/
Cargo qualities	20/	20/	21/-22/
Inferior smalls	18/	18/	19/-21/
Best dry coals	30/	30/	35/-37/
Ordinary dries	28/6	28/6	32/-34/
Best washed nuts	30/	30/	33/-35/
Seconds	28/6	28/6	31/-33/
Best washed peas	27/6	27/6	30/-32/
Seconds	26/6	26/6	28/-30/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	37/-39/
Western-valleys	29/	29/	36/-37/
Eastern-valleys	29/	29/	34/-35/
Inferior do.	28/	28/	32/-34/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	35/-38/
Through-and-through	—	—	29/-30/
Small	26/	26/	32/-33/
No. 2 Rhondda—			
Large	27/	27/	30/-32/
Through-and-through	25/	25/	26/-28/
Small	20/	20/	23/-24/
Best patent fuel	32/6	30/	50/-52/6
Seconds	30/	—	48/-50/
Special foundry coke	47/6	47/6	62/6-65/
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	50/-52/6
Pitwood (ex-ship)	60/-62/6	60/-62/6	49/-51/

* Nominal.

IRON.

The difficulty of obtaining supplies is seriously handicapping the tin-plate trade. There are many enquiries on the market which cannot be entertained, and it is reported that even American manufacturers have been obliged to turn away orders. Naturally, preference is given to the requirements of the Allied countries, and the neutrals have to take what is left. This is proving disastrous to Norway, from whence we obtain a large proportion of our food supplies. The scarcity of tin-plates for the canning industry in this country is at present so great that there is a danger of many concerns being closed down. Welsh makers would be only too pleased to supply if they had the material, but unless they can obtain the steel bars they are unable to produce the plates. At present, the demand for bars for munition purposes is so great that a very small surplus is left over for tin-plate works, and production is low in consequence. Receipts from works last week only totalled 17,036 boxes, whilst shipments amounted to 31,303 boxes, leaving 80,105 boxes in stock in the docks warehouses and vans, compared with 94,372 boxes the preceding week, and 115,597 boxes at the same date last year. This is the lowest record. Another disturbing factor has been the fixing of prices. For certificate work a week ago 36s. to 37s. was being paid for standard sizes, and for free parcels consumers were offering 42s. to 43s. per box. As and from the 19th the price has been fixed at 30s. per box, both for Government contract and "free" orders. As in previous years, all the tin-plate mills will close down during the whole of next week. It is stated, however, that the allocation of bars will proceed as usual, so that there should be a prospect of more regular working when operations are resumed at the end of the holiday. In the galvanised sheet trade there is no alteration. All prices are nominal, both with regard to bars, pig iron and corrugated sheets. Imports of iron ore continue satisfactory. Prices of scrap metals are unaltered.

Swansea.

COAL.

A somewhat firmer tone was in evidence on the anthracite coal market to-day. Best qualities of all descriptions were more active and difficult to obtain. There was also a slightly better demand for other qualities. Steam and bunker coals remained steady. Prices were on schedule terms.

Llanelli.

COAL.

There is very little change to report as to the state of the local market. Anthracite large kinds are unchanged, with not many orders offering. Stocks of these qualities are also heavy, and the holding up of wagons is interfering with work at the collieries. Machine-made qualities are, however, brisk, and buyers experiencing difficulty in covering their requirements. There is a good inland demand for these kinds, but orders are only being booked for delivery several weeks ahead. Culm is fairly active, but duff is in poor demand, and stocks on hand tend to be heavy. In steam coals the market is inclined to be irregular owing to lack of tonnage, and supplies of practically all qualities are obtainable for prompt loading. House coals are in strong demand, and manufacturing fuels are firm, with local works taking practically all available supplies.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	30/-32/
Seconds	29/	29/	27/-29/
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	25/6-27/6
Machine-made cobbles	42/6	42/6	38/-39/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles	36/	36/	—
Machine-made nuts	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-32/6
Seconds	34/	34/	—
Thirds	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubby culm	13/	13/	13/-13/6
Red Vein culm	11/	11/	—
Breakers duff	10/	10/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	34/6-36/6
Seconds	27/	27/	—
Bunkers through	25/	25/	30/-32/6
Smalls	19/	19/	20/-22/
Bituminous:—			
Bituminous through ..	27/	27/	—
Smalls	24/	24/	—
Coke-oven coke	47/6	47/6	27/6-29/6

THE LONDON COAL TRADE.

THURSDAY, AUGUST 2.

The London coal market is still feeling the shortness of supply, but as a whole there is a better arrival of loaded coal wagons at the depots. The difficulty is that the free coal offering on the open market is so exceedingly limited that ordinary merchants are confined almost exclusively to the reduced quantities fixed under the monthly contract arrangements, and are, therefore, compelled to put aside many tempting orders, both from the general public and from the smaller traders, for the simple reason that they have not the coal available. The filling up of the large cellars all over London is proceeding satisfactorily, and in many of the large institutions most unusual storage accommodation has been found, and in that way exceptional devices have been adopted to meet if possible the pressure for coal during the coming winter months. The difficulty is that so many of the London houses have very limited accommodation for coal supplies, and of recent years a large number of the suburban residences have been turned into flats, and the coal accommodation is very often limited to about half a ton, so that a weekly round of the coal van is an absolute necessity. It is not, however, this feature which is causing the coal merchants so much anxiety as the great question of dealing with the mass of industrial dwellings and small households in and around the Metropolis, who are either unable or unwilling to provide for more than a weekly amount; and it was principally in these poorer neighbourhoods where the keen suffering was caused last winter owing to the shortage of fuel. In addition, however, to the ready acquiescence of the general public to fall in with the Controller's suggestion, and to get their cellars well filled during the summer months, there is also a strong desire on the part of the borough councils to anticipate the extra pressure, and to be prepared in some way or other to meet the needs of the poorer people. The Borough of Paddington is reported to be arranging for the storage of 1,000 tons of coal, to be retailed to small consumers; and many other boroughs are equally intent upon getting in a good supply. Several of the London borough councils find a difficulty in arranging for the necessary accommodation, and in some cases we hear the Coal Controller's scheme for the poor is considered unworkable. At the present moment, the main effort of the coal merchants appears to be devoted towards laying in a stock of coal on their own ground adjoining the railway sidings, but until all the orders are executed from the general public, and cellars are well provided, there seems little prospect of stacking much coal on the ground. As a whole, however, London is far better supplied for the winter months than has been known for many years past, and although the demand is still strong, merchants are daily endeavouring to cope with the extra orders on hand, and it is certain that the filling up of the cellars, etc., began at a much earlier period this year than heretofore. The diminished output at the collieries remains an important factor, but there is a buoyant feeling in the trade that the efforts of the Coal Controller will bring into the district a larger tonnage from some of the colliery centres than formerly, and especially now the shipping trade is moderate, and vessels are scarce. Hard steam coals for the various factories along the Thames side are very difficult to obtain. Slacks are more abundant. Gas and railway companies are buying freely. On Monday 35 arrivals were entered in the seaboard market, and two on Wednesday, but all were contract cargoes. Freights are slightly

lower, and from the Humber port 17s. was recorded, and from the Tyne 16s. 6d. was firmly held a few weeks ago. Fuel is in good demand. The heavy rains of the 1st and 2nd inst. have checked the delivery trade, but a steady and not a growing quantity has been moved from the various wharves and depots. All household fuels, both by sea and rail, are quickly absorbed. Special meetings have been held by the London traders during the week to cope, if possible, with the present emergency; and the fears arising from the withdrawal of so many coal wagons and locomotives to the seat of the war has not yet been seriously felt. As a rule, collieries work short time during the summer months, but the vast numbers of orders on hand have enabled every colliery to work full time, and for the most part at high pressure. No change is reported in any of the prices either in the wholesale or retail market, but very little coal is at present on the ground at the depots. The Metropolitan Water Board report having purchased coal to the extent of £19,000. A considerable quantity of Kent coals was reported to be shipped to France during the present week.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, JULY 27. Seaborne house coal was again in good demand. A stray cargo was on offer late last day, and really found a buyer (*sub rosa*), but nothing on offer to-day. Cargoes, 31.

MONDAY, JULY 30.—There was again demand for seaborne house coal at to-day's market, but no sales reported. Cargoes, 35.

WEDNESDAY, AUGUST 1.—There was no alteration in the seaborne house coal market to-day, which remained firm, but no cargoes on offer. Cargoes, 2.

SOUTH WALES MINING TIMBER TRADE.

Accentuation of Difficulties.

The quantity of foreign mining timber allowed to be imported into South Wales and Monmouthshire during the current month falls by another 10,000 tons, being:—

To agents for Admiralty collieries ...	37,500
To other importers	22,500
Total allowed	60,000

This quantity is exactly 20,000 tons below the total allowed during June. In other words the deliveries of home grown pitwood to collieries in August must be 20,000 tons greater than they were in June. This quantity represents the felling of a vast tract of woodland area which cannot be replenished for at least 30 years. It should not be forgotten that there is a limit to the wood resources of this country, and that that limit is a matter, not of years but of a few months at the present rapid rate of exploitation. Furthermore, there is a process of selection which for mining timber still limits the available quantity of timber in sight for mining purposes. At the present time home grown mining timber, delivered, is actually dearer than foreign supply upon which a freight rate of 20s. to 22s. plus the cost of discharging is paid. The question for the Controller of Timber Supplies is whether it will not be more economical during the next two months to increase the quantities allowed from abroad rather than seek by a *tour de force* and economic loss to lean more and more heavily upon home supplies. For with heavy inland transport charges, the gradual denudation of supplies adjacent to collieries, the increasing demand, the decreasing available standing supply, and the scarcity of labour and of haulage facilities, the difficulty of collieries is likely to become extremely pronounced in September and October. In the opinion of pitwood merchants, whose ownership of forests in this country and in Ireland precludes them from bias, the Controller will have to amend his scheme before the end of October is reached; otherwise South Wales collieries will experience a serious shortage of mining timber unless a cheaper substitute for wood is found. At the present time it must be remembered that the wood imported from France is carried in small steamers, which look upon the freight as a ballast cargo, inasmuch as such vessels carry Welsh coal back to the near French and Bay ports. There is not sufficient ore from France to substitute for a wood cargo, and the further cutting down of imports will inevitably lead to ballast voyages homeward, and therefore a waste of tonnage.

Imports Last Week.

For the week ending July 27 the imports of foreign mining timber amounted to 18,897 loads. The whole was imported from the French ports, no supplies being received from Portugal. Of this quantity the agents for the Admiralty collieries received the lion's share, viz., 11,760 loads, leaving 7,137 loads for other importers. The actual quantities received were as follow:—

Cardiff (Barry and Penarth):—

Date.	To—	Loads.
July 23	Lysberg Limited (4 cargoes)...	6,600
" 24	A. Bromage	540
" 24	Pymon Watson and Co.	300
" 24	Lysberg Limited	1,920
" 24	Morgan and Cadogan	120
" 25	Budd and Company	852
" 25	Lysberg Limited	2,640
" 25	Morgan and Cadogan	144
" 26	Lysberg Limited	600
" 27	Budd and Company	156
" 27	Vyryan and Kelly	114
" 27	Morgan and Cadogan	360
" 27	Marcesche and Company	48
Total		14,424

Newport:—

July 25	E. Marcesche	530
" 25	F. R. Howe	2,880
Total		3,410

Swansea:—

July 23-27	1,063
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There were no imports at Port Talbot.

Wagon difficulty was again extremely acute in South Wales, and faced with heavy demurrage importers in a few cases offered supplies cheaply in order to secure quick release of vessels. Quotations for larch fir therefore ruled round about 60s. to 62s. 6d. per ton at Cardiff or Newport.

Home-Grown Supplies.

There was a good demand for supplies of home grown timber, and selected larch commanded figures which were actually much higher than those ruling for foreign timber.

difficult to give a reliable range of prices. The very wide, for whilst 58s. ruled in places, 72s. paid in others. Imports of Irish pitwood were

Pitwood Importers' Association.

The Bristol and Bristol Channel Pitwood Importers' Association receive a general licence each month from the Controller allowing a certain quantity of pitwood to be imported and of this total five-eighths is reserved for the agents supplying those collieries which are on the Admiralty list. There are, however, a few colliery companies which prefer to import direct rather than through the medium of the Admiralty agents; and their import quantities are deducted from the amount allowed to the Pitwood Importers' Association. As the quantity allowed is decreasing each month, the imports by the colliery firms adversely affect all the qualified pitwood importers whose allotments are reduced accordingly. This question is now under consideration, and it is hoped that a mutual agreement will be arrived at.

Bordeaux Wood Merchants.

Complaints have been rife against Bordeaux pitwood merchants who, it is alleged, are endeavouring to secure the c.i.f. value, or Cardiff spot market value, for their wood by placing the sale through Welsh agents. Although it is perfectly permissible to secure the best price possible, a line must be drawn somewhere; and such interference with pitwood merchants' businesses here is objected to. Pitwood merchants in South Wales are following out the spirit and letter of the Controller's instructions. Wood sent over from France indiscriminately is a breach of the scheme and adversely affects other merchants who are doing their best to sell at a moderate profit. Merchants on the other side, however, know that when a speculative cargo is sent, such cargo will not be held up, because the Shipping Controller will naturally demand that the vessel should be released as quickly as possible. The cargo is then discharged and finds its way to the consumers, though the importation has been in breach of the regulations.

MINERS' FEDERATION CONFERENCE.

The annual conference of the Miners' Federation concluded its session at Glasgow on Friday of last week.

Workmen's Compensation Act.

A resolution was carried for the amendment of the Workmen's Compensation Act, so as to secure payment of compensation from the day of accident, and in cases of non-fatal accidents a weekly payment of not less than 50 per cent. of the average earnings, with a minimum of 20s. a week.

On the motion of Mr. LEA (Derbyshire), it was resolved that, in cases of partial disablement, the employer should either be bound to find employment for the disabled workman, or pay not less than three-quarters of the previous average weekly earnings as compensation; though Mr. J. WINSTONE considered that the proposal did not go far enough, but should make provision for future prospective earnings.

Mr. SPENCER (Nottingham) moved that the compensation in cases of fatal accidents should be equal to three years' wages, with a minimum payment of £200.

Mr. JAMES WINSTONE moved that the minimum rate of compensation for the war period should be increased to 30s. per week. He was pleased to hear that the Government were taking some action, but the miners would not be content with less than 50 per cent. increase.

Both resolutions were carried.

On the motion of Mr. J. BAKER (Midland Federation), it was resolved that contracting out schemes should be made illegal.

Mines Regulation Act Amendments.

Resolutions for amending the Mines Regulation Act were adopted, to the effect that the persons appointed under section 16 to make inspections of the mine should be empowered when necessary to institute proceedings against the owner or manager for infringements of the Act; and that more inspectors should be appointed from working miners, and that firemen, examiners, and deputies should be appointed by the workmen and paid by the State.

Officials and Executive.

The voting for officials and executive resulted in the election of the following:—President, Mr. Robert Smillie; vice-president, Mr. Herbert Smith (president of the Yorkshire Miners' Association); secretary, Right Hon. Thomas Ashton; treasurer, Right Hon. W. Abraham, M.P.; executive, Messrs. S. Roebuck, J. Hoskin, H. Twist, S. Edwards, F. Hall, W. Carter, H. Dack, F. Swift, Jno. Robertson, Jas. Robertson, G. Barker, J. Winstone, V. Hartshorn, J. Batey, W. P. Richardson, and W. Straker.

THE BY-PRODUCTS TRADE.

Tar Products.—London and provincial markets remain quiet, but some items are in better request, and the tendency of quotations is slightly upward. The demand for pitch for next season is well maintained, and it is understood that London shippers have enquiries which would enable them to pay about 42s. per ton f.o.b. Crude tar is firmer, and producers are pressing for an increase for new contracts, but creosote is practically off the market, and prices are uncertain. Naphthalenes are in good request. Average closing values for gas works products are:—Coal tar, 20s. to 24s. 6d. Pitch, cast cost, 17s. to 18s. per ton; ditto, west coast, Manchester, 16s. 6d. to 17s. 6d.; ditto, Liverpool, 16s. 6d. to 17s. 6d.; ditto, Clyde, 17s. to 18s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., 3d. to 1s. 4d. Toluol, naked, 3d. to 1s. 4d. Crude naphtha, in bulk, north, 1s. 8d. to 1s. 10d.; naphtha, naked, north, 1s. 8d. to 1s. 10d. Heavy oil, 1s. 2d. to 1s. 3d. Carbolic acid, 60 per cent., 3s. 6d., naked. Naphthalene, "A" quality, 3d. to 1½d. to 2d.

Ammonia.—There is still a good demand on account of official quotations.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—July 26.

Sulphate of Ammonia.

Mr. ACLAND asked the President of the Board of Agriculture whether he was aware that during 1916 flat rates were fixed for the sale of large quantities of sulphate of ammonia to farmers at prices considerably lower than those on the open market, that these prices made it a very attractive purchase to farmers, that during two and a-half months in the spring of that year export was suspended so that the supply for agricultural purposes might be ample, that the prohibition of export was withdrawn only because congestion at makers' works threatened to interfere with the supply of necessary materials for munitions, and that the rates fixed by the late Government were accepted by their successors as being fair and attractive to farmers; and whether the information in his possession tended to show that a great deal of the increased use of sulphate of ammonia during the present season had been due to the efforts made in 1915 and 1916 to popularise and increase the use of this fertiliser.

Mr. PROTHERO (President of the Board of Agriculture) replied that the rates fixed by the late Government were used as the basis for subsequent negotiations with makers, but the altered system of distribution arranged in February last helped to stimulate the demand, and during the four months February to May 1917 the quantity sold for agricultural purposes was 99,875 tons, as compared with 35,128 tons in the same period of the preceding year.

July 30.

Coal Supply.

Mr. W. NICHOLSON asked the President of the Board of Trade whether his attention had been called to the fact that on June 23, 1917, a colliery company offered to supply a local merchant at Alton with anthracite coal delivered at Aldershot for 29s. 8d. per ton, subject to any restrictions which the Government might impose, but on the coal merchant accepting the offer for five trucks, the colliery company wrote on July 3 regretting that owing to a new Order made by the Coal Controller they could not supply the coal at less than 35s. per ton; if he could state the reason why the Coal Controller ordered the price of the coal to be raised to 35s. from the quoted price of 29s. 8d., and under what power, statutory or otherwise, did the Controller act in fixing prices.

Mr. ROBERTS replied that the case mentioned arose out of the operation of Part I. of the Directions as to the Sale of Coal issued by the Controller of Coal Mines on June 28 last under Regulation 9G of the Defence of the Realm Regulations, which contained no provision affecting the right of consumers in the United Kingdom to purchase anthracite at prices in accordance with the Price of Coal (Limitation) Act, but in order to avoid fluctuations in price under abnormal market conditions, they provided that the prices to which collieries were entitled under the Act should in all cases be maintained.

Mr. NICHOLSON then asked whether the Coal Controller had informed colliery companies who usually supplied coal merchants at Alton that the bulk of their output must be delivered to London merchants within 15 miles of Charing Cross, and that consequently they could not supply coal to Alton; that the London coal merchants were sending coal to Alton to the former customers of the local merchants; and under what Act the Coal Controller was empowered to further the interests of the London coal merchants and to prohibit country merchants from dealing in coal.

Mr. ROBERTS said the only instructions of the Controller of Coal Mines which seemed to have any bearing on the case were those issued at the end of March, requiring collieries in the districts normally supplying London to send to London the same quantities day by day as were sent last year. If particulars of this complaint were sent to the Controller, they would receive his attention.

Workmen's Trains (Taff Vale Railway Company).

Mr. STANTON asked the President of the Board of Trade if he would endeavour to get the Taff Vale Railway Company to grant greater convenience to the workmen who travel between Abercynon and Aberdare by putting on special workmen's coaches on each of their trains.

Mr. ROBERTS (Parliamentary Secretary to the Board of Trade) said he was in communication with the railway company on this matter, and he would write to the hon. gentleman upon receipt of their reply.

August 1.

Coal Supplies.

In reply to Mr. W. THORNE, who enquired whether a reduction in the price of coal at two well-known Midland collieries would result in a corresponding reduction in the selling price to the consumer, Mr. ROBERTS (Board of Trade) replied that prices at one or two collieries had been reduced by as much as 3s. per ton as from May 1, but it would not be correct to assume that the excess charges had been borne by the public, in view of the existing arrangement for the limitation of coal prices in London, which was based on the payment of colliery prices in accordance with the Price of Coal (Limitation) Act. Proposals for securing a closer control of retail coal prices throughout the country were being considered, and the position in London was being reviewed in that connection.

Mr. J. M. HENDERSON then asked what provision had been made for the supply of coal for domestic use during the coming winter.

Mr. ROBERTS, in reply, said that an Order by the Board of Trade dealing with household coal for all classes of consumers within the Metropolitan Police area had been fully considered, and would be issued by the Board of Trade in the course of a few days. It had been impossible as yet to provide all consumers within the Metropolitan area with their full requirements for the coming winter, but supplies had been coming into London in large quantities, and the demands of householders had been and were being met in rotation. There were good grounds for believing that the greater part of the orders which had been given would be executed by the time the new Order would affect the purchasers of coal.

In reply to further questions by Col. C. LOWTHER, Mr. HOGGE, and Mr. HENDERSON, Mr. ROBERTS said that the Coal Controller was working cordially in co-operation with the local authorities. Obviously the question of transport was one of the great difficulties that the Coal Controller had to face. Orders were being dealt with in rotation.

Mr. HENDERSON was proceeding to put another question, when the SPEAKER intervened with the suggestion that it had better be put down.

Housing Schemes.

Replying to Mr. GILBERT, who asked the President of the Local Government Board whether he had issued to local authorities a circular promising financial help for housing schemes to be put in hand after the war, and what help he proposed to give local authorities, and on what method it was based, Mr. HAYES FISHER said that he had issued a circular, saying that the Government recognised that it would be necessary for the years immediately following the war to afford substantial financial assistance to those local authorities who were then prepared to carry through without delay a programme of housing for the working classes approved by the Local Government Board, but it was not possible at this stage to indicate either the form which that assistance would take or the extent of it: that was a matter for later consideration.

COAL CONCRETED FROM DUSTS OR ASHES.

In the discussion on the paper by Mr. R. GOULBURN LOVELL at the Society of Architects on July 26 (*Colliery Guardian*, July 27, p. 158), the PRESIDENT said that, assuming the invention developed along the lines foreshadowed by the inventor, it became, in his opinion, a subject of considerable national importance, and must have effect in several ways. It would help to shorten the war, and relieve distress, and it would help to win and maintain commercial supremacy after the war. It was not difficult to understand that the calorific values of suitable aggregates throughout the country would vary, and although there might be a previously ascertained formula for manufacture, the aggregates might from time to time differ; and it would conceivably be of commercial advantage to have qualified district supervisors appointed by the licensors who would be able to determine any variation of formula on the spot, and thereby avoid any break in continuity of production. The technical training of an architect fitted him peculiarly well for a supervisory position of this character.

Mr. LLOYD JONES, who carried out the tests reported in the table in the paper, said it was important to have some idea of the ratio of the various constituents of the product. For instance, example 57 L.B., the last one in the table, London coke, contained a matrix which represented 24.51 per cent. of the raw ingredients used for making the fuel. That matrix had a calorific value of 7,985 British thermal units per lb. The base itself contained 11,620 British thermal units, or 64.71 per cent. of the raw constituents. In addition, there was added tar which had a thermal value of 16,558 British thermal units, and represented 10.78 per cent. of the raw mixture. It was from these figures of the raw constituents that a thermal value for this fuel of 11,261 British thermal units was calculated, but owing to loss by moisture, the resultant fuel only represented 96.1 per cent. of this, or 11,110 British thermal units, as given in the paper. It would be noticed that in some cases there was an apparent appreciation of the thermal value of the fuel after briquetting, but that was only in those instances where the thermal value of the base was lower than the thermal value of the matrix which was added to it. The percentage of moisture in the fuel was also important, and it had only been left out of the table because there was not room for it. In all cases, however, the percentage of moisture in the finished fuel, i.e., the hygroscopic moisture and not the free moisture, was lower than in the basis coal, cinders, or refuse. That meant that it must have been driven off by heat during the process of manufacture. There had not yet been any mechanical tests on this fuel, but a number of specially shaped briquettes, similar to those used for testing cement, were in process of manufacture for the purpose. He would have liked some form of compression test, but great difficulty had been found in devising any accurate or standard method of doing that, and therefore it had been decided to rely on tensile strength alone to indicate the mechanical properties.

In answer to questions, Mr. LOVELL said that tests were to be carried out, at the suggestion of the P. & O. Company, upon Bombay and Japanese coal and ashes from ships' furnaces. The opinion has been expressed by one of the representatives of the P. & O. Company that such a fuel would cling to the bars of the furnaces much less than did Indian coal itself.

A speaker from Birmingham, who said he was connected with an asphalt firm, said they were going to put the process on a commercial basis by using up slack coal, and if they were successful he hoped to do a large amount of business, and at the same time confer a great benefit upon the poorer people of Birmingham by supplying them with cheap coal.

COMMITTEE ON BREATHING APPARATUS.

The Committee of the Privy Council for Scientific and Industrial Research, at the request of the Home Office, have sanctioned the appointment of a Committee, consisting of Messrs. William Walker, Acting-Chief Inspector of Mines under the Home Office (chairman), John Haldane, LL.D., F.R.S., and H. Briggs, D.Sc., of the Heriot-Watt College (Director of the Enquiry), with Mr. A. Richardson as secretary; the terms of reference being: "To enquire into the types of breathing apparatus used in coal mines, and by experiment to determine the advantages, limitations, and defects of the several types of apparatus, what improvements in them are possible, whether it is advisable that the types used in mines should be standardised, and to collect evidence bearing on these points."

MIDLAND INSTITUTE OF MINING, CIVIL AND MECHANICAL ENGINEERS.

The annual meeting of the Midland Institute of Mining, Civil and Mechanical Engineers was held at Sheffield University on July 26. The chair was occupied by the PRESIDENT (Mr. C. C. Ellison).

The following new members were elected: *Members*—Mr. J. T. Greensmith, Mr. H. M. Holliday, Mr. R. J. Edwards. *Associate members*—Mr. P. H. Symonds, Mr. W. J. Hoskins, Mr. J. I. Graham, Mr. H. B. Holdsworth. *Associates*—Mr. B. W. Hewitt, Mr. R. P. Roberts. *Student*—Mr. C. H. Newby.

The annual report of the council showed that at the commencement of the year there were 413 names on the register, and 22 new members and 27 subscribing firms had been elected, making a total of 462. On May 31 the subscriptions of 372 members were fully paid up, as against 360 at the corresponding date last year—an increase of 12. The following deaths during the 12 months ended May 31 were reported with regret: Killed in action—Lieut. G. J. H. Ashwin; died of wounds—Lieut. H. C. F. Jeffcock and Lieut. R. Thomson; from natural causes—Mr. G. H. Barraclough, Mr. G. S. Cooper, Mr. D. Hunter, Sir W. A. Rucker, Lieut.-Col. J. R. Shaw, and Mr. W. P. Walker. So far as the council are aware, they had at present 66 members of the institute serving in H.M. Forces. Mr. G. Herbert Peake, of Bawtry Hall, made a gift to the institute of £1,000 in recognition of the services rendered by the institute to the coal trade of South Yorkshire. The council have decided to memorialise it by the institution of a medal, to be called "The Peake Medal," which will be presented from time to time to members who may have rendered conspicuous services to the institute. The balance at the bank at the commencement of the financial year was £364 5s. 4d., and for the year just ended £326 3s. 2d. Six meetings had been held during the year—two at Doncaster, two at Sheffield, and two at Leeds—and seven papers had been read.

The PRESIDENT said that the number of colliery companies who had become subscribing members of the institute up to the present was 30, representing a subscription of about £150 per annum. There were a number of others who had promised to join, and some who had not yet sent answers to the application. The membership of the companies would be a great help to the funds of the institute, and would enable them to carry on work which they could not very well have done without it. It was a matter of great regret that the institute had lost so many members during the past year, either through natural causes or in the service of their country. He proposed a vote of condolence with the relatives, and this was carried, all standing.

The President went on to say that the council had awarded the first "Peake" medal of the institute to their worthy secretary, Mr. G. Blake Walker. He was sure that nearly every member of the institute knew what a great deal of excellent work Mr. Walker had done for mining engineering, particularly in connection with the fostering of the interests of the institute. He proposed a vote of thanks to Mr. Walker for his generous gift of books to the institute, which practically completed the whole of the *Proceedings* of the Institution of Civil Engineers.

Mr. W. H. CHAMBERS seconded. He said that in time the members would learn the extent of the benefits that the institute had derived from its association with Mr. Walker. The gift of books was only one of the many things he had done for the advancement of its interests.

The resolution was carried with heartiness.

Mr. WALKER, in reply, suggested that members who had technical books which they were not constantly needing should place them in the library of the institute. By so doing they would be conferring a great benefit on the institute. He hoped that they would have a library that was worthy both of the institute and of the University. Even old books would be welcome, for they were sometimes very interesting because of their age.

Election of Officers.

The PRESIDENT announced that the ballot for the election of officers had resulted as under:—President, Mr. W. D. Lloyd; vice-presidents, Prof. O'Shea, Mr. H. F. Smithson, Mr. E. W. Thirkell; council, Prof. W. G. Fearnside, Messrs. J. H. W. Laverick, G. H. Ashwin, J. H. Ashton, and J. R. Wilkinson.

In handing over the presidency to his successor, Mr. ELLISON thanked the council, the members, and particularly his old friend, Mr. Blake Walker, for the assistance they had given him whilst he had occupied the chair. He hoped everybody would help Mr. Lloyd in getting the young people to attend the meetings, because he was sure that that was the only way in which we could become scientifically educated in order to compete for the trade of the world.

Mr. LLOYD, on assuming the chair, expressed his great appreciation of the honour the members had done him in electing him, and also of the remarks that had been made by the retiring president. He proposed a very hearty vote of thanks to the retiring president for his services during the past two years. Considering the difficulties of the time, he had not only maintained the position of the institute, but had also enlarged its scope in several ways, and had done noble work for the general good. They had to thank him very much for the way he had got the colliery companies to come in as members and support the work of the institute. This was a distinct advance, and would be of great assistance to the institute.

Mr. T. BEACH, in seconding, said Mr. Ellison had been responsible for a valuable innovation in offering prizes for the production of papers by the members and students of the institute.

The resolution was carried unanimously, and Mr. ELLISON briefly replied.

The Forests of the Coal Age.

Dr. D. H. SCOTT, who was introduced by Mr. G. Blake Walker, read a paper on "Forests of the Coal Age." (This will be given in our next issue.)

WELFARE OF WORKERS IN FACTORIES AND WORKSHOPS.

The Home Secretary proposes to make the following Order, to take effect from October 1 next, in regard to ambulance and first-aid at all blast furnaces, copper mills, iron mills, foundries, and metal works employing 25 or more persons:—

First-Aid.

In every factory to which the Order applies, and in which 25 or more persons are employed, the occupier shall provide, in readily accessible positions, "first-aid" boxes or cupboards in the proportion of at least one to every 150 persons. In calculating the number required, any odd number of persons less than 150 shall be reckoned as 150.

Each "first-aid" box or cupboard shall be marked plainly with a white cross on a red ground, and shall contain at least:—(i.) A copy of the first-aid leaflet issued by the Factory Department of the Home Office; (ii.) three dozen small size sterilised dressings for injured fingers; (iii.) one dozen medium size sterilised dressings for injured hands or feet; (iv.) one dozen large size sterilised dressings for other injured parts; (v.) one bottle of eye-drops; and (vi.) sterilised cotton wool.

Nothing except appliances or requisites for first-aid shall be kept in a "first-aid" box or cupboard.

Each "first-aid" box or cupboard shall be kept stocked and in good order, and shall be placed under the charge of a responsible person, who shall always be readily available. A notice or notices shall be affixed in every workroom stating the name of the person in charge of the box or cupboard provided in respect of that room.

Ambulance Room.

In every factory to which the Order applies, and in which 500 or more persons are employed, the occupier shall provide a special ambulance room, used only for the purpose of treatment and rest. It shall have a floor space of not less than 100 sq. ft., and smooth, hard and impervious walls and floor, and shall be provided with ample means of natural and artificial lighting. It shall contain at least: (i.) A glazed sink with hot and cold water always available; (ii.) a table with a smooth top; (iii.) means for sterilising instruments; (iv.) a supply of suitable dressings, bandages, and splints; (v.) a couch; and (vi.) a stretcher.

Where persons of both sexes are employed, arrangements shall be made at the ambulance room for their separate treatment.

The ambulance room shall be placed under the charge of a qualified nurse, or other person, trained in first-aid, who shall always be readily available, and shall keep a record of all cases of accident and sickness treated at the room.

Ambulance Carriage.

At every factory to which the Order applies, and in which 500 or more persons are employed, the occupier shall, for the purpose of the removal of serious cases of accident or sickness, provide on the premises, and maintain in good condition, a suitably constructed ambulance carriage, unless he has made arrangements for obtaining such a carriage when required from a hospital or other place in telephonic communication with the factory.

Any objection to the proposed Order must be sent to the Secretary of State at the Home Office, Whitehall, London, S.W. 1, within 21 days after July 27. The objection must be in writing, and must state: (a) The requirements in the draft Order objected to; (b) the specific grounds of objection; and (c) the modifications asked for. Where an objection is made jointly on behalf of a number of occupiers, the names of the occupiers and their addresses must be stated; or, if the objection is made by an association of occupiers on behalf of its members, the number of the members affected by the Order.

Spanish Coal Production in 1916.—According to the June issue of the *Boletín de las Cámaras de Comercio* (Madrid) (quoted by the *Board of Trade Journal*), official statistics recently published show that the production of coal in Spain in 1916 amounted to 3,726,865 metric tons, as compared with 3,400,979 metric tons in 1915, and 2,721,108 metric tons in 1914. Of last year's output, 1,759,687 metric tons were obtained from the mines of Asturias.

South Wales Colliery Deal.—The South Wales Anthracite Collieries, owned in Newcastle-on-Tyne, which gave employment before the war to 1,000 men, have been acquired by the Gurnos Anthracite Colliery Company, which will take over their management forthwith. The two pits purchased are situated at Ystradgynlais, in which area the Gurnos Colliery Company also operates. The output of the South Wales Anthracite Collieries during the war averages from 700 to 800 tons per day, but in normal times it was greater by over 100 tons. The collieries will be re-started as soon as possible, under the management of Mr. David Daniels, J.P., and Mr. Daniel Daniels, of Crynant, Dulais Valley.

Russian Loans to Coal Masters.—The coal masters of the Donetz basin are petitioning the Russian Provisional Government for financial assistance on account of the critical position in which the coal producing industry finds itself, both as to small and large firms. They require loans in order to enable them to carry on. It is proposed, therefore, to allocate 20,000,000 roubles for the purpose named, for, with the altered scale of wages, the exploitation of the mines at present results in a loss for the proprietors. The idea of the Minister of Trade and Industry is to lend the masters cash at the rate of 15 copecks per poond of coal extracted, the loan to be good for no more than eight months, and the rate of interest to be 6½ per cent. per annum.

LABOUR AND WAGES.

South Wales and Monmouthshire.

Mr. Jolly, of the Blaenavon Company Limited, promptly met the wishes of outside workmen for an improved method of paying out wages. Hitherto, the men have been accustomed to fetch their dockets, examine them, and return them to the pay clerk so that they may be cashed there and then. Delay resulted from this method, those who might arrive at the pay office late having to stand in the queue for a considerable time. An envelope system, as desired by the men, has now been introduced, and has allayed a growing feeling of discontent.

Arising out of the prosecutions at Blaenavon police court last week when the Blaenavon Company Limited claimed damages from 30 workmen for breach of contract, it appears that 183 actually absented themselves from work on May 19, and the company claim that the magistrates' decision is applicable to the other 153, as the proceedings taken against a nominal 30 were in the nature of a test. The men have held a meeting, and declared that the company must not deduct damages from the wages of any men other than those who were summoned unless (following fresh proceedings), they are directed to do so by order of the magistrates. Mr. W. L. Cook, J.P., reporting upon the matter on Monday, said if the company took any further action the men intended to repeat the demonstration which they held on the previous Tuesday.

Upon the motion of the anthracite section, the Federation executive will be asked to draw up a new schedule of wage rates for enginemen, stokers and outside fitters; these not having received the same advance upon their standard (so it is alleged) as was secured by the Federation for labourers and others under the new agreement.

At the half-yearly meeting, held on Saturday, of the South Wales Enginemen, Stokers and Craftsmen's Association, a resolution was carried advocating an eight-hour day for men in the mechanical departments; also, that effort should be made to secure uniform payment for overtime—this to be double for Sundays and Bank holidays and time and a-half for week-days. With regard to the schedule submitted to the Joint Board, it was recommended that a complete list of the various craftsmen and enginemen should be supplied to the Board for consideration. The different branches will be called upon to vote on a proposal that the affiliation fee to the National Federation should be increased from a halfpenny to a penny per member, and the members will be balloted as to the formation of a political fund.

A long discussion took place at a meeting of the Eastern Valley Miners' District, Monmouthshire, on Monday, regarding income-tax abatements. A deputation was appointed to interview the local surveyor of taxes to appeal for abatements for men working under various conditions which resulted in extraordinary damage to clothing. There are numerous cases in the district where men's incomes are adversely affected by such conditions, the principal one being the obligation to work with the aid of electric lamps, from which acid is alleged to leak and corrode clothes.

Owing to disputes which related to comparatively small matters, a few individuals only being affected, from ten to twelve thousand men employed by the Ebbw Vale and Tredegar companies went out on strike during last week-end. By prompt intervention of the Home Office stoppages were brought to an end, and the men resumed work on Wednesday. Sir R. Redmayne, Chief Inspector of Mines, who was accompanied by a member of the committee appointed in connection with the Control, met Mr. F. S. Mills, managing director of the Ebbw Vale Company, and Mr. A. S. Tallis, managing director of the Tredegar Company, in Cardiff on Tuesday. On behalf of the men, Mr. T. Richards, M.P., with other members of the executive, and also local representatives of the strikers, attended, and the discussion between the two sides lasted several hours. As to Ebbw Vale, it was agreed that the question concerning electrical machinery should be referred to Mr. Horsfall, electrician of Ebbw Vale Council, for the men, and to Mr. Roberts for the company. As to Tredegar, the matters in dispute are referred to Mr. David Hannah and Mr. Vernon Hartshorn.

Difficulties arose rather suddenly between the workmen and management of the Llanerch and Blaenserchan collieries Abersychan, Monmouthshire, on Wednesday, as a result of which the two concerns were rendered idle. It appears that on the previous day an official requested a cog-drawer to do work which the latter refused to perform because it was outside the conditions of his employment. A pithead meeting was held on Wednesday, with the result that all the day men ceased work.

North of England.

A mass meeting of miners at Stanley, last Saturday, passed a resolution emphatically protesting against the present high cost of living, and further demanding that the Government cease dallying with so important a question, and at once, and in no uncertain manner, take drastic steps to remove the power from profit-mongers and exploiters of dealing in the people's food. A sufficiency of the necessities of life was beyond the means of a large number of the working classes, not because such necessities were unprocurable, but because the scandalous prices imposed by such profiteers' charges was out of all comparison to wages received.

An appeal to miners has been issued by the Cleveland Mine Owners' Association to the effect that the Ministry of Munitions require an increased output of ironstone from the Cleveland district to assist in supplying munitions of war. Steps have been taken to put additional furnaces into blast, and the mine owners have supported the miners' officials in their request to the Ministry that Cleveland men with the Colours should be released and returned to the mines to assist in winning the additional stone, and the joint efforts made in that direction have met with considerable success. From August onwards a larger output of ironstone will be required and, in order that the number of men to be imported into the district may be kept as low as possible, the owners appeal (as the men's officials have already done) to their employees at the mines to curtail the amount of lost time. Since the beginning of the present year the avoidable lost time has averaged 6½ per cent. If it were reduced by about one-half, there would be no present necessity to introduce men from other districts, unless there is an improvement in time-keeping. The men will no longer feel justified in urging on the Ministry the undesirability of introducing men from other districts to Cleveland. The mine owners feel confident that they can rely upon the Cleveland miners to do all in their power to meet the necessities of the situation.

The Marsden Lodge of the Durham Miners' Association has issued an "open letter" to the county miners pleading

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Messrs. Edwards' Successful Defence—Senghenydd Fund Accounts—Seam Struck at Trimsaran—The Holiday Picture—Serious Defect by Examiners—The Return Upon Colliery Investments—Mining Classes for Monmouthshire.

On account of the continuing increase in the cost of explosives and implements, the Western Miners' Association desire that the Federation executive will consider the practicability of obtaining a reduction; and Mr. John Williams, M.P., miners' agent, will make enquiry and report to the next meeting of the Western Association.

Among the new members elected on Friday of last week to Swansea Chamber of Commerce were Mr. James Pridmore, of Tonhir Colliery Company, and Mr. J. John, of Middlemore Colliery Company.

At the same meeting it was decided to refer to the French Coal Committee a letter from Mr. Vivian, of the London City and Midland Bank, having reference to the new financial arrangements as to payment for coal exported to France.

Mr. S. J. Davies, of Nantymoel, heads the Glamorgan list of students in surveying, and is second in the list for mining—wherein last year he gained the gold medal, being then highest in the list. He is now eligible for the gold medal in surveying.

Instructions concerning the holidays were issued on Saturday last through Mr. F. A. Gibson, secretary of the Coal Owners' Association. His circular letter points out that originally the employers desired that no action in the matter should be taken pending instructions from the Controller; but the miners' representatives, at a meeting of the Conciliation Board on July 18, notified the decision of the Federation to take three days. The Controller has since telegraphed urging that only two days should be taken; but the workmen adhere to their decision. The owners' representatives, after further consideration, having in view the present position of the coal trade, owing to time being lost in consequence of the shortage of tonnage, agree to the workmen's request that there should be three days' holiday, commencing Monday, August 6.

At the meeting of Newport-Abercarn shareholders, Mr. Beynon referred to the return upon colliery investments, and said that their 20 per cent. dividend on the ordinary shares amounted to fractionally over 7d. per ton on last year's output; and he did not think that in times like the present anyone would consider a profit of 7d. per ton very excessive in a speculative industry like mining.

After four days' trial at Glamorgan Assizes, the jury returned a verdict of "Not guilty" in the case wherein Mr. W. H. Edwards, proprietor, with his nephew, Mr. D. Aubrey Edwards, manager, of the Duffryn Steel and Tin-plate Works, were charged with contravention of the Defence of the Realm Act, by failure to comply with directions from the Ministry of Munitions, and by submitting returns alleged to be inaccurate.

Mr. T. E. Watson, president of Cardiff Chamber of Commerce, has repudiated strongly the contention that shipping profits are excessive. In a speech to the members, he asserted that during 1916 the average dividend for the whole of the merchant shipping had been 17½ per cent.; but if the dividends of the previous nine years were added, the average for the whole 10 years did not amount to 7½ per cent. The great bulk of their ships were now under Government requisition, and were run at a loss.

It is significant of the persistent practice in coal stealing that a constable, prosecuting a girl of 14 for picking coal on the tip at Waen Nantyglo Colliery, said the place was most dangerous for children, and that only a few days previously a boy fell and sustained compound fracture of his leg. The girl had over 100 lb. of coal in her possession. The colliery manager asked the Bench to assist the company in the matter, for a boy had been killed a short time ago, and a woman nearly lost her life. The girl was bound over, and her father ordered to pay costs; a similar decision being given in the case of a girl of 11 years, who was with the first defendant, and had 62 lb. of coal.

Representations concerning anthracite duff have been made to the Coal Controller by Messrs. Evan Williams, Sales, Ingram, and Waddell, who had a personal interview, and obtained his promise that the facts submitted should have due consideration.

A man now in the Army was summoned at Porth for falsely representing his age in order to obtain employment at the Wattstown Collieries. He had represented himself to be 20 years of age when he was only 18, and was given a man's place, whereas he had not qualified by two years' experience. In answer to the solicitor defending, witness for the prosecution admitted that youths 18 years of age, having two years' experience, were in sole charge of working places all over the coal field; and the solicitor (Mr. Nicholas) contended that the only age under the Act was 16 years. Case dismissed.

A singular case was investigated at Cymmer by the coroner for the district, a collier having met his death while charging a hole. In company with two other men, he bored a hole, and the two men then moved back while the charging was in progress, but suddenly there was an explosion, and the charginer was found lying dead. It was made clear by the evidence that the Regulations had been duly observed, and no explanation of the accident could be given by the witnesses. There were present at the inquest Mr. Walden, inspector of mines, with representatives of the employers and the workmen. A verdict in accordance with the medical evidence was returned.

To the annual meeting of the local Liberal Association, Mr. Clement Edwards, M.P. for East Glamorgan, set out the justification for the action he has taken in Parliament as to calling up miners to the Army. He said that he had done the right thing in going to the pitheads and having it out with the men. Those meetings had shown that it was the overwhelming feeling of the coal field, even of the young miners, that when work was slack the right and proper thing for young unmarried men was to go into the ranks and join the fight with older and married men who had gone before. A resolution favouring this was passed at meeting after meeting. It was a perfectly monstrous thing that unfit men should be rushed into the Army, while in the coal fields of the United Kingdom there were over 200,000 unmarried men under 31 years of age, and nearly 600,000 in the munition works. Mr. Edwards referred also to the recent developments in utilisation of coal, especially of by-products, and predicted a great future.

Only nine dependants are now chargeable to the Tylors-town Colliery Explosion Fund; and at the half-yearly meeting of the executive committee the accounts were duly passed.

A seam 6 ft. in thickness has been struck at Trimsaran by Mr. Evan Jones, of Llanelly.

It is probable that another appeal will be made to South Wales and Monmouthshire miners to provide ambulance convoys for service at the front. When this matter was discussed and voted upon some time ago, a majority voted against the project. A distinguished deputation, it is asserted, may at an early date tour the various districts of the coal field, and make a personal appeal to the miners.

The Ynysfaio Collieries (Troedyrhiw Coal Company), Treherbert, were idle on two occasions last week, and on Monday of this week, owing to shortage of trucks. Between 800 and 900 workmen were affected. The Tirpentwys Colliery, Pontypool, was also idle on Monday from the same cause.

Important prosecutions under the Coal Mines Act, chiefly affecting examiners, came before the Newport County magistrates on Saturday, when three firemen at the Old Black Vein Colliery, Risca, Mon., were summoned by the United National Colliery Company Limited for failing to examine all the west district of the mine within two hours before work was commenced, and accurately reporting upon its condition, on June 14 and 15. It was stated that each of the defendants was an old and valued official, against whom the company regretted having to proceed. After a lengthy hearing, the Bench unanimously decided that offences had been committed, and fined each defendant £4. Similar prosecutions against three other firemen were adjourned for a week.

The Director of Mining Instruction in Monmouthshire has recommended for next session that the County Education Committee should establish mining classes at Aberbargoed, Abercarn, Abersychan, Abertillery, Bedwas, Blackwood, Blaenavon, Blaina, Crumlin, Cwm, and Wainlwyd, Cwmbran, Ebbw Vale, Llanhilleth, Maesycwmmwr, Newbridge, New Tredegar, Pengam, Risca, Tredegar, and Ynysddu. Commenting upon the summer surveying classes, the Director, in a report, states that the instruction given made text-book work real, and inspired the necessary confidence which is so conspicuously absent in embryo surveyors. The students had, in various instances, conducted surveys in school playgrounds, fields, and mountainous tracks.

Coun. Fred Davies, Newbridge, Mon., has retired from the office of chairman of the Celyn Collieries Workmen's Committee.

Local coal owners, by presenting several loads of coal to the organising committee, liberally patronised a garden fête which was held on Thursday of last week at the Girls' College Grounds, Pontypool, in aid of the Lord Roberts' Workshops Memorial Fund. The coal was sold by auction, and the good prices realised contributed substantially towards the net financial result of £220.

Mr. Zachariah Andrews, Talywain, Mon., a collier employed at one of the Varteg Collieries, has been appointed political agent to the North Monmouthshire Labour Party.

A mass meeting of the miners of the Naval Collieries, Penygraig, was held on Saturday, Mr. Mark Harcombe presiding, and it was decided to support the scheme of the Miners' Federation of Great Britain for the recruiting of miners, provided that all classes of workmen be treated alike. The meeting also decided to support a resolution passed by the executive council of the South Wales Miners' Federation favouring the sending out of peace feelers.—On Sunday a similar meeting of the Cambrian Collieries workmen, Clydach Vale, was held at Tonypandy, Mr. Noah Rees presiding, when the delegate of the South Wales conference was directed to vote in favour of the resolutions recently adopted by the executive council of the South Wales Miners' Federation favouring peace feelers.

Mr. Gwilym Williams, Herbert-street, Treorky, who recently had a course of mining at the Treforest School of Mines, has been successful at a recent examination in passing first-class certificate for M.E. He commenced his mining career at the Park pit (Ocean Coal Company), Cwmpark, and for some time he held the position of shot-man.

The Military Medal which was posthumously awarded to a Tonypandy collier, named W. G. Gould, Gloucester Regiment, of Glenville-street, Tonypandy, was presented to his mother on Friday of last week.

The managing director of Graham's Navigation Collieries, Mr. T. C. Graham, has this week gone to France, where he will serve under the French Red Cross Society in motor ambulance work.

Mr. Alfred Onions, treasurer of the South Wales Miners' Federation, who has been seriously ill for some time, is now stated to be recovering from the attack of pleurisy; and the delegates have granted him further three months' leave of absence.

An official statement has been issued by the South Wales Coal Owners' Association that the June quarter audit showed a further fall in the selling price of coal. Their request for permission to apply to the workmen's representatives for 30 per cent. reduction in wages rates has been refused by the Coal Controller.

In their monthly meeting, the anthracite miners' delegates discussed the proposal to send Welsh workmen to the pits in France, opposition being expressed on the ground that this might be detrimental to the interests of French miners, who would thereby be released for army service. It will, however, be remembered that the anthracite men's agent (Mr. J. D. Morgan) was one of the British representatives who visited France to enquire into this matter; and that it was reported that British workmen would be welcomed.

A matter of singular interest came before the same body, who were informed that three miles of railway used for the Graig Colliery, Trebanos, in the Swansea Valley area, had been sold, and that it was to be removed and utilised for war service. The colliery was stated to be a new one, employing 80 men, and that the engagement of 200 more was expected. The Coal Controller's attention has been called to the matter, and he has been informed that there are miles of railway in the neighbourhood connected with works, some of which are idle. Mr. John Williams, M.P., considered the men had a good case, and the application to the Controller is to be persevered with.

Avon Valley colliers have passed a resolution asking the central council to send a deputation to the Railway Executive, and represent their case for rebate in fares to be made to men who are working only one or two days per week in the Avon and Neath valleys.

The proprietors of Blaenmawr Colliery were summoned at Aberavon to answer a charge of using an incorrect weighing machine, 1 cwt. wrong in a ton, against the owners and in favour of the collier. It was an old machine, in use pending delivery of a new one. A fine of £5 was imposed.

Capt. J. R. McMurtrie, at one time manager of the Powell Duffryn Company's Penallta Colliery, and previously at Aberaman, was killed on July 26. He gained the Military Cross for conspicuous gallantry at Mametz Wood;

of wages. It is claimed that the workmen's case of prices is decreasing, whilst that of the employers is increasing astoundingly. The actual increase on the old scale is said, is from 33 to 39 per cent., but the cost of living far exceeds that, and leaves the workmen in a position. A new wage scale is suggested, which would still leave the coal owners the best of the bargain. The scale would substitute 3.5 per cent. for each 2d. rise in the price of coal in place of the 1½ per cent. of the old sliding scale. The proposed new scale calculates up to 15s. 6d. per ton, the ascertained price in May last, and, according to new computation, the workmen are entitled to 215 per cent. increase on the 1879 basis.

A mass meeting of miners was announced to be held at Whitehaven on Sunday with reference to the strike at Wellington pit, at which Mr. Cape would have been present, but owing to the disaster at this pit on Saturday the meeting was abandoned. The question in dispute, which has reference to four places in the No. 2 district, is, therefore, left in abeyance.

Federated Area.

At meetings of miners held in the Manchester district on Monday night, it was mentioned that as a result of recent active propaganda work there had been an accession of new members to the ranks of all the miners, transport workers and railwaymen's unions, which form the triple industrial alliance. It was further stated that a defensive programme is being arranged to be put into operation as soon as the war is ended. One object of the programme will be the maintenance of higher wages than those prevailing in pre-war days.

At the monthly conference of the Lancashire and Cheshire Miners' Federation, held on Saturday, July 28, at the Miners' Hall, Bolton, under the presidency of Mr. Thos. Greenall, it was stated that various disputes relating to working conditions which had arisen at collieries in the Manchester, Bolton and Leigh areas had been amicably settled. Reports were submitted by delegates of meetings with the Wages Board for Lancashire and Cheshire. The Board had agreed to increase the minimum rate for shot lighters by 9d. per day, raising the basis of the minimum rate for shot lighters from 5s. 9d. to 6s. 6d. per day. The Board also decided that one short shift during the week, viz. seven hours, be taken generally on the Sunday night.

The stoppage at the Brodsworth Main Colliery, Doncaster, was not of long duration, although it extended over three days. The men never had the sympathy of the public with them at all in coming out at such a critical time without giving the necessary notice. Although they had signed on to use the fork in coal getting instead of the shovel, yet when one or two were fined for a breach of the regulations the whole of them threw down their tools. The public regarded their attitude as the reverse of patriotic, and were very glad to learn that, as the result of a mass meeting held three days after the cessation of work, and at which officials of the Yorkshire Miners' Association at Barnsley were present, work was to be resumed. The stone hands and surface workers were particularly displeased at the idleness enforced upon them by the miners.

Scotland.

At Avonmill Colliery, Longriggend, an inspection recently took place in regard to some underpaid places there. The examiners report that an advance of 6d. per ton should be given on the present rates.

Trouble has arisen at Dewshill Colliery, Salsburgh through a number of the miners there who reside in the Harthill district continuing their contributions to the Harthill branch of the union, while at the same time a separate branch of the organisation is in existence at Dewshill. A strike is threatened unless the men produce clearance lines and join the branch where they are employed.

At Law Collieries, Lanarkshire, the men have balloted by a large majority in favour of having their wages paid weekly to them instead of fortnightly as at present. A meeting has been arranged with the management to discuss the proposed change.

The Larkhall branch of the Lanarkshire Miners' Union have been considering the payment of income tax on workmen's wages. They contend that the miners are not in a position to pay income tax because of the huge increase in food prices, and they desire that there should be a reversion to the old law.

Much speculation is being indulged in Mid and East Lothian as to how the Order by the Coal Control Board will affect local collieries in limiting the distance that coal may be sent. Several employers know of contracts that will be cut off from them, but they are not certain as to how many will come their way nearer their own collieries.

Iron, Steel and Engineering Trades.

According to the accountants to the Board of Conciliation and Arbitration for the Manufactured Iron and Steel Trade of the North of England, the average net selling price of iron rails, plates, bars and angles for the two months ending June 30th last was £13 10s. 9.87d. per ton as compared with £13 9s. per ton for the previous two months, and under sliding scale arrangements ironworkers' wages for August and September remain the same as prevailed during the preceding two months.

The iron ore miners in West Cumberland struck work on Saturday afternoon. The notices expired a week ago, but the Government took over all the mines and agreed to review the whole situation, and the men therefore decided to postpone action for a week. Between 8,000 and 9,000 men are affected by the dispute, which has reference to the wages of the "top" men, who state they can no longer tolerate a wage of 5s. 6d. a shift. On Sunday a conference was held between the men's leaders and representatives of the Ministry of Munitions, after which meetings were held in various parts of Cumberland. It was announced that the Government would consider the grievances immediately, and on this consideration it was decided to resume work on Monday.

National Association of Industrial Chemists.—The provisional executive appointed by representative chemists employed in the coal fields has been for some weeks engaged in framing rules and constitutions for the proposed National Association of Industrial Chemists. Its constitution has been published in book form, and all chemists employed in the coal fields of Great Britain and Ireland are invited to join for membership forms. About 100 chemists have declared full members. All members are to be addressed to the Propaganda Committee, 10, St. James' Street Schoolrooms, Sheffield.

and was held in high regard both by employers and workmen, being an able mining engineer and of urbane demeanour.

Owing to the shortage of wagons, it is reported that some collieries in the Avon Valley area are working only two days a week, much hardship being experienced by the miners' families; and it was stated in the men's district meeting on Monday that the Admiralty representative held out no hope of improvement.

Northumberland and Durham.

Co-operative Society's Colliery—Presentation at Kimblesworth—Newcastle Chamber of Commerce and Pre-War Contracts—Northumberland and Durham Miners' Associations.

At Kimblesworth, last Saturday, presentations were made to Dr. H. Munro and Messrs. Arthur Whiteside, John Studham, J. T. Bendelow, and Cecil Waterson, stonemen; James Russell, third shift overman; W. Stephenson, fore overman; H. Hudson and F. Horn, deputies; and Robt. Anderson, master shifter. They rescued John Rowell, deputy overman at the local colliery, who was imprisoned in the mine under a huge fall of stone whilst drawing timber in the Busty seam in April last. It took four hours in which to extricate him from his dangerous position, and the work was done in the face of the danger of further falls. Col. W. C. Blackett, agent of the coal company, in making the presentations—which consisted of handsome gold watches, subscribed for by the officials and miners of Kimblesworth and other collieries of the Charlaw and Sacriston Collieries Company Limited, a further £50 being added by the Carnegie Hero Trust Fund—remarked that never before had a case come to his notice in which a man had kept his nerve as Mr. Rowell had done, and so helped to save his life. Mr. Rowell's injuries consisted of superficial bruises and slight shock, from which he is now quickly recovering.

A correspondent says the Co-operative Wholesale Society is about to carry out improvements with a view to increasing output at the recently acquired Shilbottle Colliery, near Alnwick.

Mr. J. Taggart, son of Mr. James Taggart, of Montagu Collieries, Scotswood-on-Tyne, has been successful in passing the examination for qualification as a surveyor of mines. He is only 18 years of age, and is evidently one of the youngest qualified surveyors of mines in Great Britain. He now holds a position as assistant surveyor at the Montagu Collieries, belonging to W. Benson and Son, Newcastle-on-Tyne.

The fellow workmen of Pte. M. Heaviside, V.C., of Craghead, who before the war was a miner, have presented him with a gold watch and chain, 84 War Certificates, and a wallet containing a small balance of the total subscription of £133.

For the duration of the war, Mr. Chas. Bell, surveyor for the Bebside Coal Company Limited, has taken over the management of Bebside Colliery, in succession to Mr. J. W. Robinson, who has taken up an appointment at Wallsend Colliery.

The Haltwhistle magistrates fined a Plenmellor putter 10s. and costs for having done wilful damage to the local railway by releasing a coal-laden wagon from the top of an incline in the Coanwood siding. The wagon ran down, but was checked by the jack points, a check which resulted in four railway "chairs," valued at 9s., being broken. But for the jack points, it was stated, the damage might have been much more serious, for the vehicle might have run down to the Alston branch, and caused loss of life.

Michael Raine, putter at Plenmellor Colliery, Haltwhistle, has been fined 25s. for having smoked in the pit.

The miners at Blackett Colliery, Haltwhistle, which has been closed down, have presented their checkweighman and compensation secretary, Mr. R. J. Taylor, with a silver tea and coffee service and a wallet of Treasury notes, in appreciation of his services during the last six years. Mr. Taylor is a member of the Northumberland Miners' Wages Board and of the county Joint Committee.

Prosecuting a screen boy at Shildon Lodge Colliery for having stolen a quantity of oats, valued at 2d., the food of the pit ponies, Mr. Reginald Bell, manager of the colliery, explained that the animals were "rationed" nowadays, and it was a serious matter, therefore, to pilfer their food. The boy, who stated that he had taken the oats in order to feed his rabbits, was ordered to pay the costs, and was bound over for six months, the chairman of the magistrates remarking that any further offences of that nature would not be dealt with so leniently.

Mr. Thos. Wright, who emerged from his retirement a year ago to assist, on account of shortage of staff, at the Cramlington Colliery offices, and has now taken over the management, obtained his first-class certificate in mining as far back as 1882, but never cared to take up a position of manager. Only at the earnest request of Mr. John Morrison, agent to the company, has he accepted his new position.

It is suggested that, in view of the fact that 40,000 Durham miners are absent on active service at present, the position of president of the Durham Miners' Association, rendered vacant by the death of Ald. Wm. House, should not be filled at present, but that Mr. T. H. Cann, as the oldest agent, should act as president temporarily.

The executive committee of the Northumberland Miners' Association is being largely criticised throughout the county for having sent four representatives to the pacifist Soldiers' and Workers' Council meeting in Newcastle last Saturday, especially in view of the fact that the county has twice within a year repudiated by a large vote the peace-by-negotiation idea.

A resolution passed by the council of the Newcastle Chamber of Commerce on Wednesday of last week urges that emergency legislation should be passed to the effect that no party to any contract for the sale and purchase and/or the transport of merchandise entered into before August 5, 1914, should be liable for the non-performance of the whole or any part of his obligation thereunder in so far as the performance thereof shall have been rendered impossible, or, in the opinion of the court, only possible subject to excessive hardship to such party, by reason of abnormal conditions due to the war and not contemplated by the parties when entering into the contract, and suspension clause or other term to the contrary in the said contract notwithstanding. But this provision should not exonerate any party from liability for money considerations payable in respect of the performance or part performance of the contract by any other party which shall have been accepted by the first-mentioned party. It was suggested that the Government should endeavour to effect arrangements whereby the principle of the foregoing should be recognised by the courts of British Dominions and of the Allied and neutral countries in cases of contracts between persons in the United Kingdom and persons in the said Dominions and countries.

The Lord Mayor of Newcastle has issued a request to the owners of property, the coal houses attached to which

are in an unsatisfactory condition of repair, to make arrangements to have these buildings put in order, so that the tenants of the houses to which they are attached may be able to make the best possible use of their coal storage room before the winter sets in.

Cleveland.

Shipments of iron and steel from the port of Middlesbrough during July totalled 92,243 tons, 52,733 tons being pig iron, 2,528 tons manufactured iron, and 36,982 tons steel. For the previous month, the total clearances amounted to 81,390 tons, 60,638 tons being pig iron, 3,798 tons manufactured iron, and 16,954 tons steel.

Cumberland.

Operations were commenced last week for the purpose of winning coal from a drift near the site of the old Birkby Brick Works, a little to the east of Dearham Bridge Station. These works were carried on some years ago by Messrs. Tickle, of Maryport. A good many men found employment there, and several drifts were worked, in which much valuable material was secured for brick-making, besides more than one valuable seam of coal, which was mined chiefly for use in the brickyard for raising steam and burning bricks.

On Saturday last week, a serious fire occurred at the pit-head at the Wellington Colliery, Whitehaven, the scene of the great disaster in 1910. The fire originated on the screens at the pithead, which are on the north side of the headgear, and as the pit was idle at the time owing to a labour dispute, the outbreak was not discovered until it had got a firm hold. No lives were lost, but the damage, which is covered by insurance, is considerable, and it will be some months before work can be resumed. There were 250 hewers employed at the pit, the total number of workpeople being 650.

Mr. Thomas Cape, miners' agent for Cumberland, has been appointed one of the auditors of the Miners' Federation for the ensuing 12 months, at the Glasgow conference. There were eight candidates, and Mr. Cape received the highest number of votes.

Yorkshire.

Every part of the new South Yorkshire coal field is crying out about the housing difficulty, the shortage of houses having been greatly accentuated during the past three years as a result of the stoppage of building operations in consequence of the war. After the war, there will be a tremendous boom in building. The Mexboro' Council has just decided to submit the particulars of a housing scheme to the Local Government Board, with a request for information as to what assistance the Council might rely on in carrying the scheme out after the war. The new scheme contemplates the acquisition of five acres of land off Hallgate, and the erection of 80 five-roomed houses, at an approximate cost of £80,080, with an allowance of 33 per cent. for the enhanced cost of building expected to rule after the war.

Two fatalities associated with the Rossington Main Colliery, near Doncaster, have occurred within the past week. In one case, a miner, named Twigg, who was fixing compressed air pipes in the pit for the purpose of carrying away gas, fell from top to bottom of a ladder, head first, and died from concussion of the brain. It is supposed he inhaled gas, and that this caused him to fall. In the other case, a miner, named Helps, was pushing an empty tub to the coal face, when there was a bump in the roof, which fell in and buried him. Two fellow workers extricated him within 10 minutes, but the unfortunate man was dead.

Lancashire and Cheshire.

The project which was mooted some time ago by miners employed in Walkden, Little Hulton, and Boothstown districts for the provision of a cottage hospital at Walkden, has, it was announced on Monday, been dropped for the present.

The opening out of new working places in the Pilkington Coal Company's fine new collieries at Astley Green is proceeding as quickly as the times will allow. There is a great demand for houses by colliery workers.

A correspondent understands that further extensions are to be carried out at the Partington Iron and Steel Company's works at Irlam, near Manchester, where important Government orders are being executed.

Additional working places are to be opened out in the Abram Coal Company's, Hindley Green Colliery Company's, Wigan Coal and Iron Company's, and Messrs. Ackers, Whitley and Company's collieries in the Bickershaw, Hindley Green, West Leigh, and Plank Lane districts.

Hundreds of colliery workers in the Manchester and Bolton districts are now working 11 and 12 hours per day, many not arriving home until 8 p.m. This is the busiest summer experienced in the Lancashire coal trade, every pit working at full stretch in order to meet requirements.

Large quantities of coal drawn from South Yorkshire and the North Midlands are now passing through the South Lancashire coal fields by rail for Liverpool, for delivery to ships coaling at that port.

At a meeting of the executive council of the Lancashire and Cheshire Miners' Federation, representing over 70,000 members, a resolution was submitted to the effect that the Federation was of opinion that the time had come for the British Government to declare for peace on the basis of no annexations or indemnities, thereby agreeing with the declared policy and war aims of the Democratic Government of Russia. After some discussion, the conference, by an overwhelming majority, decided against the resolution.

Local colliers employed at Lord Ellesmere's various collieries now line up in queues in the afternoon at the Ellesmere Monument, Walkden, in order to board the South Lancashire Company's cars to Farnworth, and the system is said to work satisfactorily.

Many municipal electricity committees in Central, South, and South-East Lancashire, as well as cotton, engineering, and chemical firms in the same areas, are now laying in increased stocks of coal for next winter. The whole of the orders, however, cannot be complied with.

The recently issued pass list of successful candidates at the University of London intermediate examination in science (mining and engineering) includes the name of Arthur Winstanley, a student of the Wigan Mining College, whose career—while adding a further instance of the debt which the Wigan district owes to the generosity and initiative of Mr. Alfred Hewlett, and of the important results which may accrue from the provision of such scholarships as the "Alfred Hewlett" mining scholarship—is a splendid example of what can be accomplished by attendance at evening classes on the part of students having the necessary ability and determination.

Notts and Derbyshire.

A proposal to add 2s. 6d. per week to the weekly allowance of widows on the funds of the Midland District Miners' Fatal Accident Relief Society, was laid before the

board of management at their 137th quarterly meeting at Derby on Tuesday. The additional allowance would be for an extra contribution of 1d. per month per member. The board were disposed to regard the idea with favour, but decided to obtain the opinion of the branches thereon as well as on an alternative scheme for increasing the allowances to children. The quarterly report showed a membership of 52,371, an increase of 1,476 since March. Twenty-one members had died, bringing 15 widows and 25 children on to the funds. There were now 350 widows and 427 children in receipt of benefit, being increases of 18 and 11 respectively on the year. Income had exceeded expenditure by £992.

Three men were injured by three successive falls of stone in the Old pit at Gresley Colliery recently. After first-aid treatment from the colliery ambulance class and treatment by Dr. R. B. Parkhill, they were able to proceed home.

At a council meeting of the South Derbyshire Miners' Association at Ashby-de-la-Zouch, the agent (Mr. W. Buckley) urged the necessity of action to secure a more liberal allowance from boards of guardians in respect of children left fatherless and without support. Owing to the high price of food and clothing, the present scale was inadequate, and that a widow should be compelled to spend every shilling she had before any relief was given was a matter, he thought, concerning which the association should have something to say. What was needed was better representation on the boards of guardians in the South Derbyshire area. The agent reported the receipt of particulars as to the draft of recruits from the ranks of the miners, and invited an expression of opinion from the meeting. There was a strong feeling that if the representatives of the men assisted the management in arranging the draft, they would lay themselves open to resentment from families from which sons had been taken; while, on the other hand, it was urged that unless the men were represented, there would be no satisfactory guarantee against favoritism. Ultimately it was decided that each branch should convene a meeting of men. Votes of condolence were passed with relatives of 15 members who had died during the month—the largest in the history of the association.

The Midlands.

According to the monthly reports of the engineers to the South Staffordshire Mines Drainage Commission, the rainfall during July was 1.51 in. The pumping had been 12,111,600 gals. for 24 hours, against 12,279,800 gals. in June, and 12,430,800 gals. in the corresponding period last year.

Considerable discussion respecting the limitation of coal prices is going on just now among the South Staffordshire and Black Country coal masters, who are of opinion that the time has arrived when the rates fixed by the State should be re-examined, and are starting an agitation in order to bring their point of view before the notice of the Government authorities. It is admitted that the limit of 4s. per ton above pre-war prices laid down in the Price of Coal (Limitation) Act has not been universally observed in the South Staffordshire and Midland districts; indeed, only this week the Coal Controller has issued a circular fixing the wholesale price of the output of four well-known Midland collieries, whose identity is easily recognised. It is reported that the prices fixed by this new Order of local application only are about 3s. per ton lower than the collieries in question have been charging many of their customers, and as the reduction is to take place as from April 30 last, some coal merchants will have a considerable amount to receive from the four collieries affected on account of the last three months' deliveries. Cases like this apart, however, Staffordshire and Midland coal masters, who have been exactly loyal to the spirit as well as the letter of the Act, make no secret of their argument that the pre-war 4s. limit has been totally inadequate to cover the extra expenses in output to which they have been put. Instances have, in fact, been adduced this week in which South Staffordshire pits are being actually worked at a loss. Under these circumstances, it is not surprising that considerable dissatisfaction should exist at the price situation which the Government has created, or that agitation for revision of the existing scale should now be in progress. In the cases of the four Midland collieries mentioned, the action of the Coal Controller has followed upon an examination of the collieries' books, but examples such as these are, it is freely conceded, in the minority.

With reference to the acquisition of the coal mines by the Government, the general opinion among the Staffordshire coal owners is that, though the coal trade has not got all it contended for, as the result of the important negotiations which have lately been in hand, the financial basis which has now been practically settled is reasonably satisfactory.

Kent.

Preliminary operations of opening out the Snowdown hard seam are now being carried out at Snowdown Colliery, including the cutting of the shaft pillar. This coal, although not so good as that proved a few months ago in the seam at the 3,000 ft. level, will, it is anticipated, prove a fairly good household coal, and as a considerable amount of it will be on sale during the next few months, it should be a valuable auxiliary in overcoming the fuel troubles during the coming winter. As there is only one shaft into the seam at the deeper level, there is little probability that arrangements can be made to work that coal whilst the war continues.

Last week the output from the Tilmanstone and Snowdown collieries was about 5,300 tons. The drop in output is generally due to truck shortage. Additional contracts have been placed by Government departments for coal from these collieries, which has been found quite satisfactory for the purposes concerned.

Scotland.

Deputation to Controller Regarding Recruiting—Increased Pay for Surface Workers—Burntisland Coal Shipments.

A deputation from the Scottish Miners' Federation had a meeting the other day with the Coal Controller, and urged him to exercise control over the action of the military authorities in the Lanarkshire coal area, who, they declared, continued to call up and arrest men as absentees who held mining exemptions from the military recruiting court, notwithstanding the fact that the men were able to satisfy the military authorities as to their *bona fides*. An undertaking was given to the deputation that enquiry would be made into the complaints. The deputation further explained that no one had authority to call up men to the Army if these men were in possession of exemption cards and had not entered the mines since the outbreak of war.

In response to demands from local committees in Lanarkshire, the executive of the Lanarkshire Miners' Union arranged for an idle day throughout the county on

day of last week. Meetings were held at 12 different places at these resolutions were proposed protesting against the increase in the cost of food. The meeting of Kirkintilloch miners, the Miners' Federation of Great Britain circular with regard to recruiting miners was submitted and criticised, objections taken to the Federation coming to any arrangement in regard to recruiting before consulting the districts. It was unanimously agreed to send the circular back, and to ask the Federation to take a ballot of the men on the question of recruiting.

A prosecution is now pending against two workmen employed at a colliery at Cleland who are alleged to have filled an excessive amount of dirt with their coals. The charge is one of fraud.

A decision has been arrived at whereby all male surface workers at the shale mines will be granted an increase of 6d. per day, time-and-a-quarter for overtime, and time-and-a-half for Sunday.

The shipment of coal from Burntisland for the past week amounted to 10,473 tons. For the same week last year, 13,400 tons were exported.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

WARRINGTON, AUGUST 14.—The Electricity and Tramways Committee invite tenders either for part or the whole of 7,500 tons of slack, to be delivered at the Electricity Works, Howley, Warrington, during six months commencing September 10, 1917, to be delivered in accordance with the conditions of specification, copies of which can be obtained from F. V. L. Mathias, borough electrical and tramways engineer, Howley, Warrington, on payment of one guinea, which will be returned on receipt of a *bona-fide* tender. In the alternative the Committee invite tenders either for part or the whole of 15,000 tons of slack, to be delivered during the 12 months commencing September 10, 1917. Tenders, addressed to the "Chairman of the Electricity and Tramways Committee, Town Hall, Warrington," must be sealed with wax, and endorsed, "Tender for slack," and delivered not later than 12 o'clock noon, on Tuesday, August 14, 1917. The lowest or any tender will not necessarily be accepted.

Abstracts of Contracts Open.

ARMAGH, AUGUST 13. — Coal (year's supply) for the Armagh District Lunatic Asylum. Tenders to the medical superintendent.

BANTRY, AUGUST 7.—70 to 80 tons of best house coal. Tenders to the Board-room, Workhouse, Bantry.

BORRISOKONE (IRELAND), AUGUST 7.—24 tons best double-screened coal for the Guardians. Tenders to the acting-clerk, Board-room.

CORK, AUGUST 8.—900 tons of Lancashire or Welsh large steam coal for the Cork Harbour Commissioners. Forms from the Engineer's Department, Commissioners' Offices, Custom House-street, Cork.

FRAMLINGHAM, AUGUST 24.—Coal for one term to Framlingham College. Forms and particulars from the secretary.

HULL, AUGUST 8.—Coal and coke for the Guardians. Forms from the clerk, Union Offices, Harley-street, Hull.

IVYBRIDGE (DEVON).—100 tons of house coal (red ash) or part cobbles and nuts, f.o.r. Particulars from E. Wythcombe, Exeter-road, Ivybridge, Devon.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport, Isle of Wight.

The date given is the latest upon which tenders can be received.

Coal Shortage in Denmark.—The extreme scarcity of coal has created an unprecedented rise of fuel prices in Denmark. In Copenhagen it is said to be almost impossible to procure coal. Owing to the shortage, the Danish Government has introduced a Bill in Parliament for powers for the compulsory acquisition of peat and wood from private estates all over the country. Many provincial gas works are experimenting with a view to the production of gas from wood.

Coal and Coke in Canada, 1917.—The Mines Branch of the Canadian Department of Mines has received from the principal coal mine operators returns of their production during the first three months of 1917, on the basis of which the following estimates have been made of total production during this period:—

PRODUCTION, EXPORTS, AND IMPORTS.			
Coal—	1916.	First quarter, 1917.	
Nova Scotia	6,912,140	1,480,269	
New Brunswick	143,540	51,400	
Saskatchewan	281,300	85,962	
Alberta	4,559,054	1,337,659	
British Columbia	2,584,061	635,701	
Yukon	3,300	—	
Production	14,483,395	3,590,991	
Imports—			
Bituminous	13,009,788	2,907,222	
Anthracite	4,570,815	1,014,582	
Total	17,580,603	3,921,804	
Exports	2,135,359	501,570	
Coke—			
Output	1,448,782	308,690	
Imports	757,116	207,139	
Exports	48,539	5,605	

According to these estimates, the total production of coal during the first quarter of 1917 was 3,590,991 short tons, comprising 1,233,934 tons in January, 1,143,956 tons in February, and 1,213,101 tons in March. Corresponding records for the year 1916 are not available for comparison. The record would appear to show that the average rate of production in Nova Scotia and British Columbia was less than the average rate of production during 1916, but greater in the provinces of New Brunswick, Saskatchewan, and Alberta.

The total exports of coal during the three months of 1917 were 501,570 tons, as against 1,014,582 tons during the corresponding period of 1916. The imports of coal were 3,921,804 tons, as against 1,014,582 tons during the corresponding period of 1916. The imports of coke were 207,139 tons, and the exports 5,605 tons.

THE MINING INDUSTRY IN COREA.

A report on the mining industry in Corea, from the Acting British Vice-Consul at Seoul, published in the *Board of Trade Journal*, states that the authorities are promoting the mineral development of the country, and a notable inclination is being shown by Japanese capitalists to invest money in the mines of this peninsula.

So far, the most valuable mineral deposits have been discovered in the north-west—more especially in the South Heian and Kokai provinces. With supplies of coal and iron, good access to the sea, and the best labour in Corea, this district will probably become the industrial centre of the country. Minerals, however, are found throughout nearly the whole of the peninsula, and a number of promising deposits have recently been discovered in the north-east and south.

Statistics of the value of the mineral production of Corea during 1916 are not available, but the total output of coal for that year is returned at 190,000 tons, of which 122,640 tons were exported. The coal found is mainly anthracite, though a considerable amount of lignite is also obtained. The most important coal mines are situated near Heijo (Pyeng-yang) in South Heian Province, and these produced 161,766 tons of anthracite in 1916. According to an official report, the known reserves of coal in the mines are very large. Another promising mine is that near Anju in South Heian Province, which produced 21,204 tons in 1916. There are also seven smaller coal mines being worked by individual Japanese, all in North Kankyo Province, which produced in the aggregate not more than 25,000 tons in 1916. A new company has recently been formed to work anthracite mines in South Heian Province, which are said to contain 3,000,000 tons of anthracite. In addition to the above, there are six other places (all but one in South Heian Province), where deposits of anthracite are known to exist, but which have not yet been developed.

The iron mining industry in Corea has made great progress during the past two years, and the output of iron ore in 1916 amounted to 245,418 tons. It is noteworthy that the most important coal and iron mines are found in the north-west, with Heijo (Pyeng-yang) as a centre. Corean iron mines generally possess very extensive veins, and, though the quality of the ore is poor—yielding only about 50 per cent. of iron—the width and number of the veins more than compensate for the comparatively low quality of the ore. A large iron foundry is being erected at Kenji-ho, at the mouth of the Daido River, near Chinnampo. The enterprise is said to be well capitalised, and intended to be conducted on a very large scale; possibly Chinese ores as well as Corean will be dealt with. It is anticipated that this foundry will be completed by 1919.

A Japanese official is reported in the local Press as having expressed the opinion that Corean iron will eventually be sufficient to meet Japan's requirements in full. There is little doubt but that this industry has a bright future, and, with improved transport facilities, a very large increase in the output of iron ore may be anticipated.

THE FREIGHT MARKET.

From every coal shipping district in the United Kingdom comes the report of a severe shortage of tonnage, recent days having produced nothing to minimise the scarcity which has been reported with monotonous reiteration during the past few weeks. On the north-east coast, much coal business is being held up for lack of cargo space. The few fixtures which have been made are mostly for coke carriers of small dimensions for French Atlantic ports. Outside the area for which the rates of freight are limited, there have been only a mere handful of charters. Thus, North Spain is represented by the engagement of a boat for Santander at 140s., Port Said has been fixed for at 160s., and Nakskov at 200 kr. The latter, it will be noted, furnishes the first instance of a Baltic fixture for quite a long time. The coasting market has been very irregular during the week, London having been twice done at 13s. 6d. and twice at 16s. 6d., in every instance for vessels of under 1,000 tons. Barcelona is quoted, for Tyne loading, at from 200s. to 220s. Scandinavian and Spanish orders are numerous, but, at present, unavailingly circulated, and all destinations, Allied and neutral alike, could do with very much improved transport facilities. At South Wales, the position is pretty much the same as on Tyneside. Very high rates are on offer for vessels for distant destinations, but owners prefer the "quick turn round" which is offered by the nearer trades. Very few vessels have been available for allocation, and the French Atlantic has monopolised the bulk of the business. Barcelona is reported done thrice at 220s., and Gibraltar twice at 87s. 6d. Otherwise, "unrestricted" destinations are famished for want of tonnage supplies.

Homewards, the River Plate is very slow at the unaltered quotations of 145s. from up-river and 140s. from down-river ports to the United Kingdom. At the United States, coal freights from Virginia to the Plate remain at 125s., with 30 dolts. for Rio discharge. Heavy grain business is still being done at 32s. 6d. from the Northern Range to West Italy, and 35s. from the Gulf to the same destination. Net form tonnage continues to command 180s. to the United Kingdom, and 200s. to France from the Northern Range. At the Far East, tonnage is in fair request at 500s. from Madras Coast to Marseilles with kernels, 285s. from Calcutta to Genoa with jute, and 500s. from Saigon to France with rice. Kurrachee to the United Kingdom is steady, at 250s. The Mediterranean ore and phosphate ports are offering firm figures for tonnage to the United Kingdom.

Tyne to Boulogne, 500, 45s., coke; Barcelona, 2,800, 210s., reported; Calais or Dunkirk, 350, 45s., coke; Dunkirk, 800, 45s., coke; London, 400 and 700, 13s. 6d.; 900 and 950, 16s. 6d.; Nakskov, 1,000, 200 kr.; North French Range, 300, 50s., pig iron; 900 and 950, 45s., coke; Port Said, 7,000, 160s.; Santander, 3,500, 140s.; and Treport, 550, 46s., coke.

Cardiff to Barcelona, 2,800 and 3,000, 220s.; Brest, 2,000, 45s., neutral; Caen, 700 and 850, 48s., neutral; 1,300, 46s. 6d., neutral; 1,300, 46s., neutral; Fecamp, 600, 48s. 9d., neutral; Gibraltar, 2,500, 87s. 6d.; 2,400, 87s. 6d.; 500; Granville, 150, 120s., sail; Havre, 1,500, 22s. 6d.; 1,500, 45s. 9d., neutral; Honfleur, 1,000, 23s.; Rouen, 2,000,

49s. 6d., patent fuel, neutral; and St. Malo, 750, 43s. 6d., neutral.

Swansea to Dublin, 18s., several vessels; Dundalk, 650, 18s.; La Pallice, 3,000, 29s.; Caen, 900, 950, and 990, 48s., neutral; 1,100 and 1,300, 46s. 6d., neutral; Dieppe, 900, 48s. 3d., neutral; 1,900 and 1,600, 47s. 3d., neutral; Rouen, 1,400, 48s. 9d., neutral; Brest, 2,000, 45s., neutral; and Tonmay Charente, 1,650, private terms.

Tees to Gravelines or other Channel port, 300, 50s., pig iron.

Port Talbot to Barcelona, 2,800, 220s.

Newport or Cardiff to Rouen, 1,400, 74s. 3d., coke, neutral.

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

Birmingham Railway Carriage and Wagon Company Limited.—The directors have declared an interim dividend of 10 per cent. per annum on the ordinary capital, free of tax, for the half-year ended June 30. The dividend on the ordinary shares for the corresponding period of last year was 3½ per cent.

British Wagon Company Limited.—An interim dividend for the half-year of 4s. per share (£3 paid) and of 1s. 4d. per share (£1 paid), equal to 6½ per cent., is announced.

Coatbridge Gas Company Limited.—Dividends of £11 10s. per cent. per annum on the original stock, and £8 1s. per cent. on the £10 shares for the year ended June 30.

National Gas Engine Company Limited.—The directors announce an interim dividend at the rate of 7½ per cent. per annum, less income tax, on ordinary shares for the six months ended June 30.

New Monckton Colliery Company Limited.—A final dividend of 1s. per share, free of tax, on the old shares, and 9d. per share, free of tax, on the new shares, is recommended, which, with the interim dividend, makes a distribution for the year of 10 per cent., the same as last year.

North British Locomotive Company Limited.—The questions in connection with contracts taken by the company being still unsettled, the directors state they are not yet in a position to submit a balance-sheet for 1916. Meanwhile, they recommend the payment out of the reserve fund of a dividend on the ordinary share capital of 7½ per cent., tax free, in respect of 1916.

Shelton Iron, Steel and Coal Company Limited.—Interim dividend declared of 6d. per share, less tax, on account of the year to December 31 last, payable to shareholders registered August 1.

South Durham Iron and Steel Company Limited.—The directors have declared a second interim dividend of 5 per cent., for which warrants will be posted on the 21st inst.

Western Wagon and Property Company Limited.—The usual interim dividend at the rate of 10 per cent. per annum for the half-year ended June 30 has been paid.

Yorkshire Electric Power Company Limited.—The report for the half-year ended June 30 states that the revenue has increased, and, notwithstanding the higher cost of coal and labour, the net profit is larger. The net profits, after payment of bank and other interest, for the three half-years ended June 30 were: 1917, £17,617; 1916, £13,549; 1915, £9,873. In view of the financial conditions arising out of the war, the directors are deferring the payment of a dividend on the ordinary shares until the accounts are made up for the year. Of the recent issue of £71,640 of 6 per cent. cumulative preference shares, £42,845 has been taken up, leaving £28,795 still available.

NEW COMPANIES.

Korting Brothers (1917) Limited.—Private company. Registered office, 53, Victoria-street, Westminster. Registered July 21. To carry on at home and abroad the business of founders, electrical and gas engineers, etc. Capital, £15,000. Directors: F. A. Robinson, E. H. Beckett, and O. Lindenmann.

Reeves (R. W.) Limited.—Private company. Registered office, Portland-street, Leigh, Lancashire. Registered July 21. To carry on any of the businesses of marine, aerial, railway, and general engineers, etc. Capital, £2,000. Directors: R. W., A. E., R., and A. E. Reeves.

Richards (H.) and Company Limited.—Private company. Registered July 24. To acquire and take over as a going concern and to carry on the business of a steam rolling contractor, iron and brass founder, and marine and general engineer. Capital, £10,000. Directors: H. H. Richards, Altyrpe-road, Newport, Mon.; C. A. Burpitt, 2, Chepstow-road, Newport; and S. D. Williams, 24, Clyfford-crescent, Newport.

Sheffield Reduction Company Limited.—Private company. Registered July 24. To carry on businesses for the thermal treatment of metals, annealers, reducers, and hardeners of steel, etc. Capital, £10,000. Directors to be appointed by the subscribers. Subscribers: A. V. Thomson and T. Rowlands.

Southern Counties Pitwood Company Limited.—Private company. Registered office, 9, Laurence Pountney-hill, London. Registered July 24. To carry on the business as merchants in and importers and exporters of pitwood, timber growers, etc. Capital, £5,000. Subscribers: J. W. Boundy, 169, Vicarage-road, Watford, Herts; R. J. Alter, 1, Stanley-gardens, Cricklewood, N.W. 2; and G. S. Knott, 79, Waller-road, New Cross, S.E.

Wedmore Engineering Company Limited.—Private company. Registered July 23. To carry on business of general engineers, iron founders, mechanical engineers, etc. Capital, £100. Directors: S. G. Beaton, Branscombe, Woodcote Green, Wallington, engineer; and G. H. Beaton, 11, St. James-square, Holland Park, W., engineer.

Yates (G. H.) (Dudley Port) Limited.—Private company. Registered July 21. To carry on the trade or business of general bidders, ore and metal casters, founders, and smelters, etc. Capital, £6,000. Subscribers: G. H. Yates, 233, Horseley Heath, Tipton; and J. W. Knowles, Grange House, Brader Village, Oldbury.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

The *London Gazette* announces the dissolution of partnership between William Dobson and Joseph Clinton Parsonage, carrying on business as coal, coke, and pitwood merchants, at Monument-lane Coal Wharf, St. Vincent-street, Ladywood, in the city of Birmingham, under the style or firm of Joseph Palmer and Co. The business will be carried on by the last named under the original style or title.



The Silent Conveyor

(Spence's Patent).

A Fair Example of Results.

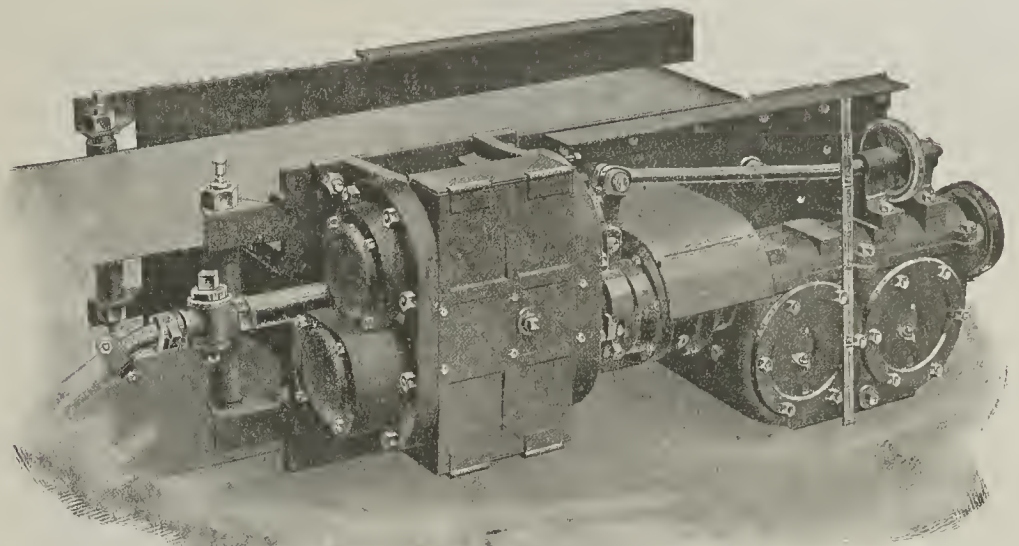
Length of Face - - 80 yards

Height of Seam - - 2 ft. 9 in.

Average Gradient
against load \sim 1 in 12

Average discharge
(5 men) - 60 tons per shift

Average load (input) - 4 B.H.P.



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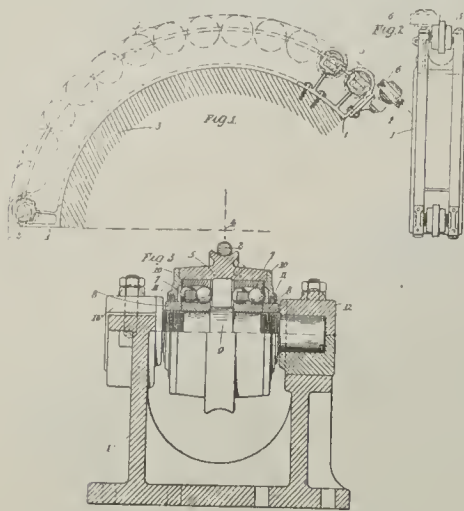
Meco Works, Moorfields,

SHEFFIELD.

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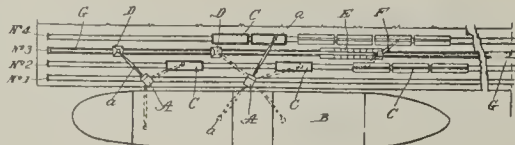
ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

Improvements in Rope-Supporting Devices in Lifting or Winding Systems. Aktiebolaget Svenska Bruken, of Artillerigatan 17, Gothenburg, Sweden.—Relates to substitutes for large guiding sheaves or pulleys, and the like, of the kind in which a series of small sheaves or rollers are arranged in an arched frame the length of which need only be sufficient to support the rope through the required angle of deflection. Fig. 1 is a side elevation; fig. 2 is an end view; and fig. 3 is a cross sectional view, on an enlarged scale, of a rope deflecting roller and its bearings. 1 is a suitably arched frame which, in the form shown, is constructed for deflecting the main rope 2 through an angle of 135 degs. The frame 1 bears on a fixed bed 3, such, for example, as a concrete bedding. Journalled in the frame 1 is a plurality of rope supporting rollers 5, preferably located at equal distances from one another, and from a common centre 4. By such an arrangement the advantage is gained, amongst others, that the load



will be equally distributed on all the rollers. Situated at the side of the frame 1 next to the driving machinery is a guide roller 6 adapted to keep the rope 2 in position in the races or grooves of the deflecting rollers. The means for journaling the separate rope-deflecting rollers is shown in fig. 3. The rollers 5 are mounted on ball bearings 7, the inner rings of which are secured by nuts 8 to a shaft 9 in any known or suitable manner. The shaft 9 is secured to the frame 1, which is conveniently U-shaped in cross section, the roller proper 5 being carried by the outer rings of the ball bearings so as to rotate with the same. Secured to the roller 5 are, further, two side plates 10, having packings 11 bearing on the shaft, or on nuts 8 thereon. To enable a rope-deflecting roller to be removed and replaced by a new one, the roller with its shaft is simply lifted out of the frame after the covers 12 have been removed. (Five claims.)

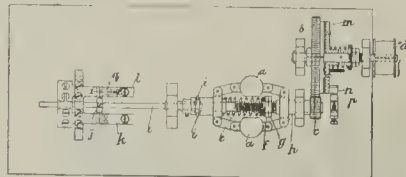
105557. Apparatus for Loading and Unloading. F. L. Stuart, Glenville-road, Greenwich, Fairfield, Connecticut, U.S.A.—This invention relates to apparatus for unloading coal, ore, and other material from cars, barges, ships, or other vessels or carriers, for delivering such material to other receptacles, for conveying the material to distant points, and for delivering it to and storing it in cars or other conveyors or to places of storage. The figure is a plan view, illustrating how the locomotive cranes may take material from a barge or ship and deliver it directly to cars or to hoppers, which in turn deliver to a conveyor belt that carries the material to the loading apparatus. In the preferred system of loading and unloading apparatus organized in accordance with this invention, four tracks are used. On track No. 1 there are one or more locomotive cranes A of any suitable well-known kind, and which may be moved to any desired position on the track. Each crane is equipped with a boom carrying a clam bucket or other receptacle for taking material from a barge or other vessel B. The boom is so mounted that it may be raised and lowered to any desired extent, and swung from place to place as required. On tracks Nos. 2 and 4 there are cars C which may be gondolas, box cars, or other similar carriers. The cars may be disposed anywhere on the tracks as may be most convenient, and the cranes and other apparatus hereinafter



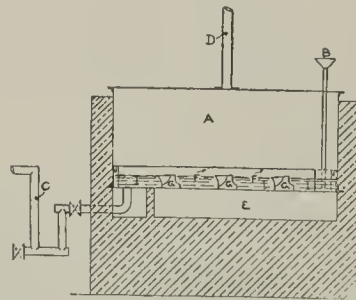
described may be shifted so that it is not necessary to break up a train of cars or to switch them or to move them from place to place as the cranes, hoppers, and other loading apparatus may be suitably moved to deliver to the cars, but when circumstances permit, the cars may be shifted with relation to the cranes. Any desired number of hoppers D may be located on the track No. 3. Each of these hoppers is mounted on a truck travelling on track No. 3, and may be shifted to any desired position relatively to the cranes, and each hopper is provided with a chute or spout, which delivers to a conveyor belt G. On track No. 3 is also located a movable loading apparatus or tripper E, consisting of a frame mounted on wheels, and provided with a boom conveyor F, supported to swing about a vertical axis, and pivoted for vertical adjustment by means of suitable tackle. The loader E is connected with the endless carrier belt G, which extends below the hoppers D, and has a looped portion which extends to the upper portion of the loader, and delivers through a hopper to the loading apparatus. The organization is such that the loading apparatus may be moved from place to place on track No. 3 between the cars on tracks Nos. 2 and 4 in such manner as to deliver to any one of said cars on either track. (Five claims.)

106360. Improvements in Mine Signalling Apparatus. John Davis and Son (Derby) Limited, All Saints Works, Derby; G. D. Croft, Hasland, Chesterfield; and J. W. End View, Hasland, Chesterfield.—This invention relates to the type of mechano-electrical signalling apparatus used in mines, in which the signals are driven or operated from the source of power. When the cage is about to start for the purpose of winding men, a signal of necessity be given whilst the

cage is running between top and bottom; it is therefore necessary when the engine stops for the "men" flag to be left in the "on" or visible position. The apparatus consists of a centrifugal governor a driven through suitable gearing b, c, from the winding engine, such as by means of pulley d. The tension on the governor and therefore the speed at which it will come into operation is regulated by means of a spring e, and set by two lock nuts f, g, on the governor shaft h. A fork slide i operated by a collar on the governor gives movement to a cam j, which in turn operates two electrical contact blades k, l, suitably connected by wiring to the releasing devices of the "numbers" indicator and "men" flag of the signalling dial. The first motion or slow speed shaft carries a clutch, attached to the loose portion m of which are the duplicate contact pieces n; these are adjustable to any point on the circumference of the said loose portion m of the clutch. Stops o are provided, so that when a predetermined arc has been travelled through by one contact piece n, the loose portion of the clutch is stopped revolving by the stops o alternately engaging the fixed stop s. At a certain point in its travel, the contact piece n operates an electrical contact p, which is in parallel with the contact k controlling the "numbers" release during very slow winding, such as "decking," and before the contact k is operated by the centrifugal governor. The "men" release contact blade l is provided with a rocking cam q having a shoulder or projection r, which enables it to be operated on the inward journey of slide cam j, but on the outward journey thereof said cam simply rocks on its pivot, and does not operate the blade l. The operation of the device is as follows:—On the first slow movement of the engine, the loose portion m of the clutch is carried round and contact piece n operates and releases the "numbers" indicator of the signal device. On speed being got up, the governor a comes into operation, and the slide cam j operates both "men" and "numbers" release contacts k and l. If "men" is run whilst the engine is running, this signal will still show on the stoppage of the engine, as on the return movement of the slide cam j the cam q will only rock without operating the blade l. (Five claims.)



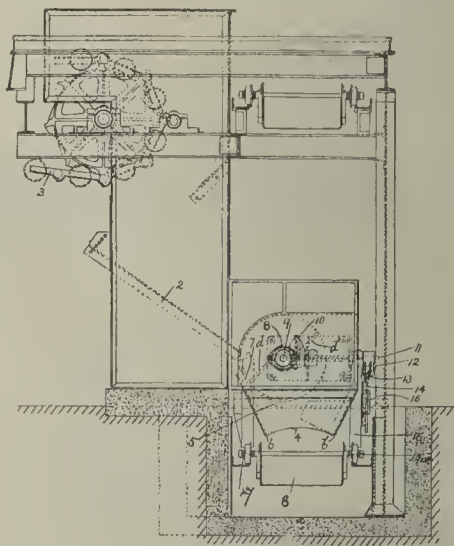
106642. Combined Tar Dehydration and Ammonia Distillation Plant. F. L. Ball, Lynsted, Queen's-avenue, Maidstone; and H. K. Hiller, 39, Victoria-street, Westminster.—According to the present invention, the liquid required to be subjected to separation, dehydration, or distillation, as the case may be, is caused to pass within a suitable still A in a long shallow continuous stream I of predetermined depth. The still is provided with an inlet pipe B for the raw liquid, an outlet C for the treated liquid, and a pipe D for the effluent vapours. The still is a rectangular vessel, in which the necessary length is obtained by a series of zigzag channels. These are formed by staggered deflector plates F of steel standing vertically on the bottom of the still, the lower edge of the plate and the bottom surface of the still being perfectly level, so as to form a practically tight joint, and yet be free to expand or contract without buckling or setting up strains inside the apparatus. They are held in place at alternate ends of the still by double angle cleats J, and are in height slightly



deeper than the stream of liquid flowing between them. A suitable depth is found to be 9 in. when the stream of liquid is 6 in., and the distance between the deflector plates being 12 in. Further, to avoid the priming and frothing action which inevitably results from the gases and vapours disengaged at the bottom of the liquid rising to the surface, there is given to the liquid alternately to the horizontal flow, also a vertical flow, by means of a series of hollow cast iron heat dispersers G. These heat dispersers, not being attached in any way to the still, do not set up any strains by reason of their expansion or contraction, and the life of the apparatus is prolonged. The still is heated externally by a direct fire, the combustion gases of which pass through a flue or flues to the chimney. These flues are built underneath the still, corresponding to the channels within the still, in such a way that, the inlet for the fluid being at one extremity of the series of channels, and the outlet at the further extremity, the liquid is progressively heated, and therefore the volatile matters can be distilled according to their respective vaporising temperatures. In this way, there is obtained a more gentle evolution of vapour than is possible if a large volume of liquid is heated at one time to a similar maximum temperature. (One claim.)

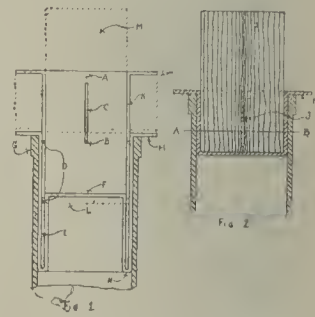
106655. Improvements in Gravity or Hinged Bucket Conveyors and Elevators. Drakes Limited, Ovenden, Halifax; and J. W. Drake, of the same address.—In the removing of coke as it is discharged from retorts, as well as in removing substances of a similar character from other positions or apparatus, it is desirable that none of such coke or substances should be deposited in any part of place except into that which is prepared to receive same. The present invention consists in so constructing the shoots or hoppers through which the substances have to be guided and fed to the buckets, and the application of parts thereto with cam actuated devices for operating them, that it is possible with the greatest precision to measure and deliver the desired quantity or amount of substance to each bucket in its turn, and that without any of said substances falling away from, or being deposited outside of, the particular bucket into which it is desired to supply same. The diagram is a side elevation, which illustrates a portion of the ordinary conveyor apparatus in connection with which the improved gravity bucket conveyors or elevators are arranged. The direction in which said gravity bucket conveyors operate relatively with the ordinary conveyor is illustrated as being at right angles thereto. In carrying the invention into effect, the shoot or hopper 2 is arranged so that the ordinary conveyor or other devices 3 (which firstly receive the coke from the retorts, or which receive and carry any substance that may have to be supplied to the gravity buckets or conveyors beneath) are enabled to deposit said substances therein in such manner that said shoot will conduct same to mouthpieces or orifices 4 beneath. The portion 5 of the hopper beneath the shoot 2 is preferably divided into two passages, so that the orifice

of each of said passages will be of an area that will lie within the area of any bucket 6, to which it has to supply the desired quantity of coke or other substance. The length of the orifice of each shoot b to b' is slightly less than the length of the bucket 6, while the width of each orifice is considerably less than the width of the bucket 6, and that in the proportion thereto and for the purpose hereinafter explained. Mounted to oscillate within the hopper 5 and above the mouthpieces or orifices is an oscillating valve or stop piece 7, and this valve or stop piece 7 is operated by having an appropriate gearing wheel or toothed quadrant 8 fixed upon its pivotal shaft 9 to engage with a toothed quadrant 10 fixed upon a shaft 11, which shaft 11 has an arm 12 also fixed upon it so that upon said arm 12 an anti-friction bowl 13 may be mounted to take against a cam 14 or like device. This cam 14 is fixed upon shaft 15 that carries sprocket wheels 16, which form part of the mechanism for moving or transferring chains 17, 17a, carrying gravity buckets 6. At the time that cam 14 has operated stop piece 7, so that it begins to deposit coke into the buckets 6, as described, the buckets 6, which are to receive the same, will be in position with their leading edges opposite the rear edges of the mouthpieces, since the width of each of said buckets 6 extends beyond the width of the mouthpiece, the time that it takes the coke to



descend into its bucket 6 is allowed for by the passage of each of said buckets from the position where the rear edges of the orifices are directly over the leading edges of the buckets 6 until said leading edges of said buckets 6 have moved sufficiently forward for the rear edges of said buckets 6 to be opposite the edges of the orifices, during which time the buckets 6 will have received their respective quantities of coke. Notwithstanding the continual movement of the buckets 6, the supply of coke is carried out during the time that each bucket is travelling beneath its respective mouthpiece, and is cut off immediately prior to the space between said buckets 6, and their neighbouring buckets being brought beneath said mouthpieces. (Three claims.)

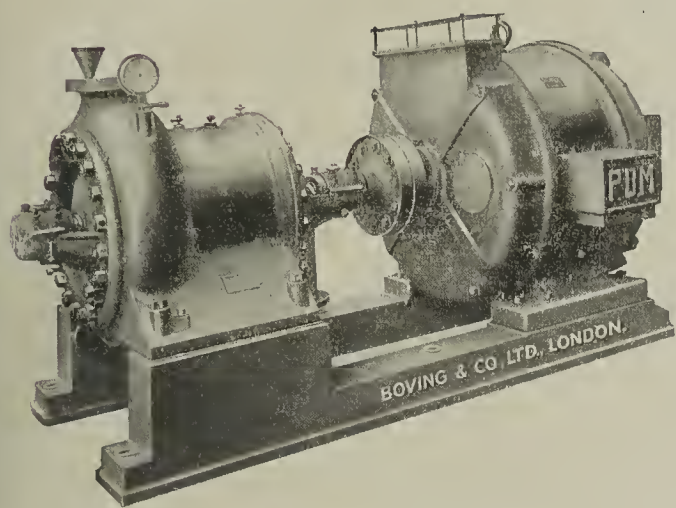
106776. An Improved Pit Prop. W. Gazeley, Ashgrove, Brook-lane, Derby.—Fig. 1 is a sectional elevation of the top of the prop, showing a cup through the junction of the two halves, when in position in the main column, this cup is for use where the roof settlement is excessive. It is provided with extending sleeves pieces K to support the extra depth of the short wood prop in the cup, and to ensure the gradual crushing of the fibres from the top downwards. This cup is made in two halves, and there is a small space between each half, for the purpose of knocking the cup out of the main column, to replace the wood. The cup from H is produced to N, then turned and finished to form bottom at F, forming the cavity E, in which the sleeve piece K slides up and down, the sleeve is fastened to the cup H, by means of a stud B, as shown in fig. 1, which works in the slot C. Fig. 2 is a sectional elevation, through the top of the prop, showing a simple form of cup, for use where the settlement is not excessive, it is made in two halves, and there is a small space at J to facilitate knocking out by the flange H, the wood is placed in two sections of cup, and driven into the main column tight enough to be rigid as shown. J shows the space between halves of cup. B shows the stud with screw shaped head, which fastens the sleeve K to the cup H, the stud may be threaded and screwed into the cup, or riveted. C shows inside elevation of slot, with inside edges splayed to suit head of stud B, A is a spike, riveted, or screwed into the sleeve K. In the cavity E a piece of metal O is inserted at each side of the joints of cup and riveted as shown at T, to prevent dirt getting into the cavity when the cup is out of the main column, a piece D is taken out of sleeve piece K, to allow the sleeve to slide behind O in the cavity E, L indicates the lower edge of sleeve K when the latter is drawn out to its full extent. To fit cup into the main column, the sleeve pieces K are pulled out of cup to the full extension, the short wood prop M is placed between the two halves of cup, and resting on the bottom F, the sleeve pieces are given a blow, to drive the spikes A into the wood, to hold the sleeve pieces extended, the cup with the wood, is then driven into the main column, and is then ready for use. As the wood M is crushed the sleeve pieces K are forced down on to the flanges H, the spikes A crushing down the grain of the wood. The top of the main column is strengthened by a metal band G, which is welded on to the main column. (Three claims.)



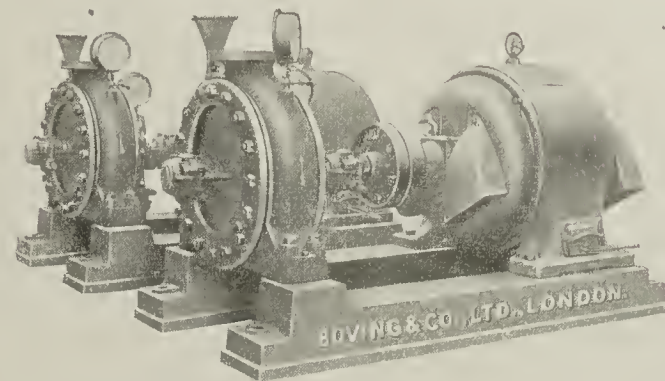
106852. Improvements in Signalling Apparatus for Use in Mines. A. Rowe, 16, Gwilym-street, Rhydfelan, Pontypridd, Glamorganshire.—This invention relates to signalling apparatus particularly applicable for use in mines, and has for its object to provide a signalling apparatus in which the striker is positively operated to strike the bell a distinct blow at each operation. The figure is a front view of a signalling apparatus provided according to the invention. A wood frame is provided consisting of the parts f¹, f², f³, f⁴, secured together by means of screws, while at each side members s⁵ are mounted flush with the side of the frame. A cover or lid l¹ is mounted hinged to the frame. An iron strap p¹ is mounted to surround the frame, and is secured to the parts s⁵, and lugs are formed on the strap,

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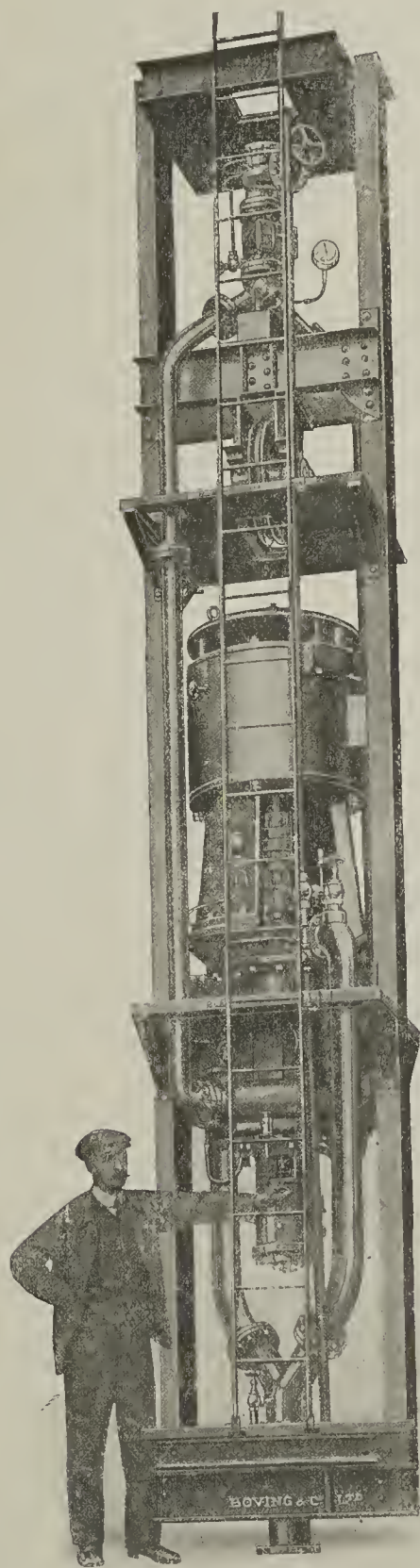
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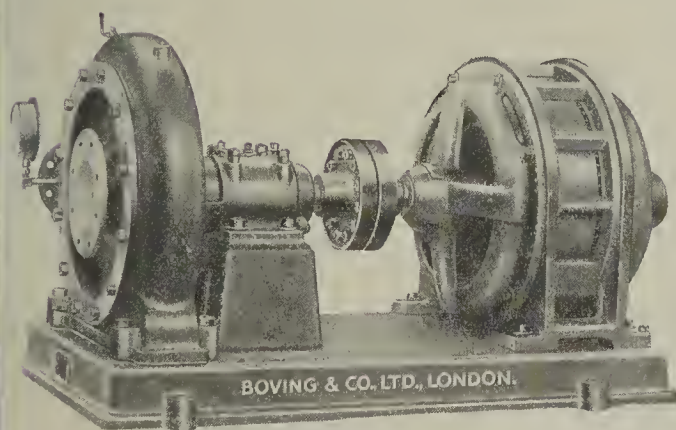
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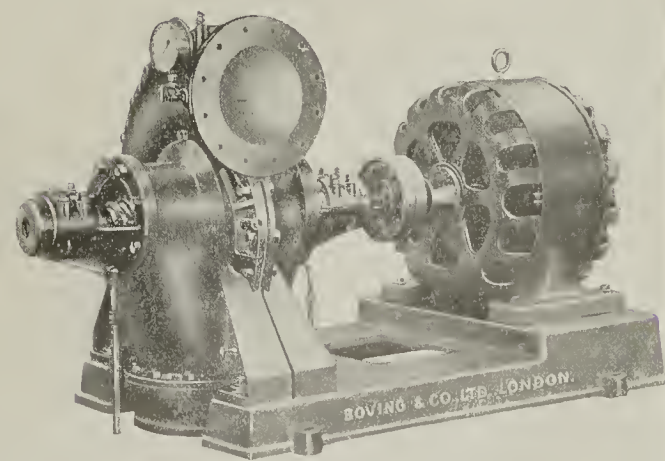
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THE COLLIERY GUARDIAN

AND

JOURNAL OF THE COAL AND IRON TRADES.

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FRIDAY, AUGUST 10, 1917.

No. 2954.

FORESTS OF THE COAL AGE.*

By Dr. D. H. SCOTT, F.R.S.

The question as to the conditions under which coal forests grew is a most difficult, attractive, and interesting one to the geologist and the botanist alike, but unfortunately one about which we up to now really know very little, and about which there is a good deal of difference of opinion among those who are qualified to judge.

What sorts of plants were they which constituted the forests of the coal age, and the *débris* of which has built up our coal? Can we tell anything, from the character and structure of the plants, about the conditions to which they may have been adapted? Is there anything special in their structure to indicate some special set of conditions under which they lived? Here we at once find ourselves face to face with a difficulty. If the trees of the coal measure period had belonged to the same families as our trees which are living to-day, it would not be very difficult to tell, from their structure, to what kind of environment they were adapted, because we should know the corresponding variations in structure among living trees and plants according to the conditions. But that is far from being the case. The plants which formed the coal forests belonged entirely to totally different families, and to a great extent to totally different classes of plants from any now living; to families and classes now either wholly extinct or perhaps represented only by small herbaceous plants bearing little enough resemblance to the trees which were related to them in the old days.

With regard to the main groups of plants which composed the forests of the coal age, a restoration of the coal forest flora has been prepared by Prof. Potonié,† but as every fossil botanist has his own view of the habit of the plants—which after all were now only found in fragments—it does not follow that Prof. Potonié's ideas are in every respect correct, though they give some idea of the kind of trees and plants under discussion. One of the greatest and most important groups of the coal plants was that of the Sigillaria. Some of them branched pretty freely; others little or perhaps not at all. Some were very tall; others had short, stumpy stems. The Cordaites came nearer to our Conifers than any others of the period. Another group was the Calamites, about which there was a good deal of evidence to show that they were really graceful trees. There were a number of ferns and fern-like plants, some of which grew into tree ferns, whilst others very probably might have climbed over their larger neighbours.

A modern scene, which perhaps in some respects may serve to suggest some of the characteristics of a coal forest, is a mangrove swamp in the Tropics. This is a better analogy to a coal measure swamp than is the oft-quoted peat bog, though, at the same time, the author considers it only a very remote one.

The first group of trees to be considered is that of the Calamites—the coal age relations of the Horsetails. There is considerable similarity of structure between the two, but, unlike the modern Horsetails, the Calamites possessed the power of unlimited growth in thickness. Examples of astonishingly perfect preservation of the original structure of these plants are known, showing every cell perfect, though the fossils are some millions of years old. Again, sections of leaves still exhibit the very delicate structure, with many of the cells very much elongated at right angles to the surface, just as is the case in most modern leaves. The little mouths of the leaves have been studied, and found to agree minutely with those of the modern Horsetails. The rootlets, too, show a structure like that of the rootlets which now grow in soft, marshy ground. On the other hand, the long, slender cones of the Calamites are—like many other things in the coal measures—not simpler, but more complicated in structure than the cones of their living allies. A highly-magnified section of such a cone shows the remarkable fact that it contains two kinds of spores. In some of the spore-sacs there were innumerable little spores, whilst in the others there were a much smaller number of very large spores. This differentiation of the spores into two kinds—the small ones being the male and the big ones the female—which is quite unknown among the living Horsetails, was discovered by Williamson, and shows that in this respect, too, those plants were more highly organised than their living allies.

The Sphenophylls formed a little group which never grew into trees, and which has now perished altogether. There is no evidence that the stems were more than, probably, $\frac{1}{2}$ in. thick at most. They had quite a different organisation from that of the Calamites, or indeed of any other plants. Some members of the family attained a much greater size, and it is not improbable that this group may have had its day at an older period than that of the coal measures, and

that we see only its dwindling remains in the coal measure flora.

The greatest group of all is that of the Lycopods, which were plants allied to the Club-Mosses, which are now represented in England by the stag's horn and other species. The Selaginellas are a very tropical group still, but always comparatively small plants, though a few of them grow to a considerable length. A *Lepidodendron* found by Mr. Lomax at Chequerbent a year or two ago measured 114 ft. in length up to the first branching of the stem. From the first forking to where the branches and leaves were was a distance of 20 ft. Some of the very biggest trees were of this Club-Moss family.

The *Lepidodendrons*, like the Horsetails, grew indefinitely in thickness by the formation of new wood and bark, like our forest trees, and some of the cones were of very considerable length—as much as a foot. Here, again, there were spores of two kinds—innumerable small ones, and quite a small number of huge ones, just as are found in the *Selaginella* to-day. It has recently been found that some of these extinct relations of the Club-Mosses went much further than that, and produced a kind of seed, consisting of a thick envelope, enclosing a single enormous spore which filled the whole cavity. These structures, while not exactly like modern seeds, were closely analogous with them.

The *Sigillaria* group is noticeable on account of the arrangement of the leaves, and also of the underground organs, of which four were given off, and which forked repeatedly. These latter are well known as *Stigmaria*, which consist of the underground organs or roots of *Sigillaria*, *Lepidodendron*, and probably some other of their relations. The structure of the cones of *Sigillaria* appears to be practically identical with that of the cone of the *Lepidodendron*, so that all these plants were glorified Club-Mosses.

The ferns of the coal measures are perhaps the most familiar, in a popular way, of all the coal plant fossils, because of their beauty and great resemblance to the ferns of the present day. Fern-like fronds were no doubt a very great feature in the coal measures, but apparently the number of true ferns was not so very great. These true ferns were not really anything very startling. They belonged either to different families from those now living, or to families which are no longer very prominent. Many of them attained the stature of tree ferns, but so ferns do still. The great fact, however, which has come out in recent years about the ferns of the coal forests is that most of them were not ferns at all, since it now appears that probably a majority of the plants which looked like ferns in the coal measures were reproduced by seeds like flowering plants, and not by spores like the true ferns. The seed was very much like that of a group of plants called Cycads at the present day. Among others, *Neuropteris*, long believed to be a fern, has now been shown, by Mr. Kidston's discovery, to be a seed-bearing plant, and not a fern at all.

Another group of coal forest trees was the Cordaites, which came nearest to the living Conifers. The great, simple, sword-shaped leaves used to be considered the leaves of some plant like *Yucca*, though that was totally wrong. The group was intermediate in character between the well-known Conifers and the tropical and sub-tropical Cycads, and perhaps was nearest of all to that extraordinary tree, the maidenhair tree, which bears large plum-like seeds and leaves like the leaflets of a maidenhair. It is a most interesting tree, because it has no living relations at all, although in geological ages later than those of the coal measures—in and around the oolite period—there were a great number of representatives of this group; it is quite probable that it was derived from, and related to, these Cordaites trees.

Considering some of the groups of coal forest trees more in detail, in those days relations of the Horsetails undoubtedly did grow into trees. During the intermediate geological ages—such as the mesozoic, lias, oolite, and so on—Horsetails were to be found. The further back one went, the bigger they were, and, conversely, by the time one got down the ages again to the tertiaries, one only found Horsetails of moderate size, like our own. And there is some evidence that our recent Horsetails really may be the degenerate scions of the great old Calamite stock, though why they got so reduced is a very difficult question. In a general way, we can only say that they got reduced because they had to stand the competition of new groups, which under changing conditions were better adapted for tree life.

Skipping the Sphenophylls, which do not seem to have grown into trees at all, and coming to the Club-Mosses, it is more than doubtful whether, in coal measure times, Club-Mosses grew into trees, because, side by side with these huge relations of the Club-Mosses, we find real Club-Mosses like those of the present day—little plants agreeing very nearly with the genus *Selaginella*. There is no reason to suppose

that in the coal measures our *Selaginellas*, for example, were anything very different from the *Selaginellas* of the present day; and the great Club-Moss trees belong to a different stock altogether from the living ones.

True Conifers and Cycads do not appear in our coal measures at all, and they scarcely appear within the period. There are a few rather doubtful remains in the upper coal measures, but they began really to be prominent in the Permian.

We are dealing, for the most part, with a flora totally remote from the tree flora of the present day, and not directly comparable with it. The main differences between the coal flora and the present flora are differences of race, not of conditions; of nature, not of nurture. Allowing for such differences due to the plants starting from a different hereditary basis, and belonging to different families, the structure is remarkably like that of present-day plants; and the author finds it impossible to believe that the general conditions then were fundamentally different from what they are now.

It has been suggested that there was a great excess of carbon dioxide in the air in coal measure times. Well, the structure of the plants, and of the leaves especially, looks as if they had to get their carbon dioxide in very much the same way and in similar, meagre quantities as recent plants. There is no sign of any big difference in this respect in the structure. Then, again, some experiments were tried at Kew a few years ago on the way plants can endure more liberal supplies of carbonic acid, and the results were most disastrous. The plants produced all sorts of abnormal growths, and perished rapidly. Whilst that is not absolutely conclusive, because, of course, the experiments could only be made with modern plants, at any rate we must not assume that plants have ever been able to endure a very much greater supply of CO_2 than they get at the present day.

The plants of the coal period appear to have been adapted to fundamentally the same conditions as those now existing on the earth, and to just the same requirements of breathing, gas exchange, water absorption and water conduction, food transport, mechanical strength against every kind of strain, as the plants now living. The main differences were differences of style; their traditions were different, they belonged to other groups, and started from another hereditary basis.

The general habit of the flora was not very essentially different, though often peculiar in detail, from that of plants now living, as the very mistakes of palaeobotanists show. The ferns, which are proved to have been no ferns, were so like the real ones that one genus was described by its discoverer as *Alethopteris*, the true bracken. Even Sir Joseph Hooker thought that recent genera of ferns could be recognised, though the example that he took was one which has turned out not to be a fern at all. This is only mentioned to show that, in habit, there was not necessarily any essential difference of a big kind between the plants then and the plants of the present day, if they could delude people like Sternberg and Sir Joseph Hooker.

The Cordaitan leaves, now known to have been those of trees allied to Conifers, were long called *Yuccites*, and so on. Although not exactly known in the Conifer group, they are still a familiar type of leaf in other groups. As regards the structure, the wood, when once it started to form a real trunk, was the same in general structure as the wood of the Conifers of the present day. It was not so complicated as the wood of the hardwood trees, but was on essentially the same lines as those of Conifers, and the resemblance often extends to minute details.

The chief difference between the coal measure woods—not the wood that was first laid down, but later growths—and modern woods, is that we scarcely ever find any annual rings. Delusive appearances are found, but they always turn out not to be real, continuous, regular rings; and that has generally been taken as an indication of an equable climate. If there had been regular alternations of summer and winter, it is most likely that the trees would have formed annual rings; and the author is inclined to think there was an equable climate.

The reproduction, it is true, was very different from that of modern trees. Very often it was by spores, as in the Calamites, Sphenophylls, most of the Lycopods, and the tree ferns, and, when by seeds, the seeds were like those of the more primitive seed-bearing plants of the present day. There is a big difference there, but reproductive organs are generally common to large groups of plants, and remain constant for very long periods. Most likely the real reason for the antique fashion of the reproductive organs of the coal measure plants is that the higher families of insects had not yet arisen. We have not got true flowers, because we had not got the higher families of insects, and most likely it was that great correlation which made all the difference to the reproductive organs of the plants. We have got back to a time before the appearance of the flower. There may have been some beginning of the relation between insects and plants, but it was only a beginning.

Broadly speaking, it is pretty clear that the plants of the coal forest did not live under very different conditions from those of the present day. Different

* From a paper read before the Midland Institute of Mining, Civil and Mechanical Engineers, on July 26.

† This, and many of the different plants described in the paper, were illustrated by means of lantern slides.

... were then dominant, but they gained their ... by the same general policy which in turn ... by their supplanters at a later date. ... as already stated, their adaptation was ... the same, at least if we except the reproduc-

regard to the question of any special adaptations in the plants of the coal forest indicating the particular set of conditions under which they lived—perhaps not unlike some particular set of conditions still existing on the earth's surface—the coal flora has never been properly studied from this point of view. The habit of the plants, as shown in casts and impressions, gives us little information as to their special adaptations. The study of structure—based on petrifications—is, after all, rather a new subject, and hitherto we have thought of little else than relationships—the bearing of fossil evidence on evolution, in fact. Physiological anatomy, the study of structure in relation to function, as yet hardly exists for fossil plants.

However, the structure affords some confirmation of the generally accepted view that the coal flora were a swampy flora. One of the best examples is in the roots of *Calamites*, which show just the same hollow structure, with numerous cavities, as we find in plants with a very wet environment at the present day. By no means all the plants show that structure, though, and especially as regards the family of the *Cordaiteae*, they do not seem to show any particular swampy indications in their structure. At the same time, it must be remembered that the great French authority, Grand'Eury, finds *Cordaitean* roots mixed up with those of the other coal plants. The usual idea is that there are at least two sets of plants represented among the remains—the true inhabitants of swamps, whose remains were preserved *in situ*, at least, in many cases—and the drifted remains. The argument as to the first set would probably apply to the coal balls found in the Bullion mines in various places in Lancashire and Yorkshire—that these were formed *in situ*, just as the fragments dropped from the trees. That is what Hooker and Binney said, and it seems to be confirmed by recent work. But, at the same time, in these very seams, one finds roof nodules which are very different. Whereas in true coal balls there is a mixture of all kinds of plants in the same ball, in these roof nodules there is almost invariably only one plant, if any at all, and generally a thick stem or leaf stalk. They are very often, though not always, a somewhat different sort of plant from those found in the seam, and it has been suggested that these were drifted remains which may have come from a drier habitat in the neighbourhood. That seems extremely probable, and one can scarcely doubt that there were drier habitats, the plants from which sometimes got fossilised. At the same time, Grand'Eury believed that the whole flora was a swampy flora, and that the strictly dry land was uninhabited, because, he says, he can account for all the remains which are found among coal fossils in the rooted stumps, obviously *in situ*, remaining from the trees of the coal swamps. That, however, is a negative argument, and the author personally does not believe in it, but thinks there must have been dry land plants as well.

Then, besides this question of a swampy flora, there are one or two things which might seem at first to point the other way. Some of these fern-like plants had thickish fleshy leaves, that one would not expect in plants of that kind, and they look like the leaves of plants adapted, not to wet, but to dry surroundings. Dry plants, desert plants, and so on, have been very much studied, and their character is fairly well known: and one does occasionally get features in these coal plants—e.g., in these thick fleshy leaves—which do very strongly suggest plants of dry conditions. Another point is the structure of the *Lepidodendron* leaves, which were very careful to shelter their stomata, which were located in deep grooves, and, in addition, protected with hairs choking up the grooves. That is precisely what is found in plants on dry heaths, and all kinds of dry positions. It has been suggested that these apparently contradictory features, swampy adaptations and adaptations to drought, would find their explanation if the swamps were salt swamps. Now, a mangrove swamp also contains plants which show the strongest adaptation to dry conditions. Their leaves have often, in extreme form, the same peculiarities as desert plants, yet they grow in the water all the time, and that may have been the case in the coal measure period. It may have been salt, or, at least, brackish water, in which some, at any rate, of the coal plants grew, and this may account for the combination we sometimes get of adaptations to swampy conditions and drought conditions.

The growth of many of the coal trees must have been rapid. One feature in favour of this view is the beautiful preservation of the sculpturing on the surface of quite big trunks, for instance, *Lepidodendrons* and *Sigillarias*—great stems, with every detail of sculpturing on the external surface. That is a thing one would hardly get on a big trunk at the present day. One would get the bark weather-worn, and all kinds of vegetation growing on it, and disfiguring it and hiding its details. If the trunks of those coal trees were as old as one would expect from their size, they would probably be disfigured and weathered in a similar way. The beautiful preservation of the surface in these comparatively big stems seems to be evidence that they grew rapidly; and the regularity of the internal structure and the absence of annual rings all fit in with that. One may, at any rate, say that conditions must have been very favourable. It seems very probable there was a fairly high temperature, and the climate was probably equable.

Of the flora was perhaps most ... in the tropical fern houses in ... Kew. That was probably the ... regards most of the plants. The ... is not so much that of climate ... in the families chiefly repre- ... that the coal forests show us

is a particular stage of evolution of the vegetable kingdom, exhibited under exceedingly favourable conditions. However similar the physical conditions might be in these days, we can never get back to anything like the coal flora, because the plants themselves have evolved very much too far. One thing which may be mentioned, in conclusion, is the extraordinarily high organisation of the coal flora. In most respects, one may say, very broadly speaking, it is as highly organised as a modern flora. Of course, there are exceptions: no marked adaptations to insects, and so on. But, on the whole, what strikes one is the extraordinarily high organisation, and that shows us what a prodigious distance we must already be, in the later palaeozoic from which plant fossils come to us; what an enormous way we must be from the origin; that evolution has been an immensely more complex process than is often popularly supposed. It has had its ups and downs, and only a bit of the last chapter is revealed to us at all.

Prof. W. G. FEARNSIDES, in proposing a vote of thanks to Dr. Scott, said that geologists had to study coal, not as part of a forest, but as a rock, and he supposed that if there was one thing that mattered to the Sheffield district at the present time, it was—where they were to get the substitute for the South Derbyshire hard coals which it had been arranged, under the Coal Control scheme, should go elsewhere. When the science of palaeobotany had advanced to such an extent that, given any fragment of coal, they would be able to say which plants were present in it, they would need no chemical analysis. When they advanced to such a stage that, by the examination of a single piece of coal, they might see what there was in that part of the coal field which lay north of the Yorkshire border, and what there was that would replace those long-flaming, non-smoking hard coals that came to them from Derbyshire, then they would all see the immense usefulness of the work done by Dr. Scott and his colleagues, and the application it had to applied science as well as to pure science.

Mr. G. BLAKE WALKER, in seconding, referred to the extraordinary uniformity of the fossil flora of the coal measures through an immense period of time. In that district, and in almost all coal districts, the carboniferous strata, and particularly those associated with coal, were of immense thickness. Although Dr. Scott had told them that the growth of the coal trees was probably extremely rapid, yet in no other branch of palaeontology did they find a succession of strata of any duration without perceiving very considerable modifications of the fauna and the fossil remains. In the Kent coal field the different horizons were mostly determined, he believed, geologically, not so much by any variations in the vegetable remains as in certain associated fossils belonging to the Mollusca and other typical fossils, and an attempt had been made to correlate the Kent coal field with that of France—the Pas-de-Calais—by means of certain beds in which certain characteristic fossils occurred. He did not know that anyone had hazarded the duration of the coal period, but it must have extended over an enormous lapse of time, perhaps even millions of years. But that the same plants should have survived and presented similar characteristics until perhaps the very end of the period, when in the upper coal measures some variations appeared to occur—that over this immense lapse of time there should have been no development, and that the coal deposits should have sprung like Minerva fully armed from the head of Jove, not to be modified again during the whole period, was an extraordinary fact, and one which he had not seen accounted for, because the process of evolution was going on then as it always had done. What Dr. Scott had told them, that certain climatic conditions existed during the formation of the coal, which contributed very materially to the extraordinary rapidity of the growth of the vegetation which formed the base of the coal seams, was a matter which he thought still required considerable investigation. They could hardly conceive the vegetation to have accumulated in the mass it did unless conditions had been singularly favourable to its growth.

The resolution was carried unanimously, and was briefly acknowledged by Dr. Scott.

Discussion.

Prof. KENDALL (Leeds) said that the discourse had interested him exceedingly, inasmuch as there were certain critical questions upon which the geologist required the assistance of the botanist, and he thought, too, that the converse would also apply. There had been conflicting views as to the mode of origin of the coal seams, and upon that, naturally, botany should throw a good deal of light, from the nature of the plants. He thought that the two opposing classes of evidence mentioned by the author might be readily reconciled by the study of existing peat bogs. Peat bogs had their dry seasons and their wet seasons. There were periods in their growth which must have lasted hundreds, or more than hundreds, of years in the case of some of the deeper peats. At a certain stage a peat bog became dry, and they got pine trees flourishing—a regular definite pine zone. Then, by obstruction of drainage, the pine forest became a swamp, the pine trees died, an interregnum took place, and then up came another class of tree in their place; and by-and-by the bog became dry again, and the various forms of heather grew upon it. They might have a recurrence of these dry and wet conditions again and again, so that he could not see that there was any necessary incompatibility in the botanical testimony. Prof. Fearnside's suggestion that botanists should study coal, and tell them what the economic uses and value of coal might be, was somewhat on the lines of a suggestion which he (the speaker) threw out last year at the British Association meeting at Newcastle, and upon which a committee was working—namely, that they should take a particular coal seam or seams and trace them right across a particular district, and find how far their economic qualities and their geological characteristics varied. He was not sanguine at all,

for this reason, if for no other: the Haigh Moor seam was a coking coal in one colliery, and in the next adjacent colliery was non-coking, but yet it was impossible to believe that there was a radical and fundamental change in the flora from the top of the seam to the bottom to account for so profound a change in its physical and chemical characteristics. Mr. Blake Walker had commented upon the suggestion that there was little change in the plants. There was surprisingly little change—nothing like the change that could be found in the botanical characteristics, say, of any of the later formations of comparable thickness. They would find, in 5,000 ft. of the tertiary rocks, far more profound and fundamental changes than were observable in the coal measures. The really rapid, or comparatively rapid, evolution in coal measure times appeared to have been amongst mussels. The mussel shells characteristic of the lowest seams, say, of the Beeston bed coal, were very different from those on the top, the size decreasing from very large ones to shells only as large as one's little finger. He found that the generality of our seams finished with *Sigillaria*; that was the case with the Haigh Moor, the Parkgate, and the Silkstone.

NOTES ON COAL WASHING EXPERIMENTS.*

By J. PASCAL.

The results set forth in the present paper have been obtained by the method employed by Messrs. Beer, of Liège. The method is based on the construction of curves of classification and lavability curves, the latter being obtained by collecting, in a special vessel, a deposit of the washed coal in layers—as in a washer—the coal being at the top and the stones below, whilst between the practically pure coal on the one hand and the practically pure stones on the other will be situated all the intermediate grades of mixed coal and schist. This deposit is then divided into, say, 10 layers, which are separated, dried, weighed, and incinerated.

The next step is to represent on squared (millimetre) paper the total weight (M N) of the several layers, this being taken as equivalent to 200 mm. Starting from M and proceeding downward, the weight of the second and following layers is also marked off; and midway of each layer is inserted, horizontally, the percentage in ash, based on a scale on which 200 mm. represents

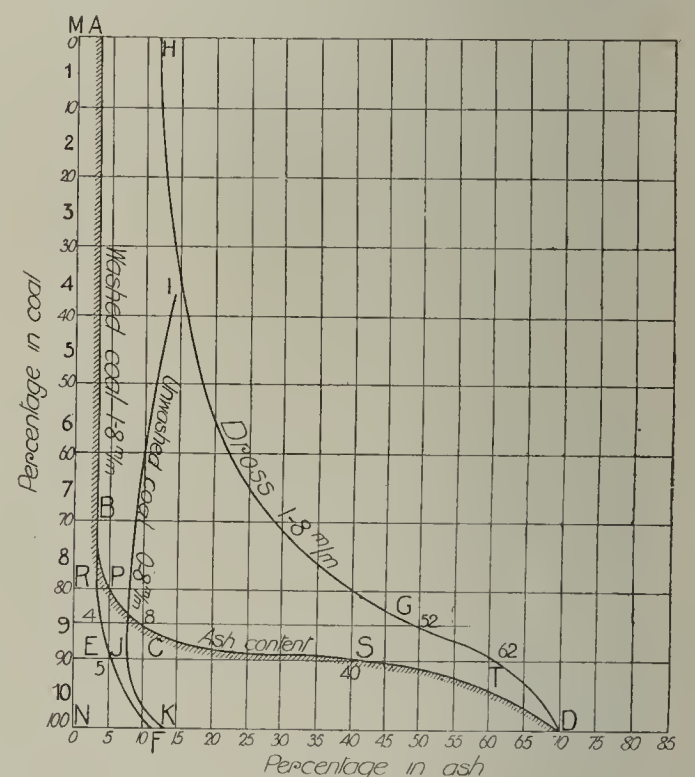


FIG. 1.—CURVES OF ASH PERCENTAGE.

100 per cent. By joining up all these points we obtain the curve (A B C D, fig. 1) of the ash percentage of each layer.

The height M N is then re-divided into 10 equal portions, so as to have layers 1 to 10 of equal height.

The curve A B C D has a fairly high degree of accuracy, because the coal is readily distinguishable from the stones (dross), though practical experience has shown that the division into coal and stones never occurs so cleanly as in a good washer, in which the material has greater freedom of movement than in an apparatus where it is only classified in a vertical direction. That is to say, the results obtained by direct washing are rather better than those in the tests.

The most interesting part of the curve is certainly B P C D, which is determined by working with a larger number of sectional layers. If, however, greater certainty be desired, two or three washings are given, and the upper half—consisting of pure coal only—of each layer is removed, the lower portions being washed again so as to furnish a longer column of the doubtful section. This is subdivided into layers and incinerated, and a fresh curve is plotted, which is brought to the same scale as the lower moiety of the contested curve. It will then be seen whether any corrections are necessary.

The curve A B P C D enables one to conclude that the new disposition given to the curves indicates very closely what goes on in a washer where the coal is on the top and the schists or stones underneath. This curve may be employed to examine the possible results obtainable by washing.

To ascertain what the results would be if the valves of the washer were set so as to separate the deposit at the height comprised between the 9th and 10th sectional layers, thus giving nine layers as washed coal and one, the last, as dross, the height M N is divided

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into 100 equal parts representing 100 per cent. of the total yield; consequently the yield would be nine-tenths, or 90 per cent.

The ash content of the washed coal will evidently be the mean of the ash content of the first nine layers. The way to ascertain it is as follows:—If we take the first seven layers, which have a uniform ash content of 3 per cent., the height M 70, or A B, represents the height of these layers; and this height multiplied by the width M A—representing 3 per cent.—will give the total amount of ash contained in these seven layers. This quantity is represented by the surface M A B 70. By analogy, the surface 70 B P 80 represents the ash of

the width 90 T. By proceeding in this manner up to the top of the diagram, we obtain the curve DTGII which may be termed the characteristic of the dross (stones). As a check, the points F and H should be in the same vertical line, since, for these two points, the entire deposit is regarded as constituting either all the washed coal or all the dross, the content of the raw coal being then ascertained.

When the characteristic curves have been plotted, it will evidently be sufficient to draw a horizontal line at a suitable determined altitude, which will give the desired theoretical plane of separation to be obtained by washing. This horizontal, for instance, 50 EST, will enable one to say that, in the hypothetical case considered:—

- (1) A yield of 90 per cent. will be obtained ;
- (2) The washed coal will have had an ash content represented by 90 E, *i.e.*, 5 per cent. ;
- (3) The dross or stone will have an ash content represented by 90 T, *i.e.*, 62 per cent. ;
- (4) The consumer will burn a mixed coal containing up to 90 S, or 40 per cent., of ash in a coal having 5 per cent. of ash, which is a fine result from the coal owner's point of view.

It may be pointed out that, once the line of separation has been established, the four results—yield, proportion of coal, dross and mixed product—are absolutely interdependent.

Testing Apparatus.

The experiments were performed on coals below 28 mm. ($1\frac{1}{8}$ in.) in diameter, and by means of the apparatus illustrated in fig. 2, which, though somewhat rudimentary, proved quite satisfactory.

The apparatus consists of a length *A* of cylindrical iron pipe measuring 99 mm. in internal diameter, 300 mm. in length, and 3 mm. thick, having two diametrically opposite rectangular notches *a*, 100 mm. wide and 6 mm. deep, cut in one of its edges. A handle *B*, in the shape of an inverted U, made of round bar iron 10 mm. thick, each limb measuring 400 mm. in length, is provided at the end of each limb with a spur *b*—of rectangular section, 10 by 5 mm.—bent inward at right angles, and adapted to fit in the notches in the cylinder *A*. The distance between the two limbs of the handle is 106 mm., so that the cylinder will pass between them without too much play. A ring *C*, of 6 mm. round bar, is bent at *c* to form an internal recess 11 mm. in diameter, and is cut and turned outward, at a point diametrically opposite, to form two small branches *d*, 10 mm. long and 5 mm. apart, the whole forming a clip. The internal diameter of the ring is about 105 mm., and the ring itself is slipped over the cylinder *A* in order to hold the handle *B* in position. A second handle *D* is similar to *B*, but of

inside A, so as to fit against the spurs *b*, and the end *f* is lowered in the cylinder until it rests on the top of the horizontal member of the handle D being the same contact with that of the handle B, and approximately parallel therewith.

Performing the Test.

The coal is first classified into the usual grades sold by the colliery (in this case 0—1, 1, 8, 8, 15, and 15—28 mm.), and a quantity of about 1 kilogram, is placed in the apparatus, which is then immersed in water, the washing being effected by gripping the handles B and D and imitating the piston stroke of a washer.

With a little practice, the operator will be able to judge what piston stroke and how many will give the best result according to the size of the coal, and to wash a sample in 10—15 minutes. The noise made by the coal in rising and falling in the cylinder will form a guide, and the effect can be checked by analysing the column of washed material.

When the washing is finished, the disc *f*, with the superimposed column of washed material, is gently lifted out by cautiously raising the handle D, each layer of the material being scraped off, as its lower edge comes flush with the top of the cylinder A, and placed in a special receptacle. The several layers are then dried, weighed, and incinerated.

In order to obtain layers of equal height, all that is necessary is to determine the total thickness of the column, and to make use of the graduations on the limbs of the handle D in determining the successive stages through which the disc is raised. It is desirable that the disc should be lifted horizontally, which is easily accomplished by making the two limbs of D slide against the horizontal member of B as a guide, and watching that the opposite graduation marks on D emerge from the cylinder as nearly level as possible.

Fig. 3 illustrates several of the curves of lavability obtained with this apparatus. The incineration of the various layers will show whether the washing has been properly carried out; and if imperfect results are obtained, the experiment must be repeated, the piston stroke being modified. After a few trials a perfect washing will be obtained.

It was contemplated to replace the iron cylinder by a glass one, which would have rendered visible the composition of the several layers in the column, and thus shown at once whether the washing was successful; but this idea was abandoned, because, owing to the particles lying more loosely together at the walls of the cylinder, the washing water is able to penetrate more easily there, and consequently the washing is completed before the central portion of the column has been fully washed.

The washing of fine coal is more difficult to test than

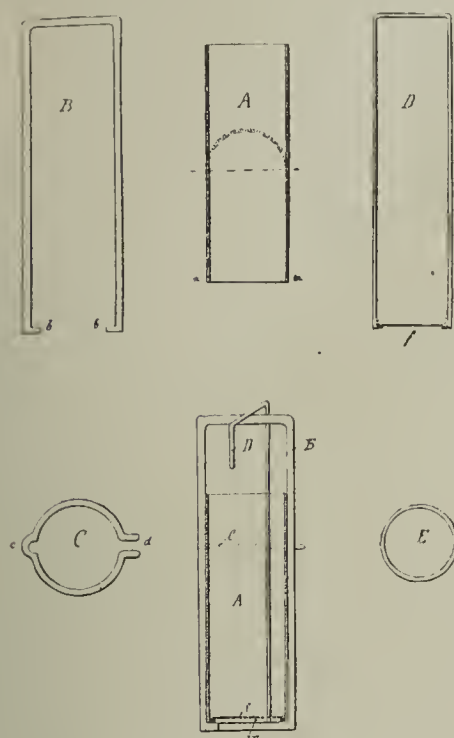


FIG. 2.—TESTING APPARATUS.

the eighth sectional layer, and M A P 80 represents the ash in the first eight layers.

Dividing this latter surface by the height M 80 gives the mean width, 80 R, which will represent the mean ash content of the first eight layers. Similarly, the quotient obtained by dividing the surface M A B C S 90 by the height M 90 will give the mean width, which, applied at 90 E, will give the mean ash content of the first nine layers, *i.e.*, the required figure for the washed coal.

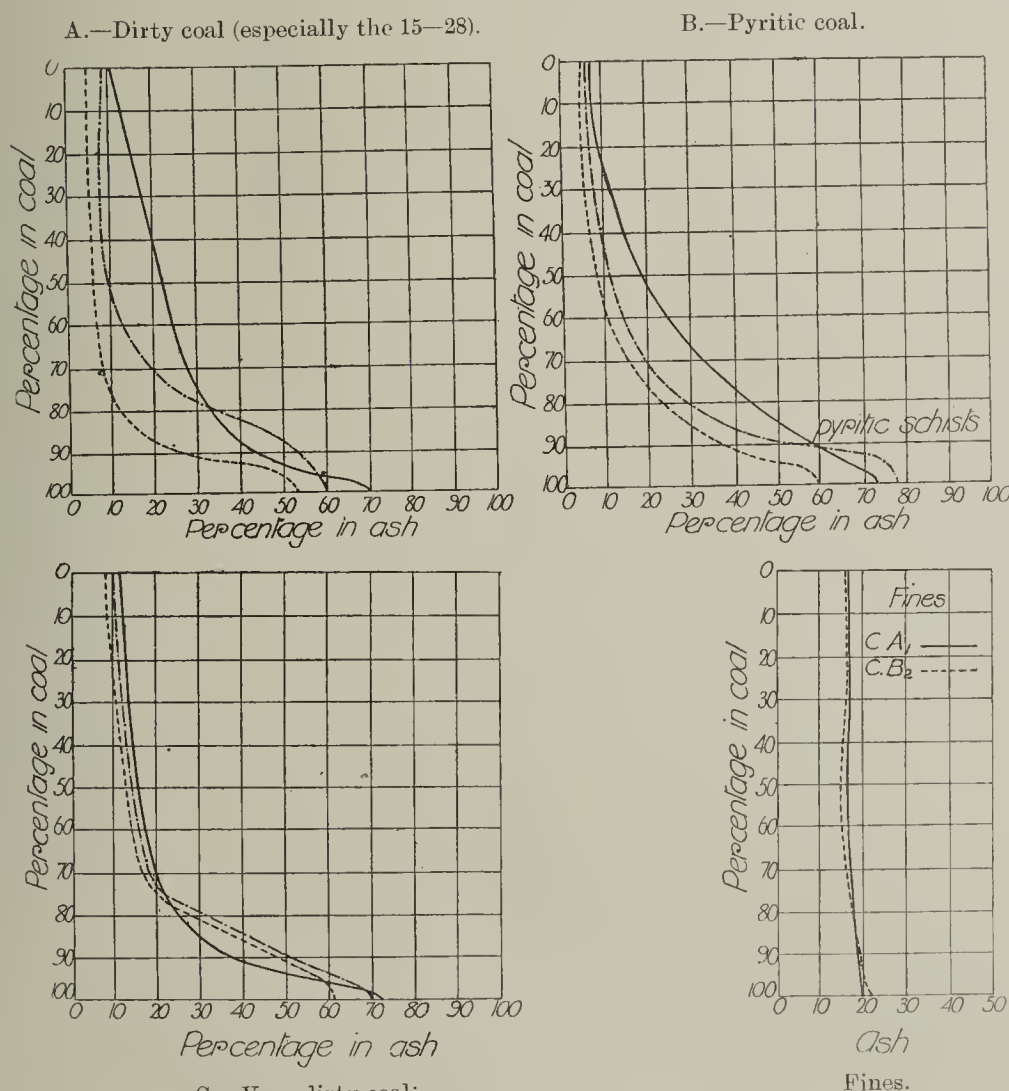


FIG. 3.—CURVES OF LAVABILITY.

A.—
Composition of the 0-28 { 23% of 0-1 mm.
33% of 1-8 mm.
22% of 8-15 mm.
22% of 15-28 mm.

B.—
Composition of the 0—28 { 33 % of 0—1 mm.
39 % of 1—8 mm.
15 % of 8—15 mm.
13 % of 15—28 mm.

C.—
Composition of the 0-28 { 26% of 0-1 mm.
23% of 1-8 mm.
26% of 8-15 mm.
25% of 15-28 mm.

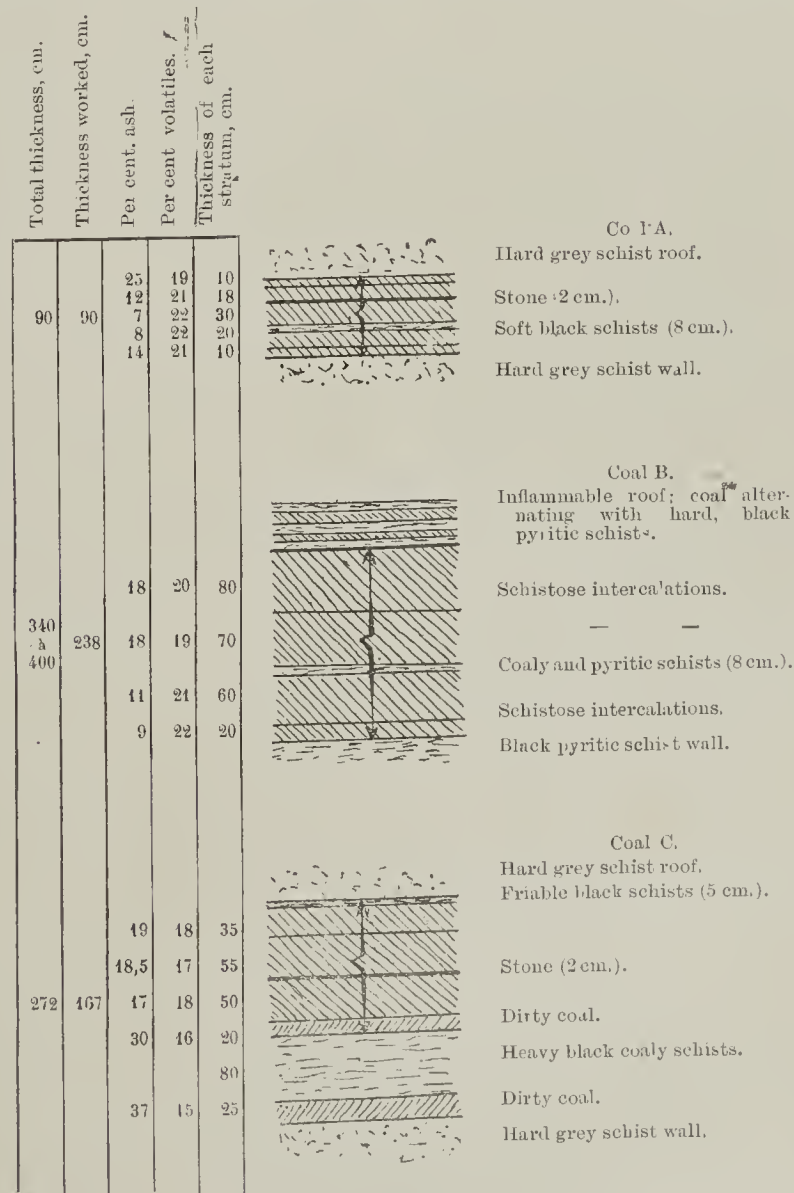


FIG. 4.—DIAGRAM OF SEAMS.

(The braces indicate the portions worked.)

By dividing the area $MABPCSD$ into sub-areas, starting at B and proceeding downward, dividing each area by the corresponding height, and setting out the resulting mean widths horizontally, we obtain a curve $ABREFF$, which is the characteristic of the washed coal. As a check, if the whole column of material be taken as coal, we get NF as the ash percentage, and this value ought to correspond to the ash content of the raw coal, less the loss of sludge which can be determined from the effluent.

By analogy, it may be said that, to obtain the ash content of the dross, the mean widths of the area DSCPBA will have to be determined, commencing at the bottom. Therefore, assuming that the last sectional layer constitutes the dross, the portion NDS90 must be plotted and divided by 90 N, which will give

6 mm. round bar. The limbs are 98 mm. apart, and thus can slip easily inside the cylinder A, each limb being graduated by means of file cuts. The terminal spurs, which are short, are soldered to a disc *f*, 97 mm. in diameter, of copper wire netting, the same as used in the washing tables. The wire is 1.5 mm. in diameter and the netting has 12 meshes per sq. cm. A split ring E, of steel wire, 3 mm. thick, and designed to act as a spring, is inserted into the cylinder A, in which position two ends of the wire just meet.

In putting the apparatus together, the handles B and D are arranged like two adjacent links of a chain. The cylinder A is introduced between the limbs of the handle D, so that the spurs *b* engage in the notches *a*. The ring C is slipped over the cylinder A, and secures the handle B to the latter. The ring E is placed

that of larger sizes. For this purpose, the disc *f* is made of very fine sieves, strengthened with brass, and the amount of coal treated in the apparatus is much smaller, a few hundred grammes being sufficient. In the main, the operation is the same, but varies in detail according to the constitution of the slack and the more or less clayey nature of the accompanying schist dust.

Fig. 3 gives two lavability curves for fine coals and show how little the ash content is reduced by washing. As most of this fine coal passes into the sludge (over 90 per cent. of ash), it seems desirable to free the coals from dust prior to washing, and to unite the fine coals with washed smalls having a relatively high content of ash. Fig. 4 is a diagram of the seams from which the coals giving the results shown in fig. 3 were obtained.

Recording Apparatus.

periments were supplemented by tracing the piston strokes by means of the simple apparatus shown in fig. 5. This consists of a base carrying two vertical shafts B, B', 15 mm. in diameter, and 300 mm. apart, on which two vertical drums, R, R', 250 mm. high and 100 mm. in diameter, are adapted to turn freely. Each drum has a plate of iron G on the lower end, and rests on an iron pedestal C secured to the base plate. A horizontal arm I is secured to the upper end of the drum R. The shaft B is fitted with a grooved pulley K, 300 mm. in diameter, resting on a sleeve J, which is tightened up on the shaft B by means of a set screw, and enables the distance between the pulley and the drum to be adjusted. A series of taper holes L are bored through the pulley, to receive a taper dog N, through which the pulley drives the arm I and drum R.

Between the two drums a dove-tailed slide F is mounted transversely on the base plate to guide the travel of a rectangular zinc plate E (160 by 180 mm.) set up in a plane parallel to that of the shafts B, B', and turned back at the sides, as shown in fig. 5. A stop

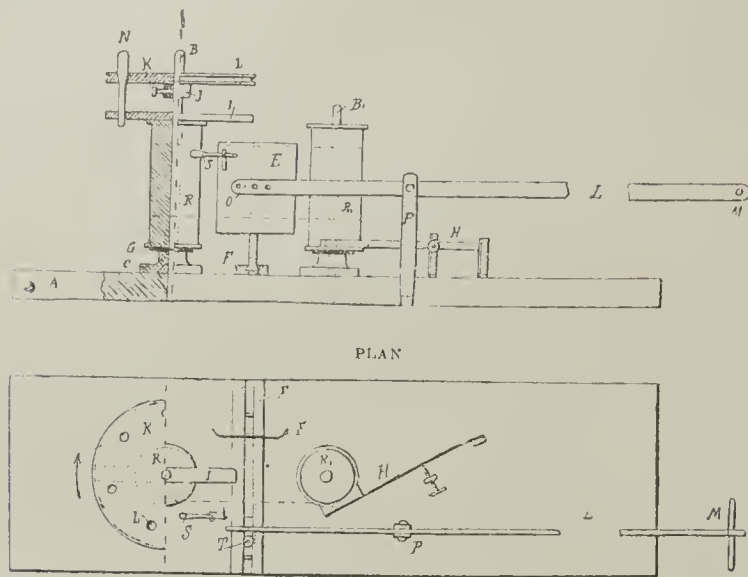


FIG. 5.—RECORDING APPARATUS.

T, adjusted by a set screw, also travels in the slide. A lever L, about 1·30 m. long, is pivoted at a point about one-quarter the way along, on a horizontal axis carried by an upright P, which is tapered at the lower end to fit a hole in the base plate A. The long arm of the lever is provided with a cross handle M, whilst the short arm is pierced by small taper holes O facing the plate E, and reducing the leverage of M in a known proportion: 1 to 5, 1 to 4 . . . These holes O receive the stylus.

A small shoe brake H, mounted on a flat spring, the tension of which is adjusted by a set screw, bears against the drum R', to keep the paper band in tension. The stylus (fig. 6) consists of an ordinary pencil holder, with a milled nut b for adjusting the length of the pencil. This holder fits, friction tight, in a tube d containing a spiral spring r to press the pencil against the paper band. The butt end of d is tapered to fit the holes O.

A paper band, 12 to 15 cm. wide, and of convenient length, e.g., 5 m., is wound on the drum R', the free end being attached to the drum R, so that it can be wound from the former to the latter. The stop T is tightened up in the slide F in such a position that it

FIG. 7.—CURVES FOR COAL C.

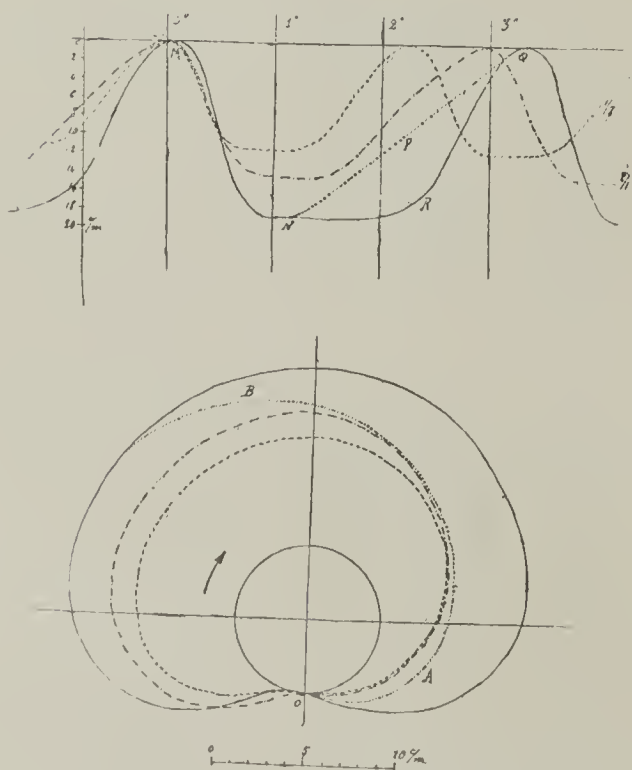


FIG. 8.—CAM PROFILE FOR COAL C.

will cause the plate E to keep the paper band under suitable tension for the correct registration of the diagram. The pulley K is belt-driven at low and uniform speed by a convenient motor, whilst the handle M is maintained in contact with the apparatus, whose curve of movement is to be drawn.

When all is in order, the dog N is inserted in one of the holes O, the pulley K, and the plate E is moved with the stop T, whereupon the dog N describes an arc of a circle, the drawing commencing as soon as the dog N enters the hole O. To stop the apparatus, the plate E is moved back, and the dog N withdrawn. The paper band travels can be measured by measuring the velocity of rotation and

the diameter of the drum, plus the paper thereon—a somewhat delicate calculation, especially when long bands are used. This difficulty can be overcome by mounting in front of the plate E a second stylus S, fixed at the end of a handle U, which oscillates through a small arc between two stops x (fig. 6). The whole is mounted on a support, and is adjusted by a screw so as to keep the stylus pressed against the paper. A metronome operates the handle, so that the stylus touches the paper at regular known intervals of time. To draw the curve representing the piston stroke of

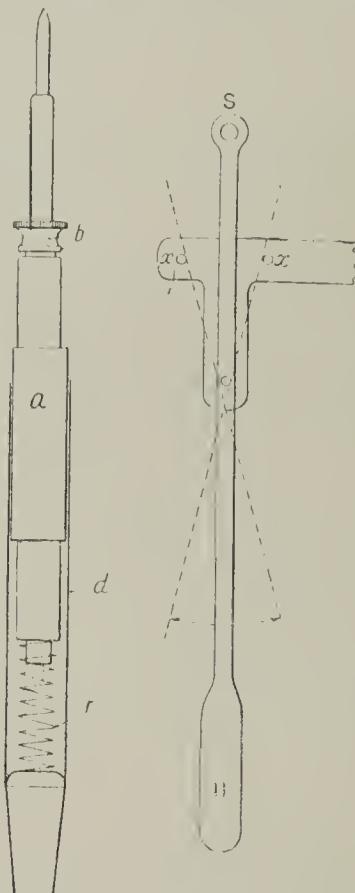
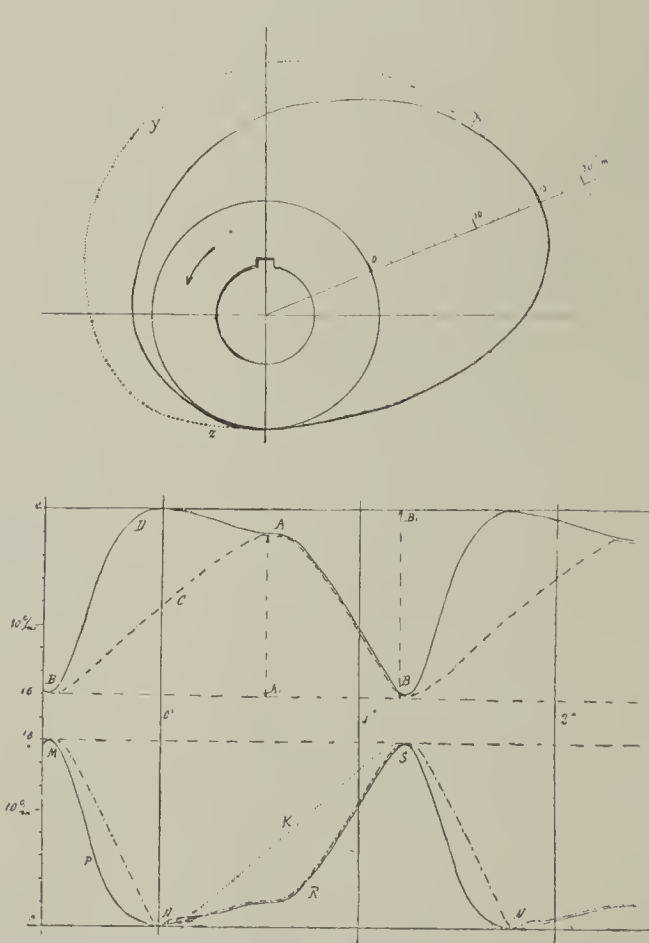


FIG. 6.—MAIN AND AUXILIARY STYLUS.

the washing tester, all that is needed is to grasp the handle M of the recorder and the two handles B and D of the tester in the same hand, the diagram being taken as soon as the operator has found the proper stroke to ensure good washing.

Fig. 7 gives the curves obtained in the author's experiments on washing the coal C, whose lavability curves are shown in fig. 2. The unbroken line repre-

FIG. 9.—CAM PROFILES FOR FLOATING AND HEAVY PISTONS.



FIGS. 10 AND 11.—PISTON-STROKE CURVES FOR FLOATING AND HEAVY PISTONS.

sents the washing of size 15—18 mm.; the dot-and-dash line, 8—15 mm.; the broken line, 1—8 mm. They demonstrate by experiment the well-known principle of washing, that the amplitude and number of the piston strokes should vary with the size of the grain. These curves of movement enable the cam profile (fig. 8) to be drawn.

It is evident that the operations within a testing apparatus differ from what goes on inside a coal washer, and therefore the nature of the piston stroke and the profile of the cam determined therefrom cannot, in most cases, be applied directly in practice. Nevertheless, they give an indication of the direction in which any modification of the working of the washer should proceed; and this indication is particularly valuable when the question is the washing of a new coal, the tests on which have been compared with those on a coal for which the conditions of washing are known.

Some of the modifications are of prime importance, such, for instance, as that indicated by dotted lines in figs. 7 and 8 for washing the 15—28 mm. coal, assuming

that a floating piston is employed. To lessen the suction, the piston ought to rise freely. The cam should therefore consist from A to B of a spiral arc, and the curve of movement will be M N P Q instead of M N R Q.

The recording device has also been applied to checking the working of the piston trough type of washer, with a piston surface 1,000 by 600 mm., washing table 1,000 by 1,600 mm.; slope, 0·8 per cent.; output, six tons per hour; water consumption, 1 cu. m. (220 gals.) per ton of coal; piston strokes, 30 to 35 per minute. The floating piston is driven by a cam and lever.

The unbroken lines in figs. 9, 10 and 11 represent the profile of the cam (fig. 9), the curve of the piston stroke of the floating piston (fig. 10), and the corresponding curve for a heavy piston (fig. 11).

The diagrams of the curves of movement are represented by dot-and-dash lines in figs. 10 and 11.

With the floating piston, the cam determines, at A B, the down stroke of the piston, which then rises freely at B C A, under the upward thrust of the water, the cam disconnecting at B D A. The cam profile is such that the stroke A A' of the piston is less than the stroke B B', which the cam would enable to be given. The cam causes the piston to descend before it has reached the full up stroke, and a slight jar is set up at A. Though the profile of the cam is but imperfectly adapted to the movement produced, it nevertheless ensures satisfactory running and proper washing.

To do away with the maintenance charges for keeping the floating pistons tight, it was considered desirable to replace them by heavy pistons, without modifying the cam profile, the piston descending by its own weight, and being lifted by the cam. The washing remained satisfactory, but the proportion of sludge increased, though there was nothing in the nature of the coal to cause this change. An investigation of the working of the washer showed that the heavy pistons produced greater suction than the floating pistons.

The reproduction of the curve of movement places this fact in evidence. Fig. 11 shows that the piston descends freely at M N, the cam disconnecting at M P N. There is a considerable jar at N, with a slight rebound. The piston rises again at N R S, under the action of the cam, the rise at R S being very rapid, and thus causing intensified suction. This might be remedied by modifying the profile of the cam, as shown by the dotted line at X Y Z, which would give the curve of movement as M N K S.

SAFETY RULES FOR ELECTRICAL EQUIPMENT IN COAL MINES.†

By H. H. CLARK and C. M. MEANS.

(Continued from page 157.)

DIVISION 5.—MISCELLANEOUS EQUIPMENT.

Fixed Electric Lamps.

For wiring and control requirements of fixed electric lamps, see Rules 124 to 136, inclusive.

137. Electric lamps used to illuminate haulage roads, side tracks, and similar passageways in non-gaseous places* of a mine may be connected to power and trolley lines.

138. Lamps may be connected in multiple or in series, and no fuse or switch will be required for one lamp or series of lamps. A switch may be used if it is desired to switch the lamps on or off, and a fuse must be used if it is necessary to protect any considerable length of wire.

139. All sockets shall be of the keyless weather-proof type, and have no exposed metallic parts. Lead wires shall be rubber covered, and of a size not smaller than No. 14 B. and S. gauge. The lead wires shall be made a part of the socket and permanently connected thereto. These wires shall be attached directly to the line wires by soldering or by mechanical connectors. Sockets shall not be supported by the line wires, but by an additional insulator or insulators or some other device that will be entirely independent of the line wires.

140. In mines that contain gaseous places*, and in which electricity is used only for lighting, or where the lighting circuits are separate from the power circuits, the potential* of such circuits shall not exceed the limits of low voltage*, and all lamps shall be connected in multiple.

141. Not more than 24 lamps shall be attached to any one circuit, and the power taken by any one circuit shall not exceed 1,300 watts.

142. In gaseous places* of a mine incandescent lamps shall be protected by approved* fittings of strong glass or metal.

143. Incandescent lamps shall be so installed that they cannot come in contact with combustible material.

144. Electric lamps shall be replaced by an authorised person* only, and in gaseous places* only after an examination for gas has been made with a safety lamp.

Portable Electric Lamps.*

145. Portable incandescent lamps,* other than approved* battery lamps, shall not be used except in connection with the repair and inspection of machines and equipment, and then only in non-gaseous places in mines. When so used, they shall be protected by a heavy wire cage which completely encloses both lamp and socket, and shall be provided with a handle to which both cage and socket are firmly attached, and through which the cord supplying the current is carried. The socket shall be keyless, and the lamp circuit shall be protected by a fuse.

146. When a portable lamp* is one of several connected in series between a source of potential* and the

* The meanings of some of the terms and expressions used in this paper have been defined in order to avoid confusion. (See page 111, July 20.) The terms so defined are designated with an asterisk (*) in the text.

† From United States Bureau of Mines Technical Paper 138.

earth, the portable lamp* shall be the one in the series electrically nearest to the earth connection.

147. The use of portable lamps with leads of ordinary flexible cord is prohibited. Only lamp cords approved* for this purpose shall be used.

Self-Contained Portable Electric Lamps.†

148. Self-contained portable electric lamps for use in gaseous places* shall be of a type approved as permissible by the Bureau of Mines.

Electric Shot-Firing Equipment.

149. Electricity from any grounded* circuit shall not be used for firing shots.‡

150. Special precautions shall be taken to prevent shot-firing conductors from becoming grounded* or from getting in contact with other electric circuits.

151. Only authorised persons* shall be allowed to fire shots with electricity in a mine.

152. The electric detonators or igniters and leads thereto shall be suitable for the conditions under which the blasting is carried on, and shall be approved by the Bureau of Mines.

153. Portable shot-firing machines shall be of efficient design, and shall be substantially constructed. All such machines shall be enclosed in strong, tight casings.

154. Primary or secondary batteries used for shot-firing shall be enclosed in a well-constructed casing provided with a special form of contact plug for making the connection between the batteries and the shot-firing leads. The design of the plug shall be such that considerable pressure will be required to make the contact, which will be immediately broken unless the plug is forcibly held in position.

155. There shall be no exposed contacts on the outside of the battery casings.

156. All portable shot-firing machines shall be equipped with a detachable handle, connecting plug, key, or similar approved* device, without which the shot-firing circuit cannot be closed, and which shall under no circumstances pass from the custody of the person authorised to fire the shots.

157. No shot-firing device shall be connected to the shot-firing leads until all other steps preparatory to the firing of the shot have been completed, and all persons have moved to a position of safety.

Disconnection of Leads.—158. Immediately after the firing of a shot, the firing leads shall be disconnected from the supply of electricity, and no person shall approach a shot which electricity has failed to explode until the firing leads have been so disconnected and an interval of 10 minutes has elapsed since the last attempt to fire the shot.

Shot Firing from Surface.—159. In coal mines employing the system of firing shots electrically from above ground when everyone is out of the mine, a complete metallic circuit shall be employed, and both wires shall be covered with insulation and supported upon glass or porcelain insulators.

160. There shall be a switch at the mouth of each working place, so that the circuit can be kept open while the miners are at work and closed only when the shots have been prepared and the miner or miners are leaving the place.

161. There shall be a locked switch in the circuit at the entrance to each heading or side entry, which shall be locked open and be thrown in only by an authorised person* when all the men are out of the respective heading or branch entry.

162. There shall be in the circuit at the foot of the shaft or slope two plugs with flexible leads not less than 5 ft. long to break further the main circuit of the shot-firing system until all the men in the mine have gone out, when the plugs will be put in by the one man authorised* to do so. Provision shall be made for locking the plugs out of circuit.

163. There shall be located in the power house a locked switch to be used for connecting the shot-firing circuit to the generator or power line. This switch shall be thrown in only by the man who is authorised* to do the shot firing, and not until the men have been checked out of the mine.

164. There shall be located in the shot firer's cabin a locked firing switch which shall be thrown in only by the authorised* shot firer after all the men are out of the mine, and after all other switches have been thrown in. In firing shots, this switch shall be thrown in but once.

165. To ensure that all men are out of the mine, an approved* system of checking shall be employed.

166. All shot-firing lines shall be carefully insulated, and the two wires that form the circuit shall be placed on the side of the entry or passageway opposite from that on which the trolley wire is placed, and so far as possible other roads than the trolley road shall be used for carrying the wires into the working places.

Electric Signalling Equipment.

167. The parts of electrical signalling systems used in connection with mines shall be designed, constructed, and installed in an approved* manner. No voltage* in excess of 25 volts shall be applied to signal circuits in gaseous places.

168. Signalling equipment that is to be used in any gaseous place* shall be so designed and constructed that no sparks sufficient to ignite gas can be obtained from the operation of the system. Only insulated wire shall be used in gaseous places*.

169. Suitable precautions shall be taken to prevent electric signal or telephone wires from becoming grounded* or from coming in contact with electric conductors, whether insulated or not. Signal circuits and telephone wires shall not be installed on the same side of an entry as power conductors.

† The use of self-contained portable electric lamps* of suitable design and construction is recommended for all coal mines, provided that in gaseous places or in places where blackdamp is given off in large quantities frequent inspections with safety lamps are made.

‡ It is recommended that all shots be fired electrically, and that for inside firing shots be fired separately and one at a time on account of the danger of causing blown-out shots and resultant explosions. If fired in groups, the firing should be done only from the surface.

Industrial Unrest and South Wales Miners:

CRITICISM OF THE COMMISSIONERS' PROPOSALS.

(SPECIALLY CONTRIBUTED.)

The report of the Welsh panel of the Commission on Industrial Unrest is devoted mainly to the conditions, temporary and permanent, which govern the inter-relationships of employers and workmen, and it bears so unmistakably the impress of the views of its Socialist member, Mr. Vernon Hartshorn, that it is already a discredited document. The Commission's terms of reference were "to enquire into and report upon industrial unrest, and to make recommendations to the Government at the earliest possible date." The panels for the other seven districts of the United Kingdom have kept very closely to these instructions, and have reported almost exclusively on those temporary disturbances of pre-war conditions which had contributed to unrest among the working classes; but other than that due to such general causes as increased cost of living, methods of recruiting, etc., the Welsh Commission found no serious unrest in the South Wales coal mining industry, and the greater portion of its voluminous report consists of a statement, biassed and in many respects inaccurate, on the geographical, sociological, and political conditions of the coal field, and of a long series of recommendations the character of which has not been inaptly described as "an essay on constructive Socialism."

In the summary of its recommendations, however, the Commission includes four specific proposals relating to firemen, price-lists, payment for small coal, and the wages of colliery officials; and it is with these proposals rather than with the Commission's dissertation on general social and economic questions that the writer proposes to deal. These four specific proposals are as follow:—

(1) The appointment and dismissal in future of colliery firemen, examiners, and their deputies by joint committees of the management and the men.

(2) The revision of old price-lists, with a view to the abolition of the "allowance" system.

(3) The provision of direct payment in respect of small coal by the adoption of rates for "large" and "through" coal respectively.

(4) Standardisation of rates of wages for colliery officials, and the recognition of their unions by the employers.

The chief objection against the first of these proposals is that it strikes at the principle of undivided managerial responsibility on which the structure of statutory mining law has been based. "Every mine," states the opening clause of the Coal Mines Act, "shall be under one manager, who shall be responsible for the control, management, and direction of the mine, and the owner or agent of every mine shall appoint himself or some other person to be the manager of such mine." The choice of the manager in the selection of firemen is, moreover, strictly limited to men who have specially qualified for such positions by the possession of a first- or second-class certificate of competency, are 25 years of age or upwards, have had at least five years' practical experience underground in a mine, and are able to test for gas with a safety lamp, can measure an air current, and have good hearing. This principle of direct responsibility on the part of a colliery company and its manager compels the adoption of the utmost precautions, both in the interests of the safety of miners and of the property controlled, and the requirements of the law are now so exacting that a manager cannot very well appoint any but a competent person to discharge the important duties of a fireman. Moreover, the inspectors, in their reports to the Home Office, write very favourably of the efficiency of the services rendered by the present-day fireman. In their report, however, the Commissioners advocate a great extension of the powers of the workmen as co-partners in the working of the colliery, and the proposal that joint committees of men and workmen should be set up to appoint and dismiss firemen is only one of their many other suggestions for "identifying the worker more closely with the control of the industry." A still more drastic change of this sort advocated by them is that no worker should be liable to be dismissed except with the consent of his fellow workmen as well as his employer. Neither is compatible with the efficient managerial control. Dual control in such a matter as the examination of the underground workings and the other duties discharged by a fireman would be disastrous. The chief complaint brought against the present system is that under it the fireman is handicapped, and, it is alleged, even frustrated, in the execution of those of his duties which make him the chief servant of the company in seeing that the underground places are in proper working condition—viz., by managerial pressure in regard to the maintenance and increase of outputs; but it has been found repeatedly that there is no ground for this charge.

The proposal that old price-lists should be revised, with a view to the abolition of the allowance system, would not effect its object. It is quite true that differences occasionally arise between employers and workmen over the fixing of these supplementary or substitutive allowances; but the practical necessity for allowances will continue so long as the physical conditions underground remain what they are. No price-list could ever be framed to meet every contingency arising in the working of a seam of coal; the special conditions requiring a variation in the application of a price-list rarely, if ever, recur in precisely the same form or in similar circumstances, and while there is no reason why payment in such conditions should not be quickly and amicably arranged by men actuated by no other motive than that of establishing a fair temporary rate of remuneration, it is certain that a revision of all price-lists would not merely be a task of interminable duration, but also one likely to lead to fric-

tion far more serious and general than that due to occasional differences over the fixing of allowances.

The adoption of the proposal that provision should be made for direct payment in respect of small coal by fixing rates for "large" and "through" coal respectively would not only revolutionise the wage system in the South Wales coal field, but would also minimise, if not entirely remove, that incentive to the production of clean large coal to which, more than to anything else, South Wales owes its present position as a coal exporting centre. The South Wales Miners' Federation has been advocating this change on every occasion on which the general wages agreement has been under revision during the past 15 years, but without success. In every one of the Conciliation agreements since 1902 the contract between the employer and the workman has been for the production of clean large coal only, and a vital condition of the standard cutting prices for the production of such large clean coal is that they "shall include all services in respect of the small coal necessarily produced in filling large coal, in conveying it from the working places to the screen at the surface and in the process of screening," because such cutting prices are, in the terms of the contract, "equal to the value of all the services involved in getting such large and small coal and more than the value of the services rendered in respect of the large coal only." The proposal is therefore objectionable to the coal owners from the points of view both of expediency and principle. The suggestion of the Commissioners is that all price-lists should contain alternative prices for "large" coal and "through" coal, and that if the proportion of small exceeds 30 per cent. of the whole the man should have the right to be paid on the through coal rate, whereas if the percentage is below 30 per cent. the owners should have the option to pay on the large coal basis. The reason for this demand is the rise in the price of small coal. The Commissioners point out that its price has increased during the past 30 years from 2s. 6d. per ton to 17s. per ton. These are most misleading figures, for they do not take into account the relative values and quantities of large and small coal in the periods compared, or their bearing on cost of production on the whole output, or of the great direct and indirect increases which have been made in the payments for the production of large coal, and they ignore the vital circumstance that the colliery owners during the war have been supplying the Admiralty with large coals at prices below the cost of production. Moreover, under normal conditions, it is the average price per ton of the whole product that determines the remunerativeness or unremunerativeness of a colliery undertaking, and it has been proved repeatedly that the miner in the South Wales coal field is to-day getting a much larger proportion of each shilling in the price of coal than he did 30 years ago. In any case, therefore, every price-list in the coal field where wages are now paid on the basis of large coal outputs—and they are by far the majority—would have to be revised and reduced on large coal if payment for small coal were ever determined upon, and it is difficult to imagine any alteration in the wage system which would prove more prolific of disputes. Such would be the inexpediency of the adoption of the proposal. The objection to the principle of the change is still more serious. It is quite true that the coal owner derives benefits from those temporary booms during which the price of small coal rises above the long period average, but the miner shares in this higher price; for in all quarterly audits the average price of small as well as of large coal is now taken into account. A fifth of any increase in the price of small coal is added to the average price of large coal. Thus, if the average price of large coal in any quarter, for example, were 20s., and if in that quarter the average price of small coal showed an increase of 5s. per ton, then the average selling price on which the general wage rate would be varied would not be 20s., but 21s. This practice meets the workmen's complaint in regard to the increasing price of small coal; but the coal owners do not want small coal produced. The commodity which they have sunk their plant and machinery to produce, and for which they primarily employ labour, is large coal; and they consider to-day, just as they did 30 or more years ago, that it would be inimical to the best interests of the industry, and those of the nation as a whole, to introduce into the wage system a factor which would remove the incentive to the production of large coal.

Certifying Surgeon Appointed.—The Chief Inspector of Factories has appointed Dr. L. H. Butler to be certifying surgeon under the Factory and Workshop Acts for the Castleford district of the county of Yorkshire (West Riding). A vacancy is announced at Ebbw Vale, in the county of Monmouth.

Holland's Fuel Supply.—Germany has temporarily given up the despatch of coal to Rotterdam for transhipment to German North Sea harbours, in view of the risks involved. German stocks of coal awaiting shipment in the North Sea have been handed over to the Dutch, an equivalent quantity being deducted from the monthly coal imports from Germany into Holland. The Dutch Government Coal Distribution Department has been informed by German coal merchants that considerably less fuel will be delivered in August than in the preceding months. At most, 250,000 tons will be imported, this being 100,000 tons less than in May and July. Furthermore, it is explained that the German mine industry will be unable to furnish even this quantity in September, so the import will be reduced to below 200,000 tons. The Coal Distribution Department has immediately taken steps to endeavour to obtain a further quantity up to the 350,000 tons already contracted for in connection with this most serious news. Dutch coal merchants have already been informed that the Government Coal Distribution Department will be unable to give the final allotment for the coming month.

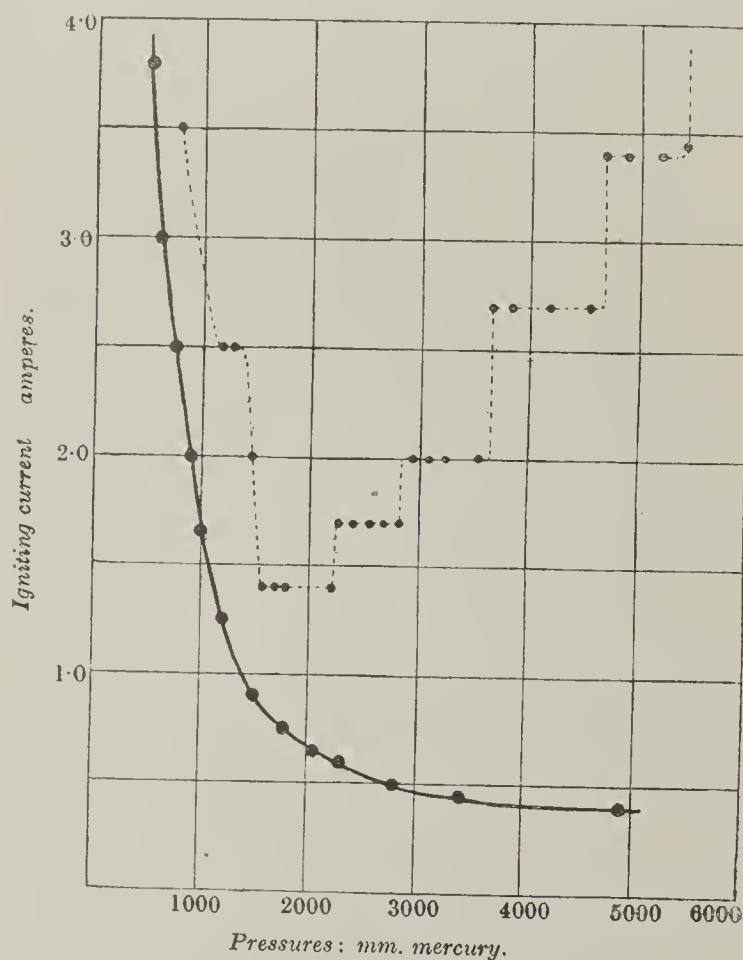
CURRENT SCIENCE AND TECHNOLOGY.

Pressure on the Electrical Ignition of Methane

Wheeler (*Trans. Chem. Soc.*) gives an account of experiments made to check the observation by Thornton that the ignition of a mixture of methane and air by the impulsive electrical discharge "proceeds *per saltum* as the pressure is changed" (*Colliery Guardian*, September 15, 1916, p. 504). The results differ in two essential respects from Thornton's, because a possible explanation of one of the differences is suggested.

A diagram representing Thornton's results is shown, in dotted line in the figure. The "igniting-currents" recorded are those currents passing through the primary circuit of the particular induction of coil used which, when broken, gave secondary discharges just capable of igniting the mixture, which contained 9.5 per cent. of methane. The electrodes were of nickel. Not only are there well defined "steps," but when the pressure of the mixture is increased above 2,000 mm. the direction of the stepped curve is reversed. This result, indicating decreased "ignitibility" of a given mixture as its pressure is increased, would, if correct, be as important practically as theoretically. The author was unable to confirm Thornton's observations, his own results being represented by the curve shown in full line in the figure.

An attempt was made to use one of the explosion vessels that had been employed for the work at pressures less than atmospheric, so as to make the results directly comparable, but it was found that the spark-gap (1 mm.) was too great. For when the pressure of the mixture



was but little greater than atmospheric it was found that the least discharge that could cross the gap caused ignition of the mixture, and there was no means of ascertaining whether, if a discharge of less intensity could have crossed, it also could have caused ignition. A new explosion vessel with a spark gap of between 0.25 mm. and 0.5 mm. was therefore employed, the electrodes being of platinum. This reduction in the spark gap enabled a secondary discharge of less intensity to pass, whilst at the same time, owing to the decreased length of the sparks, a greater intensity was required for ignition of the mixture. Thus ample margin was obtained between the "minimum sparking-current" and the "minimum igniting-current."

With this smaller spark-gap the minimum sparking current was 0.35 ampere when the pressure of the mixture in the explosion vessel was 5,000 mm.; whereas with the mixture at atmospheric pressure (760 mm.) a discharge crossed the gap readily when a current of less than 0.25 ampere was broken in the primary circuit. It was found that this increased difficulty in the passage of the discharge with increased density of the intervening medium was more marked the less powerful the induction coil, the minimum sparking current in air, for example, when a "1-inch" coil of cheap manufacture was used being 2.0 amperes at atmospheric and 3.5 amperes at 5,000 mm. pressure.

In these observations lies a possible explanation of the apparent increased difficulty of ignition with increased pressure of the mixture recorded by Thornton, the suggestion being that his records disclose in reality the increased difficulty of passage of the discharge with increased pressure of the gas. A mixture may appear to be more difficult to ignite by an impulsive discharge across a fixed spark-gap when under high compression than when at atmospheric pressure, not because the mixture is less "ignitable," but because the discharge passes less readily.

Miners' Phthisis Prevention.

For collecting and counting the fine particles of mine dust, which play such an important part in the causation of miners' phthisis, the African Government has adopted a mechanical collector to which a "dust meter" has been given. This device, with satisfactory results, has been used by the Phthisis Committee of the Mines, with the object of determining the amount of dust in the mines of the Union. In its present form comprises an

aluminium casting about 5 in. long, in which is mounted the barrel of a small air suction pump. The suction end of the barrel communicates with a shallow chamber formed on the side of the casting. This chamber has one open side which in use is closed air-tight by means of a glass microscope slide which is removably held in place by a spring. Communication between the chamber and the external atmosphere is made by a small nozzle positioned at right angles and close to the glass plate. The air pump piston is fitted with a cup leather packing so directed as to cause air to be drawn into the barrel when the piston is raised. The end of the barrel is so shaped as to eliminate dead space when the piston is fully depressed. The raising of the piston is effected by a spring. In order to make a suction stroke, the piston is pressed fully down and is so retained by a trigger. Upon releasing the trigger the piston is forced up by the spring until it comes in contact with a stop, so that a definite volume of air is collected at each suction stroke.

Before being placed in position the glass slide is coated with a sticky substance, usually vaseline. Upon the piston making a suction stroke it tends to exhaust the air from the slide chamber. The external air accordingly flows through the nozzle, and, impinging as a jet on the sticky surface of the slide, deposits its contained dust as a round spot on such surface. The strength of the spring and the size of the nozzle are such that the jet of air impinges on the slides at the rate of 40 metres per second. After removal of the slide the dust particles in the spot are counted with the aid of a microscope provided with an eye-piece micrometer, consisting of a piece of glass ruled into small squares to facilitate counting. The number so obtained, compared with the known volume of air passed into the pump, gives the number of particles per unit volume of the air tested. One glass slide can be utilised for taking a considerable number of samples, as the spots of dust are small. After the samples are taken, the slide is transferred to a specially designed dust-proof carrier for safe transport to the surface. If necessary, however, the slide can be immediately examined under-ground by means of a portable hand microscope.

The Conditions of Coke Formation.

In a note submitted to the Académie des Sciences, Messrs. G. Charpy and M. Godehot emphasise the importance of a particular thermal treatment of varied kinds of coal for the highest production of coke, and they prove by new methods of experiment that such treatment is invaluable in obtaining a good yield of coke from low-grade coal (from the coking point of view), thus extending the range of coke-producing fuels. In stating the results of comparative experiments on three kinds of coal the resistance to compression is expressed in kilogrammes per square centimetre, easily measured by means of a small lever machine. The coal was first powdered, then sifted to get the grains to a uniform size, and the powder was kept in an atmosphere saturated with water vapour at a temperature of 18-20 degs. Cent. till it absorbed a predetermined amount of moisture. It was then packed into a small tube made of refractory material and subjected to a pressure of five kilogrammes per square centimetre. The tube, firmly closed at both ends by metal discs, was then heated in an electric furnace. Under these conditions and with the class of coal used, the coke obtained was uniform and of good shape (cylindrical) for the crushing tests. The experiments also confirmed the known unfavourable effects which the oxidation and progressive heating of the coal produce on the coking process. In a further experiment to determine the variation in production under different temperatures, a tube was inserted into a furnace heated to a uniform temperature for an hour, the results being then noted and tabulated.

RESULTS OF CRUSHING TESTS (KILOGS. PER SQ. CM.).

Coking temperature, Degs. Cent.	St. Eloy coal. Results. Kilogs.	Ferrières coal. Results. Kilogs.	Noyant coal. Results. Kilogs.
650	20	18	99
	22	19	98
	19	21	94
	17	17	100
	20	20	104
	21	19	105
Mean	19.85	19	100
800	31	27	92
	29	30	98
	36	31	93
	35	28	94
	34	34	90
	32	33	95
Mean	32.9	30.5	93.6
1,000	35	49	39
	36	44	33
	38	48	36
	41	42	38
	40	43	35
	42	46	37
Mean	38.7	45	36.8

The influence of temperature is greater than would have been supposed and is, moreover, different. Whereas the St. Eloy and Ferrières coals, which give at low temperatures a coke which is too soft to use, furnish at 1,000 degs. Cent. a stronger coke (crushing strength 40 kilogs.), suitable for certain purposes, though still mediocre, Noyant coal gives, at 650 degs., a coke with a strength of 100 kilogs., and at 1,000 degs. Cent. one that is almost inferior to that from the other coals. These differences are accentuated when the thermal treatment is complicated, so that, if after heating at 650 degs. the temperature be gradually raised to 1,000 degs., the coke

from St. Eloy coal is not appreciably improved, whilst that from Noyant coal becomes much stronger (130 kilogs.), and equal to good metallurgical coke. It is, therefore, desirable to ascertain exactly which is the most suitable heat treatment for each kind of coal in the coking process.

RECENT DEVELOPMENTS IN JAPANESE BY-PRODUCT COKING.*

By T. KURAHASHI.

In Japan, especially at Kyushu, Osaka, and Tokyo, there are many coke plants, but most are beehive ovens. There are by-product ovens, however, at the following places: Tokyo Gas Light Company Limited, Tokyo; Osaka Seimi Company Limited, Osaka; Mitsubishi Makiyama Coke Plant, Tobata, Fukuoka; Imperial Steel Works, Yawata, Fukuoka; and Miike Colliery, Omura, Fukuoka. Of these the Imperial Steel Works and the Miike Colliery are most important.

The Tokyo Gas Light Company, the oldest and biggest gas company in Japan, has several gas works around the metropolis, namely, Senju, Fukagawa, Oshima, Shiba, Sunamura, Omori, and the Fukagawa tar products works. Of the gas works, the first four are operated with retorts, while the last two, Sunamura and Omori, have by-product ovens. The Sunamura plant has two batteries, one of 18 Koppers regenerative ovens, the other of 15 of the Semet-Solvay type. The Omori plant has one battery composed of 10 Koppers recuperative ovens. Both works recover by-products—tar, ammonium sulphate, and also benzol from the Semet-Solvay ovens. From the Koppers plants, the surplus gas is used for illuminating purposes, so that the benzol cannot be recovered, because it is an important illuminating component in the gas. On the other hand, tar and other by-products in the crude state are shipped in small tank boats to the Fukagawa Tar Product Works, and treated so as to produce various dyestuffs, medicines, and other high-grade coal-tar distillation products. The coke is sold for foundries and metallurgical plants, and the breeze for fuel for limekilns.

The Osaka Seimi Company Limited, Osaka City, is one of the oldest coke by-product recovery plants in the Japanese Empire, and its former chief engineer, Dr. K. Shimomura, who is the foremost authority on the coke industry in Japan, contracted with the Semet-Solvay Company about 20 years ago, to build one battery of 10 Solvay-type ovens, thus founding the first by-product coke oven plant in Japan.

Now the company has two batteries of the same type, with tar, ammonium sulphate, naphthalene, and benzol recovery plants and dyestuff factory. But last year the dyestuff factory was transferred to the Japanese Dyestuff Manufacturing Company Limited, with the similar plant of the Osaka Gas Light Company Limited, and hereafter Dr. Shimomura will be the chief engineer of the new company.

The north-eastern Kyushu, famous as a coal field and on account of its recent industrial growth, is important for the coke industry. It contains three by-product coking plants as follow:

The Mitsubishi Makiyama Coke Manufacturing Company was established in 1910, to supply the blast furnace coke to the Imperial Steel Works, and it was originally operated with beehive ovens. But now it has two batteries of Semet-Solvay by-product ovens, one of 25 ovens, the other of 10 ovens, besides 50 beehive ovens. Tar, crude naphthalene, and benzol are recovered.

One of the interesting features of the plant is that ammonia liquor and surplus gas are supplied to the Asahi Glass Manufacturing Company Limited, the biggest and only window glass factory with the American mechanical blowing system in Japan, and there the surplus gas is used as fuel in the glass-making. Ammonia liquor is also furnished to the Am-Solvay Process Soda Manufacturing plant, which belongs to the glass company.

The Imperial Steel Works, the most distinguished steel and iron works in the Orient, have coke plants for the blast furnaces. They were formerly beehive ovens of the Coppee type, but are now by-product ovens of the Semet-Solvay and Koppers types. The Semet-Solvay plant comprising 150 ovens, arranged in six batteries of 25 each, each oven having a capacity of six to seven tons of coal, had been built up in 1907-8; on the other hand, the Koppers type, comprising one battery of 120 ovens, each of seven tons capacity, were begun in 1914. Tar, ammonium sulphate, naphthalene, and benzol recovery plants are in operation, and the benzol is supplied to the Japanese Dyestuff Manufacturing Company.

In this connection, mention may be made of the results obtained in experiments on the utilisation of coke-oven waste heat for steam raising with the Babcock and Wilcox multitubular boilers by the engineers of the steel works. The waste heat from one battery of the Semet-Solvay ovens which carbonise 100 tons of coal per day, can raise 45.6 tons of eight atmospheric pressure steam per day, that is, 456 kilogs. per ton of coal per day; on the other hand, the surplus gas from the ovens can raise 580.8 kilogs. of steam per ton of coal carbonised, thus we have a total of 1,036.8 tons of steam per battery per day. The steam, of course, is used for steam engines in the central power station of the works.

It is said that the steel works had decided to contract for any new type of coke oven of recent enlargement, and it will apparently contract with some American by-product coke oven builder as yet undecided.

The Miike Colliery, the largest colliery in Japan, which belongs to the Mitsui Mining Company Limited, Tokyo, has the most improved 122 Koppers regenerative ovens in four batteries (in which is No. 4 battery

* Metallurgical and Chemical Engineering.

just put in operation), each oven of eight tons capacity; the coal carbonised amounts to about 120 tons per battery per day. Plants for the recovery of tar, ammonium sulphate (Koppers direct process), naphthalene, anthracene, and benzol, and also for the manufacture of dyestuffs are provided. Of these, alizarine dyestuffs produced from the anthracene are the only ones successfully made in Japan. The gas produced amounted in 1916 to 3,600,000 cu. ft. per day (from three batteries) of which 1,800,000 cu. ft. were used for the coking, 1,200,000 cu. ft. for the two gas engines, each of 3,000 horse-power (one is spare), the surplus for boilers, zinc furnaces, etc., and, finally, a part for delivery to the city for the use of the Omuta Gas Light Company Limited.

According to recent news from Tokyo, it would seem to be a fact that the works are engaged in research on a type of new coke plant that will be built in parallel with the present Koppers ovens, and that the works will select some new type, now being improved in the United States of America.

The South Manchurian Railway Company Limited has decided to adopt the Roberts type of oven for the coke plant which will belong to the An Shan Chan Steel Works in South Manchuria, and the company has contracted with the American Coal and By-Product Coke Company of Chicago, Ill., about the new coke and its by-product plants. The annual output of coke is said to be about 150,000 net tons.

The coal used in present practice in the works mentioned above is as follows:

	Ash.	Volatile matter.	Fixed carbon.	Sulphur.
Bujun*	7.53	50.36	42.11	0.71
Miike†	14.85	40.23	44.92	3.92
Takashima†	8.58	37.15	54.27	0.95
Honkeiko*	20.54	21.52	57.94	0.143
Kaihei*	14.70	31.70	53.60	1.183
Amakusa†	10.92	17.20	71.88	0.976

* Manchuria. † Kyushu.

Among them, "Takashima" produces good coke, low in ash and sulphur, high in calorific power, and moderate in coking power, but a little high in phosphorus.

"Miike" is famous, too, of high calorific power, moderate caking power, rich in by-products, but one defect is its high sulphur content.

"Honkeiko," low in sulphur, phosphorus, and volatile materials, produces good coke, but it is unsuitable for use in the blast furnace because of its high percentage of ash, and also its high melting point. "Kaihei," "Sakito," "Futase," "Amakusa," are good too.

With respect to the by-product coke industry, there is a great question as to the future of the dyestuff manufacture in Japan. The importations of dyestuffs into Japan, almost all of them from Germany, were as follow (1 yen = 2s.):

	Synthetic Indigo. Yen.	Other coal-tar dyes. Yen.
1913	1,879,967	4,154,658
1914	3,277,362	4,485,691
1915	—	—
1916	123	2,385,526

This shows that the annual importations amounted to about seven or eight million yens, that is, nearly £700,000-£800,000. But since the beginning of the great war, importations have been cut off, and the shortage of the stock has brought about an unnatural rise in their prices. Under these circumstances, many consumers have turned their attention to possibilities of home supply.

Japan has 40 colour works now, but many of them being on a very small scale, are unsuitable for that kind of industry, the following being the exception: Tokyo Gas Light Company Limited, Tokyo; Japanese Dyestuff Manufacturing Company Limited, Osaka; Yura Dyestuff Manufacturing Company Limited, Wakayama; and Miike Colliery, Omuta, Fukuoka.

In the writer's opinion, it would be better for Japan to have one or two large works (say one in Osaka and the other in Kyushu) instead of 40 or more little works. When peace comes, it is probable that the small works will suffer, and many of them be forced to stop operation.

MINERS' WAGES: APPLICATION FOR 25 PER CENT. INCREASE.

The executive of the Miners' Federation, on Wednesday, decided to send in to the Coal Controller the application for a 25 per cent. increase on the present rate of wages agreed upon by the annual conference of the Federation at Glasgow. The application is based upon the rise in the cost of living, and the Coal Controller is asked to convene a meeting of the trade to consider it.

Our mining correspondent writes that the miners' application for the advance of 25 per cent. is likely to be pressed independently of any action which may be taken by the Food Controller to regulate and reduce prices. It is contended that the increase of wage asked for is justified by the prices for food which have been obtaining for some months past.

A new list (No. 32) of additions to the Statutory List of firms of enemy nationality or enemy association with whom persons in the United Kingdom are forbidden to trade has been published by the Foreign Trade Department. Copies can be obtained at a trifling cost from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C.

Hull Coal Traffic.—The coal traffic through the port of Hull during July decreased by 41,356 tons compared with July of last year. The official monthly returns show that 256,079 tons were imported to Hull last month, compared with 297,437 tons in July last year. For the period January-July 1917 the imports totalled 1,688,920 tons, against 1,914,489 tons for the corresponding period last year—a decrease of 225,569 tons.

SOME RECENT DECISIONS UNDER THE WORKMEN'S COMPENSATION ACT.

[SPECIALLY CONTRIBUTED.]

Effect of a Strike on Compensation.

To appreciate the issue raised in the recent appeal of *Price v. Guest, Keen and Nettlefolds Limited*, careful attention to certain provisions of the Act is required. Paragraph (1) of the First Schedule provides that in the case of a fatal accident to a workman who "leaves any dependants wholly dependent upon his earnings," the compensation shall be a "sum equal to his earnings in the employment of the same employer during the three years next preceding the injury . . . but not exceeding in any case £300." To this there is a proviso to the effect that "if the period of the workman's employment by the said employer has been less than the said three years, then the amount of his earnings during the said three years shall be deemed to be 156 times his average weekly earnings during the period of his actual employment under the said employer," the maximum of £300 applying, of course, in this case also. A feature of the appeal referred to was that either method of computation was possible, according to the view taken of the circumstances of the employment, and the question was which method was legally applicable.

A workman who met with a fatal accident at one of the company's collieries in March 1916, had been in their service for considerably more than three years. In ordinary circumstances, therefore, the award would clearly have been "a sum equal to his earnings . . . during the three years next preceding the injury," subject to the statutory limit. The employment, however, must in a sense be continuous, for clause (2) of the First Schedule provides that in connection with "earnings" and "average weekly earnings," certain rules shall be observed, one of them being that "employment by the same employer shall be taken to mean employment by the same employer in the grades in which the workman was employed at the time of the accident, uninterrupted by absence from work due to illness or any other unavoidable cause." In this case, it appeared that the workman had been subject to the Conciliation Board agreement of 1910. Early in 1915 the men gave notice to determine that agreement, but continued to work at the old rate until July 14 following, when they went on strike for a week, notwithstanding a Government Proclamation under the Munitions Act pronouncing abstention from work to be illegal. Work was resumed on July 22 under a new Conciliation Board agreement. The county court judge was of opinion that the strike constituted an interruption of the employment by absence due to an unavoidable cause, thereby introducing a new contract and period of service, and a new grade of employment. He therefore held that the compensation should be a sum equal to the man's average weekly earnings multiplied by 156, whereas the employers contended that the strike was not an unavoidable cause, and that the compensation should be a sum equal to the man's earnings during the three years next preceding the accident.

On the basis adopted by the county court judge, he was able to award the maximum compensation of £300, but on the three-year basis it was about £40 less. The Court of Appeal, however, disallowed the award, the Master of the Rolls saying that the workman's absence from work during the seven days was not due to an "unavoidable cause," but was due to an act of volition, that there did not appear to be any evidence on which the county court judge could find that the absence terminated the old contract of service, and that the compensation should be calculated on the workman's earnings during the three years preceding the accident.

Agreements with Workmen Under Age.

An interesting decision has been given by the Second Division of the Court of Session in a claim against the Fife Coal Company. The workman was a youth under age, and had been employed as a drawer. There was some doubt as to liability, but ultimately the company settled the claim for a lump sum payment of £16. When a memorandum of the agreement was submitted to the Sheriff Court for registration, a case was stated on the question whether the agreement was valid, the contention having been raised that as it had been signed only by the youth, and not by his father as his guardian, the presumption was that it was made without the consent of the latter. It appeared, however, that in his capacity of guardian the father participated in the negotiations for settlement, was present when the youth signed the receipt for the money, signed as a witness to his son's signature, and received the money. On these facts the court held that there was ample evidence that the consent of the guardian had been obtained, and that it was not necessary to decide whether the signature of the father was necessary.

Effect of Military Service on Compensation Payments.

A workman suffering from disability of a kind to justify compensation payments is an unlikely recruit for the Army, but such a case was recently before the Newcastle County Court in connection with a claim for the continuance of compensation payments from the Throckley Coal Company. The mere fact of the man being called up for military service did not in itself cancel his right to the continuance of the payments; the question was the amount of his earnings in his military service. Paragraph (3) of the First Schedule of the Workmen's Compensation Act, 1906, provides that "in the case of partial incapacity, the weekly payment shall in no case exceed the difference between the amount of the average weekly earnings of the workman before the accident and the average weekly amount which he is earning or is able to earn in some suitable employment or business after the accident, but shall bear such relation to the amount of that difference as under the circumstances of the case may appear proper." In this case, the applicant in September 1915 had an attack of nystagmus from which he partially recovered, when he was given light work on the surface and the compensation payments were reduced, being afterwards discontinued when he was called up for service. The case for the employers was that the man's income was now greater than before his accident, and the question was what military allowances should rank as earnings. The county court judge made an award in favour of the applicant, holding that only the military allowances in respect of the man himself could be regarded as earnings, and that the allowances in respect of the wife and children could not be included.

Coal Exporters as Ship Owners.—A growing feature in the coal trade is the purchase of vessels by South Wales exporters, in order to ensure delivery of their exports and keep their collieries going. Messrs. Cleaves and Company, of Swansea, have now three steamers, and Messrs. Evans and Rogers, Pascoe, and E. W. Cook and Company also purchased steamers for their respective firms.

LAW INTELLIGENCE.

HIGH COURT OF JUSTICE. CHANCERY DIVISION. July 31.

Before Mr. Justice YOUNGER.

Krupp's Iron Ore Contract.

Orconera Iron Ore Company Limited v. Fried. Krupp Akt.-Ges.—The plaintiffs asked for a declaration that an agreement, dated August 15, 1873, for the supply of iron ore by the company (who own large mines of iron ore near Bilbao, in Spain) to Krupp's was dissolved, abrogated, and avoided by the outbreak of war between England and Germany on August 4, 1914, except as to the liability of Krupp's to pay for ore delivered to them before that day, and that the company was not bound to deliver ore or observe or perform the agreement. The Orconera company—incorporated as an English company on July 17, 1873, with a capital of £200,000, divided into 20 shares of £10,000 each—was formed by the Dowlais Iron Company, the Consett Iron Company, Alfred Krupp (who was then trading in Germany as Friedrich Krupp), and Ybarra Hermanos and Company, a Spanish firm. The objects of the company were to adopt and carry out two contracts—(1) for the acquisition of the mines of iron ore and works near Bilbao, and the rights and interests of Ybarra Hermanos and Company therein; and (2) for the acquisition of a concession from the Spanish Government of the right to construct and work the Orconera and Luchana Railway, in Spain. By an agreement with Friedrich Krupp, it was provided that the agreement should continue in force for 99 years, and that Krupp's should take a minimum quantity of 75,000 tons, and that the company should, if required, deliver to him a minimum quantity of 200,000 tons of iron ore per year; in the year just before the war they had received a great deal more. Upon the outbreak of war, an Order was made vesting the right, title, and interest of Krupp's in the said agreement and all other contracts and arrangements between the company and Krupp's, and all the property of Krupp's in England, in the Public Trustee, as the custodian of enemy property in England and Wales. By order of the court, the custodian had paid to the company the moneys due to them from Krupp's out of moneys in his hands belonging to Krupp's. Questions having arisen as to the agreement, it was directed that the company should bring this action to have the agreement declared void, to which Krupp's and the custodian were defendants.

In delivering his considered judgment, Mr. Justice Younger, after stating the facts and reading the material clauses of the memorandum and articles of association of the plaintiff company and of the agreement between the company and Krupp's, said that Krupp's had before the war received supplies of ore far in excess of the amount provided by the contract, and it was stated that the contract was worth £45,000 a year to them. It was a tradition of the courts that even such a litigant as Krupp's should not be deprived of his rights except on full consideration of all the circumstances and in accordance with the law. Mr. Leslie Scott, for the plaintiffs, had contended that the outbreak of war dissolved all contracts with alien enemies. Mr. Compston, for the defendants, argued that the contract here was only ancillary to the general scheme, and was like a long lease to Krupp's, which should be suspended, and not abrogated. He (his lordship) could not assent to either of the extreme views. Mr. Leslie Scott relied on two passages in the judgment in *Esposito v. Bowden* (7 E. & B. 779), but these had been considered recently, and he referred to the judgment of Lord Justice Pickford in *Zinc Corporation v. Hirsch*, and the judgment of Lord Justice Scrutton in *Rio Tinto Company v. Eitel Bieber and Company*, decided so recently as the previous Wednesday. He also referred to the judgment of Lord Justice Swinfen Eady in *Andrew Miller and Company Limited v. Taylor and Company Limited* ([1916] 1 K.B., 402). If a contract involved trading with the enemy, war would invalidate the contract. To decide whether the outbreak of war had dissolved the contract, it was necessary to consider the nature of the contract (*see Metropolitan Board of Works v. Dick, Kerr and Company* [1917] 2 K.B. 1). On the other hand, to call this a lease was a figure of speech. The contract defined the rights of the parties, and it was necessary to regard the terms. Did the contract contain terms of suspension applicable to war between England and Germany? In his opinion, it did not. The reservation of the rights of arbitration, and the taking of accounts was not sufficient to invalidate the contract. But considering the constitution of the company, and the whole facts of the relations of the parties and the nature of the agreement, he came to the conclusion that the plaintiffs were entitled to the declaration for which they asked.

On the application of the defendants, the time for appeal was extended to November 1.

Manchester Ship Canal Charges.—Owing to further increased war allowances having to be granted to employees throughout the canal, and to continued enhanced prices of stores and materials, the company have found it necessary to increase their charges from August 6, 1917, by 15 per cent. on all Ship Canal tolls and wharfage rates, ship dues, and charges for the use of the Ship Canal tugs; and by 10 per cent. on rates for discharging and loading vessels, and for quay portage, warehousing, and storing in the open in respect of merchandise and minerals.

Coal in Angola.—The United States Consul-General at Cape Town states that specimens of coal from Angola have been tested by a chemist in Cape Town, who found it rich in petroleum. Samples of various oil products were prepared from the coal by the chemist, ranging from paraffin and petrol to lubricating oil and vaseline. The coal fields are very extensive, and the coal has been used locally for many years by the natives in smelting iron ore. Samples were some time ago sent to Lisbon for examination, but they were found valueless, because the coal produced too great a quantity of soot.

Mine Fatalities in the United States.—Several publications issued by the United States Bureau of Mines, contain some statistics on accidents in coal mines in the United States. The monthly statements for 1916, together with 1915, show that the number of fatalities was 2,225 respectively, 2,225 and 2,269—a decrease of 44 per cent., whereas the production of coal has risen 10 per cent. The accidents, together with the chief causes, are tabulated month by month for the two years, from which it appears that falls of roof and coal, and nine others and other motives are chiefly responsible, gas and other explosions coming next.

CONTENTS.

ARTICLES :-	PAGE
Control in Trade of the Welshman	259
the Coal Age	251
Coal Washing Experiments	252
Safety Rails for Electrical Equipment in Coal Mines	254
Industrial Unrest and South Wales Miners	255
Recent Developments in Japanese By-product Coking	256
Miners' Wages: Application for 25 per cent. Increase	257
Some Recent Decisions under the Workmen's Compensation Act	257
Obituary	263
South Wales Mining Timber Trade	263
Miners and Recruiting	264
Trade Unions in 1915	266
The American Coal Trade	266
Coal Mining in New South Wales	267
Blast Furnace Dust	267
Labour and Wages	269
The Freight Market	270
Open Contracts	270
New Patents Connected with the Coal and Iron Trades	272
Government Publications	272
Publications Received	272
Abstracts of Patent Specifications Recently Accepted	272
REPORTS OF MEETINGS :-	
North of England Institute of Mining and Mechanical Engineers	265
THE COAL AND IRON TRADES	260-263
The Tin-plate Trade	263
The London Coal Trade	263
The By-Products Trade	263
CURRENT SCIENCE AND TECHNOLOGY	256
LAW INTELLIGENCE	257
INDIAN AND COLONIAL NOTES	264
PARLIAMENTARY INTELLIGENCE	264
NOTES FROM THE COAL FIELDS	268
COAL, IRON AND ENGINEERING COMPANIES	270
MISCELLANEA :-	
Certifying Surgeon Appointed—Holland's Fuel Supply	255
Hull Coal Traffic—Coal Exporters as Ship Owners —Manchester Ship Canal Charges—Coal in Angola—Mine Fatalities in the United States ..	257
Serious Strikes in Australia—Coal Distribution Scheme—Norwegian Railways Coal Order	263
Committee on Housing—Electric Power in Indian Collieries	264
Exempted Mine Workers	267
Big Coaling Depot for Sydney, New South Wales ..	270
Pocahontas Developments	272

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Joint Editors—
J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
(At present on Active Service).

LONDON, FRIDAY, AUGUST 10, 1917.

The London coal depots have worked regularly during the week with the exception of Monday, and the delivery trade has been brisk. Good supplies by rail and sea have come forward, and a good number of loaded wagons have been released. Empties are becoming scarce. Hard steam coals are difficult to obtain. Slacks are plentiful. Gas coals are in good demand, and are coming forward freely.

The Northumberland market has been dull and featureless, and, although a slightly-improved tone is to be observed during the last few days, only the fixed minimum selling prices prevent values from slumping. South Yorkshire and Lancashire report abnormal pressure on the collieries for house coal, the immediate needs of these markets being far in excess of the supply. Trade in the Midlands likewise is very brisk, especially for households for London and south-west England districts.

Reports from the Humber indicate fair shipments to Allies; otherwise trade is quiet, the neutral trade being in suspended animation pending arrangements with Government.

An improvement in tonnage arrivals in South Wales had the effect of reducing the heavy stocks of coal which had been accumulating for some time. Production is likely to be sharply curtailed this week on account of the holidays. Although prices are unaffected, there is more hopefulness regarding the future.

Conditions in Scotland remain dull, and little improvement is looked for under the present tonnage difficulties; the western collieries still manage to keep going fairly well, but idle time is to be anticipated in spite of heavy industrial requirements. No change of any importance is to be noted in the Irish trade; imports from Scotland are well maintained.

The freight market has shown practically no improvement, and industry has been seriously hampered by the shortage. French Atlantic ports have been responsible for most of the chartering business, especially in South Wales and on north-east coast.

A general meeting of the Mining Institute of

Scotland will be held in the Royal Technical College, George-street, Glasgow, at 3 o'clock to-morrow (Saturday), when Mr. G. L. Kerr's paper on "The Higher Training of Colliery Managers" will be discussed, and Mr. George Gibb will read a paper on "Intensive Mining in Thin Seams."

Government Control in Trade.

THE Merchants' Committee of the London Chamber of Commerce has drawn up a report upon the effect of Government control of the sale and distribution of necessary commodities mainly from the standpoint of its influence upon merchants. The report criticises the methods adopted rather than the objects in view. The aim of the Government has, of course, been to regulate the supply and use of commodities necessary for the defence of the realm and for the essential needs of the civilian population. Not only are the home requirements concerned, but also those of Allied countries. The committee, however, considers that the maximum advantage to the State combined with the minimum interference with trade has not been secured owing to a failure in adequately enlisting the services of the mercantile community, with its exceptional knowledge of the sources of supply and the elaborate organisation upon which the world-wide trade of the country has been built up. The limited use which has been made of trained business men is held to have been responsible in many cases for high prices and ultimate scarcity.

The committee points out that an inevitable result of restriction of imports without due regard to the maintenance of continuous supplies from abroad is to drive the merchant out of business, and is prejudicial to the best interests of the country. Briefly, it is argued, the action of the Government has been to cut the communications between supply and demand. Controllers cannot be expected to have an adequate knowledge of the intricate ramifications of the world's trade. They are held to have failed to appreciate the relationship between the merchant and the manufacturer. The tenders invited for raw materials, for instance, have often been confined to manufacturers only, regardless of the fact that the merchants have held large stocks available at lower prices. A notable exception is afforded by the Wheat Commission, which from the beginning has employed as brokers established merchant firms, whose technical knowledge has been of considerable advantage in maintaining prices at a comparatively uniform level.

It is not easy to give in a short space the reasons which are advanced for the conclusions arrived at by the London merchants. It seems to be the feeling that Government buying, regardless of the ordinary channels of supply, automatically puts the market against itself. By cutting down prices foreign trade is attracted to other markets, and it will be difficult to recover trade which is thus lost to the country. Whether rightly or wrongly the merchants take the view that the Government regards them as both useless to the Empire, and as being generally unworthy of consideration.

Certain specific examples are adduced. These include the distribution of Cleveland pig iron, tinsplate, steel, copper and lead. In the case of tinsplates merchants complain of the recent arrangements made with respect to export goods for France, Italy and Portugal by the Government, which requires orders to be placed direct with the works. Steel manufactured for special requirements in the Colonies lies rusting, they say, in the works owing to the refusal of export licences, while regular customers for various metals have been driven to deal with foreign producers.

We have endeavoured to indicate, as far as space allows, the position taken up by a body of men who may justly claim to have done much to establish the commercial supremacy of the Empire. The statements made in this report are naturally of an *ex parte* character, and their value cannot be properly assessed in the absence of the case on behalf of the Government, compelled as it was to act in face of grave emergencies and under conditions of very great difficulty, especially in regard to tonnage. It is difficult to see how the country could be expected to pass through so acute a crisis without injury to existing commercial interests. Under such circumstances it seems to be inevitable that the middleman must suffer. No reasonable person will desire to

belittle the status of the middleman, and he uses as a distributing agent, his willingness to take considerable risks, or his claims for fair remuneration for his services.

It is not necessary to brand him as a profiteer, and in any case such a tendency could be frustrated by adequate supervision. It is for this reason that the merchant asks for control rather than elimination, and there seems to be much to be said in favour of his contention. A good case seems to have been made out with regard to the want of co-ordination of the various controlling departments now in existence. The merchant finds himself too much ignored and generally out of it altogether; whereas he feels that his experience and knowledge might have been utilised with advantage. We have presented his case as he himself sees it, and it is to be hoped that due consideration will be given to the recommendations submitted in this report.

Mentality of the Welshman.

OF the eight divisional reports of the Commission of Enquiry into Industrial Unrest, that for the district of Wales, including Monmouthshire, is the most exhaustive and also the most interesting. Its interest largely centres about the fact that it is virtually a survey of the industrial conditions prevailing in the South Wales coalfield, although other industries outside coal-mining—including steel, iron and tinsplate manufacture, engineering and ship-repairing, building and transport—are also concerned. The particular group of industries which have centred round the South Wales coalfield are all a direct consequence of the development of coal mining in this area. Here more than anywhere Coal is King, and the consciousness of this fact has perhaps played an important part in developing a particular attitude of mind in the South Wales miner—an attitude which is not yet fully understood even within the industry itself, and still less by the public at large. The Commissioners urge the necessity of a more complete analysis than they are able to give of the economic and social conditions prevailing in this area, and they suggest the importance of an exhaustive investigation of this subject at an early date as a pressing need and a paramount duty. We cordially support this conclusion, for it is a field which has been but imperfectly explored hitherto. Much has been written upon it, it is true, but the subject has generally been discussed from an *ex parte* standpoint, rather than as an impartial study of social economics. To most of those who have been able to regard the South Wales coal miner from a detached point of view there is something wholly incomprehensible in his mental attitude, the probable explanation for which is the presence of some psychological factors which have hitherto escaped their proper share of recognition.

The Commissioners draw attention to some possible reasons for the lack of social solidarity, or what may be termed the community sense, in this area. There are few town centres or municipal buildings. The land surface is deeply intersected by narrow valleys, along which monotonous rows of houses, generally on the less sunny side, are often overshadowed by huge coal tips, and but scantily relieved by gardens, allotments, or areas available for recreation. It is in such isolated and unattractive social conditions that successive generations of colliers pass their lives. Both the geographical and sociological features of this area present obstacles to the growth of social solidarity. There is a tendency to cleavage and aloofness between the native colliers and the immigrants from other areas, between whom and the indigenous population there is often but little sympathy in habits of life or thought. It is held to be broadly established that collieries manned by officials of Welsh sympathies and trained in the traditions of the Welsh coalfield are much less troubled with labour disputes than those managed by officials of a different training and outlook, who are charged with a frequent want of tact in dealing with the inborn sensitiveness of the Welsh miner. This assertion merits serious attention. If it is as well-founded as this report suggests, it would itself afford a sufficient explanation for at least a part of the trouble which has agitated the South Wales coal field in recent years. The growth of friction has certainly tended to increase with the development of coal mining, and, therefore, with the

immigration of outside labour. This is a biological question that deserves closer

even greater importance is the gradual change that has taken place in the policy of the trade union movement. The younger generation has been fed upon the writings of the Fabian Society, the Independent Labour Party and the works of foreign writers. Instead of the older policy of confining attention to safeguarding the special interests of the miners, these younger men have embarked upon wider questions of social reform involving the reconstruction of the whole basis of society. These so-called "advanced" men are no longer satisfied with political action upon constitutional lines, which they regard as ineffectual for their purpose. They maintain that the root cause of all their real and imaginary grievances lies in the relation between Capital and Labour, and they have been taught to believe that by means of a large scheme of industrial unionism they will be able to forge a weapon capable of overthrowing the capitalist forces which they believe to be ranged against them. This assumed antagonism is, of course, a fundamental fallacy attributable mainly to the false doctrines of KARL MARX, and built up on erroneous views of the place of capital in industry. We cannot now enter into the demerits of this doctrine. It is enough for the present to point out that in South Wales a distinct cleavage exists between the two movements, the one adhering still to the older policy of political action; the other, revolutionary in its character, aiming at industrial unionism in its broader sense, with the ultimate object of securing the control of production.

The younger and confessedly revolutionary party are actively opposed in their views to the trade union officials, whose wider experience and specialised knowledge has held them somewhat in check. Their first object, therefore, is to undermine the influence of the officials and to strip them of executive power. The growth of the revolutionary spirit has been fostered by the unfortunate fact that the education of the miners has been largely left in the hands of a particular school of economists who have found in the closely packed valleys of Glamorganshire a suitable field for the development of class consciousness. The Commissioners, therefore, very properly urge the importance of affording facilities for the spread of education upon sounder and wider lines in this area. It is abundantly clear that something should be done to counteract the fatal policy which seems to have abandoned the South Wales valleys to the mischievous propaganda of a narrow and misguided school of so-called economics. The seed thus sown has fallen upon fertile ground—virgin soil in fact—and little or no effective effort has been made to provide an antidote for the poison that has been thus sown broadcast throughout the area. This work should clearly be taken in hand by the University, and there should be a wide extension of the scope of university teaching in Wales. The university must go to the men. It is not enough to invite the men to go to the university.

The fundamental problem to be attacked is to break down the barriers which exist between the employer and employed. We would suggest that courses of lectures upon Marxian sociology should be given in every industrial centre. Few people who talk and write upon the relations between Capital and Labour are really familiar with the absurdity of the views advocated by KARL MARX, whose illogical arguments are too often accepted as rigid principles of economics. Nowhere has the doctrine of the antagonism of the classes, now in process of being abandoned by the more educated Socialists of the world, been more persistently upheld than in those isolated valleys of South Wales. We believe the South Wales miners to be an intellectual and knowledge-seeking race, and if an organised effort were made to illustrate the falsity of the doctrines with which they have been fed, the fundamental weakness of which no Socialist has yet been able to answer, they would soon learn that the improvement of their conditions is not to be achieved by the methods which have been taught to approve. The report of the Commissioners of the South Wales Coalfield, which has been practically abandoned to the untrained and uneducated work amongst the miners, is a veritable field, its fertile soil waiting for the sowing of the seeds of a discredited

THE COAL AND IRON TRADES.

THURSDAY, AUGUST 9.

Scotland.—Western District.

COAL.

The situation in the Scotch coal trade has not undergone any change during the past week. Conditions remain dull, and little improvement can be looked for under the present tonnage difficulties. Collieries in the West of Scotland still manage to keep going fairly well, but idle time is imminent in spite of heavy industrial requirements. Shipments for the week amounted to 94,409 tons against 72,101 in the preceding week and 94,879 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	25/-26/
Ell	26/6-28/	26/6-28/	27/-28/
Splint	28/-30/	28/-30/	35/-40/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

There is no diminution in the demand for all classes of iron products, and works are finding great difficulty in meeting requirements. Pig iron is not too plentiful. Hematite iron is, of course, reserved for war work, while foundry and at times forge qualities are difficult to obtain. There is little or nothing being exported outside of shipments to the Allies. Prices remain firm and unchanged. Moukland and Carnbroe f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. The pressure for malleable iron goods continues to increase, and these are now being substituted for steel where possible. Consumers, however, are getting very meagre supplies, as the works are largely engaged in the production of steel. Black sheets are in constant request, but outputs are difficult to regulate owing to insufficient supplies of raw materials. The price is still about £18 5s. per ton, net, f.o.b., Glasgow. The price of galvanised material excludes practically all but Government buyers. Exports generally are very restricted.

Scotland.—Eastern District.

COAL.

The coal market in the Lothians district is dull and lifeless. The local outlet is not large, and shipments continue small. Clearances for the past week amounted to 15,718 tons against 17,805 in the preceding week and 45,771 tons in the preceding week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	34/-35/
Secondary qualities.....	25/6	25/6	34/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

Conditions in Fifehire are not improving. Admiralty requirements are fair at the moment, but otherwise business is slow. Shipments were 26,876 tons against 33,858 in the preceding week and 53,850 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	43/
Unscreened do.....	24/-25/	24/-25/	40/
First-class steam coal.....	28/	28/	40/
Third-class do.	24/	24/	30/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 137,003 tons, compared with 123,764 in the preceding week and 194,500 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The prompt market has been very dull and featureless during the week under review. The tonnage scarcity has been of famine dimensions, and under these circumstances very little business for spot shipment has been negotiable, many collieries have been laid idle and many other pits have been working only very irregularly. Stocks of all descriptions of coal and coke have been offering considerably in excess of the demand, and only the recent fixing of minimum prices has prevented selling values from slumping. At the time of writing, however, tonnage arrivals have shown a perceptible improvement, and prompt business has brightened up correspondingly. Many more vessels are needed, however, if the mining industry is to be assured of regularity of employment and the full absorption of output. All descriptions of fuel are in excessive supply and held for bare minimum figures. Forward prospects are unimproved. With reference to the Norwegian State Railways' enquiry for offers of 18,500 tons of steams for August-September despatch, news arrived towards the end of last week that contracts for 12,000 tons had been divided amongst three local merchants for quantities of 4,000 tons each. D.C.B. quality is stipulated at 30s. per ton f.o.b., with an option of Durhams for half the total quantity at from 28s. 6d. to 30s. per ton according to quality.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	47/6-50/
Do. Tynes (Bowers, &c.) ...	29/6	29/6	47/6-50/
Secondary, Blyths	25/6	25/6	40/-45/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	40/-45/
Unscreened	23/6-25/	23/6-25/	32/6-40/
Small, Blyths	20/	20/	27/6-30/
Do. Tynes.....	18/6	18/6	25/-27/6
Do. specials.....	20/6	20/6	30/-32/6
Other sorts:—			
Smithies.....	25/-30/	25/-30/	35/
Best gas coals (New Pelton or Holmside) ...	25/	25/	35/-36/
Secondary gas coals (Pelaw Main or similar) ...	23/6	23/6	33/-34/
Special gas coals	26/6-30/	26/6-30/	37/6-40/
Unscreened bunkers, Durhams	24/-25/	24/-25/	30/-35/
Do. do. Northumbrians	24/-25/	24/-25/	32/6-35/
Coking coals	24/-25/	24/-25/	33/-34/
Do. smalls	24/-25/	24/-25/	32/-33/
House coals	28/6-30/	28/6-30/	45/-50/
Coke, foundry	42/6	42/6	45/-47/6
Do. blast-furnace	42/6	42/6	40/-42/6
Do. gas	29/-30/	29/-30/	32/-34/

Sunderland.

COAL.

The dullness in the coal market has been accentuated by the Bank Holiday. Generally the position is without change, and colliery prospects for this week are not good. Values remain nominal at the official schedule figures; coke prices, too, are unaltered though firm, with a full home demand and a fair export enquiry. The Norwegian State Railways have placed an order for 12,000 tons out of the 18,500 tons asked for, the qualities being D.C.B. option Wear qualities at schedule prices, shipment to be made during August-September. There is nothing doing in forward business.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	37/6
Secondary do.	23/6-25/	23/6-25/	33/6
House coals:—			
Best house coals	30/	30/	45/
Ordinary do.	28/	28/	37/6
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	45/
South Hetton do.	28/6-30/	28/6-30/	45/
Lambton unscreened ...	24/	24/	34/
South Hetton do.	24/	24/	34/
Do. treble nuts	20/	20/	35/6
Coking coals unscreened	25/	25/	33/6
Do. smalls	25/	25/	32/6
Smithies.....	25/	25/	34/6
Peas and nuts	24/6-26/	24/6-26/	37/6
Best bunkers.....	25/	25/	36/
Ordinary bunkers.....	24/	24/	32/6
Coke:—			
Foundry coke	42/6	42/6	47/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	30/	35/

Outward freight chartering is at a standstill owing to the continued dearth of tonnage.

Middlesbrough-on-Tees.

COAL.

There is very little movement in the fuel market, and the general position is unchanged. Positions of collieries are anything but satisfactory, no change for the better being noticeable in the acute irregularity of tonnage, which has caused great inconvenience. Hope of early improvement in this respect, however, is expressed. Enquiries on behalf of neutrals are on only a very limited scale, but there are more than hints of an almost immediate largely increased official absorption of coal. Best Durham gas coal is 25s., and second quality 23s. 6d. Bunker coal is still dull, but prospects are regarded as rather better. Unscreened Durhams are 24s. to 25s. Household coal is quiet but steady. Coking coal continues to be well taken up at rates that have ruled for some little time past. Home demand for coke keeps heavy, local needs being very large, and notwithstanding plentiful supply values are well maintained. Average blastfurnace kinds are realising the fixed maximum of 28s. at the ovens, the low phosphorus qualities remain at the limitation figure of 30s. 6d. at the ovens. Export trade is dull. For shipment, patent oven and beehive coke are both quoted 42s. 6d., and gas coke 29s. (less minimum remuneration of exporters) f.o.b. Middlesbrough dock.

IRON.

Firmness and a fair amount of activity continue to characterise the market so far as Cleveland pig iron is concerned. Supply of this commodity is quite plentiful, so that no difficulty is experienced in meeting the heavy home demand under the very liberal August allocations, and promised improvement in the tonnage situation should lead to expansion of foreign trade. Output of the better qualities of Cleveland pig has increased owing to the excellent and regular working of furnaces, and production of forge iron has proportionately decreased, so that stocks of the latter, which a little while ago were rather heavy, have been very much reduced. Forge is now being extensively and advantageously employed in the manufacture of basic iron, so that the refusal of the authorities to permit the export of this quality to neutral countries appears to have been justified. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge are all quoted 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. There is absence of new features in the east coast hematite branch. Distribution is still under careful official supervision, and adequate supplies continue to go forward to customers accessible by rail, but the surplus available for sale abroad is small. A few home sales are reported from time to time, but new foreign business is very difficult to put through, and export quotations are nominal. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France and 142s. 6d. for export to Italy. In the manufactured iron and steel industries the huge Government requirements and the

large and still increasing needs of the ship yards absorb almost the whole production, and ordinary commercial business is on a very limited scale. Prices are steady.

Cumberland.

Maryport.

COAL.

The Cumberland coal trade remains in a satisfactory condition, the demand for all classes of fuel is fairly well maintained, and requirements are still big enough to absorb the whole of the output. Business, however, was rather quieter than usual over the holidays, but this was due, no doubt, to the fact that a good many of the larger consumers had been stocking heavily for some weeks past. There has, of course, been a certain amount of inconvenience caused by the holidays; but the more important users were so well supplied with fuel this year that the dislocation in both the coal and iron trades was probably very much less than in former years. The pits were idle on Monday and Tuesday; some of the coke plants had only one day's holiday, but it will probably be some days before all the collieries are in full swing again. Production has been rather uneven of late, and it will no doubt be lower than usual this week. There is a keen demand for fuel on all accounts, and, although local needs are probably not so large as they were some months ago, the collieries have still sufficient orders on hand to keep them very busily employed. Gas and locomotive fuels for home consumption are in fair demand, but landsale is still very dull. Coal for industrial purposes is in strong request, and the iron and steel and other public works are still making a very heavy call on the supplies of manufacturing fuel. The export trade is very brisk, but stocks for shipment have been rather scarce this week. Landsale is quiet, but there is a heavy demand for all kinds of works fuel for the Irish market. The shipments for the week have amounted to 2,265 tons, compared with 2,200 tons last week and 4,375 tons at the corresponding period of last year. The largest cargoes were for Dublin, Belfast, Carrickfergus and Londonderry. All the by-product coke ovens are in full operation, and the whole of the output is being absorbed. There has been no alteration either in home or export quotations. Best sorts at the pits are quoted at from 22s. 6d. to 23s. 4d. per ton, with best washed nuts at from 20s. 10d. to 21s. 3d. per ton. Best export coal is 19s. 6d. per ton f.o.b., with best washed nuts at 17s. 6d. per ton. Best gas coal is 20s. per ton, with washed nuts at 19s. per ton, delivered in the district. Bunkers are in firm demand at from 25s. to 30s. for best sorts, and from 21s. 6d. to 25s. for mixed sorts. Best house coal delivered in the Maryport district is quoted at from 1s. 5½d. to 1s. 6d. per cwt., or from 27s. 6d. to 28s. 4d. per ton. Other current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " ...	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise)	25/	25/	25/
Do. (for foreign-going steamers)	30/	30/	30/
Bunkers (mixed nuts and steam coal) (coastwise)	21/6	21/6	21/6
Do. (foreign)	25/	25/	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gasworks	19/	19/	19/

IRON.

The hæmatite pig iron trade on the west coast remains very firm. Makers are still busy, and there is the same heavy demand for metal, but as far as production is concerned, the situation is not quite as satisfactory. Owing to the holidays the output of native iron ore has been lower than usual, so the smelters have had a keen struggle to maintain anything like an adequate production. Most of the iron ore pits have been idle for several days, and the miners have been on holiday, but it is expected that work will be resumed at all the iron ore mines in the district before the week end. With regard to hæmatite pig iron, the demand is greater than can be met, and a much bigger production will be necessary before the claims of all consumers can be fully met. At present even important consumers on special work are in some cases merely existing from hand to mouth. All the iron that is being made in this district is going into prompt use, a very large proportion being absorbed on Government account, and practically all the make of ordinary iron is going into consumption at the steelworks at Workington and Barrow. The bulk of the low phosphorus iron is being consigned to the Midlands and Scotland, while a substantial tonnage is also going to other important consuming areas. With such a keen demand, prices are easily maintained at the Government maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with special iron at 140s. per ton, and semi-special iron at 135s. per ton f.o.t. Warrants are unchanged at 115s. per ton. The steel industry keeps very brisk, and all the engineering shops are fully employed, most of the work being for the Government. The steel works and some of the engineering shops have been closed over the holidays, but all the plants are expected to be in full swing by the beginning of the week.

South-West Lancashire.

COAL.

The holidays absorb a considerable portion of this week. Monday and Tuesday were generally "played" at the Lancashire pits, and there was rather a slack start on the Wednesday morning. In house coal there is no cessation in the demand, and it is with difficulty that the various towns are getting quotations for the emergency coal they are proposing to put into stock. In slacks, the holiday stoppage has cleared whatever little tonnage there was standing about. There is nothing fresh to report.

Prices at pit (except where otherwise stated).

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Best	21/-22/	21/-22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/upwds.	23/upwds.	24/
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	24/-24/6
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was almost deserted on Tuesday owing to the holidays, and scarcely any business was done. The general tone of the coal trade continues very firm, and the demand for house coal is very strong. There is also an active call for all descriptions of engine fuel. List prices generally are as below:—

Prices at pit (except where otherwise stated).

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Best	22/-23/	22/-23/	22/-23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/-18/6	18/-18/6	18/-18/6
Furnace coal	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	16/upwds	16/upwds	16/upwds
Common slack	14/6upwds	14/6upwds	14/6upwds

* As per official list.

IRON.

There was a poor attendance on 'Change in Manchester, owing to the August holidays, and very little doing. There is nothing whatever to add to the reports which have appeared during the last few weeks.

Yorkshire and Derbyshire.

Leeds.

COAL.

Many of the pits in West Yorkshire ceased work for two days in observance of the Bank holiday, and in some cases where repairs were necessary for three days, but the stoppage was by no means general. There was, however, no meeting on the Coal Exchange this week, as, quite apart from the loss of output owing to the partial holidays, the collieries have practically nothing to offer for open market business and prompt delivery, with the exception of the small and inferior grades of steam slacks, which are fairly plentiful. The demand for all other descriptions of coal continues to be very active, particularly so in regard to house coal. Owing to the anxiety of the larger users as well as merchants to lay by stocks for the winter the pressure on the collieries for house coal is still abnormal, and the immediate needs of the market are far in excess of the available supply. The ease in small steam slacks is due partly to the fact that Lancashire has been taking smaller deliveries in recent weeks, and also to the preference which consumers are giving to better grade fuels, as an indirect result of the labour difficulty. The munitions and engineering works in the Leeds districts and many other industrial concerns in adjacent areas suspended operations for a full week, and the temporary check in consumption of nuts and specialised fuels should afford a little relief. The demand for washed furnace coke is very pressing, especially from the Frodingham district, but coking smalls are almost as scarce as ever. Pit prices, as given in the appended list, are very largely nominal, especially in view of the present unsettled position:—

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ...	20/-21/	20/-21/	20/-21/
Wallsend & London best	19/-20/	19/-20/	19/-20/
Silkstone best	19/-20/	19/-20/	19/-20/
Do. house	17/-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	23/-24/	23/-24/	23/-24/
Silkstone best	22/-23/	22/-23/	22/-23/
Do. house	20/-21/	20/-21/	20/-21/
Other qualities	19/-20/	19/-20/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	16/-17/	16/-17/	16/-17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/	15/-16/	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	17/-18/	17/-18/	17/-18/
Large double-scrned engine nuts	16/-17/	16/-17/	16/-17/
Small nuts	15/-16/	15/-16/	15/-16/
Rough unscreened engine coal	15/-16/	15/-16/	15/-16/
Best rough slacks	14/-15/	14/-15/	14/-15/
Small do.	12/-13/	12/-13/	12/-13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

There is practically no change in the position so far as general business is concerned. The steady further call for workers to join the Colours is causing some little irritation at collieries, and there are complaints that the measures taken to comb out the eligible men who rushed into the pits since August 1914 have not been strictly adhered to. The Monckton Main Colliery was shut down on Monday owing to the younger men protesting against the alleged unfair recruiting measures, but the miners' officials are working to prevent the disaffection spreading, and are taking action with the authorities in the matter. Frequent difficulties are cropping up with regard to the fuller outline of the scheme of control of the supplies, but there is no

alternative, and both consumers and the Government realise this as inevitable. Meanwhile, a certain inconvenience has been suffered by various consumers, particularly with regard to house and gas coal, owing to the fact that the district committees these are minor, and the demand for all classes of steam coal continues to be of a very active character. Though the export of large steamers is still restricted beyond the needs of the Allies and the Admiralty, the large output is fairly easily disposed of. The requirements of the railway companies and for other home purposes are of a very extensive character, and large steamers continue to be taken in substitution of steam nuts, which are almost entirely taken for supplies to the munition and other engineering concerns. The problem of an adequate supply of slacks is as acute as ever, and the greatest effort is still necessary to obtain a sufficient delivery to keep the by-product plants in full operation. Small steam fuel and ordinary slacks continue to be in good demand, but the supply of gas coal on contract account is hardly so satisfactory as could be wished for in view of the greater pressure to accumulate stocks for the winter. The supply of house coal to London and the south continues to be of a heavy description, and it is impossible for collieries to give the ordinary contract supplies which are pressed for by other areas in which consumers have realised the importance of laying in stocks. The demand for furnace coke continues to be of a heavy description, and despite all efforts the ovens are unable to meet the demand.

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	16/6-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.

COAL.

The whole of this week is being observed as a holiday in the munition works in this district, and many other establishments are not re-opening until to-morrow (Friday). The holiday spirit is thus very much in the air, and affects practically every branch of business life, the coal trade not excepted. Fair shipments are, however, being made to the Allies, but otherwise things are extremely quiet. The prompt market is idle, and trade with neutrals hung up pending what arrangements their agents may make with our Government for their supplies, which are not likely to be forthcoming to any considerable extent, from South Yorkshire at any rate, in view of the tremendously heavy calls upon outputs for other purposes. Little or no business is likely to be done until next week.

Chesterfield.

COAL.

A stoppage of two days at the beginning of this week was followed by a general resumption of work. The demand for coal is as active as ever, and consumers are eagerly pressing for deliveries. House coal orders are coming to hand freely, but it is still very difficult to satisfy consumers' requirements. Coal for manufacturing purposes is urgently wanted, especially cobbles and nuts for gas-producers. Slack for boiler firing is in steady request. A brisk demand exists for gas and locomotive coal. The export trade is unchanged, the demand for Derbyshire coal being stopped, owing to its shipment being prohibited. The coke trade is in an active condition, every quality being much wanted.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

All departments are extremely busy, and work was promptly resumed after the stoppage for Bank holiday.

Nottingham.

COAL.

The intervention of the holiday has affected the ordinary course of the trade in the past week, but it came as a welcome relief to all engaged in the industry after a period of sustained activity. Simultaneously with the break in colliery operations, munition works in this district closed down for two or three days, so that the loss of output of coal will not cause a shortage of fuel so far as war requirements are concerned. Prior to the holiday the demand in the domestic fuel section continued active, although a somewhat easier tone was perceptible, and it is anticipated that there will be less pressure from the public for supplies during the next few weeks, in consequence of the precaution which many householders have taken by way of obtaining stocks earlier in the season than usual. Nevertheless, collieries can readily dispose of all the supplies available to merchants who have little stock in hand for winter use. The demand for steam coal continues on an extensive scale, large steamers being in particularly brisk request, whilst supplies of nuts and cobbles are scarcely equal to the demand. There is a fair supply of slacks, with the exception of the grades most suitable for coke making.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	18/-18/6
Secondary do.	17/-18/	17/-18/	17/-18/
Best hard coals	16/9-17/6	16/9-17/6	16/9-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

There was no business passing to-day (Wednesday) in either anthracite or steam coals, owing to the collieries being idle over the holidays.

Most of the pits were at full work on Wednesday, but the loss of two days' output in consequence of the holiday has placed the executive still further in arrear. All orders are still in heavy request, the shipping requirements for the month being no stocks to draw upon. There is no change to report in the quantity continuing exceptionally large delay in forwarding supplies.

There is little new to be said about the iron and steel trades of the district. Most of the works were closed for three days this week. The stoppage was taken advantage

Llanelli.

COAL.

The position of the local market remains unchanged. Anthracite machine-made qualities are very firm. Beans and nuts in particular are difficult to secure, and orders are only booked when delivery can be taken several weeks forward. Cobbles are also a steady enquiry, but peas are not quite so active, supplies being offered fairly freely. Large kinds are the slowest feature of the anthracite section, and as stocks on hand are fairly heavy, buyers have not much difficulty in securing the qualities they desire. The inland demand is strong, but delays in execution of orders are very frequent. In the steam coal section the position is irregular, and the lower grades of all qualities are easily obtainable. Large kinds are not a firm enquiry, and throughs and smalls are also easy.

Prices f.o.b.

	Current prices.	Last week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	30/-32/
Seconds	29/	29/	27/-29/
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	25/6-27/6
Machine-made cobbles.....	42/6	42/6	38/-39/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	29/-31/
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubby culm.....	13/	13/	14/-15/
Red Vein culm.....	11/	11/	—
Breakers duff	10/	10/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	36/6-38/6
Seconds	27/	27/	—
Bunkers through	25/	25/	27/6-31/6
Smalls	19/	19/	20/-22/
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	—
Coke-oven coke.....	47/6	47/6	26/6-28/6

THE IRISH COAL TRADE.

THURSDAY, AUGUST 9.

Dublin.

The observance of Bank holiday has interrupted business to a slight extent, but there is no change of any importance since last week. The import trade is active, both with regard to supplies for local storage and for railway despatch to the provinces, as well as for the large manufacturing concerns which stock direct from the shipping. Prices stand as follow:—Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s., all less 1s. per ton discount. Irish coals at Castlecomer collieries, co. Kilkenny, are:—Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d., all at the pithead. Coals from the Wolfhill collieries, Queen's County, are:—Malting coal, 46s. per ton; house, gas and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton, all f.o.r. Athy, on the Great Southern and Western line. Both the Castlecomer Company and the Irish Mining Company have replied to the Clonmel Guardians' queries, stating that they were unable to supply coal to the union owing to heavy orders already in hand. The Guardians have accepted a tender to supply 200 tons of Wigan coal at 47s. 6d. per ton. It is stated that the Kill (co. Cavan) coal scheme is progressing satisfactorily, and a temporary mining engineer has been appointed. Uniform tenders for turf at 12s. 6d. per load were recently received by the Castlereagh Guardians, who finally decided to advertise for tenders for coal in preference to paying the advanced prices.

Belfast.

Demand for house coal is still good for stacking purposes, and merchants' stocks are well maintained, as regular supplies are coming forward from Scotland. Current quotations are:—Best Arley, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. It is somewhat difficult to quote for steam coal, owing to the large variety on the market. Cheapest Scotch can be had as low as 29s., while the better qualities are selling as high as 35s. to 37s. 6d. per ton. The demand for gas coke is rather limited at present, and price ranges from 37s. 6d. to 40s. per ton. Foundry coke is in good request at 60s. per ton for second quality, and 65s. for best beehive oven. At a meeting of the Belfast Trades and Labour Council, a resolution was adopted to request the Corporation to purchase and store a supply of coal for the public in winter, as done in England.

THE TIN-PLATE TRADE.

Liverpool.

Only a very small business is reported, pending the publication of the full schedule regarding fixed prices, which it is expected will be issued during the next few days. The Director of Steel Production has sent out a circular to the trade, stating that stock holders may dispose of unrestricted sizes only which were in stock on July 23, but not those arising after that date, to the home trade only, without restriction as regards price, until August 31, 1917, after which date all tin-plates and terne-plates can only be sold against permit, and under Government order re fixed maximum prices.

Serious Strikes in Australia.—The men employed in the workshops of the State Railways in New South Wales went out on strike on Tuesday, and under an agreement, by which the various trade unions in Australia are pledged to support each other, the trouble rapidly spread among railway and tram men and coal miners. The strike has also been extended into Queensland, and it is feared that a long and bitter struggle is inevitable.

THE LONDON COAL TRADE.

THURSDAY, AUGUST 9.

The London coal trade during the week has been largely of a holiday character. At many of the depots, however, a great spirit of patriotism has been shown, and loaders and carmen started off with their usual loads on the Tuesday, so that the delivery trade has been fairly maintained for each day—except, of course, on the Monday. The London Coal Exchange was closed on Bank holiday, but the seaborne arrivals have continued good, 19 vessels (all contract cargoes) being returned on Friday's market as arriving in the River Thames, and 24 on Wednesday. This is very much below the corresponding week of last month, but on the average for the year the quantities are much higher than last year. Freight is firm and strong, but shipping is scarce. In one case during the week as low as 15s. has been recorded from the Tyne to London. The railway companies have brought to the London depots the loaded wagons, invoiced during the week preceding the holidays, with unusual alacrity and promptitude, and this has helped the delivery trade very considerably. Some anxiety is still felt as to the new regulations of the Controller which are shortly to come into force, but the consensus of opinion seems to be that an increasing quantity will be earmarked for the London district, especially from the coalfields nearest to the Metropolis. The re-arrangement of the coal supplies from Yorkshire and Lancashire, usually shipped from the Humber and Mersey ports, to be diverted into channels likely to feed the London and southern districts must tend to bring an increasing quantity by rail, so that the long distance traffic curtailed from Durham and Lancashire will not be felt so keenly as was at one time feared. Very little coal has at present been put into stock at the wharves and depots, but it is distinctly apparent that large consumers, as well as householders generally, have built up better stocks than in former years. The steady work at all the collieries also during the summer months, when, as a rule, short time has been worked, has had an appreciable effect upon the available tonnage for house use. Steam coals continue exceedingly scarce. The London Coal Market opened on Wednesday after the holiday, but comparatively few attended. The demand for all qualities of household fuel was well maintained, and there has been apparently no accumulation of stock in any direction during the holidays. Steady work is reported at all the depots, and the fairly rapid clearance of the loaded wagons has been very helpful just now as the collieries are beginning again to complain of a shortage of empties. Government orders are expected to be on an increased scale during the present month, so that all merchants are very urgent about orders on hand. Cokes have had a good run, both for furnace coke and gas coke, and, if anything, an increased quantity has been produced at the ovens, which the Government and the shipbuilding yards have quickly absorbed. Slacks have been plentiful, and lately the factories along the Thames side have made a full use of this quality of fuel. Colliery representatives still decline booking orders on the open market, and although a good deal of pressure is often brought to bear upon them to enter an occasional order, they adhere strictly to the principle that contract supplies must first be executed before any coal can be sold in the ordinary market course. The heavy call for hard steam coal and nuts for Government use, and the pressure at the shipping ports for this class of fuel render it very improbable that an adequate quantity will be available for London during the next few months.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, AUGUST 3.—The seaborne house coal market was somewhat quiet to-day in view of the approaching holiday, no cargoes having changed hands, but the enquiry continues good. Cargoes, 19.

WEDNESDAY, AUGUST 8.—The holiday influence still prevails, but the demand for seaborne house coal continues good and supplies very scarce, no cargoes being on offer to-day. Cargoes 24.

OBITUARY.

Maj. Arthur Toward Watson, of the King's Royal Rifles, of Bishopthorpe Garth, York, who has died from wounds, was the last surviving son of Mr. H. W. Watson, of Burnopfield, and was a coal exporter and managing director of the Hamsterley Colliery Limited.

Mr. James Thomson, a well-known mineral borer, has died at his residence in Dunfermline. He supervised the sinking of deep bores in Spain and Russia, and was responsible for many others in Scotland and the North of England. At Cameronbridge, Fife, he sank the deepest bore in Great Britain. Before the last seam was pierced the bore had penetrated to a depth of nearly three-quarters of a mile.

Engine-room Artificer Austin Leo Shields, R.N.R., who has been lost at sea, served his apprenticeship with the Cramlington Coal Company Limited, and prior to taking up a seafaring career was an official with the Wallsend and Hebburn Coal Company Limited.

Mr. George Parkinson, coal merchant, of Norton, who left England for Australia a short time ago, is reported to have died whilst on the way as the result of a chill. He leaves a widow and family.

THE BY-PRODUCTS TRADE.

Tar Products.—As usual at the holiday period, markets are quiet, and there is practically nothing to report. Pitch for next season's shipment is called 45s. per ton f.o.b. Creosote, which may now only be sold under licence, is nominally 4½d. net per gallon. The average quotations for gas works products are as follow:—Coal tar, 20s. 3d. to 24s. 9d. Pitch, east coast, 16s. 6d. to 17s. 6d. per ton; west coast, Manchester, 15s. 6d. to 16s. 6d.; Liverpool, 16s. 6d. to 17s. 6d.; Clyde, 17s. to 18s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½ to 6¾d. Solvent naphtha, naked, north, 1s. 11d. to 2s. Heavy naphtha, north, 1s. 1d. to 1s. 2d. Heavy oils, in bulk, north, 3¾d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—Home trade demands are still being filled at official rates. A little export business is passing under licence at £23 per ton.

SOUTH WALES MINING TIMBER TRADE.

Heavy Decrease in Half-Year's Imports.

The decrease in the quantity of foreign mining timber imported into South Wales and Monmouthshire in the first half of the present year is somewhat striking. Accepting £3 per ton as the c.i.f. value of the foreign wood ex ship at South Wales ports (the average declared value as given by the Board of Trade returns worked out at round about this level), the total comparative loss compared with the imports of the first six months of 1916 is equal to £573,645. In other words, the Government plans of restricting imports has resulted in limiting our indebtedness to France and Portugal by considerably over half a million sterling, while the single voyages of 95 vessels of 2,000 tons gross were available for the carriage of other goods. The decrease compared with the first six months of 1916 amounts to 239,019 loads or 191,215 tons, the following being the actual quantities imported:—

IMPORTS FOR THE FIRST HALF OF 1917.

	Cardiff.	Newport.	Port Talbot.	Swansea.	Totals.
1917.	Loads.	Loads.	Loads.	Loads.	Loads.
January ...	55,849	9,307	4,767	4,023	73,946
February ...	57,592	9,632	3,071	3,187	73,482
March	64,214	9,252	3,008	4,954	81,428
April	70,568	6,300	2,599	3,630	83,097
May	61,258	11,432	2,211	5,399	80,500
June	62,687	17,099	1,466	584	81,836
Totals	372,168	63,022	17,122	21,777	474,089
Totals first half 1916...	526,822	100,017	32,139	54,070	713,108

The further curtailment of foreign imports, however, is liable to be pressed to a point which will result in economic loss and probably stoppage of collieries for want of mining timber. For the stipulated decrease each month until October behoves the acceleration of the cutting of home-grown timber, and opinions amongst those competent to judge are that the supply will not be equal to the demand when October is reached.

Imports for the Week.

For the week ending August 3, the quantity of foreign mining timber imported into South Wales amounted to 23,254 loads, or round about 18,600 tons, actual quantities being as follow:—

Cardiff (Barry and Penarth):—

Date.	Importer.	Loads.
July 28	Morgan and Cadogan	600
" 28	Marcesche and Company	132
" 28	Lysberg Limited (4 cargoes)...	9,240
" 31	Franklin Thomas	3,000
" 31	Morgan & Cadogan (3 cargoes) ..	468
" 31	Morgan & Cadogan (2 ") ..	780
" 31	Grant Hayward (2 ") ..	336
Aug. 1	Franklin Thomas... ..	3,000
" 2	A. Bromage	1,020
" 2	Lysberg Limited	3,120
" 3	Lysberg Limited	1,200

Total.....22,896

Swansea:—

July 30	—	308
Aug. 2	—	50

Total..... 358

There were no imports at either Newport or Port Talbot.

Market conditions have again been unfavourable for pitwood merchants. Colliery wagons were difficult to procure owing to the large number of trucks held up awaiting shipment. Importers with heavy demurrage costs were inclined to quote favourable terms for a quick discharge and market values ruled at 60s. to 64s. per ton ex ship Cardiff. At the latter figure there is little or no remuneration to the importing merchant. The average c.i.f. price of all imported wood during the past six months works out at 64s., and then loss in weight and demurrage costs has to be borne at the present low levels. There are a few importers who are not inclined to do business merely to change money and chance a heavy loss. When there is no remuneration merchants will naturally stop importing. The licence granted by the Controller for last month was utilised to the full stipulated quantity, an increase of 10 per cent. being granted to supply those collieries which prefer to import direct. The licence granted to the Allocation Committee of the Pitwood Importers Association this month has been divided into three parts to facilitate business at the three chief ports.

The Home-Grown Trade.

Arrivals of Irish and Cornish mining timber were good and sales improved. The secretary of the Coal Owners' Pitwood Association states that deliveries of home-grown timber to collieries are increasing. All the timber possible, however, will be needed, especially when the end of October arrives. This month, however, is one in which cutting should really commence. As a matter of fact, cutting has been going on all the year round. To cut whilst the sap is in the tree violates all forestry precepts, but the insistent demand has been such that no cessation was possible. Nevertheless, there is a danger that wood of short girth will quickly rot and be unequal to the great strain required in mining practice. To cut before October is to garner wood which has the consistency and character of a vegetable. Little wood has been held back for higher prices in South Wales, and the Standing Timber Order of 1917, which aims at eliminating the profiteer, is more welcomed than derided. Where there has been holding back is generally in the case of those estate owners who were reluctant to spoil the arboreal beauty of their land. It must be said, however, that estate owners having woods and coppices have been very patriotic in allowing such to be cleared.

Coal Distribution Scheme.—The Controller of Coal Mines has appointed Mr. Frank Pick, commercial manager of the London Electric Railways, as his assistant to deal with matters in connection with the London Coal Distribution Scheme.

Norwegian Railways Coal Order.—The Norwegian Railways, which a few days ago closed with a contract for merchants for three lots of 4,000 tons each of D.C.B. option half Durham, have now, by agreement with the merchants, increased the quantities to 2,000 tons each, making 36,000 tons in all, at the same time extending the delivery to October. Prices and other commercial conditions remain as in the original order.

MINERS AND RECRUITING.

figures relating to the recruiting scheme supplied by the coal controllers to the Ministry of Great Britain, and now issued to the various unions, are as follows:—The number ordered by the War Cabinet to be found for the Army, 40,000; the number posted as the result of Forms 17 and 18 and of voluntary enlistments up to May 30, 10,695; the number estimated to be fit for general service to be obtained on Forms 17 and 18, who were not posted before the 31st, 6,074; the number estimated as the result of Form 20, 2,487; total, 19,256, leaving a total deficit of 20,744. The net result is therefore that all existing methods of recruitment yielded in actual and estimated numbers a total of 19,256, so that 20,744 must be raised under a new method of balloting.

Meetings have been held in various mining districts during the past week, and the matter came before a meeting of the executive of the Miners' Federation of Great Britain, held at the Imperial Hotel, London, on Wednesday. Mr. Robert Smillie, the president, reported that the Coal Control Board had held a meeting in London that day, at which the whole question had been gone into. The miners' representatives, in accordance with instructions received from the executive, asked for a month's delay in adopting the new scheme for recruiting the miners in order that the matter might be more fully dealt with in the districts, it having been reported to the miners' executive that considerable ill-feeling and unrest had been caused in the districts owing to the hurried way in which the new scheme had been put before the men. He was hopeful that this month's delay would be granted, and it was agreed that a conference of the Miners' Federation should be convened within the month, after full instructions and the modified scheme of recruiting had been sent out to the districts. He further reported that the comb out of men from those who had gone in since August 1914, was to be vigorously carried on and completed before the new scheme would take effect.

The executive committee had under consideration the conference of the Labour Party, which is to be held to-day (Friday). The executive unanimously agreed to recommend the conference of miners' delegates not to come to any finding on the question of holding an international conference until they had heard the full statement from the executive of the Labour Party on Friday, and that they should ask for an adjournment after the statement had been made in order to allow the sections to meet and finally decide as to how their votes should be cast. The delegates conference yesterday accepted the recommendation of the executive.

INDIAN AND COLONIAL NOTES.

Africa.

South African Coal Trade.—The coal trade of South Africa continues in a healthy condition, and with the solitary exception of the collieries in the Cape Province, the business transacted continues to expand. During the first three months of the year the total tonnage sold throughout the Union of South Africa amounted to 2,493,511, for an average of 6s. 4d. per ton at the pit tops, as compared with 2,306,633 tons, and an average pit top price of 5s. 4d. per ton for the corresponding period of last year. Natal shows the most pronounced improvement in the average selling prices, which advanced from 7s. 3d. per ton a year ago to 9s. 11d., and the tonnage sold for the quarter ending March from 718,135 tons to 746,695 tons. The collieries in the Transvaal showed the greatest increase in the tonnage sold, but the improvement in price during the first quarter of the year was only equivalent to 5d. per ton, as compared with a year ago. Despite the chronic scarcity of rolling stock on the railways owing to the European war, the railways continue to handle a constantly increasing coal traffic, and for the first three months of the year the tonnage sold by the collieries increased from 1,401,594 tons to 1,544,060 tons, a large proportion of the increase being in connection with long-distance traffic. Even the collieries in the Orange Free State increased their output of saleable coal from 175,575 tons to 200,169 tons for the first three months of the year, but lost a penny per ton in the average pit top selling price. The greatest decline was, however, in connection with the coal trade of the Cape Province, where the total output fell from 11,329 tons for the first quarter of 1916, to 2,587 tons for the corresponding period of the present year. This is due to the railways refusing to use Cape coal any longer, owing to its inferior quality, so that to all intents and purposes as a competing factor the Cape collieries have ceased to exist except to a very limited extent for local requirements, the bulk of which, however, is still supplied principally from the Transvaal and Natal coal fields. Compared with a year ago the number of producing collieries in the Union of South Africa, has increased from 62 to 63, the Transvaal Province having increased its collieries from 29 to 30, Natal from 21 to 23, whilst the number in the Orange Free State has remained constant at five, but in the Cape Province the number has declined from seven to five. The tendency throughout the Transvaal and Natal is evidently in the direction of opening larger collieries than has been the case in the past.

Coal Discoveries.—It has been announced that whilst boring for water at Grahamstown in the Cape Province, a combustible substance having the hardness and appearance of coal was struck at a depth of 120 ft. from the surface. It burns readily, and is undergoing a geological and chemical investigation to ascertain its value as a fuel. Considering the circumstances of coal mining in the Cape Province, the discovery scarcely promises to be a workable seam of coal. Some interest has also been aroused regarding the discovery of coal in Angola, in Portuguese West Africa. The place where the coal has been found is only about seven miles from Zenze Railway Station on the line under construction 90 miles from the Port of Loando. This territory has been known for some time to be subject to Portuguese administration, but the subject has been difficult, owing to the regulations laid down. As far as is known, the coal is of little value for its contents of fixed carbon being only 10 per cent., the ash contents run from 25 to 30 per cent., much to be regretted, because a fair value so close to a railway and port would be of value to the territory. The principal value the coal

contains will be found in its by-products and relative high volatile matter. Experiments on a small scale show that the coal is capable of producing up to 75 gals. of crude oil per ton, which when refined will yield a good class of lubricating oil, paraffin, and other products. Unfortunately, the coke produced from the coal carries only 50 per cent. carbon, and probably over 30 per cent. of ash, so that if used for enriching purposes in gas works the coke as a by-product will be of little value. The high percentage of ash contained in the coke will make it a poor fuel for railways and industrial purposes, but where no other fuel is available some means may be devised for its use. The seam of coal is 6 ft. in thickness with a sandstone roof and a shale floor. Outcropping on a mountain side, it may be worked by adits in a cheap manner. At the present time it is worked in a primitive manner for a Government contract for fuel, and in the absence of railway communication between the mine and the railway is carried by native porters in loads of 100 lb. Naturally, as a fuel, its use is wasteful, the rich by-products going entirely to waste. Even the sandstone forming the roof of the coal seam is impregnated with oil to payable extent. The shale forming the floor of the seam is also oil bearing. Probably the yield would be 30 gals. to the ton, the crude oil obtained by distillation on refining yields principally a product suited for lighting purposes. Taken on the whole, the Angola discovery is more valuable from a by-product standpoint than for fuel purposes.

Canada.

Serious Outlook.—W. F. O'Connor, Cost of Living Commissioner, has made a report on the coal situation in Canada, stating that the situation is very serious. There is less anthracite coal in the country than a year ago. The shipbuilding programme of the United States is going to tie up the transport system, and will seriously affect the prospects of Canada obtaining coal from the American mines. Canadian railways are short of coal cars, and last year American coal was brought to the border, but could get no farther. American coal companies have placed an embargo on coal going out of the country, and the United States desires to keep coal cars in the country in case of an emergency arising. Mr. O'Connor states that the remedy for winter coal famines is the abolition of the contract system, under which large consumers make contracts with the dealers for future deliveries when coal is cheapest. Whenever a shortage develops, dealers have to keep their coal in storage to be ready to fill contracts, and cannot sell to the public. He recommends that the contract system be abolished, which would leave storage free.

Fuel Controller.—The Canadian Government has appointed Charles A. Magrath to the position of Fuel Controller under the provision of the War Measures Act, with full authority to control fuel distribution and prices throughout Canada. He will arrange for an equitable distribution of the supply, and take measures to secure economy in the use of coal and increase home production, and provide for importation to make up the shortage. Mr. Magrath has for some time been prominent in public affairs, was formerly member of the House of Commons for Medicine Hat, Alta., and is now chairman of the Canadian section of the International Waterways Commission.

State Mining.—The Canadian Government has taken over and will operate the mines of the Crow's Nest Pass district, British Columbia, under the War Measures Act. W. H. Armstrong, a large contractor of Vancouver, B.C., has been appointed Commissioner in charge of operations. The miners have been on strike for some months for a large increase in wages, and negotiations had resulted in an agreement for a new wage schedule, but the owners insisted on a clause imposing a penalty on miners quitting work. The men refused to accept this. Under Government direction the men will work under the terms of the agreement, giving them a considerable increase in pay, but without the penalty clause. The collieries will be run day and night to make up for lost time.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—August 2.

Clay Cross Iron Company.

Mr. W. THORNE asked the Minister of Munitions if he was aware that the Clay Cross Iron Company was a controlled firm, that women working at the slag cracking machines were being paid 2½d. per hour less than the men for doing the same class of work, that the men working the slag cracking machines were being paid a much lower wage than the men doing the same class of work at other iron works in Derbyshire, that boiler firemen, brick burners, and many other sections of men and boys were being paid less than other firms are paying in Derbyshire, and that the management refuse to deal with the union officials about the matter.

Mr. KELLAWAY said that, so far as the rates of women were concerned who were working on slag cracking machines, their wages would be the subject of a general investigation which was being made into the wages of women employed on munitions work in Sheffield. With regard to the boiler firemen and brick burners and to the relations of the company with the union officials, a full enquiry was being instituted.

August 3.

Irish Coal Reserves and Mineral Resources.

Mr. SCANLAN asked the President of the Board of Trade whether or not the Irish Office and the Board of Trade had considered the report of the expert sent by the Controller of Mines to examine the mineral field at Arigna; whether the Government were prepared to publish the report of the expert; and whether the Government were now prepared to take any and, if so, what steps to make the coal reserves of Arigna available for the supply of Irish demands in the coming winter.

Mr. ROBERTS replied that the Controller of Coal Mines was still in consultation with the Chief Secretary upon the expert's report on the Arigna coal and other mines, and it was not considered desirable yet to publish the report.

To a later question by Mr. SCANLAN, who asked the Prime Minister whether the Government proposed to take any and, if so, what steps to develop and make available for Irish needs the mineral resources of Ireland, Mr. DUKE (Chief Secretary for Ireland) said that the Department and the Geological Survey had been in communication with the Ministry of Munitions as to Irish mineral resources, and enquiries were at present being carried out. The Department's economic geologist was a member of the Advisory Committee appointed by the Ministry of Munitions in connection with the matter.

August 6.

Financial Arrangements with Coal Owners.

Mr. DUNCAN MILLER asked the President of the Board of Trade whether he was able to state what financial arrangements had been completed with coal owners in connection with the State control of the coal industry.

Mr. ROBERTS replied that he could not at present add to the reply which was given on July 12.

To a further question by Mr. MILLAR, as to whether it was intended to make a statement upon the subject before the Recess, and, seeing that the Coal Controller was appointed five or six months ago, had not sufficient time elapsed to enable the Government to come to a decision, Mr. ROBERTS said that there were certain matters now before the law officers, and as soon as they were settled a statement could be made; he promised to endeavour to expedite the decision.

Housing Working Classes.

Mr. HAYES FISHER, replying for the President of the Board of Trade to a question by Sir J. D. REES, as to whether the Government had decided to afford substantial assistance from public funds to local authorities who were prepared to build houses, and, if so, whether he could indicate the source from which, after the war, such assistance was to proceed, said that he was not in a position at the present time to give any further information on the matter beyond that given in reply to the member for York on the 31st ult.

Creosote Oil.

Mr. WATT asked the President of the Board of Trade whether he was aware that traders were being refused the use of creosote oil in their trade; that in the case of road and pavement makers this meant complete stoppage of their business, some already having stopped work altogether; that the contractor for the road making of the Admiralty housing scheme at Gourock was prevented the use of creosote oil for the fulfilment of his contract; and whether he would take any action to prevent traders being put out of business by his Department, in view of the fact that plenty of this oil was in the country.

Sir W. EVANS replied that the demand for creosote oil for fuel had made it necessary to limit its use for other purposes. The whole matter was receiving careful attention.

August 7.

Shipping Freights.

Replying to Mr. HOUSTON, who asked the Parliamentary Secretary to the Shipping Controller whether he was aware that a Spanish steamer was on or about July 31 chartered for a cargo of coal from this country to Barcelona at 215s. per ton; and whether other vessels under the control and direction of the Inter-Allied Chartering Executive were only permitted to receive a freight to Algiers or Oran, approximately the same distance, of 48s. 6d. per ton, Sir LEO CHIOZZA MONEY said that the fixture referred to was effected, but the Inter-Allied Chartering Executive could not effectively control the rates which are paid for cargoes to Spain carried in Spanish steamers, even if they had any interest in making the attempt. So far as neutral tonnage was concerned, the Executive did not restrict the rates to Algiers and Oran to 48s. 6d. per ton.

August 8.

Delivery of Coke.

To Mr. WILLIAM THORNE, who asked the President of the Board of Trade if he was aware that at the present time coke was delivered in loads of 20 bags, and not one ton in 50 was ever weighed, and these loads at most contain 15 or 16 cwt. for a ton; and would he consider the question of having coke weighed in the same manner and under the same conditions that coal was sold and weighed, Mr. ROBERTS replied that coke was sometimes sold by measure and sometimes by weight, but he had no evidence that misrepresentation as to the weight or measure purporting to be sold was prevalent. As coke was capable of absorbing a considerable amount of moisture, to require it to be sold by weight would not necessarily benefit the consumer.

August 9.

Exemption of Coal Miners.

In reply to a question by Mr. WING, regarding harvest work for miners, Mr. MACPHERSON (Under-Secretary of State for War) said that the exemption of miners was arranged for by the Home Office, acting through the colliery recruiting courts, and the War Office was not directly concerned administratively. If their exemption was conditional upon the men being engaged in coal mining, it would obviously lapse if the men ceased to be engaged in coal mining and became engaged in the occupation, for example, of shipbuilding. This would not necessarily preclude them from being exempted as shipbuilders, but it would be obviously improper to exempt such men as coal miners. The courts dealt specially with cases of men who were unemployed in the mines for two or three days in the week, and who engaged in temporary work to make up the deficiency in wages owing to want of transit in the district in which they worked.

During last month, the exports of pig iron from Middlesbrough amounted to 52,733 tons—1,945 tons coastwise and 50,788 tons abroad—as compared with 60,638 tons in June, a decrease of 7,905 tons. The exports of manufactured iron and steel amounted to 39,510 tons—2,174 tons coastwise, and 37,336 tons abroad—as against 20,752 tons in June, an increase of 18,758 tons.

Committee on Housing.—The President of the Local Government Board has appointed a Committee to consider questions of building construction in connection with the provision of dwellings for the working classes in England and Wales, and to report on the methods of securing economy and despatch in the provision of such buildings. Sir J. Tudor Walters, M.P., is chairman.

Electric Power in Indian Collieries.—The collieries of India, and especially those in Bengal, have during the past few years been gradually adopting electricity as a motive power in place of steam. Companies owning a number of collieries have recently effected an economy by installing units at a central station and distributing electricity to the various collieries. Coal-cutting machines have not made much headway, but there are several in use, chiefly of the "hammer" type, worked by compressed air.

North of England Institute of Mining and Mechanical Engineers.

Mr. FRANK COULSON, retiring president, occupied the chair at the annual general meeting of the members of the North of England Institute of Mining and Mechanical Engineers held on Saturday, August 4, in the lecture theatre of the Wood Memorial Hall, Westgate-road, Newcastle-on-Tyne.

The council reported that Mr. Henry Walker, H.M. divisional inspector of mines, Edinburgh, had been invited to become an hon. member of the institute. Mr. Chas. Henderson had presented a safety lamp to the collection being made by the institute to replace that destroyed by fire at the Brussels Exhibition some years ago.

The PRESIDENT mentioned that Mr. Allan Cordner, the assistant secretary, with the assistance of Prof. Louis, and perhaps others, had undertaken to do all he could to assist the Institution of Mining Engineers in its work during the illness of its secretary (Mr. Percy Strzelecki) and, also, in the making of arrangements for the institution meeting to be held in Newcastle next month.

Annual Report.

The council's annual report made reference to the loss sustained by the deaths during the year of Mr. J. H. Merivale, Mr. T. E. Jobling, and Mr. J. P. Kirkup—all of whom had taken a prominent official part in the affairs of the institute. During the year four other members had been killed in action, and six members and one associate had died. Twenty-five members had resigned, and 19 others had ceased to be connected with the institute. The membership now stood at 1,203, as compared with 1,160 in 1916, 1,214 in 1915, 1,242 in 1914, 1,273 in 1913, and 1,298 in 1912. A "G. C. Greenwell" silver medal had been awarded to Prof. W. G. Fearnside for his paper on "Some Effects of Earth Movement on the Coal Measures of the Sheffield District (South Yorkshire and the Neighbouring Parts of West Yorkshire, Derbyshire, and Nottinghamshire)," and a prize had been awarded to Mr. Fang Chun Lee, Assoc.I.M.E., for his paper on "Some Practical Notes on the Economical Use of Timber in Coal Mines." The institute had received a legacy of £500 from the executors of the late Mr. Geo. May, the income from which was to be used for purchasing a prize or prizes to be given annually to any of its students as the council might think fit, such to be called the "George May" prize or prizes.

The Finance Committee's report stated that the total receipts, including £117 18s. 10d. received for return of income tax for the years ended April 5, 1914, 1915, and 1916, were £2,896 17s. 6d. The expenditure was £2,357 4s. 8d. Increases were shown in salaries and wages, rent, rates and taxes, library purchases, printing, stationery, incidental expenses, and contributions to the Institution of Mining Engineers. Decreases were shown in insurance, heating, lighting, water, furniture and repairs, postages, cleaning, travelling expenses, and reporting.

On the motion of the PRESIDENT, these reports were adopted.

Election of Officers.

The election of officers for the year 1917-1918 resulted as follows:—President, Mr. John Simpson; vice-presidents, Messrs. A. M. Hedley, R. L. Weeks, Mark Ford, Samuel Hare, Simon Tate, and J. R. R. Wilson; and members of council, Messrs. R. S. Anderson, Sidney Bates, C. S. Carnes, Benjamin Dodd, W. C. Mountain, W. O. Tate, R. J. Weeks, E. S. Wood, J. B. Atkinson, John English, R. W. Glass, M. H. Kellett, Philip Kirkup, John Morison, R. E. Ornsby, H. M. Parrington, R. S. Tate, and W. B. Wilson.

The following were elected to represent the institute on the council of the Institution of Mining Engineers: Messrs. R. S. Anderson, Sidney Bates, W. C. Blackett, R. O. Brown, W. Cochran Carr, Frank Coulson, Benjamin Dodd, T. Y. Greener, Reginald Guthrie, Samuel Hare, A. M. Hedley, Philip Kirkup, C. C. Leach, Henry Louis, W. C. Mountain, R. E. Ornsby, M. W. Parrington, Walter Rowley, F. R. Simpson, John Simpson, W. O. Tate, J. R. R. Wilson, W. B. Wilson, and E. S. Wood.

Mr. COULSON thanked the members for the assistance they had given him during his year of office, and expressed the confidence that that assistance would be extended to his successor.

Mr. JOHN SIMPSON thanked the members for having conferred upon him the honour of election as their president, and, moving a vote of thanks to Mr. Coulson for his services during the past year, expressed regret that that gentleman's health had necessitated his vacation of the chair a year earlier than the usual time.

Mr. COULSON was duly thanked for his services, and a similar tribute was paid to the vice-presidents, councillors, and officers, and to the institute's representatives on the council of the Institution of Mining Engineers.

Geologists Recognised.

Mr. COULSON presented Prof. Fearnside with the silver medal mentioned in the annual report.

Prof. FEARNSIDES, returning thanks, said that, in scanning the list of former recipients of the medal, he did not see the name of any geologist, and he took it, therefore, that, in granting that medal to him, the institute, which was the senior institution of mining engineers, was acknowledging that the science of geology was one that deserved well of mining engineers, and that a knowledge of it conduced to increased safety in carrying out the work of mining. As a matter of fact, the paper for which he had received that medal was not yet finished, and he accepted the medal rather as an encouragement to go on with the work than as a reward for the work he had been able to do.

New Members.

The following gentlemen were admitted into the institute: *Members*—Mr. R. N. Fowler, North Wal-

bottle; Mr. T. E. Howl, Leeswood, Mold; Mr. N. Hunter, Wallsend; Mr. J. Lightley, New Brancepeth Colliery; Mr. A. F. Newman, Newcastle, New South Wales, Australia; and Mr. T. E. Rutherford, New Brancepeth Colliery. *Associates*—Mr. J. Douglas, Ferry Hill; Mr. F. E. Harris, New Brancepeth Colliery; Mr. C. Parish, Charlaw, Sacriston; Mr. H. J. Pye, Middlefield, Ushaw Moor; Mr. J. Turnbull, Sacriston; and Mr. O. Wood, New Brancepeth Colliery.

The Timbering of Coal Mines: Discussion.

The discussion on Mr. F. C. LEE's paper on "The Use of Timber in Coal Mines" (see *Colliery Guardian*, April 20, 1917, pp. 761-63) was resumed by

Mr. J. R. R. WILSON, H.M. inspector of mines, who stated that he hoped that those who had been using iron and steel supports would give the results of their experience. Mr. Lee was singularly fortunate as a student in having had the opportunity of seeing a system of working which was not scientific, and could not have been the result of experience and with its attendant evils, and then having been allowed to change over that system and work the coal upon lines which, in the case of others, had been proved by lifelong experience to be the correct method. The paper referred to the longwall method of working coal, and the author told them that "on account of the rapid advance of the face, which invariably means a good roof, or fairly so, the class of timber employed in longwall working is correspondingly inferior in quality." He gave that as one reason why the timber was not withdrawn, and, as another reason for that neglect, he blamed section 52 of the Coal Mines Act. One wondered how much timber was withdrawn from the goaves before the Coal Mines Act became law. In longwall workings in other coal fields the faces were often rapidly advanced where the immediate roof was by no means always even fairly good; it was often very short or of a clayey nature which required very close timbering. If there was one system of working that, more than another, required a really first-class support, it was longwall. The man who used inferior timber invited disaster, and it would be only fair if, at the time when the inevitable disaster occurred, that man should happen to be engaged near the coal face. The reason timber was not withdrawn from longwall workings was not because it was inferior, nor was it on account of a misunderstood clause of the Coal Mines Act; it was for want of thought, and often for want of knowledge. He was sorry to see the suggestion that a man who was not a qualified skilled workman was quite capable of withdrawing timber, but the writer seemed to grow out of that opinion further on. At first, as a sinner, Mr. Lee complained that the Act insisted upon the work being done properly, *i.e.*, safely. Later on, he seemed to have found salvation, for he told them that that was the most successful way as shown by the results, and he ended by preaching the gospel of scientific longwall, and advocated the soundest methods of safe and economical mining. Mr. Wilson commended to colliery managers the author's suggestion respecting the appointment of a special underground official to look after timbering. That had already been done at one or two Durham collieries, and had proved wise. Mr. Lee's points for guidance to such an official were well worth pondering. Most props in a gateway at the side of a pack were serving no useful purpose, but, as Mr. Lee said, did more harm than good to the roof, the pack, and themselves. It should be considered a misdemeanour to leave a prop in a pack. With regard to break-off timber for canches, the best way to save it was to eliminate it altogether. In those coal fields where the longwall system had been very long established, and where it was seen at its best, the packs were kept in front of the canches. There was then not the same danger of a drawn or broken roof, from shot-firing, which ultimately had to be supported by packs. No careful manager allowed odd props to be lying at random by the side of roleyways. When they were so found, kind enquiries should be made as to the well-being of the last official who passed that way. The author was to be congratulated that he was connected with collieries where it was realised that one prop cost less than two props and a supported bar. Oftener than not the bar or plank soon became endbound, and the first side-pressure broke it in the middle, and rendered it worse than useless. As the author pointed out, a tapered bar was very effective, as it would bruise at the end and continue to support the roof, and was certainly economical. Packs, as was mentioned in the paper, should be built to support the roof, and not as a slender wall to hide a heap of dirt. They should be straight in line with the side canch, but the packs themselves should determine that line, and not the reverse. The author properly pointed out how systematic timbering not only facilitated drawing, and thus saved timber, but also tended to make the roof pressure uniform along the face, so that less breakage was likely to occur. A face which moved fairly quickly broke less timber than one that was taken forward slowly. The roof behind the coal face must rest on something; the longer any roof rested upon a given section of timber, the worse it was for the timber, and the more dangerous the roof became. In a machine-cut face the roof would fracture on the line of each cut; if it was held up too long, it would probably break off at the face. If the face moved forward very slowly, the roof upon the timber slowly subsided, and the friction of that slow movement upon each line of fracture produced a smooth slippery surface. Moreover, where the line of fracture usually lay at an angle slightly overhanging the goaf, the speaker had observed that the parting in the roof, instead of overhanging the goaf, was often on a vertical line, and, when the movement of the face was unusually slow, it occasionally lay in the opposite direction, *i.e.*, leaning over the face. Slips in that direction were fruitful sources of accident, as a piece of unsupported roof at the face, in the

shape of a right-angled triangle, might fall without any warning. The weight upon the face along a slow moving face might be immense. Mr. Lee had made the experiment of measuring the vertical height from floor to roof, say, every 3 ft. from the face to the goaf; if so, he would have realised what a powerful lever was at work. That lever should do a great deal towards getting the coal, and its length should be determined by the power required; and that length was the only portion of the roof which should receive any support. A longwall face of considerable length used less timber per running yard than a series of short stepped faces. The latter method brought in its train many evils—the roof tried to break off on a line parallel to the general line of face, *i.e.*, diagonally to the actual face line; the roof weight crushed off the coal at the corner of the fast side, where the air road was supposed to be, and stopped the ventilation; in many seams that had proved to be a source of gob fires. As the roof could not get down on a line parallel to the actual face, too much weight was brought upon that face, and that was shown by the development of slips which, for some reason, assumed a direction at right angles to the general line of face and diagonally to the actual face. That mode of working was not true longwall—it was a bastard, and was the product of carelessness out of want of knowledge. The excuse often given for the method was that the particular roof could not be kept up on a longer face. A reason never heard was that the gate packs were neither wide enough built, so that the roof could break off at the goaf sides; the supporting timber at the face was not properly arranged, and the back timber was never systematically withdrawn from the goaf. If pit economics compelled the introduction of coal-cutting machines or conveyors, it was astonishing how soon many of these difficulties disappeared. The principles of successful longwall working were well known, and one of the very first was to withdraw every prop from the goaf. At many Midland collieries, every prop entering the mine had to be accounted for, and the broken props were counted as carefully as the new ones entering the mine. Perhaps those who were responsible would ascertain if the cost of timber per ton of output in the Northern coal field compared favourably with that in other coal fields; in other words, was the quantity used per ton of output less or greater than in other districts? There appeared to be nothing in the conditions to make it greater. Mr. Lee's suggestion respecting systematic timbering reminded the speaker of three things which a mining engineer practising in China told him many years ago. He described a visit to a very old coal mine entered by a drift where the face was so far inbye that a workman who took in his own empty tub could return with it laden with coal only after the lapse of nearly 24 hours. The method of working was longwall, the timbering was systematically set, and every prop along a considerable length of face was in perfect line with its neighbours. Mr. Lee came from China, and had been studying mining with Prof. Louis and others. The speaker thought they could safely predict that, if that vast rich country sent over her sons who would show the same perseverance, the same powers of observation, and the same keenness in their work as the author manifested, her industrial future was as secure as her tremendous past was renowned.

Mr. J. W. JAMESON supplemented Mr. Wilson's remarks as to the endeavours which are being made in Durham county to economise in the use of timber, by stating that he knew a colliery where, in the early part of this year, a joint meeting of all officials and deputies was called, and the constantly increasing difficulty of obtaining timber, together with its consequently greatly enhanced cost, was explained, and the necessity of care in its use, owing both to local and national considerations, pointed out. The officials very cordially agreed to do what they could to reduce any waste. Qualified men, who, for want of a better term, were called "economisers," were appointed to examine the timber in the various districts in the pits, and to report daily to the manager as to the quantities of timber used, and as to any improper use of it. The employment of these men caused extra expenditure on wages, but the outlay was more than counter-balanced by the saving in timber. The saving since their appointment had been about 20 per cent. on the number of pieces sent down the pit, and about 21 per cent. on the cubic feet used, while the extra outlay on wages for this supervision had been about 20 per cent. of the value of timber saved.

Mr. Lee was cordially thanked for his paper.

A New Siphon: Discussion.

Discussion of Mr. GEO. R. NICHOLSON's paper on "The Horsley and Nicholson Automatic Compound Siphon" (see *Colliery Guardian*, April 20, 1917, p. 766), was continued.

Mr. COULSON said it occurred to him that the model of the siphon shown was working under the most favourable conditions, and that he could not think that it would work as well if the suction pipe were taking water out of dip workings with an open end. It also seemed that, with certain classes of water containing gas or air, it would be very liable to form an air lock which would stop the siphon. It was impossible with some water to prevent the formation of air locks. He had had some little experience in trying to force water through pipes where there were air locks, and had put on enormous pressures but without success.

Mr. C. C. LEACH asked whether the siphon was more difficult to start than was an ordinary siphon.

Mr. NICHOLSON explained that the siphon was simply started in the ordinary way, and was then put into the automatic, and needed no further attention. At the air locking, the glass model he brought on the previous occasion demonstrated the practicability of the siphon clearing an air lock entirely out. They maintained that, with their apparatus, under ordinary conditions any air lock was carried off in action. Two of these siphons were now working in pits, and three others

He understood that one of the latter had a total lift of about 27 ft. Mr. J. W. Johnson was thanked for his paper and demonstration of the siphon. A paper on "Little Namaqualand and its Possibilities as a Copper Producing Country," by Mr. F. W. JENKINS, was read, and the proceedings then terminated.

TRADE UNIONS IN 1915.

The report of the Chief Registrar of Friendly Societies for 1915 (Part C—Trade Unions) states that at the end of 1915 the membership of the 669 unions (out of a total of 677 on the register), particulars of whose operations for the year are included in the summaries, was nearly 3,440,000 and the funds exceeded £8,600,000. The income for the year totalled over £4,800,000, and the expenditure over £3,200,000. About £290,000 was expended in unemployment benefit (including £120,000 State unemployment insurance benefit), £92,000 in dispute pay, £590,000 in sickness and accident benefit, over £200,000 in funeral benefit, and a further £530,000 in benefits of a miscellaneous character. The total income of registered trade unions was £70,000 less than in the previous year. The average contribution per member in 1915 was 6d. per week, as compared with 6·2d. in 1914 and 6·5d. in 1912 and 1913. The total expenditure was less than the 1914 figure by £1,140,000 and less than that for 1913 by £500,000. The decrease as compared with 1914 is attributable almost wholly to a reduction in the payments for unemployment and dispute benefits. The net amount of unemployment benefit payable from the unions' own funds

The figures relating to enginemmen, a group of unions largely connected with mines, are as follow: Number of unions making returns, 39; total membership, 54,425; total income, £63,043; proportion of increase from—(1) members, 88·6 per cent.; (2) Board of Trade, 0·3 per cent.; (3) other sources, 11·1 per cent.; average contribution per week from each member, 1914, 4·8d., 1915, 4·7d.; expenditure, £33,032 (£48,265 in 1914); amount expended per member in benefits—(1) unemployment, 9d. (3s. 6d.); (2) dispute, 4d. (2s. 1d.); (3) sickness and accident, 2s. 6d. (2s. 4d.); (4) funeral, 11d. (9d.); (5) other benefits, 1s. 1d. (10d.); amount of management and other expenses, £19,975; proportion of expenses to total income, 31·68 per cent.; expenses per member, 7s. 4d.; funds December 31, £128,981; increase during 1915, £24,707; increase, per cent., 23·7; funds per member, December 31, 1914, £1 18s. 4d., December 31, 1915, £2 7s. 5d.

Particulars relating to the chief unions in the mining group are given in the table below.

THE AMERICAN COAL TRADE.

The bituminous market is still in the process of adjusting itself to the new conditions, in the course of which (says *Coal Age*) the prompt business has come to almost a complete standstill. Shipments are confined almost entirely to contracts, and enquiry for free coal usually meets with no response. On what business is being done in the spot market, however, it is very largely at the Government maximum, although there is no evading the fact that there are a few interests who are opposed to meeting this figure, and that some small tonnage is going at better prices. Buyers are also expecting the Government to take

with the agreement made with Secretary Lane, yet there are persistent rumours that some houses are asking higher prices. Production was better than during the preceding week, but only because of the short tonnage in the previous period owing to the holiday inactivity. The coal producers feel that they have done their part, and it is now up to the railroad companies to provide the cars and move the coal promptly.

Advices from Baltimore indicate that it will be but a matter of a short time before everything will be shaken down to the 3 and 3·25 dols. basis. Meanwhile there is no great amount of coal coming here outside of contract fuel or coals for export and bunker use. The fact that tonnage on free coal has fallen off considerably since the 3 dols. basis was set, while general tonnage is said to be running about the same, might indicate that some mine connections have heretofore been holding out a part of their contract coals to take advantage of the recent high prices in the spot market.

As regards anthracite the promises of the big companies for heavier shipments this month are failing to materialise. With the bigger operators issuing statements showing record-breaking production figures, the dealers who are having these figures quoted to them by their customers are placed in an embarrassing position to make adequate explanation. The time is at hand when either the Federal Trade Commission or the operator should attempt to clear up this inconsistency, which is steadily becoming a matter of serious concern in trade circles. The fall season is now definitely in sight, and the most urgent appeals to shipping interest as to the prospects for obtaining tonnage are met with either direct evasions or only meagre assurances. Dealers ordinarily have their full winter's reserves in by this time, and waiting for the fall trade to open up.

Union.	Members.	Income.					Expenditure.					Funds	
		From members.	Other sources.	Unemployment.	Dispute.	Sick and accident.	Funeral.	Other benefits.	Payments		Management, &c., expenses.	on Jan. 1.	on Dec. 31.
									from Political Fund.	to federations, &c.			
		£	£	£	£	£	£	£	£	£	£	£	£
Yorkshire Miners	130,863	123,747	7,831	2,826	1,835	—	12,708	—	3,908	4,104	40,476	145,024	210,745
Durham Miners	90,638	131,862	7,308	9,458	1,916	46,559*	3,379	1,027	6,225	3,521	58,932	139,893	148,046
South Staffordshire & East Worcestershire Miners	4,210	3,350	96	302	—	262	621	22	—	397	1,383	4,788	5,247
Cokemen and By-product Workers	3,621	2,729	59	249	3	—	—	—	—	500	1,416	2,234	2,854
Northumberland Miners	28,239	16,618	1,400	743	—	—	2,041	—	1,924	1,993	6,889	13,736	18,164
Cumberland Miners	8,102	9,970	303	1,196	224	—	—	18	138	705	2,225	5,829	11,596
Durham Deputies	1,900	1,757	59	167	—	432	69	—	—	59	1,029	2,175	2,235
Nottinghamshire Miners	35,315	36,458	6,078	1,801	—	—	—	7,213	1,013	17,570†	7,390	176,016	183,535
Warwickshire Miners	10,000	10,719	535	50	—	—	—	—	—	1,113	4,388	18,451	24,154
Pelsall District Miners	6,238	6,517	565	191	—	—	635	545	300	436	2,158	13,186	16,003
Leicestershire Miners	6,726	7,302	556	23	—	—	—	876	—	504	1,329	14,179	19,305
South Derbyshire Miners	5,289	5,670	263	166	—	—	511	25	200	187	1,179	8,137	11,502
Bristol Miners	1,599	1,818	39	—	—	—	101	62	103	53	635	346	1,249
Cannock Chase Miners, Enginemmen, &c.	8,500	7,164	322	45	—	701	463	25	293	1,006	1,546	7,720	11,117
North Stafford Miners	19,265	17,599	2,079	2,073	—	—	—	1,738	956	1,105	7,797	36,355	42,643
Northumberland Deputies	1,380	1,374	16	—	35	—	363	1	—	154	556	1,321	1,602
Derbyshire Miners	33,094	45,427	11,606	2,362	—	—	—	7,009	—	3,044	12,632	312,172	344,686
North Wales Miners	12,610	13,520	937	461	—	—	582	200	657	341	4,908	14,635	22,151
South Wales Miners	135,165	190,211	33,313	9,241	16,713	—	—	12,326	7,289	13,627	71,965	65,225	157,588
Old Hill and District Miners	2,014	1,857	56	—	—	—	237	—	—	245	643	1,475	2,263
Lancashire and Cheshire Miners	81,411	52,489	4,586	—	2,042	—	—	756	3,991	1,946	6,066	77,449	118,823
North Wales Surface-men	1,316	800	33	136	—	—	18	—	—	3	353	977	1,300
Ilkeston Conservative Miners	160	95	—	1	—	—	—	—	—	—	19	77	152
North Wales Mining Officials	2·1	172	—	—	2	—	—	—	—	4	139	136	163
Notts Under-Managers and Deputies	183	2·2	20	7	—	—	—	28	—	—	33	922	1,076
Shropshire Miners, Enginemmen, &c.	2,000	2,458	25	275	—	214	115	154	65	749	319	466	1,028
North Warwickshire Miners	1,815	1,290	44	14	—	11	—	—	—	—	714	1,419	2,014
Highley Beh. of Miners' Federation of Great Britain	837	712	—	—	1	29	5	—	—	—	87	1,277	1,867
Cumberland Colliery Officials	255	404	1	24	—	142	3	35	—	2	124	53	128
National Association of Colliery Deputies	1,454	1,010	10	47	—	—	—	—	—	53	600	831	1,151
Yorkshire Deputies	1,871	2,009	32	—	50	—	78	—	—	15	806	1,753	2,845
Colliery Enginemmen and Boilermen (F.)	12,603	—	312	—	—	—	—	—	—	7	293	137	149
Winding and General Enginemmen	2,013	3,458	362	49	—	795	286	619	—	25	734	10,112	11,424
Durham Colliery Mechanics	6,014	5,056	403	470	27	—	—	662	—	174	1,170	11,247	14,203
Northumberland Colliery Mechanics	1,446	1,067	96	20	—	—	95	170	—	116	432	3,211	3,541
Farnworth Enginemmen, Boilermen, &c.	21	27	3	—	—	10	—	—	—	—	10	123	133
South Wales, &c., Colliery Winding Enginemmen	801	589	24	—	18	120	30	—	—	7	330	608	7·6
Lancs., Cheshire, & N. Wales Enginemmen, &c. (F.)	3,114	—	2,685	107	9	—	—	—	109	26	795	3,354	4,993
Monmouthshire & S. Wales Colly. Enginemmen, &c.	6,021	3,653	182	139	563	—	—	—	—	36	2,135	2,124	3,086
National Federation of Colliery Mechanics (F.)	8,922	—	35	—	—	—	—	—	—	—	25	230	240
Lancashire and Cheshire Colliery Firemen	1,888	953	16	7	28	—	—	10	—	28	495	787	1,188
North Staffs. Underground Colliery Firemen, &c.	786	8·2	8	68	—	219	44	5	—	11	208	781	1,080
Free Engine Keepers of Fife and Kinross	423	416	45	—	—	273	71	—	—	—	91	1,378	1,404
Scottish Colliery Firemen and Shot Firers	230	66	—	—	—	—	—	—	—	1	56	—	9

(F.) = General Federation.

* Includes superannuation benefit.

† Gift of £15,000 for motor ambulance for wounded.

was under £173,000, as compared with £716,000 in the previous year. The average payment per member under this heading was only 1s. 9d., as against 5s. 5d. in the previous year. The total disbursements for dispute benefit amounted to only £92,000, being £575,000 less than in 1914. The average expenditure on this benefit was less than 7d. per member.

There was an addition to the accumulated funds of registered unions of over 1½ million pounds sterling, for three-fifths of which the engineering and mining groups were together responsible. The comparative absence of unemployment and the absence of any large disputes no doubt accounted for this large expansion, which brought the total increase in accumulated funds for the three years 1913-15 to nearly three millions sterling. It is estimated that at the end of the year registered trade unions held a total of at least £840,000 in the War Loan.

The following particulars relate to unions in the mining group:—Number of unions making returns, 54; total membership, 663,463; decrease in total membership, 5·37 per cent.; total income, £819,924; proportion of income from—(1) members, 90·1 per cent.; (2) Board of Trade, 0·1 per cent.; (3) other sources, 9·8 per cent.; average contribution per week from each member: 1914, 4·9d.; 1915, 5·0d.; expenditure, £511,930 (£811,879 in 1914); amount expended per member in benefits—(1) unemployment, 9d. (3s. 6d.); (2) dispute, 8d. (7s. 3d.); (3) sickness and accident, 2s. 6d. (2s. 4d.); (4) funeral, 8d. (7d.); (5) other benefits, 1s. 1d. (10d.); amount of management and other expenses, £19,975; proportion of expenses to total income, 31·68 per cent.; expenses per member, 7s. 4d.; funds December 31, £128,981; increase during 1915, £24,707; increase, per cent., 23·7; funds per member, 31st December, 1914, £1 18s. 4d.; 31st December, 1915, £2 7s. 5d.

further drastic action in the matter of price fixing, which may force quotations to even lower levels, and are therefore showing a tendency to hold off. However, this cannot continue for long, as there is a very heavy consumption, and buying must soon start up again.

Shipments at Hampton Roads are moving fairly well in all directions, though they are not heavy on account of the small supply of coal and the scarcity of vessels for the foreign trade. Receipts from the mines are still light, as is also the coal in transit. New England consumers seem to be trying to cover their shortage, as shipments to that territory are unusually heavy, and would no doubt be still heavier if the coal was available for shipment. Export licences must now be secured for all cargoes of coal and for bunker coal supplied to steamers in the foreign trade. Particulars concerning cargo licences are not yet available, but bunker coal may be furnished any steamer not bound to a port in Norway, Sweden, Denmark, Holland, or their colonial possessions or dependencies. When steamers are bound to ports in these countries, a licence or permit must be obtained before the coal may be supplied. The effect of this regulation will be to put all steamers trading to America under the control of the Government. If bunker coal is refused, the voyage cannot be pursued. There is expected to be some delay to steamers until things are in smooth working order. It is probable that the same regulations will apply for cargoes as for bunkers.

At Philadelphia, while enquiries for coal continue as strong or even stronger than when the price was at 5 dols. and over, it cannot be said that the market has as yet entirely adjusted itself to the new selling conditions. While practically all quotations are being made at the 3·25 dols. rate for mine-run coal, in accordance

but all yards are practically bare of supplies now, and the retailers are hard pressed to meet current orders. The steam sizes display no particular strength over last week, and 3·50 to 3·75 dols. for buckwheat is the ruling price. Rice is bringing around 2·25 dols., with barley weak at 1·75 dols. One of the larger companies still continues to store a slight production of rice, boiler, and barley, which is in excess of their current demands. No further steps have been taken in the matter of pooling anthracite, and the committee which was appointed by the individual operators is quietly resting until a move is made by the larger companies. It is believed that the matter of the anthracite pool will not be gone into until after the bituminous pool, which has been lately arranged for, is in successful operation. The prices per gross ton f.o.b. cars at mines for line shipment are as follow: Broken, 5 dols.; egg, 4·25 dols.; stove, 4·50 dols.; nut, 4·60 dols.; pea, 3·20 dols.; buck, 2·90 dols.; rice, 2·40 dols.; boiler, 2·20 dols.; barley, 1·90 dols.

Freights.—Although unchartered steamers for export coal are still very difficult to obtain, the market to certain destinations is somewhat weaker, owing to the scarcity of available coal for export. A few steamers for export coal were chartered since last report, but none of any importance have been reported. Freight rates on coal by steamers to Europe are as follow:—West Coast of Italy and Marseilles, about 100 dols.; Spain (Atlantic), 30 to 36 dols.; Spain (Mediterranean), 32·40 to 38·40 dols.

A London syndicate has purchased the group of gales, comprising an area of about 4,000 acres of undeveloped Coleford High Delf (Dean Forest) coal, and it is hoped to start working them shortly.

COAL MINING IN NEW SOUTH WALES.

According to the annual report of the Department of Mines, New South Wales, for the year 1916, the output of coal for that year was estimated at 219,976,936 tons, valued at £83,356,873, being a decrease of 1,321,847 tons and £88,211 in value when compared with the year 1915. The coal exported during the year was 3,434,098 tons, valued at £1,873,298, as against 4,668,394 tons, valued at £2,485,448, for the previous year, thus showing a decrease of 1,234,296 tons and £612,150 in value. The coal shipped to overseas ports totalled 1,230,439 tons, valued at £727,511, as against 2,067,324 tons, valued at £1,128,722, in the preceding year. The exports to Australasian ports amounted to 2,203,659 tons, valued at £1,145,787, being a decrease of 397,411 tons and £210,939 in value on that for 1915. The production from the Northern district amounted to 5,311,832 tons, valued at £2,406,265, as compared with 6,307,015 tons, valued at £2,397,833, for the year 1915. The output from the Southern district totalled 1,848,933 tons, valued at £660,761, as against 2,261,398 tons, valued at £784,316, for the previous year. The collieries in the Western district produced 966,396 tons, valued at £269,393, as compared with 880,595 tons, valued at £242,481, for the preceding year, thus showing an increase of 85,801 tons and £26,912 in value.

The Chief Inspector of Coal Mines (Mr. W. Humble) gives particulars of this branch of the mining industry. The following table shows the output of coal, the numbers employed and the number of mines at work in the various districts:—

District.	Output of coal.		Persons employed.		No. of mines
	1916. Tons.	1915. Tons.	Below ground.	Above ground.	
Northern	5,311,832	6,307,015	8,367	3,130	83
Southern	1,848,933	2,261,398	3,036	939	16
Western	966,396	880,595	1,147	273	25
Total, 1916	8, 271,611	—	12,550	4,342	124
Total, 1915	—	9,449,008	13,682	4,539	119

It will be noted that there was again a considerable reduction in the output as compared with the previous year. The Northern district shows a reduction of 16 per cent. and the Southern district about 18 per cent. in their outputs, while the Western district has an increase of 9 per cent. This is probably due to the Western market being, to a large extent, a local one, certainly more so than either the North or South, whose trade depends on shipping. Of the total output of coal 5,406,343 tons were drawn from shafts and 2,720,818 tons from tunnels. East Greta Colliery has been deemed to be a shaft.

The total number of persons employed in and about coal and shale mines shows a reduction of 1,329 when compared with the previous year, which in turn was 753 below the year 1914. It appears that the war restrictions have operated, by reducing the output, in forcing men into avocations other than coal mining. A number of miners have also enlisted for active service. The number of mines, 124, exceeds by five the number working during the previous year, the increase being mainly due to the starting of several small places working outcrop coal.

The quantity of coal and shale raised per person employed in and about mines average 649 tons below ground, 482 tons per person including surface workers. The corresponding figures for the year 1915 were 691 tons per person employed underground, and 519 tons per person employed in and about the mine.

In 1916 2,450,271 tons of coal were cut by machinery as compared with 2,817,072 tons in 1915. Of these 1,797,066 tons (2,163,726 tons), a decrease of 365,660 tons, were got by 173 (172) machines, and 653,205 tons (654,346 tons), a decrease of 1,141 tons, by 139 (100) compressed air machines. While there is a decrease of 365,660 tons cut by electricity, there is only a decrease of 1,141 tons by compressed air. It is very gratifying to find that, while the number of electric coal-cutters is only one more than the previous year, the number of compressed air machines has increased by 39. It is to be hoped that this increase will continue, and that several of the safety-lamp mines now using electricity will substitute compressed air as the driving power. Some have already done so, and others, from the inception of machine coal cutting, have steadily refused to use electrically-driven machines. It is quite unnecessary to point out to the respective proprietaries and managers the dangers attending the use of electric coal-cutters at the face of mines which are generally dry and dusty, and in which firedamp is occasionally seen.

The following table shows the distribution of the output in 1915 and 1916:—

	1916.		1915.	
	Tons.	Per cent.	Tons.	Per cent.
Exports to Australasian ports	2,203,659	27.12	2,581,810	24.85
*Exports to foreign ports	1,230,439	15.14	3,286,223	31.63
Home consumption	4,693,063	57.74	4,522,589	43.52

In 1915 for the first time, the "home consumption" reached 50 per cent. of the total output; while for the year 1916, there is a gratifying further increase of 7 per cent.

The following table shows the principal markets to which coal was shipped from Newcastle in 1915 and 1916:—

	1915. Tons.	1916. Tons.
To Australasian ports	—	—
Victoria	1,159,366	961,053
Queensland	107,906	115,218
South Australia	791,147	667,924
West Australia	194,209	186,052
Tasmania	116,010	94,515
New Zealand	447,755	293,761

	1915. Tons.	1916. Tons.
To foreign ports—	—	—
United States	123,210	21,458
Java	168,839	36,834
Philippine Islands	62,310	—
Fiji	44,916	52,737
Chili	251,287	116,957
Straits Settlements	93,581	45,575
Sandwich Islands	59,915	21,822
Japan	10,916	13,760
Guam	53,992	55,397

Shipments increased to the following destinations:—New Caledonia, 33,765 tons (17,541 tons); Great Britain, 42,577 tons (14,470 tons); Japan, 13,760 tons (10,916 tons); Sumatra, 9,463 tons (*nil*); Canada, 2,963 tons (*nil*); and Fiji, 52,737 tons (44,916). On the other hand they declined to India 87,381 tons (122,065); Mauritius, 1,197 tons (12,744); Peru, 9,630 tons (42,406); Ecuador, *nil* (28,339); Panama *nil* (1,330); and New Guinea, 14,300 tons (21,195). The total exports amounted to 2,937,508 tons, a decrease of 1,068,669 tons compared with 1915. From Wollongong 153,243 tons were exported, a decrease of 28,755 tons compared with the preceding year; from Port Kembla and Bellambi jetties 178,897 tons or 78,277 tons less than in 1915; and from Sydney 317,693 tons or 31,117 tons less than in the previous year. These shipments included:—Bunker coal, 311,241 tons; New Caledonia, 1,838 tons; Solomon Islands, 1,058 tons; and Fiji, 1,570 tons.

In 1916 437,587 tons of coke were made, valued at £387,570 19s. 5d., an increase of 19,834 tons in weight, and £74,330 0s. 3d. in value. The average value per ton at ovens was 17s. 9d. as compared with 15s. in 1915. There were 884 coke ovens at work, 203 built but not working, and 22 in course of building—a total of 1,109. The persons engaged in manufacture of coke numbered 599. The greater portion (288,911 tons) of the output was produced in the Southern district. The Broken Hill Proprietary's iron and steel works at Newcastle were recovering sulphate of ammonia and tar in addition to using the coke for smelting and the oven gas for fuel in the boilers and blast furnaces. Messrs. G. and C. Hoskins were laying down a large plant at Wongawilli, in the Illawarra district, for the production of coke for their blast furnaces at Lithgow, and for the recovery and utilisation of the various by-products; and were also increasing the number of coke ovens in the Lithgow district.

During the year 13 fatal and 123 non-fatal accidents were reported. Each of the fatal accidents resulted in one death only; the non-fatal accidents caused injuries to 125 persons. All occurred at the coal mines. The fatal accidents showed a decrease of 10 as compared with the previous year, and the non-fatal accidents an increase of six accidents and six injuries. Of the deaths three were caused by falls of roof, three from being run over or crushed by trams or tubs, four by machinery and three by miscellaneous accidents. The persons injured may be classified according to place and cause of injury: explosions of firedamp and coal dust, one; falls of side, 15; falls of roof, 23; explosives, seven; run over by trams, 21; other haulage accidents, five; by machinery, two; sundries, 23; by machinery on surface, four; on railways, sidings, etc., 13; by electricity, one; and by miscellaneous accidents, 10. The death-rate from accidents per 1,000 persons employed was 0.77 as compared with 1.262 in 1915, and 626,507 tons of mineral were raised per life lost, as compared with 411,529 tons in 1915. The one non-fatal accident from explosions of firedamp or coal dust occurred at South Greta Colliery, in which naked lights are used. It appears that the brattice had been broken to allow work to be done behind it, and this caused an accumulation of gas at the face, 40 yards away. During the shift, one of the two miners went with his naked light on his head to the face, where he lighted the gas. The injuries were not serious. With regard to electric lighting at most of the large collieries, and more particularly at those having electrical installations for power purposes, the shaft bottoms, sidings, main flats, and clippings on stations, are all lighted by incandescent electric lamps. Clusters of electric lights are provided in the sinkings at Aberdare Central and Aberdare South collieries; and while there is increased efficiency in the sinking due to this light, it is also much more comfortable for the men than any other kind of lighting. Only two mines were using electric safety-lamps in the face workings, viz., Dudley, where about twenty, designed and made locally, were in daily use; and 360 Wolf lamps, at South Bulli Colliery.

The ventilation of the mines, generally, continued about the same. During the year Gunnedah, one of the Northern collieries, erected a locally made fan at one of the tunnel mouths, and obtained fairly good results. Bulli Colliery also replaced its furnace by an electrically driven fan. The report recommends that, so far as the creation of air currents is concerned, the collieries generally should have "summer" and "winter" ventilation programmes. The motive power, whether fan or furnace, is least effective during the hot weather; and to provide for a good and uniform amount of air underground, the ventilating apparatus should be driven more in the summer than in the winter months. The difference in the face ventilation of mines ventilated by a furnace or by a small and perhaps inadequate fan is very marked during the summer months, and these places in particular should endeavour to keep up the face ventilation, either by driving the apparatus more, or, if this cannot be done, by paying more attention to the stoppings and brattice. The effect of the hot weather on the quality of the ventilating current is very pronounced in the moist and wet mines. There the air current is almost at saturation point, the moisture on the roads having been picked up and partially vaporised by the intake air currents. The effect of this on the workmen is very depressing, and while it may not be possible to do away with the moisture, it is possible to increase the volume of air flowing round the faces, either by driving the ventilating apparatus harder, or by paying more attention to the stoppings and brattice, or perhaps both. It would appear that the altitude of the pit mouth above sea level does not much affect the question of moisture in the air currents. The mountain mines in

the Lithgow area, 3,000 feet above sea level, have more depressing atmospheres than the low-lying similar mines on the coast, but it is not uncommon for moist, wet, or dry intake roads along the coast to have to flow. Five fires occurred during the year at Duckenfield Colliery, East Greta, Kilmogilgan Centenary and Aberdare Extended.

At the State coal mine, Lithgow, early in September a start was made in clearing the land in the vicinity of the proposed shafts and colliery works. The site of the shafts is on portion 151, parish of Marangaroo, county of Cook, and about 1½ miles from Eskbank station. The coal area available within 1½ miles of the shafts is under 200 acres, so that for the first three or four years after the coal is reached the output will be small, but the colliery will be equipped to raise an output of 1,500 tons per day. Beyond the 1½ miles limit the area of Crown coal available amounts to about 10,000 acres, and, making a conservative estimate of 6,000 tons per acre recoverable, the coal available in the above area is equal to 240 millions of tons. It is intended to make the shafts 19 ft. in diameter, inside the brick lining. The coal will be reached at a depth of about 260 ft.

In his report, Mr. G. E. Carne, the Government geologist, states that he visited Lymington Colliery, Cardiff, with Mr. J. T. Tennant, Inspector of Collieries; and in the presence of Mr. J. Dawson, the colliery manager, and of his overman, measured vertical sections of three of the principal working faces pointed out by them. From each of these an average sample (exclusive of bands) was taken, and these were handed to Mr. J. C. H. Mingaye, who analysed them with the following results:—Moisture, 2.15—2.46 per cent.; volatile matter, 33.70—34.49 per cent.; fixed carbon, 51.19—51.64 per cent.; ash, 11.92—12.51 per cent.; coke, 63.11—64.15 per cent.; sulphur in coal, 0.326—0.329 per cent.; specific gravity of coal, 1.338—1.344; evaporative power, 12.4—12.2; calorific power, 6,497—6,551 cal.; B.Th.U., 11,700—11,797. Samples were also taken of the coals at No. 2 Ashtonfields Collieries, near Thornton. The seam worked at Ashtonfields probably corresponds with the "fourth," or "Big Ben" seam, of the Tomago or middle coal measures, otherwise known as the East Maitland. Prof. David, in his "Geology of the Hunter River Coal Measures," refers to the coal of the middle coal measures in the following terms:—"The coals contained in these seams are essentially splinty and bituminous mixed, and are more tender and friable than either the Greta coal below, or the Newcastle coal above. This circumstance makes them less suitable for export, though very useful coals for home consumption, especially for steam, gas, blacksmith and household purposes." The main tunnels at Ashtonfields are being driven west from about the centre of portion 25, parish of Maitland, county of Northumberland; the average dip of the seam is 1 in 12 to the west, or between 4½ and 5 degs. from the horizontal. One section measured near the face of No. 3 "cut-through" south, about 500 ft. from the mouth of the tunnel, revealed a thickness (including bands) of 7 ft. 10½ in. In another, 27 ft. further in, the vertical thickness was 7 ft., including bands; but the lowest portion of the seam was so inferior, owing to the clay bands, it had to be discarded. Evidently the portion of the seam below the thickest coal band (3 ft. 3 in.) is not constant in composition or value. Whilst the Ashtonfields coal may be regarded as a useful coal for local use, its tender character will militate against shipment or long train carriage. Moreover, the number of included clay bands will necessitate very careful mining to keep the ash contents down to the limits shown in the accompanying analyses. Samples from these sections analysed as follows: No. 1—Hygroscopic moisture, 1.9 per cent.; volatile matter, 31.70 per cent.; fixed carbon, 53.35 per cent.; ash, 13.00 per cent.; sulphur in coal, 0.77 per cent.; water converted into steam by 1 lb. of coal, 12.1 lb.; specific gravity, 1.35; calories, 6,497; B.T.U., 11,700; coke, slightly swollen, firm and lustrous; ash, grey, granular. No. 2—Hygroscopic moisture, 2.17 per cent.; volatile matter, 34.35 per cent.; fixed carbon, 52.36 per cent.; ash, 11.12 per cent.; sulphur in coal, 0.626 per cent.; water converted into steam by 1 lb. of coal, 12.1 lb.; specific gravity, 1.353; calories, 6,497; B.T.U., 11,700; coke, well swollen, firm and lustrous; ash, faint yellow tinge, semi-granular.

BLAST FURNACE DUST.

The Minister of Munitions has issued an Order that no person shall buy, sell, deal in, or dispose of any blast furnace dust, or treat any such dust so as to extract any component part thereof, except under and in accordance with the terms of a licence issued on behalf of the Minister of Munitions by the Controller of Potash Production. All persons producing or in possession of blast furnace dust shall make returns in regard to rate of production, stocks, purchases, sales, dealings, or other matters relating to said dust in such form and at such times as may be required by the said Controller. Samples of any blast furnace dust produced by or in the possession of any person shall be furnished to the Controller in such form and quantity and at such times as the Controller may prescribe. Such samples shall be taken in the manner prescribed by the Controller or his authorised representative. The term blast furnace dust includes all dust deposited or otherwise derived from the gases of any furnace used for treating ores for the production of iron or any of its alloys. Applications in reference to the Order should be made to the Controller of Potash Production, Ministry of Munitions, 117, Piccadilly, W. 1.

Exempted Mine Workers.—The draft list of owners and miners' unions under the new scheme for the Army exempt certificated miners' managers, under officials, and deputies, including hauliers, putters, trimmers and drawers, including enginemen, pumpmen, electricians, stockmen, mechanics, including blacksmiths, shoemakers, sawyers, wagon and tub makers, and repairers.

Notes from the Coal Fields.

LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Miners' and Employers' Action on Wage Rate—Cardiff Coal Washery Re-started—South Wales Miners and the Government: Resolutions at a special Conference—The Controller's Action on Contract Arrears—Wholesale Coal Stealing—Fireman's Serious Omission.

Mr. T. J. Callaghan and Mr. T. P. Cook were representatives of South Wales at the meeting of the Chairmen's Committee for Supply of Coal to Allies, held in London on Friday of last week.

Upon the refuse tips at Pantisallog, Merthyr, a manufactory is to be put up for obtaining patent fuel from the debris, to be used as a substitute for coal, Merthyr Council having given leave for this work to be carried on by Mr. T. L. James, of Dowlais.

The refusal of the Coal Controller to assent to the colliery proprietors applying for a decrease of wages provokes all the more surprise because of the peculiar circumstances in which the industry now stands. As their secretary pointed out, this is the third audit since last September, and each of them has shown a reduction in the average prices as compared with those in the September quarter of 1916. In addition, there is the increased and continually increasing cost of production; and therefore the employers consider that there should be a reduction of 30 per cent. in the general wage rate. But the Controller directs that no application shall be made for a general reduction at present. His refusal to approve has to be read in conjunction with the decision of the Miners' Federation of Great Britain to apply for an increase of 25 per cent.—so wide a variance between the two sides being unprecedented. The special feature of the moment is that neither side operates through the usual agency of the Conciliation Boards, and that the Advisory Committee which assists the Controller will doubtless have a prominent part in dealing with the question. One reason for the men's urgency in certain parts of this area is the irregularity of work, which makes their rate of pay something widely different from their actual earnings, especially in the western district. At present, the employers refrain from pressing their application for reduction in the wage rate, complying with the request of the Controller; but it has to be noted that they follow this course "without prejudice to their future position."

The Coal Factors' Association of South Wales and Monmouthshire held a special meeting at Cardiff Exchange for the election of officers, the membership having so much increased that it was considered desirable to take this course. Practically all the former officers have been re-elected. The following gentlemen, with seven others, constitute the executive committee: Messrs. Horatio Kendrick, Cardiff (chairman); H. S. Cook, Swansea (vice-chairman); E. C. Bliant (hon. secretary); V. Grey (assistant); and C. H. Pullin (treasurer). Swansea members will appoint a district committee to deal with questions arising at their end. It is proposed to link the organisation with the London Coal Factors' Association.

The fine coal washery at Cardiff Docks, owned by the Cardiff Coal Washery Company, which closed at the outbreak of war, has now re-started, the Admiralty having arranged to provide the necessary coal for working. Small coal of the inferior qualities will, it is anticipated, be mainly dealt with, and this will to some extent remove a growing difficulty which has been prevalent. Given adequate supplies, this undertaking, which is comparatively new, and is equipped with first-class modern machinery, can deal with a very large quantity of small, and add materially to the business of the port. The Admiralty authorities are in control for the present.

A donation of £100 has been made by the Lewis Merthyr Colliery Company to the war work of the Y.M.C.A.

The resumption of work at Ynyscedwyn and Ystradfawr Anthracite Collieries in the Swansea Valley is announced, and it is probable that both undertakings will be in full operation as soon as trade conditions permit.

Although the Mining Association and the Miners' Federation of Great Britain agreed to the scheme for carrying through the "comb out" of men from the mines, the South Wales Federation (which is represented on the executive that made the agreement on behalf of the Miners' Federation of Great Britain) have rejected the scheme by a decisive vote of 236 to 25. This result formed part of the proceedings at a two-days' conference in the closing days of last week, the 302 delegates present being representative of 147,420 members. Of the total number of men required from the mines, the quota of South Wales under the scheme was 4,575; and it was suggested that the Conciliation Board should allocate the number to be taken from each colliery from among unmarried men between 18 and 25 years of age. As to the procedure, the scheme proposed that the employers would draw up lists for submission to a joint committee of officials and workmen, which committee would deal with any objections. The names of those finally left in the list would be subject to a ballot as to whose exemption certificates should be withdrawn.

Objection was taken in the conference to any utilisation of the trade union organisation for military purposes, and it was upon this point that the vote was cast, the general opinion being that the duty rested with the military authorities. According to the allocation, Glamorgan would have had to supply 3,021 men, and Monmouthshire 1,238, the remainder coming from Carmarthenshire, Breconshire, and Pembrokeshire. After their vote of rejection, the delegates resolved to take a ballot of the members as to the procedure to be adopted for giving effect to their decision, and that "the Government be requested to refrain from putting the scheme into operation pending the taking of the ballot."

Afterwards, the conference discussed a "peace" resolution submitted by the executive. It sought to "ascertain the opinion of the organised labour movement of this country so as to offer the labour movements of the belligerent Powers the British working class view of a peace settlement," and, if they subscribe to it, to "take such action as will compel their respective Governments to adopt it." This resolution gave rise to lively debate; and, after adjournment to the second day's sitting of the conference, it was then carried by 212 votes to 43. Subsequent matters of debate included the question of food

tenance a "down-tools" policy, with the sole idea of stampeding the Allied Governments into a premature peace.

A circular has been issued by Mr. Finlay Gibson, secretary of the Coal Owners' Association, who is also secretary of the District Coal and Coke Supplies Committee, giving directions for the sale of coal. It is addressed to coal factors and to local authorities, and announces that the Controller will arrange that existing contracts in which arrears of delivery were outstanding on June 29 shall be submitted to local committees—three coal owners and three exporters—to decide whether the arrears shall be supplied at the contract prices or are to be regarded as cancelled. In coming to decision, these committees are to consider:—

- (1) Whether the coal was already sold abroad (or, in the case of bunkers, to ship owners) prior to June 29, and there is an obligation in the contract to deliver.
- (2) Whether arrears were due to colliery owners' fault or arrangements with colliery owners.
- (3) Whether any deliveries were made during the three months prior to June 29.
- (4) Whether the purchaser, while failing to take deliveries, has bought improperly elsewhere.

In the first two cases, the Controller states there will be no question as to the right of the purchaser to delivery of the arrears; but other cases will have to be determined on their merits, and the third and fourth considerations will assist the committees in deciding the reasonableness of each application, from the point of view of undue hardship. The committees should, at the same time, bear in mind that

- (a) Lack of tonnage cannot in itself be regarded as establishing the claim to delivery of arrears; and
- (b) Generally speaking, arrears of speculative contracts should be cancelled.

The France and Italy Committee for Supply of Coal met on Friday of last week, and appointed three representatives of colliery proprietors and three of coal exporters to deal with the question as to arrears on contracts and cancellation. Messrs. H. J. Hill, P. Miles, and E. R. Moxey were selected to represent the exporters, with Messrs. Coward, J. Powell, and E. Franklin Thomas as substitutes, if needed; and Messrs. North Lewis, W. R. Hann, and R. McNeil as representatives of the colliery proprietors. Sir Thomas Hughes will act as independent chairman.

Two men were fined at Aberavon—one £6 and the other £3—for stealing coal from trucks on the Rhondda and Swansea Bay Railway. A police sergeant in hiding at midnight saw defendants get on the trucks and throw out the coal to their wives; and it was found that one of them had a ton and a-half in his coal house, while the other had half a ton, the whole of which they admitted had been taken at different times from the trucks. It was stated by the prosecution that thefts of coal had become alarming; and the police superintendent said that a whole truckful had been known to disappear in a single night.

James Bartlett, fireman at the Black Vein pit of the United National Colliery Company Limited, Cross Keys, was summoned at Newport on Saturday for failing to inspect and accurately report upon the condition of his district of the mine on June 15 and 16. Great interest was manifested in the proceedings. The allegation against defendant was that he reported the presence of gas in only a few places, whereas an examination made by representatives of the workmen revealed a considerably larger number of accumulations. The under-manager admitted that whilst the men's inspection was in progress there was ample assistance available if the inspectors became involved in danger, but Bartlett had only a 15-year-old lad to help him. The Bench imposed a fine of £4. Charges against two other men were not proceeded with.

At the Porth sports on Monday, Maj. D. Watts Morgan (miners' agent), who is home on special leave, was presented with tokens of regard and appreciation, the gift of the Porth and Cymmer Reception Committee, which has made similar gifts to 400 returning heroes, mostly miners.

Mr. E. A. Rodd, who has been ordained to the pastorate of Hope English Baptist Church, Treherbert, was a collier employed at Tonypandy before he entered the University College, Cardiff.

A new reservoir, with a storage capacity of 23,000,000 gallons, which had been in course of construction since 1912, was opened at Penyrheol, Monmouthshire, on Thursday of last week. It is the property of the Pontypool Gas and Water Company, and will supply the lower portion of the company's area, and thus afford a greater pressure to the upper. Mr. T. H. Deakin, J.P., chairman of directors, who was accompanied by several local public representatives and colliery proprietors, liberated the water from the reservoir into the public service mains. The contractors were Messrs. W. and J. R. Watson Limited, Edinburgh and Bridgend. The water is taken from Nant Daer, and is pronounced by London experts to be of excellent quality. There are no houses on the gathering ground, and the site is 750 ft. above sea level. The reservoir has three inlets and one outlet, and measures 600 ft. in length by 500 ft. wide.

Pte. John D. Jones, Welsh Regiment, Tylorstown, who is officially reported to have died from wounds received in France, was a collier employed at the No. 8 pit, Tylorstown, before re-enlisting in 1914. He served in the South African campaign.

An enquiry into the circumstances of a fatal accident at the United Tube Corporation Works, Newport, Monmouthshire, was held on Friday of last week. It was stated that deceased (George Curtis Brand, labourer), whilst carrying a bucketful of waste oil, passed by a stationary truck, and was knocked down by an engine. The driver gave warning of approach, but it was assumed that the sound of the whistle was muffled by the din of the works' machinery. The coroner said it was gratifying to find that in large works such as the undertaking in question ample facilities were provided for rendering first-aid, as frequently the only chance of preserving life was instant attention. Verdict: "Accidental death."

Two soldier miners from the Pontypool district have recently received Military Medals for conspicuous bravery in the field—Sergt. Jack Hales, Monmouthshire Regiment, who in civil life is a collier employed at Tirpentwys Colliery; and Pte. Edward Dix, King's Shropshire Light Infantry, of Machine Meadow, Pontnewynydd, formerly a collier at the Gwental Colliery. Pte. Dix was called up as a Reservist.

Northumberland and Durham.

Durham Owners Support New Industries—Miners and Conscientious Objectors—Northumberland Miners' Association Reject Affiliation—Serious Token Frauds.

Mr. J. T. Johnson, of East Holywell, retired under-manager, left estate valued at £1,773 gross and £1,729 net.

Capt. Reginald Eyre Bryant, of the Durham Light Infantry, partner in the firm of Messrs. Bryant and Company, coal exporters, Newcastle, who was killed in action

in France on January 20 last, left estate of the gross value of £13,917 18s. 8d., of which £13,899 9s. 3d. is net personally.

The executive committee of the Northumberland Miners' Association has advised its members that it is of opinion that no good purpose can be served by the association becoming affiliated with the National Alliance of Employers and Employed.

After a long spell of ill-health, the Right Hon. Thos. Burt, P.C., M.P., is now greatly improved, and hopes to resume his duties at St. Stephen's in the very near future.

Mr. Coverdale S. Anderson, of Bilton Banks, who was appointed by the Co-operative Wholesale Society Limited to succeed the late Mr. J. A. Dixon as manager of Shilbottle Colliery, has been awarded a first-class certificate for mining engineering.

The Gateshead County Court judge reserved his decision after hearing the claim of Alexander Borthwick, stoneman, for compensation from the Washington Coal Company in respect of injuries received through claimant having fallen on the ice whilst on the sidings of the Washington Glebe pit last December. Claimant admitted that there were notices posted up forbidding unauthorised workmen to use the sidings, but about half the men used them, and he did not think that the notice applied to men at the colliery. The manager of the colliery and the traffic manager stated that unauthorised workmen were not permitted to use the sidings, and they themselves had turned men back; this prohibition was in consequence of an accident some years ago. For the claimant, it was contended that the sidings, up to the point where they joined the main line, were included in the colliery premises, and there had been no persistent effort to prevent the workmen using the sidings. On the other hand, the respondent company argued that the accident did not arise out of or in the course of the man's employment, and that the man was where he had no right to be at the time of the accident.

Token frauds are, unfortunately, rather common in Northumberland and Durham collieries, but it is very unusual for any colliery official to be so charged: the Castle Eden magistrates have inflicted a fine of £10 on George Coulson, a deputy overman, who was charged with having attempted to obtain the sum of 1s. 1d. by false pretences from the Horden Collieries Limited. It appeared that a putter named Bellingham placed a tub in the face with his token on, indicating that he was entitled to be paid in respect of that tub, one of which was subsequently found some distance away, and two other tokens. One of these tokens indicated that defendant's son had putted the tub, and the other that he had filled it, whereas defendant had filled the tub and, it was alleged, substituted his son's token. The chairman (Col. Burdon) said there was a doubt in his mind as to whether to send the man to prison.

At the same court, John Peel, 49, authorised shot-firer, was summoned for having contravened the Coal Mines Regulations by removing part of the stemming of an unexploded mine in the Horden pit, and placing a second charge in the same hole. The prosecuting solicitor pointed out that one charge exploded, and the man might have thought the other exploded, but he did not make any report of the case. Later, when two stonemen went into the place, they observed two wires. If the charges had discharged, they did not know what might have happened. It was considered a serious case, and defendant was fined £6.

The Castle Eden magistrates also cautioned Edward Palmer, miners' secretary, South Hetton, who was charged with having committed a breach of the Streets Collections Regulations on July 13, by having permitted a girl under 16 years of age to collect money in the street at South Hetton. The collection was on behalf of the Aged Mine Workers' Homes Association. Defendant admitted having been warned by the police. He stated that he had not time to withdraw the girls who were collecting, as he wanted to catch the men coming from the colliery pay office. No fine was inflicted.

Durham coal owners are giving a good deal of financial assistance to the movement for introducing new home industries, such as spinning and weaving, to Weardale, as witness the following contributions to a fund for the purpose: Messrs. Bell Brothers Limited, £15; Messrs. Bolekow, Vaughan and Company Limited, £15; the Consett Iron Company Limited, £10; and Sir Hugh Bell, £5.

For having hewn and filled off the wallside at Seaham Colliery, John O. McGann, 25, putter, has been fined £5 by the local magistrates. It was stated that the offence was committed at cross roads, where the place was originally 2 yds. wide, and now, by reason of such practices as that with which McGann stood charged, was 4 yds. wide. The chairman remarked that, owing to the imposition of heavier fines, such offences had been less common for some time.—At the same court, Andrew Meir was fined 10s. for having struck a landing lad in the same pit, and Fredk. Maddison 20s. for having behaved in a violent manner in the colliery. Maddison, it was stated, had struck a putter named Hutchinson with a pick, laying him off work for a fortnight.

Second-Lieut. (temp. Capt.) Robert Lindsay Wood, Royal Engineers, youngest son of the veteran Durham coal owner, Sir Lindsay Wood, has been awarded the Military Cross.

The Wingate lodge of the Durham Miners' Association, having considered the question of the appointment of an agent in place of the late Ald. William House, is of opinion that the present time is inopportune for such an election, in view of the great number of Durham miners who are serving with the Colours. The lodge points out that there are at present six agents and 12 committee men, and any problems which may arise through the war or otherwise can certainly be dealt with by these 18 gentlemen.

Lieut. John Hunter, Royal Engineers, of Chester-le-Street, who has just passed his final examination as a mining engineer, had to overcome many hardships during the process. He won a Durham County Senior Exhibition, and went to Armstrong College to study for the B.Sc. degree, which he succeeded in taking. He joined the Officers' Training Corps in October 1914, went to France in 1915, and was wounded very severely in the arm in 1916. Since then he has undergone nine operations, and was only able to devote six weeks to preparation for his first-class mining engineer's certificate. He served his apprenticeship with Mr. James Wilson, manager and agent for the Edmondsley Colliery Company.

At a meeting of Chopwell miners, it was moved that all anarchists and conscientious objectors holding office in connection with the local miners' lodge should immediately resign their positions. The chairman (Mr. Will Lawther) ruled, however, that, by the rules of the Durham Miners' Association, the officials were elected by ballot for a period of 12 months. The meeting upheld his ruling by 63 votes to 60.

Cumberland.

The quarterly meeting of the council of the Cumberland Miners' Association was held at Workington last week, Mr. J. Dickinson, Aspatria, presiding. The quarterly balance-sheet showed that the credit balance had increased by £2,216 16s. 6d.; there is invested in War Loan £7,175; and that the cash in bank amounts to £14,035 19s. 4d. A deputation from the Whitehaven miners attended the meeting, and laid before the council their views with regard to the placing in employment at other collieries in the district of the men who had been thrown out of work by the stoppage at Wellington pit. Mr. T. Cape was instructed to take the matter in hand, and also address a meeting of the miners at Whitehaven. It was also decided that Mr. Cape should issue a circular letter to the various lodges, asking members to contribute 3d. per head per week to the support of the Whitehaven miners during the period that they may lack employment. The secretary, Mr. Cape, laid before the council a circular issued with reference to the recruiting of miners, and it was found that in nearly all cases the instruction of the Miners' Federation that committees should be set up to carry out the official scheme, had been complied with. It was agreed that the association protest against certain pit top workmen having to pay unemployment contributions under Part 2 of the National Health Insurance Act.

Barrow Coal Supplies Committee are still negotiating with the Coal Controller to get Barrow placed in the Lancashire and Yorkshire area, instead of in the area which means the bringing of coal to the borough by a long route from Northumberland and Durham. It is urged that the coal from the north-east district will mean an extra cost of from 8s. to 10s. a ton, which will be a heavy burden, not only upon householders, but upon large consumers, such as the Corporation gas and electricity works. It was reported unofficially on Friday of last week that the Coal Controller had agreed to allow the household coal to be brought from Yorkshire and Lancashire until further notice, but no definite decision had been made in regard to the steam and other coal used by the big firms.

At Whitehaven Police Court on Thursday of last week, Francis Campbell, colliery shift hand, Whitehaven, was charged at the instance of Andrew Millar, colliery manager, Lowca, with having passed beyond a certain fence without authority, in contravention of the Coal Mines Act, 1911, at Lowca Colliery on July 6. It was stated that the breach of the rules charged against the defendant had led to the death of a workman. As a working was abandoned, a wooden bar or fence was put up, and beyond that bar no man should go without obtaining authority. A man named Bowman, who lived at Parton, seemed to have been short of a prop. The proper place to obtain a prop was the siding. However, they went to an adjoining working and removed a prop which was there for the purpose of supporting the roof. Unfortunately, when the prop was removed, the roof came down and killed Bowman. Defendant, who had nothing to say, was fined £3.

At a meeting on Friday of last week between the management of Wellington pit, Whitehaven, and the men's representatives, it was agreed that places should be found for as many hands as possible at the colliery company's other pits, and that the matter which was in dispute be referred in the meantime to the Conciliation Board, to be dealt with before the resumption of work at Wellington pit, which, it is hoped, will be ready in the course of two or three months.

Yorkshire.

Mr. E. R. Hutchinson, ship owner, of Hull, has been elected chairman of the Humber Committee for the Supply of Coal to France and Italy, in the place of the late Mr. James Turner.

The Spennorth District Council have accepted the tenders of Messrs. W. Bennett and Sons and Messrs. W. H. Sharp and Sons to supply 1,000 tons each of coal for the electricity works during the year ended June 30, 1918.

Mr. Thos. B. Smith, who has been for some time coke oven chemist for Messrs. Pease and Partners Limited at Bowden Close, has been appointed chief chemist at the works of the Barnsley Smokeless Fuel Company Limited. He took up duty there on August 1.

At the Halifax Town Council meeting, an amendment that the price of coke be 15s. per ton to residents within the borough, against the minute that the existing price of 20s. per ton should be maintained to September 30, after which the price would be raised to 25s. per ton, was defeated, as was also an amendment that a person purchasing 1 cwt. of coke be charged more than 9d. per cwt.

At the recent quarterly meeting of the Bingley Co-operative Society, in the course of discussion on the report, there were complaints of inequitable distribution of coal amongst members, and speakers advocated the ticket system. The president (Mr. S. R. Foster) said there would have been a famine in coal, so far as that society was concerned, if they had depended solely on the railway for bringing coal from the pits to the town. Delivery by rail could not be counted on, but the society had been able to get supplies by sending their own canal boat to the pit. They had had to get many provisions by sending their own motor wagon.

In view of the growth and importance of the mining village of New Edlington, near Doncaster, as a result of the development of the Yorkshire Main Colliery, the Parish Council are endeavouring to persuade the Doncaster Corporation to run through cars to Edlington. The extension of the service to the Woodlands model village has been a great success, for it is so freely patronised by the employees of the Brodsworth and Bullcroft colliery companies that it is already paying handsomely. When the Markham Main is sunk at Armthorpe, there will be another extension needed, with equally good and certain prospects of success. Doncaster has, indeed, good reason to be thankful for the discovery of minerals beneath its surface.

A rather peculiar accident formed the subject of an inquest at Doncaster last week. The deceased, Maxey Croxford, a miner, was pulling over a big piece of coal from the face with a bar, at the end of his shift, so that it would not be dangerous to men coming through on the opposite shift, and stepping back sharply out of the way, he collided with a prop, and was consequently caught by about 16 cwt. to a ton of coal, pinned down, and so badly injured that he died in Doncaster Infirmary soon after admission. During the enquiry, it was stated that the ambulance equipment of the Yorkshire Main Colliery, where the mishap occurred, was excellent, there was no lack of appliances and material, and that the company was very liberal in this direction. A good deal of bandaging, etc., was, said one witness, stolen by the pit employees from time to time. A verdict of "Accidental death" was returned by the jury.

Several pit employees were before the Doncaster (West Riding) magistrates last Saturday, for offences in the mine, and in each case were ordered to forfeit a week's wages.

For the dangerous practice of taking a match and cigarette down the Denaby Main Colliery, a young haulage hand of Mexborough was fined 25s., or seven days; whilst three employees of the Brodsworth Colliery Company were fined for riding ponies in that pit. In one of these cases, two employees were on one pony, and the horsekeeper declared they were going full gallop on it through the mine.

Lancashire and Cheshire.

The Earl of Ellesmere is working new seams and mines under the townships of Worsley, Little Hulton, and Tyldesley. Due notice has been given to the local authorities.

The opening out of new mines at the Abram Coal Company's pits in the Bickershaw district of South Lancashire is being pushed forward.

Despite depletions of men through the war, large and increasing quantities of bunker coal are being handled at the Partington tips on the Ship Canal.

The majority of collieries in the Manchester and Bolton districts closed down on Friday night of last week until Wednesday morning of this week. At certain pits, work was resumed on Tuesday morning. This is one of the longest holidays many of the miners in these areas have had for a couple of years.

Co-operative societies in South-East Lancashire are finding it necessary to increase the price of coal. The Farnworth with Kersley Society, which has over 7,000 members, has just advanced the price 3d. per cwt.

Apropos of the big housing scheme which is being promulgated by the Local Government Board, it is stated that the local authorities in the colliery districts of Worsley, Walkden, Swinton, Little Hulton, Atherton, Tyldesley, Astley, and Leigh, in South Lancashire, are already arranging ambitious housing schemes of their own. These, of course, will be submitted to the Local Government Board for approval or otherwise.

At a meeting of the Finance Committee of the Bolton Corporation, held last week, the Mayor reported on the steps to be taken by the local Domestic Coal Supply Committee in connection with the distribution of coal during the coming winter. It was stated that the Finance Committee were prepared to finance the Coal Supply Committee for distribution expenses to be incurred, subject to the accounts being submitted to the borough treasurer.

The Shilbottle Colliery, near Alwrick, Northumberland, recently purchased by the Co-operative Wholesale Society, of Manchester, has an area of 27,000 acres, of 3,000 tons to the acre, or an 8,000,000 tons estimated supply of the best house coal (2½ ft. seam), and a lower seam of steam coal with 24 more years lease.

A special committee of the Bolton Corporation has been appointed to select suitable sites in which to stock coal for the coming winter. Already one or two sites have been chosen. Other municipal authorities in Central, East, and South-East Lancashire are also making similar arrangements.

It was reported on Tuesday in Manchester coal trade circles that negotiations had been opened on behalf of a powerful colliery concern in the Manchester district, for the acquisition of certain colliery properties in the Bolton area. So far, however, it is understood that the proposals are of a tentative nature.

Various big mill owners and iron founders in South-East Lancashire are said to be now financially interested in colliery concerns in South and South-East Lancashire.

The Midlands.

Birmingham and district area present perhaps fewer complications concerning the working of the Coal Controller's transport scheme than very many others. Yet even in that district the project continues to be very widely debated. It seems that the only local sources of supply which will be taken away are North Staffordshire (which will be debarred from sending any but gas and coking coal) and North Wales. All classes of Yorkshire coal will be open to the Birmingham district according to its known requirements. The district will be able also to draw upon the Derby and Nottingham area for steam and gas qualities, and upon Leicester for steam and house coal. The radius of distribution assigned to Birmingham and district comprises Shropshire, Northants to Essex, South-Western counties, South-Eastern counties, and London. North Staffordshire will have outlets in North Wales and Shropshire, while Shropshire will send across its borders into South Wales and Monmouthshire and the South-Western counties; the Controller can always effect re-adjustment, if necessary, by issuing special permits.

Consumers of coal from the Cannock Chase coal field appear to have mistaken the intention of the new Government Order with regard to the conveyance of coal by canal. It has transpired this week that merchants who, by reason of the new Order, are debarred from continuing to receive supplies from certain localities on the Chase which they were previously getting by rail are under the impression that the same supply may now be sent by canal. This, however, is not so, and the sooner factors realise the correct situation the earlier will any dislocation to trade be prevented. The true position is that where in June last coal was being sent by rail into an area now prohibited, it must as from the date of the operation of the transport scheme (September 10) be kept in the area in which it is produced, or exported to permitted areas. In the near future, many Cannock Chase coal consumers will find their present supplies by rail cut off, and fresh sources of supply will then be arranged by the Coal and Coke Supplies Committee for that district. In the re-allocation, the Coal Controller directs that, where possible, the new supplies shall be *via* canal. Therefore, all local buyers who are in a position to take delivery in this way would be wise to make the necessary arrangements at once. At the present time, coal on Cannock Chase is very scarce, and it is hoped the collieries will make their present holiday stoppage as short as possible.

Kent.

Two big cofferdams constructed at Tilmanstone Colliery under the advice of Prof. Galloway, the South Wales mining expert, for the purpose of dealing with the water, and thus decreasing the work of the pumps, are now being utilised to their full extent, with results that are in every way satisfactory, and which are productive of considerable economy in the electrical power consumed.

As a sequel to the recent decision of the shareholders in Kent Collieries Limited (proprietors of Shakespeare Colliery, Dover) and the Channel Collieries Trust Limited, to amalgamate the interests of the two concerns in a new company, to be known as the Channel Steel Company Limited, it has been decided at a meeting of the creditors that the Channel Collieries Trust should be wound up, and Mr. J. A. Selway was appointed as liquidator.

Scotland.

Scotch Coal Shipments—Spontaneous Firing—Wemyss Company's Collieries—Murdostoun Colliery—Improvement at Fife Pits.

In Fife, full work has been obtained at all the collieries since the holidays. This is a decided change for the better in the case of miners in the steam coal pits, as these men for months previous got little more than half time. This improvement is in some measure due to the accumulation of a large number of empty wagons. In the Lothians, considerable difficulty is experienced in getting rid of the outputs.

On Saturday, fire broke out in the coal bins at Rosie, Isabella, and Lochhead collieries, belonging to the Wemyss Coal Company. The coal worked at these collieries is very liable to spontaneous firing.

Some of the colliery doctors in Fife are anxious to be paid direct from the fund formed by contributions from workers, instead of from the patient, as they state in cases the payment by the patient is often a hardship.

A motor ambulance has been gifted to the Lochgelly Ambulance Association, costing £600. A suitable garage has been presented by the three different coal mining concerns in the district.

The coal shipped from Burntisland during the week amounted to 10,870 tons, as against 10,010 tons in the same week last year. The total for the month was 32,921 tons.

Messrs. Archibald Russell and Company, colliery owners, Glasgow, have acquired a controlling interest in the Murdostoun Colliery Company.

Shipments of Scotch coal for the year to July 28 aggregate 4,099,566 tons, a decrease of 1,799,536 tons, as compared with the corresponding period of 1916. The groups of districts embraced are: Clyde, 2,828,359 tons; Fife, 704,260 tons; Forth, 566,947 tons. The falling-off in shipments is specially to be noted in those from the Fife ports, the decrease in the same period this year being 862,699 tons.

LABOUR AND WAGES.**South Wales and Monmouthshire.**

There is a movement on foot with the colliers of Blaenavon, Monmouthshire, to enter into agreement with the employers, providing for an inclusive price for timber setting in the coal face. After local discussion, the matter was raised at a meeting of the Eastern Valley Miners' District, where views, both favourable and unfavourable, were expressed, the meeting eventually deciding against the proposal. It was argued that if Blaenavon entered into such an undertaking, although financial benefits would accrue, the all-important result would be a stringent saving of timber, and a possible disregard for safety. The counter-argument was that every practical collier would instinctively ensure safety, irrespective of the question as to whether or not he was to be paid for it. The matter has not yet been finally determined.

There was no cessation of work at the Crumlin Valleys Colliery, Monmouthshire, in the latter part of last week, an interview between Mr. W. L. Cook, J.P., deputy miners' agent, and representatives of the employers having resulted at a timely moment in the withdrawal of the notice of dismissal tendered to a pumpman. Work was also resumed on the late shifts on Wednesday, after one day's idleness, at the Llanerch and Blaenserchan collieries (Messrs. Partridge, Jones and Company), the position of the cog drawer who refused to do work which he regarded as not being obligatory having been determined to the satisfaction of the men when a deputation waited upon the management.

Mr. James Winstone, J.P., acting-president of the South Wales Miners' Federation, referring to the several matters discussed at a conference of the organisation on Friday of last week, said there could be no question as to the determination of the delegates who attended with regard to the subjects of peace and food prices. As far as food prices were concerned, the difficulty was to persuade the delegates not to carry a resolution pledging a stoppage of work after a conference a fortnight hence. The delegates were firmly of opinion they were being exploited by those responsible for dealing with the people's food, and they were determined to have prices reduced and profiteering abolished immediately. Concerning the right of assembly and free speech, the delegates voted favouring a protest against the interference that had taken place, and he (Mr. Winstone) hoped the Home Office and other authorities, if they desired to maintain order, would take due notice of the resolutions passed at the Cardiff conference. The men were not in a frame of mind to be ignored any longer. As far as the "comb out" question was concerned, the only matter that would be submitted to the workmen for ballot would be as to what action shall be taken if the "combing" is persisted in.

The executive council of the South Wales Enginemen, Stokers', and Craftsmen's Association have decided to make application for 25 per cent. advance in wages to all members, this application to be made to the coal owners without delay, in accordance with instructions from the National Association.

Barry coal tippers, at a meeting on Sunday, received the answer of the company to their demand for better wages. This being regarded as unsatisfactory, they resolved to repeat it, and to meet again in a fortnight.

North of England.

A special council meeting of the Northumberland Miners' Association will be held in Newcastle to-morrow (Saturday), to consider the situation created by the new recruiting scheme, and also the question of the allocation of trade in the county, so as to regularise and apportion the employment at the various collieries.

A meeting of the Durham Coal Trade Conciliation Board held at Newcastle on Friday of last week, Sir Lindsay Wood, Bart., presiding, decided that miners' wages should remain unaltered at 107½ per cent. above the basis of 1879 for the ensuing three months.

The question of relieving the families of men who, having been transferred by the Army to Class W, are now working in coal pits which at present are only affording indifferent employment, came under the consideration of the General Committee of the Newcastle War Relief Fund last week. A meeting of the district chairmen and trustees had decided that relief should be given to the civil distress caused through unemployment and that necessity existed, but only for one week at a time, and the men working short time at the pits were not to be paid about 15s. per week. The Lord Mayor said the civil distress caused by war conditions. The unemployment of the Walker miners for example, was caused by these conditions, because they

The ships to deal with the coal. The Walker and that the time at the pit there had averaged a week for the past three months. He said if the men could get work anywhere to earn an income, they were too proud to ask that committee for any aid. It was decided that the committee should be granted under the limitations indicated in the Lord Mayor.

A case of some interest to miners was heard at the Wigan County Court on Friday of last week, when a Maryport coal miner, named John Jas. Mattinson, sued Altharrows Collieries Limited, for the recovery of 10s. 2d., being one day's wages. Plaintiff, it appeared, was engaged on contract work, and travelled to his work by train for 12 miles, and arrived at his destination at 5.45 a.m. He got to the pithead about three minutes to six. There were 16 of them at the top of the pit, and eight of them were taken down before the horn blew. Plaintiff was refused permission to go down the pit, although one of the other seven, who was essential to the working of the pit (being in charge of the haulage engine), was subsequently taken down. The secretary of the Cumberland Miners' Association said they put pressure on the men who lived near to go down the pit instead of waiting about it. He believed there had been only one other case of this kind, and it had been settled by the Conciliation Board. The case was adjourned until next court.

Federated Area.

At meetings of colliery surface workers held last week-end and the beginning of this week in the Leigh, Atherton, Bolton, and Manchester districts, resolutions were adopted in favour of securing an eight hours day and an advance in wages, coupled with other improvements in present working conditions. Further meetings of colliery surface workers will be held in other Lancashire districts this week-end, at which similar resolutions will be submitted.

The National Federation of Colliery Surface Workers is agitating for an eight hours day for all surface men, an advance in wages of 25 per cent., and a firmer recognition of trade union rights.

A prolonged discussion, occupying several hours, took place at the monthly meeting of the council of the Notts Miners' Association on Wednesday of last week, with reference to the internal management of the association. At the close of the deliberations, it was announced that no official statement was available as to the decision reached. A circular from the Minister of Labour, regarding a scheme to establish local committees to deal with the problem of demobilisation, was considered, and the council decided that, whilst willing to give the Government every assistance, it was felt that so far as miners were concerned, the existing machinery was quite sufficient for the purpose in the area covered by the association. At an adjourned meeting held on the following Saturday, the Bentinck Colliery workmen were granted permission to take a ballot to remedy a grievance. In reference to the further recruitment of miners, the report of the Joint Board held at Derby in the previous week was accepted.

Scotland.

At a meeting of the Fife Miners' Association, Mr. W. Adamson, M.P., submitted a report regarding a visit made to certain French coal fields where it was proposed to employ men from this country. Mr. Adamson pointed out that, so far as the working conditions were concerned, these were satisfactory, but the questions of wages and housing would have to be arranged between them and the Government. It was reported that the threatened strike at Lochgelly had been averted, the management undertaking to receive a list of non-unionists employed, with a view to drastic action being taken if they do not join up in a reasonable time.

At Clyde Colliery the men desire liberty to strike against the employment of two tradesmen who refuse to join the miners' union. The matter has been taken up by the executive committee.

At a meeting of the executive of the Scottish Miners' Union, it was decided that they be not represented at the conference to be held in Glasgow to-morrow (Saturday), in connection with the proposal to form committees on the lines laid down at the recent Leeds conference. At the same meeting it was agreed, after hearing a deputation from the Lithuanian workers in the country, to recommend that the Lithuanian workers in this country should have the same privileges as our own people in the event of their deciding to remain in this country, and that they should only be asked to recruit under the same conditions as their fellow workmen in mines and public works. A large number of those countrymen are employed in the mines of Lanarkshire.

THE FREIGHT MARKET.

Very little tonnage has been available for loading from north-east coast ports during the past week, and industry has been seriously hampered by the shortage. Many collieries have had to "lie idle" because of lack of transport facilities, and many others have worked only short time. The chartering business done has been mainly to near destinations, as, for instance, the French Atlantic ports for the carriage of coke at scheduled rates, and the taking up of vessels for London from the Tyne at 15s. The only fixtures for a port any considerable distance away are those of two vessels for Barcelona, at the record payment of 215s. per ton. The inactivity of the market is purely the product of the tonnage scarcity, for a very large number of orders are in circulation, Scandinavia and Spain, in particular, crying out for cargo space. At South Wales, the amount of chartering done has been small, and, as in the case of the north-east coast, has been mainly for French Atlantic ports. Bilbao has been done at 130s., and Gibraltar and Huelva are reported fixed for at 85s.—all three vessels from Cardiff. All the other business is for nearer ports. The quantity of tonnage available even for allocation to scheduled ports has been far from sufficient to meet the normal demands of trade.

Homewards, the markets have shown no great change. The River Plate is dull, at 145s. from up-river and 140s. from down river ports to the United Kingdom. Coal freights from Virginia to the Plate are still quoted at 125s., with 30 dols. for Rio discharge. Heavy grain business Range to West Italy is listed at 100s. West Italy from the Gulf. On net basis, the Northern Range continues to be quoted at 140s. to the United Kingdom, and 200s. to the Mediterranean. Madras Coast to Marseilles with 100s. to Calcutta to Genoa with jute at 100s. and with rice at 500s. From the United Kingdom, the rate is about 250s. More and phosphate ports are taking up business on offer, and are paying firm figures.

Tyne to Boulogne, 600, 45s., coke, six voyages; Barcelona, 2,100 and 3,300, 215s.; Calais or Dunkirk, 800, 45s., coke; Dunkirk, 600, 45s., coke; London, 1,500, 15s., reported; 1,200 and 1,350, 15s.; North French Range, 450 and 800, 45s., coke; and Treport, 800, 46s., coke.

Cardiff to Brest, 2,000, 45s., coke; Brest-to-Havre range, 150, 120s., sail; Bilbao, 3,000, 130s., neutral; Cherbourg, 1,200, 47s. 3d., neutral; Caen, 700 and 600, 48s., neutral; Gibraltar, 2,400, 87s. 6d., 500; Huelva, 1,600, 85s., neutral; Havre, 2,200 and 1,400, 45s. 9d., neutral; La Pallice, 3,700, 29s.; Rouen, 1,500, 1,200, 1,900, and 2,000, 48s. 9d., neutral; 850, 25s. 6d.; and St. Malo, 1,100, 21s.

Swansea to Rouen, 1,800 and 1,350, 48s. 9d., neutral; and Caen, 1,300, 46s. 6d., neutral.

Port Talbot to Rouen, 1,100, 48s. 9d., neutral; 1,500, 25s. 3d., patent fuel.

Tees to North French Range, 600, 49s., pig iron; and 700, 50s., pig iron.

Methil to Goteburg, 1,600, 190 kr.

LATER.—Since the foregoing fixtures were reported, the following additional charters have been arranged:—

Cardiff to Bilbao, 3,000, 130s.; Brest, 2,000 and 2,100, 45s., neutral; Caen, 600, 47s. 6d., neutral, two vessels; 700, 47s. 6d., neutral; Rouen, 2,050, 2,000, and 1,900, 48s. 9d., neutral; and St. Malo, 950, 22s.; and 1,050, 21s.

Swansea to Caen, 1,300, 46s. 6d., neutral.

Port Talbot to Rouen, 1,100, 48s. 9d., neutral; 1,500, 25s. 3d., patent fuel; and St. Servan, 600, 22s.

Hull to Caen, 875, 61s. 9d., neutral.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Davis (D.) and Sons Limited.—Interim dividends have been declared in respect of the six months ended June 30 last at the rate of 6 per cent. per annum upon the preference shares, and at the rate of 20 per cent. per annum upon the ordinary shares, both less tax. The dividend on the ordinary shares is the same as the interim distribution last year.

Durban Navigation Collieries Limited.—The report for 1916 states that the profit for the year, after providing for depreciation, is £25,475, to which must be added the £34,017 brought forward, showing a total of £59,492. Deducting the guaranteed dividend paid January 1, 1916, there remains a balance of £46,838, out of which a dividend of 10 per cent. has been paid, leaving a balance of £31,021 to be carried forward.

Fox (Samuel) and Company Limited.—The directors have decided to pay a dividend for the year ended June 30 of such an amount as will make, with the interim dividend paid in February, a total of 10 per cent. for the year, free of tax.

Glamorganshire Workmen's Cottage Association Limited.—The report for the year to June 30 states that the expenditure on capital account was £39,349. The revenue account shows a profit of £1,039, which added to £1,294 brought forward leaves £2,333. The directors recommend a dividend of 3½ per cent. for the past half-year, making 6½ per cent. per annum, free of income tax, leaving a balance of £1,294 to be carried forward.

Henley's (W. T.) Telegraph Works Company Limited.—An interim dividend on the ordinary shares at the rate of 10 per cent. per annum, less income tax, for the half-year ended June 30, has been declared.

Jessop (William) and Sons Limited.—An interim dividend is announced at the rate of 5 per cent. per annum, free of tax, on the ordinary shares for the half-year, the same as a year ago.

Longridge Coal and Cannel Company Limited.—A dividend of 2d. per share (4½ per cent. per annum) is announced.

Normanby Iron Works Company Limited.—Final dividend on the ordinary shares of 5 per cent., making 10 per cent. for the past year.

North Central Wagon Company Limited.—The net profit for the year ended June 30 amounted to £33,606, which with £5,543 brought forward makes an available total of £39,150. A dividend at the rate of 15 per cent. per annum, less tax, is proposed, which with the interim dividend at the rate of 13 per cent. makes 14 per cent. for the year, less tax; £10,000 is transferred to reserve, and £13,399 carried forward.

Midland Railway Carriage and Wagon Company Limited.—The report for the year ended June 30 shows a gross profit of £58,925, as compared with £49,617 the previous year. To this must be added the amount brought forward from last year, £11,213, making together the sum of £70,138. Deducting from this the various sums set apart for depreciation, debenture interest, and other prior charges, leaves the balance available for distribution £33,304, which it is proposed to apply as follows: Dividend on the preference shares at the rate of 6 per cent., free of income tax; dividend of 7½ per cent., less income tax, upon the ordinary shares; balance carried forward, £15,392. For 1915-16 the dividend was 5 per cent., while for the previous year only the preference dividend was paid.

Sheffield Forge and Rolling Mills Company Limited.—The directors state that it will not be possible to present a report and balance-sheet at the annual meeting on August 23. They are, however, satisfied that sufficient profit has been made to justify them in declaring a dividend of 15 per cent. for the year, free of income tax. Satisfactory progress is being made with works extensions.

South Durham Steel and Iron Company Limited.—An interim dividend of 5 per cent. (1s. per share), less tax, is announced.

Vickers Limited. Interim dividends for the half-year ended June 30 last will be posted on August 31 to holders of stock and shares of the company who are registered on August 16—2½ per cent., less income tax, on the preferred 5 per cent. stock and 5 per cent. preference shares, and 1s. per share, free of income tax, on the ordinary shares.

Waste Heat and Gas Electrical Generating Stations Limited.—An interim dividend of 2½ per cent. for the half-year ended July 31, less tax, has been declared, payable 31st inst. to holders registered 21st inst.

NEW COMPANIES.

British Pyro Products Limited.—Private company. Registered August 1. To carry on business for the manufacture and production of pyrophosphoric acid and salts. Capital, £20,000. Directors: B. Levin, A. J. Pennington, and E. E. Wier, F.C.S.

Bredmins Limited.—Private company. Registered office, 34, Waterloo-street, Birmingham. Registered August 2. To carry on the business of metal workers, metal casters,

engineers, etc. Capital, £2,000. Directors to be appointed by subscribers. Subscribers: F. H. Pepper and J. F. Smith.

Holmes and Jordan Colliery Company Limited.—Private company. Registered August 3. To acquire the Holmes and Jordan Colliery, Rotherham, and to carry on the business of colliery and mine owners, etc. Capital, £150,000. Directors to be appointed by the subscribers. Subscribers: E. L. Mason and J. S. Wilkinson.

Lees (J. B. and S.) Limited.—Private company. Registered July 30. To take over and carry on the business of an iron master, iron and steel manufacturer, and timber and slate merchant. Capital, £50,000. Directors: Capt. J. Lees and Z. J. Belcher.

Mayfield Engineering Company Limited.—Private company. Registered July 30. To carry on the business of mechanical, general, and electrical engineers. Capital, £500. Directors: A. Bent and R. S. Davies.

Mersey Shipbuilding Company Limited.—Private company. Registered office, 453, Strand, W.C. Registered July 28. Nature of business indicated by title. Capital, £50,000. Directors: J. J. O'Neill and J. Morgan.

Naylor (J. H.) Limited.—Private company. Registered August 2. To carry on the business of engineers, brass founders and finishers, and manufacturers of miners' safety lamps. Capital, £15,000. Directors: J. Naylor and O. N. Smeh.

Piggott Electrical Company Limited.—Private company. Registered office, 24, New Bridge-street, E.C. 4. Registered August 1. To carry on the businesses of electrical and mechanical engineers, electricians, etc. Capital, £5,000. Directors: G. E. Piggott and Sarah Piggott.

Ransomer (Tipton) Limited.—Private company. Registered July 31. To carry on the business of general engineers and manufacturers. Capital, £50,000. Directors: J. Malan verMehar, H. G. G. Blakemore, and J. E. Hobbs.

Wheway (Job) and Son Limited.—Private company. Registered office, Birchills Hame and Chain Works, Green-lane, Walsall. Registered July 31. To take over the business of an iron founder and a manufacturer of hames, chains, and other saddlers' ironmongery. Capital, £75,000. Directors: S. B., S. G., and W. R. Wheway.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

ABERYSTWYTH, AUGUST 14.—The directors of the Aberystwyth Gas Company invite tenders for the supply of 5,500 tons of screened gas coals, cobbles, or nuts, covering 12 months, delivered at Aberystwyth Station. Tenders, with analysis, to be delivered on or before August 14, 1917. Further particulars can be obtained from Mr. J. Gaunt, engineer and manager, Gas Offices, Aberystwyth.

WARRINGTON, AUGUST 14.—The Electricity and Tramways Committee invite tenders either for part or the whole of 7,500 tons of slack, to be delivered at the Electricity Works, Howley, Warrington, during six months commencing September 10, 1917, to be delivered in accordance with the conditions of specification, copies of which can be obtained from F. V. L. Mathias, borough electrical and tramways engineer, Howley, Warrington, on payment of one guinea, which will be returned on receipt of a *bona-fide* tender. In the alternative the Committee invite tenders either for part or the whole of 15,000 tons of slack, to be delivered during the 12 months commencing September 10, 1917. Tenders, addressed to the "Chairman of the Electricity and Tramways Committee, Town Hall, Warrington," must be sealed with wax, and endorsed, "Tender for slack," and delivered not later than 12 o'clock noon, on Tuesday, August 14, 1917. The lowest or any tender will not necessarily be accepted.

Abstracts of Contracts Open.

ARMAGH, AUGUST 13.—Coal (year's supply) for the Armagh District Lunatic Asylum. Tenders to the medical superintendent.

BULFORD.—Fuel for Carbston stoves (about six tons monthly) during ensuing winter. Particulars from Col. A. R. Holbrook, Commanding A.S.C., Salisbury Plain, Bulford.

BURNLEY.—10,000 tons screened gas coal for the Corporation Gas Department. Particulars from Mr. J. P. Leather, gas engineer, Gas Works, Burnley.

FRAMLINGHAM, AUGUST 24.—Coal for one term to Framlingham College. Forms and particulars from the secretary.

GRANARD (IRELAND), AUGUST 13.—150 tons screened coal (free from slack) for the Guardians. Tenders to Mr. J. Kiernan, clerk, Board-room, Granard.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport, Isle of Wight.

NOTTINGHAM, AUGUST 13.—Coal (year's supply) for the Health Committee. Particulars from the town clerk, Guildhall, Nottingham.

PORTLAND, AUGUST 13.—3,000 tons best quality screened gas coal for Gas Committee of Portland Urban District Council. Particulars from the gas manager, Mr. B. Taylor, Gas Works, Portland.

The date given is the latest upon which tenders can be received.

Big Coaling Depot for Sydney, New South Wales.—Ball's Head, Sydney Harbour, New South Wales, is to be transformed into the largest coaling depot in the Southern Hemisphere, at a cost of about £500,000. The scheme, which is a joint enterprise on the part of a British and a New Zealand shipping company, will bring into existence a depot which will carry stocks of coal of 50,000 tons and upwards, as well as stores of oil fuel up to 12,000 tons. Two large jetties are to be built, giving accommodation for ships of the maximum tonnage likely to go Sydney, with a depth of 30 ft. of water at low tide on the shore frontage and 60 ft. at the jetties. The colliers will be discharged by mechanical grabs, and sent to the stacks by means of electrical conveyor belts. Electrical weighing machines are included in the plant and will work in conjunction with the conveyor belts. At present vessels coaling at Sydney are dependent mainly on coal received by sea from Newcastle (60 miles distant), Wollongong (40 miles distant), or Port Kembla (50 miles distant).

WET SHAFT LININGS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Aitken, R. Boiler house door. (11128)
 Allen, R. Valve gear for internal combustion engines, pumps, compressors, etc. (11041)
 Balston, R. M. Rotary engines. (10936)
 Binnie, W. J. E. Electric detonators. (11073)
 Bolton, C. H. Signalling apparatus for winding engines at collieries, etc. (11269)
 British Dyes Limited. Grinding mills, disintegrators, etc. (11059)
 British Thomson-Houston Company. Starting devices for electric motors. (11149)
 British Thomson-Houston Company (General Electric Company). Fluid pressure brakes. (10963)
 British Thomson-Houston Company (General Electric Company). Electric motor control systems. (11031)
 British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Motor control systems. (11226)
 Brown, G. Elevating apparatus. (11194)
 Burnard, S. L. Rotary internal combustion engines. (11255)
 Cammell, Laird and Company. Internal combustion engines. (11179)
 Carter, G. J. Internal combustion engines. (11179)
 Chédru, G. E. Pistons. (11300)
 Cosgrave, S. A. Pit props. (11025)
 Cousins, R. J. W. Internal combustion engines. (10983)
 Crompton and Company. Dynamo electric machines. (11222)
 Crosland, T. P. K. Grinding mills, disintegrators, etc. (11059)
 Davis, R. H. Breathing apparatus. (10967)
 Findlay, M. Air compressed rock boring machines, etc. (10899)
 Galloways Limited. Cylinders of uniflow steam engines. (10931)
 Gasoline Corporation. Art of distilling hydrocarbon oils. (11212)
 Glenn, W. S. Coal saving arrangement for steam boilers. (11283)
 Heinrich, H. Rotary engines. (10975)
 Higginson, J. Process for treating or hardening, etc., in manufacture or treatment of steel. (11139)
 Hird, L. E. Devices for controlling fuel consumption in fire places. (11004)
 Igranic Electric Company (Cutler-Hamer Manufacturing Company). Electric circuit controllers. (11035, 11036)
 Lucas, O. D. Electric detonators. (11073)
 McDonnell, P. Coal saving arrangements for steam boilers. (11283)
 Malcast Foundry. Pit props. (11025)
 Midgley, A. H. Self-regulating dynamos. (11289)
 Notarianni, G. Safety device for mines, tunnels, and quarries. (11069)
 Parkin, T. C., and Phillips, E. B. Steam and air engines. (11159)
 Peet, J. Rotary engines, pumps, etc. (11062)
 Pensabene, N. Dynamo electric machines. (11222)
 Pilling, H. Cylinders of uniflow steam engines. (10931)
 Remy, M. E. de B. Two-stroke internal combustion engines. (11021)
 Rose, J. R. Process of manufacturing gaseous fuel. (11238)
 Ryner, A. Internal combustion engines. (11150)
 Shepherd, T. Internal combustion turbines. (10942)
 Smith, J. S. Valve gear for internal combustion engines, pumps, compressors, etc. (11041)
 Stone and Company, J., Wells, A., and Whitaker, A. Semi-rotary pumps. (11019)
 Sugimoto, S. Gas burners for blast furnace stoves. (11032)
 Symons, E. B. Crushing machines. (10941)
 Tompkin, A. Tank for carriage or storage of inflammable liquids. (11182)
 Turner, J. Grinding mills, disintegrators, etc. (11059)
 Vandervell and Company, C. A. Self-regulating dynamos. (11289)
 Wake, J. F., and Williams, R. Briquetting small coal, coke, iron ore, etc. (11199)
 Walker, A. System of forced draught for marine and land boilers. (11189)
 Wellington, S. N. Production of gas. (10972)
 Wellington, S. N. Destructive distillation of carbonaceous substances. (10973)
 Wellington, S. N. Apparatus for destructive distillation of carbonaceous substances. (10974)
 Westinghouse Machine Company. Generating power. (11225)
 Whaley, J. Internal combustion engines. (11237)

Complete Specifications Accepted.

(To be published on August 23.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 10180. Stedman, L. B. Internal combustion engine. (108174)
 10239. Liechty, H. Vertical water tube boiler. (103468)
 10295. Clarkson, T. Steam generators. (108177)
 10425. Schollkohl-Ges. Method of improving coke as heating medium for stoves and the like. (100968)
 10439. Mackinlay, J. J. H. Burners for boilers, etc. (108185)
 10476. Walker, J. H. Lifting or hauling gear. (108188)
 10658. Wellington, S. N. Destructive distillation of carbonaceous substances. (108200)
 10776. Percival, B. Reversing valves and flues for regenerative furnaces. (108205)
 11011. Davidson, J. Internal combustion engines. (108211)
 11100. Waddington, H. R., and Parsons, I. H. Electrical signalling apparatus for use in mines and for other purposes. (108213)
 11101. F. J. Armitage, C. Apparatus for manifolds of by-product coke ovens, or furnaces, or the like. (108236)
 11102. British Thomson-Houston Company (General Electric Company). Electric motor control. (108237)
 1106462. L. C. van. Internal combustion engines.

14482. Wolsley Motors Limited, Remington, A. A., and Pitt, J. D. Multi-cylinder internal combustion engines. (108242)
 14487. Johnson, A. Coal and like conveyors. (108243)
 15029. Conway, J. L. Miners' hand lamps. (108248)
 16505. Nosworthy, W. H., and Prescott, S. J. Apparatus for lighting fires or heating purposes. (108257)
 1917.
 1461. Trefferies et Laminiers du Havre, Anciens Etablissements Lazare Weiller, Soc. Co-operative de Rugles, et la Canalisation Electrique Reunis, and Roudy, C. Furnaces. (108269)
 2786. Waygood-Otis Limited (Otis Elevator Company). Load carrying devices. (108274)
 3043. Paetow, C., and Lippmann, H. Method of tinning sheet metals. (104510)
 5517. Raymond Brothers Impact Pulverizer Company. Dust separator for pulverising mills. (105763)
 6607. Temmer, A. U-shaped superheater elements. (106280)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
 1571. Iki, O. Feed water purifiers. (108301)
 9402. Koppers, H. Door for furnace retorts, etc., for producing gas coke, etc. (108306)
 9968. Soc. Anon. Ateliers Clerc et Quantin. Pumps. (108310)
 10131. Drägerwerk H. and B. Dräger. Inhaling apparatus. (108314)
 10611. Theisen, H. E. Drying, purification, and cooling of gases, vapours, etc. (108319)
 10776. Svenska Turbinfabriks Aktiebolaget Ljungström. Radial flow turbines, particularly of the oppositely running rotor type. (108322)
 10834. Svenska Turbinfabriks Aktiebolaget Ljungström. Radial flow turbines having an axial flow blade system and two rotating blade wheels. (108324)
 10875. Svenska Turbinfabriks Aktiebolaget Ljungström. Radial flow turbines having an outer axial blade system. (108326)

GOVERNMENT PUBLICATIONS.

. Any of the following publications may be obtained on application at this office at the price named post free.

Commission of Enquiry into Industrial Unrest:—No. 1 Division, Report of the Commissioners for the North-Eastern Area (Cd. 8662), price 2d. net; No. 2 Division, Report of the Commissioners of the North-Western Area (Cd. 8663), price 4d. net; No. 3 Division, Report of the Commissioners for the Yorkshire and East Midlands Area (Cd. 8664), price 1d. net; No. 4 Division, Report of the Commissioners for the West Midlands Area (Cd. 8665), price 2d. net; No. 5 Division, Report of the Commissioners for the London and South-Eastern Area (Cd. 8666), price 1d. net; No. 6 Division, Report of the Commissioners for the South-Western Area (Cd. 8667), price 1d. net; No. 7 Division, Report of the Commissioners for Wales, including Monmouthshire (Cd. 8668), price 6d. net; No. 8 Division, Report of the Commissioners for Scotland (Cd. 8669), price 2d. net.

Reports of the Chief Registrar of Friendly Societies for the year ending December 31, 1915 (Part C, Trade Unions), price 3s. 3d. post free.

Alkali, etc., Works Regulation Act, 1906, 53rd Annual Report on Alkali, etc., Works, by the Chief Inspector, Proceedings during the year 1916, price 1s. 9d. post free.

PUBLICATIONS RECEIVED.

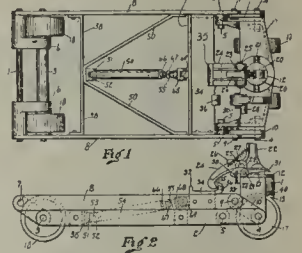
"American Exporter" (Vol. 81, No. 1), July 1917, price 25c. a copy; "Industrial Management" (Vol. 53, No. 4), July 1917, edited by John R. Dunlap, price 25c.; "The Geological Magazine, or Monthly Journal of Geology" (Decade 6, Vol. 4, No. 8), August 1917, price 2s. net; "Journal of the Western Society of Engineers" (Vol. 22, No. 2), February 1917, price 50c.; "The Mining Congress Journal" (Vol. 3, No. 7), July 1917, price 20c. per copy; "The Beama Journal" (Vol. 3, No. 3), July 1917, price 1s.; "Chicago Giant Rock Drill (Tappet Type)" (Bulletin 137 of the Chicago Pneumatic Tool Company); "Annual Report of the Department of Public Works of the Province of Alberta, 1916.

United States Bureau of Mines, Department of the Interior: "Monthly Statement of Coal Mine Fatalities in the United States, January 1917," compiled by A. H. Fay; "Monthly Statement of Coal Mine Fatalities in the United States, February 1917," compiled by A. H. Fay; "Monthly Statement of Coal Mine Fatalities in the United States, March, 1917," compiled by A. H. Fay; (Technical Paper 82), "Oxygen Mine Rescue Apparatus and Physiological Effects on Users," by Yandell Henderson and James W. Paul; (Technical Paper 106), "Asphyxiation from Blast Furnace Gas," by Frederick H. Willcox; (Technical Paper 140), "The Primary Volatile Products of the Carbonisation of Coal," by Guy B. Taylor and Horace C. Porter; (Technical Paper 143), "The Ores of Copper, Lead, Gold, and Silver," by Charles H. Fulton; (Technical Paper 153), "Occurrence and Mitigation of Injurious Dust in Steel Works," by J. A. Watkins; (Technical Paper 166), "Motor Gasoline, Properties, Laboratory Methods of Testing, and Practical Specifications," by E. W. Dean; (Bulletin 147), "Abstracts of Current Decisions on Mines and Mining, Reported from September to December 1916," by J. W. Thompson.

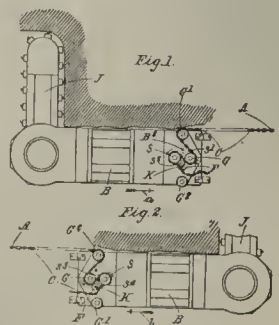
Pocahontas Developments.—The Pocahontas Fuel Company Incorporated (formerly the Pocahontas Consolidated Collieries Company) is making a development on the Virginian Railroad, across the Guyan River from Elmore, that will have an annual output when it gets in full blast, according to semi-official advices, of over 1,000,000 tons, a fifth of the Virginian Railroad's present tonnage. A mining town which the company is building around its works, called Itmann, named after I. T. Mann (president of the company), will at the same time probably be the most elaborately laid out, and the most lavishly equipped of any in West Virginia. Coal will be mined through 35 openings above the Guyan, and down in the valley below. A veritable city is being equipped to house the thousands of men who will be employed.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

106670. *Improvements in Lifting Trucks.* W. Stueb-ing, junr., of 308, Walnut-street, Cincinnati, Ohio, U.S.A.—This invention belongs to that class of trucks which are used in lifting and trucking loads usually placed on platforms, the truck being capable of moving under the platform and then elevating the same on an elevating platform forming part of the truck. Fig. 1 is a plan view of the truck; fig. 2 is a side elevation of the truck with the platform in its lowered position, the hook mechanism of the handle engaged with the hook mechanism of the platform. The truck is formed of a lower frame consisting of a front head 1, two rearwardly extending connecting bars 2 connected to the back axle 3, and connected in the front with the head 1 through the pins 4 and 5. The lifting or elevating platform of the truck consists of two links 6, fulcrumed on the shaft 3, and carrying at their other bearing ends the shaft 7. To the shaft 7 are connected on both sides the link bars 8, extending forward to the front of the truck, and connected through the pins 9 to the links 10. The links 10 in turn are connected through pins 4 to the front head. To operate the truck when the elevating platform is in its lowest position, the operator forces the hook 24 down into engagement with the hook 35 on bridge 34, the handle 22 is then pulled into a horizontal position, forcing the link bars 8 which are connected to the bridge 34, to elevate on the links 10, and allow the pawl 30 to engage with the hook 36 on bridge 34, thus locking the elevated platform with its load, and to disengage the hook 24 the operator continues to move the handle 22 downwards, and this forces the hook 24 rearwardly until it passes out of contact with the hook 35, and then, through the spring 27, the hook 24 is quickly and automatically pulled up into normal position against the stop 26, the spring 27 having been placed at tension when the hook 24 was first placed into engagement with the hook 35. After the platform is raised and locked into position, and the hook 24 has automatically been released from hook 35, the tongue or lever 22 is then free to turn in a complete circle laterally, thus allowing the fork 13 which carries the two front wheels 17 to turn in all directions. When the elevating platform is down, the handle and front wheels can also be moved laterally and in a circle, the same as when the platform is elevated; thus it will be seen that the handle and wheels are free to turn in all directions when the platform is down or up. In order to lower the elevating platform after it has been elevated, the operator steps on treadle 31 of pawl 30, thus disconnecting pawl 30 from hook 36, allowing the platform to descend. A description follows of the hydraulic check and its operation. This hydraulic check will operate perfectly when a load is on the lifting or elevating platform, and the locking means are released, and various forms of hydraulic checks have been used for this purpose, but when the platform is in an elevated position and locked, without a load, it has been necessary when the locking mechanism has been released, to give the elevating platform an initial downward movement by some manual means, as, for instance, by standing on the platform or pushing downward upon it; but with a spring which is placed at a tension when the elevating platform has been pulled up or lifted, will by itself pull down the lifting platform without the interposition of manual means, and this is one of the features of the invention. (Four claims.)



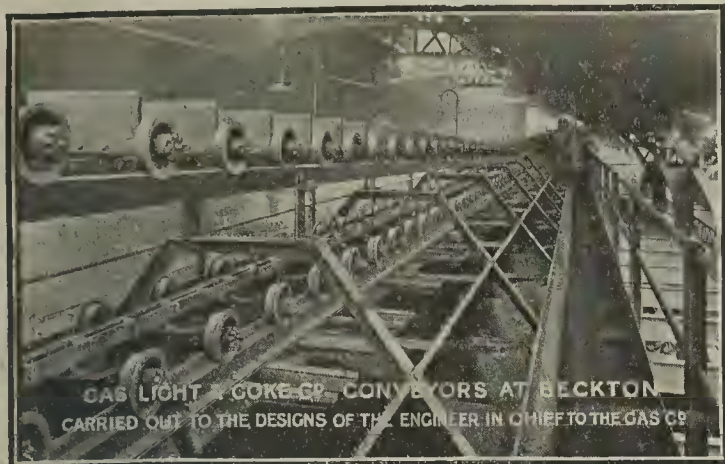
106779. *Improvements in Coal-Cutting Machines.* G. Rimmer, 1, Bye Pit Cottages, Highfield, Wigan.—A coal-cutting machine of well-known type is provided with a haulage chain, the latter being anchored at one end so that the machine can pull upon the anchored chain by means of a rotatable sprocket wheel. The haulage chain is used, in the case of a machine of the type hereinafter illustrated, (1) to slew the jib, when "cutting in"; (2) for "fitting," turning the machine, etc.; and (3) for propelling the machine along the face of the coal when cutting. It is the object of the present invention to so construct the machine that the chain shall unfaithfully be diverted from the sprocket wheel at the proper place, and that jamming such as has occurred heretofore for the reason above set forth, shall thus be prevented. With reference first to fig. 1, B is the body of the machine, which at one end is provided with the jib J, and at its other end with a central sprocket wheel S rotatable in bearings in the said other end. This sprocket wheel S is driven by an air motor or electrically. At opposite sides of that end of the machine at which the said sprocket wheel is situated are guiding pulleys G¹ and G² for the chain. There is in line with the sprocket wheel S another guiding pulley G. The chain C is anchored at A by any suitable anchoring device, and is led from the anchor round one side of the guiding pulley G¹, round the pulley G, and thence round the front side of the sprocket wheel S; the sprocket wheel is intended to rotate counter clockwise in this view, and the direction of travel of the machine will be that indicated by the arrow a. The chain C comes on to the sprocket wheel at the place s¹ in the path of the sprockets, and is required to leave the sprocket wheel at the place s² so that the path of the sprockets whilst the chain is in them extends through more than a semi-circle in the machine, i.e., from s¹, counter clockwise, round to s². In the similar view, fig. 2, the direction of travel of the machine as indicated by the arrow b therein, is opposite to that in which it would progress in fig. 1; and correspondingly, the rotation of the sprocket wheel S is clockwise, the chain in fig. 2 coming into the circular path of the sprockets at s³ and being required to leave it again at s⁴. In fig. 1 is shown a finger F firmly attached to the machine, say, by a screw K, and extended into the path of the chain C at the place s² at which it is desired that the links of the chain should be diverted out of the sprocket wheel; this finger forms in effect a plough extended into the groove of the sprocket wheel, so that should the links of the chain tend to remain gripped in the wheel when they come round to the finger F, the latter will "plough" or strip them out of the sprocket wheel. At B² in fig. 1 is a screw-threaded hole, and in fig. 2 the finger F and screw K have been shifted from the position



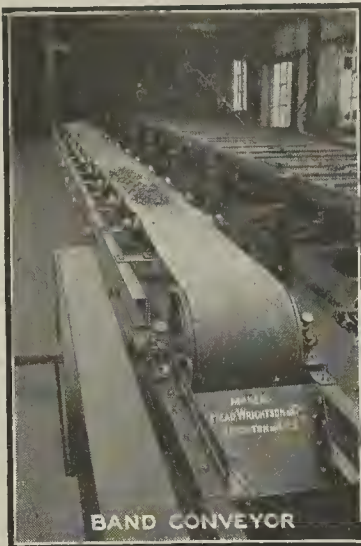
HEAD, WRIGHTSON & CO. LTD.

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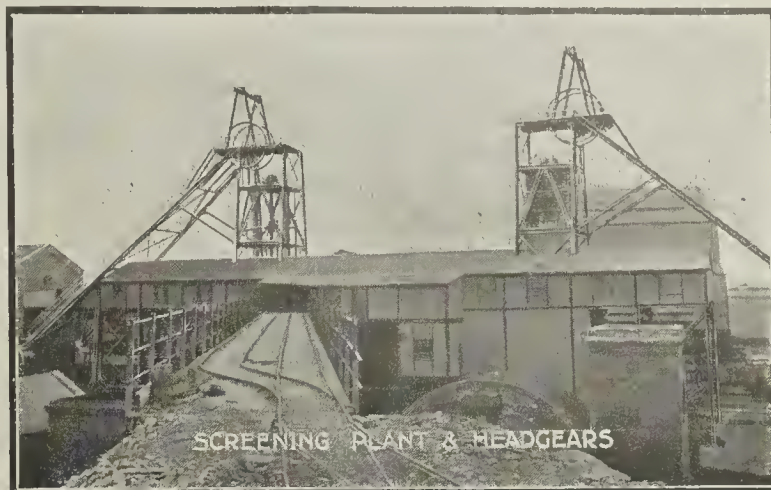
London Office—5, Victoria Street, Westminster, S.W.



GAS LIGHT & COKE CO. CONVEYORS AT BECKTON
CARRIED OUT TO THE DESIGNS OF THE ENGINEER IN CHIEF TO THE GAS CO.



BAND CONVEYOR



SCREENING PLANT & HEADGEARS



TUB CREEPER



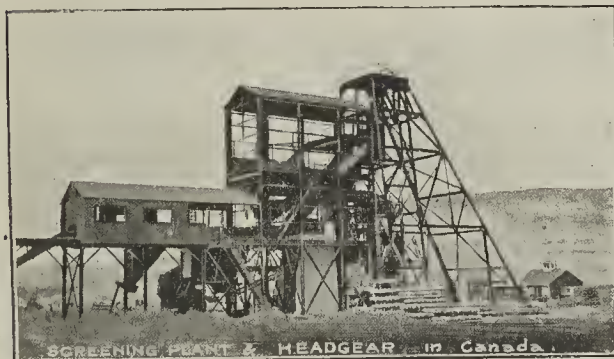
NOTA-NOS COAL WASHER INSTALLATION



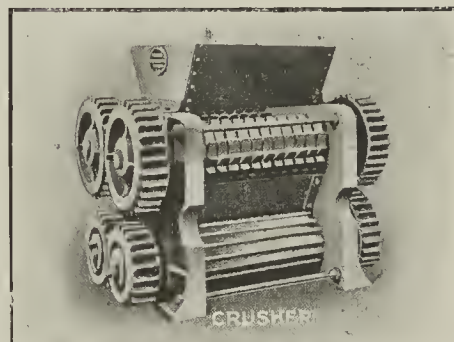
HYDRAULIC COAL SHIPPER



MARCUS SCREEN



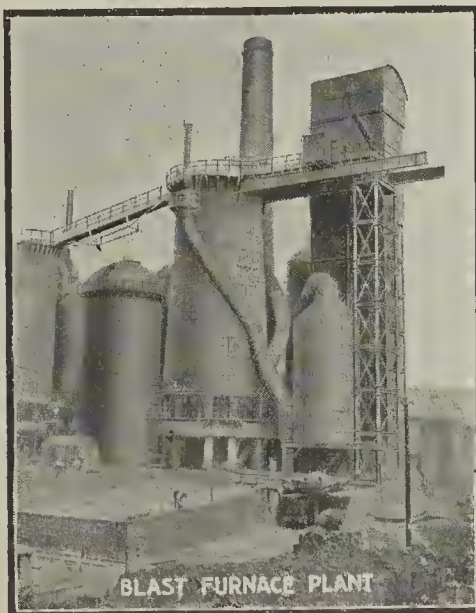
SCREENING PLANT & HEADGEAR IN Canada.



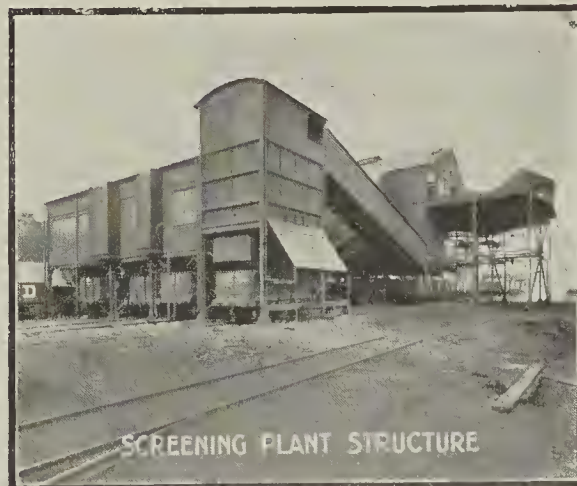
CRUSHER



GANTRY & ROPE HAULAGE



BLAST FURNACE PLANT



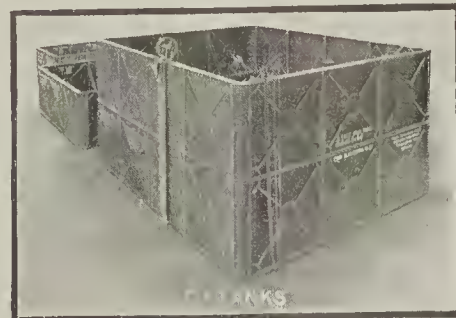
SCREENING PLANT STRUCTURE



STEEL TANK



STEEL TANK



STEEL TANK

Blast Furnace Plant
Bunkers (Steel)
Bridges
Crushing Plant
Coal Shippers
Castings
Coal Washers
Chairs
Coke Screens

Colliery Plant
Cages
Cage Props
Conveyors
Caissons
Detaching Hooks
Drop Forgings
Dock Gates
Elevators

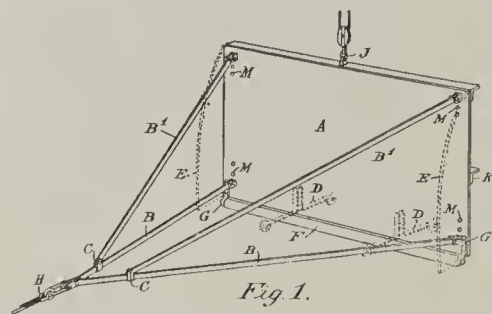
Friction Clutches
Forgings
Cantries
Grinding Pans
Headgears
Hoists
Mining Plant
Marcus Screens
Nota nos Washers

Nissen Stamp Mills
Pit Tubbing
Pulleys and Pulley
Blocks
Rollers
Roofs
Stampings
Steel Wagons
Steel Chimneys

Screens
Storage Bunkers
Shippers
Tub Creepers
Tipplers
Tanks
Wagons
Wagon Hoists

the machine which they occupied in fig. 1 to a new position, in which the screw K will be in the hole of the finger F will divert the chain from the sprocket wheel to place s^1 . Thus it will be seen that the finger F is attached to the machine in each of a plurality of positions, so that the diverting of the links of the chain out of the sprocket wheel by the finger shall occur at either of the positions as may be desired. The screw K and hole B form a simple means of attaching the finger to the machine in the desired positions, but any other strong and simple means could be employed for the same purpose. During much of the time of operation of the machine the finger F will have but little to do, for but little effort is ordinarily required to free the chain from the sprocket wheel at the discharging point of the latter; but should any link or links become jammed in the sprockets, the finger F is always present and operates to free them as they move in relation to the finger in the rotation of the sprocket wheel. (Two claims.)

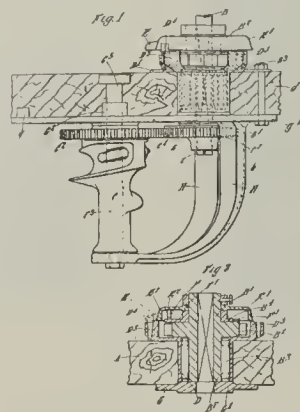
106879. *Improvements in Scraper or Cargo Moving Boards.* N. Briata, 86, Blantyre-road, Liverpool.—The ordinary scraper boards that are used for feeding elevators and for moving cargo on the quays are usually a rectangular board drawn forward by ropes attached to the four corners, or to one, two, or more points, and a handle at the back for the operator to guide it. This invention is designed to enable the board to a very large extent to be worked in the hold without any person being in the dusty atmosphere there, this dusty atmosphere being very bad for the health, while, at the same time, considerable economy in labour is obtained. The drawing shows a perspective view of the first apparatus, except that it is shown with rectangular bars instead of tubes. Tubes are, on the whole, best, but they are slightly more expensive, as they have to be jointed at each end for pivots or for attachment to each other. BB, B¹ B¹ are four arms attached to pivots near the four corners, and the upper ones to pivots or eyebolts on the lower ones at points CC. These pivots or eyebolts G connecting bars B with the board A can be fixed or screwed so that they can be fitted into any of the holes M M. The pivots C can be rigidly fixed to the lower bars B, or if desirable could be adjustable along the bars B so as to be fixed by set screws or the like at any point in B as required. DD are brackets fastened to the board carrying a small roller wheel at each end. These brackets were on the apparatus sketched, but have been generally dispensed with as useless, and are not claimed. EE are two end plates shown in dotted lines, as sometimes they are not used. F is a roller carried in bearings in brackets G. This roller is usually sufficient without the brackets D and their small rollers. Small wheels or pulleys have heretofore been proposed or used for supporting the main board in a scraper or crab. These were especially useful when the board was carried from place to place as they enabled the apparatus to be drawn over the ground, but this roller F extends almost the whole breadth of the board, and is to one side of the board, though close to it, and can be raised and lowered as required, thus regulating exactly the depth to which the board can sink. It also has a tendency to level the material in front of the board. It will be noticed that the four rods BB come to an apex. In the drawing they are fore-shortened so as to give a sort of general perspective, but they can either come to a point in a line perpendicular to the centre vertical line of the plate, or to one side of the plate, or at any other point between, but in practice hitherto they are made with the bars B¹ similar in length, and the bars B similar in length to each other so that the common junction shall be in a vertical



plane passing through the board in its vertical centre line. H is the connection for the tow rope, and J a connection for rope anchored from above. The brackets G are arranged so as to fit any of numerous holes in the board, whereby the roller can be raised and lowered. The transverse arms D are so arranged that they can be placed at different heights as required, or they can be arranged so that the arms or brackets carrying the rollers can be turned upside down, so that the rollers can be adjusted as regards height of float, or be thrown out of work altogether. It is very desirable that the arms shall be pivoted to an eyebolt on the board instead of being rigidly fixed to it, and two or more holes are placed in the board for the eyebolts so that the eyebolt can be placed in any one or other as desired, and thus the angle of the board can be regulated to a certain extent, though it is usually almost perpendicular. The arms D, too, carrying the small rollers can be bent towards the centre line so as to keep the rollers always within the horizontal triangle formed by the rods or tubes B; consequently when the board is drawn against a pillar or obstruction in the ship the rollers are not caught. The ribs K can be of any number, but one at the top and the other near the centre are preferable, though they can be made in cruciform form, they being simply for strengthening the board. If they are on the front of the board, instead of shown in the rear, they can also be used in part or in whole for attachments for the tubes B¹ or B¹¹. The mode of action is as follows:—One rope being fastened to the eyebolt of the tubular spider at H, or at the junction of two stout ribs at right angles to each other on the top, and another rope fastened to the top of the board, the two ropes are passed into the hold at two points as far off as possible, or if passed down the same hatchway they are guided by pulleys to the opposite ends of the hold. The rope attached to the board itself at the top lets the apparatus down perpendicular to itself. As it comes against the grain in the ship, the rope is slackened, and the draw rope is pulled upon, thus drawing the board towards the elevator. When the board has arrived nearly to the elevator, the tow rope is slackened, and the lifting rope is actuated until the board has reached the far end of the hold. The action is repeated. Where, of course, the centre of hold, and not at one end, the tow rope is fastened to the elevator point close to the elevator. The two tubes need not be fixed always near the corners. (Seven claims.)

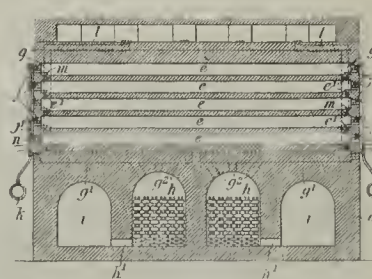
106880. *Improvements in or Relating to Winding Mechanisms.* P. A. Daglish and W. L. Lorkin, both of 1, Portico street, Strand, London.—This invention

relates to hand-operated or power-driven winding mechanism, and is particularly intended for hand-actuated brake mechanism of electric cars and other vehicles, such as that of the kind wherein the operating hand wheel or hand lever is connected to the chain drum of the brake by means of gearing, and in which two stops are employed, the co-operation of which limits the unwinding or releasing movement of the hand wheel or lever. The chief objects of the invention are to provide brake mechanism which, as compared with such mechanism heretofore constructed, will be more efficient in its action, more readily assembled and dismantled, of less weight, more compact and capable of being more readily adjusted. Fig. 1 is a side elevation showing a brake mechanism constructed in accordance with the invention, the mechanism being in position on a car platform; fig. 2 is a section of the upper portion of fig. 1. B is a shaft that is actuated by the operating hand wheel or lever. C is the chain drum, and C¹, C² are the gear wheels connecting the shaft B to the said chain drum. The lower end of the shaft B may be of square or other suitable cross section to engage with a sleeve B¹, which forms part of or is connected to a ratchet wheel B². The lower



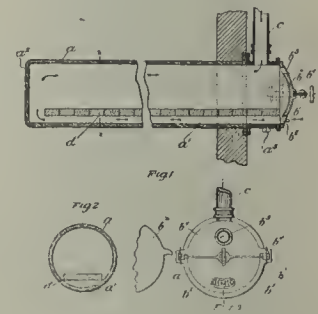
part B² of the sleeve is in contact with a roller bearing B³ disposed between it and a boss D formed on a plate D¹ on which a pawl D² for co-operating with the ratchet wheel B² is mounted. The plate D¹ is shown formed with four lugs or sockets D³ or the equivalent, any one of which is adapted to receive a stop D⁴ for co-operating with a projection E formed on a loosely mounted cover E¹. This cover is also formed with a stop E² adapted to co-operate with a pin F carried by a disc F¹, which is loosely mounted between the cover E¹ and the ratchet wheel B². The said disc F¹ is provided with a curved slot F², in which a pin B¹ carried by the ratchet wheel B² is disposed. From the above description, it will be seen that the parts referred to constitute a form of lost motion arrangement similar to that set forth in the specification of Patent No. 26060/12, whereby the extent of the unwinding or releasing movement of the operating hand wheel or lever can be altered to compensate for wear of the brake shoes or other parts, or to adapt the mechanism to brakes in which different lengths of chain are required to be wound upon the chain drum in applying the brake, the required adjustment being obtained by the placing of the stop D⁴ in one or other of the four lugs or sockets D³. When the shaft B is rotated the ratchet wheel B² moves with it, and after having moved through nearly a complete revolution, causes the pin B¹ thereon to co-operate with the end of the slot F², thereby moving the plate F¹. After a time the pin F engages with the projection E², and the cover E¹ is then moved until the projection E comes into contact with the fixed stop D⁴. By these means the shaft B can move through approximately three complete revolutions in applying the brake, and when the brake is released the chain drum will be stopped in the original predetermined position. It will be observed that by reason of the stop D⁴ being mounted in one of the lugs or sockets D³, it can be readily removed from the top of the car platform, so that it can be placed in another of the pillars when desired. The plate D¹ is formed with lugs D⁵, by which it can be suitably fixed to the car platform. (Six claims.)

106905. *Improvements in Regenerative Coke Ovens.* J. A. Roelofsen, Winchmore, Coldbath-road, Harrogate, Yorkshire.—In this invention, the horizontal heating flues are connected directly to vertical flues, the lower ends of which are in direct communication with the outer ends of sole flues, extending only half-way or approximately half-way across the oven, and in communication at the inner end with the regenerator chambers, those beneath the right hand half of the oven sole with the right hand chamber, and those beneath the left hand half of the sole with the left hand chamber. By this means the pre-heated air and the products of combustion from the heating flues both travel between the middle of the oven and the sides thereof, but in opposite directions. Referring to the figure, a indicates the body of the oven, b the coking chambers, c the oven sole, and d the charging openings for the coal into the chambers b. e are the horizontal flues, which are built in the walls f separating the coking chambers b, each end of each of said horizontal flues being in communication by a lateral port e¹ with an upright flue g, the lower end of which is in communication with a horizontal passage or flue g¹ beneath, and extending halfway across the oven sole c; this latter passage or flue g¹ communicates by the passages g² with the regenerator chamber h, which itself is in communication by the passage h¹ with the air chamber i. Gas for heating the horizontal flues e is introduced into each end thereof alternately through nozzles j connected to vertical pipes j¹, the series of such vertical pipes being in connection at their lower ends with the gas main k. The two air chambers i are connected with a central flue leading into the chimney, and dampers are provided and adapted to be raised and lowered by means of a winch, so that either of these two chambers can be connected to the chimney draught whilst the other is open to the atmosphere; in this way the draught on the oven flues can be changed alternately from one end of the oven to the other as required. In connection with the same winch, there are preferably arranged means, such as wire ropes and levers, for controlling the main cocks on the gas mains k, so that the operation of the chimney dampers can at the same time control the inlet of gas to the horizontal flues. During one heating operation, that is to say, when the gas is entering, say, the right hand end of the horizontal flues e, the air necessary for combustion passes through the air chamber i in connection with that end of the horizontal flues, and passes through the red hot checkered brickwork in the regenerator chamber h in connection therewith, thence into the flues g¹ beneath the oven sole, and so into the vertical flues g and through the several ports or orifices e¹ into the horizontal flues immediately in front of the gas jets j, thus providing the air for the combustion of the latter. The flames and the products of com-



bustion travel along the horizontal flues to the left hand end thereof, where they pass through the ports e¹ into the vertical flues g, and so down into the corresponding sole flues g¹ and thence through the regenerator chamber h into the air chamber i, whence they escape through the chimney into the atmosphere. In the second period, the passage of gas, air, and products of combustion is reversed, the gas entering the heating flues at the opposite end of the oven, and hot air being drawn through the regenerator chamber in connection therewith. The vertical flues g are extended upwards, and are connected with horizontal flues l at the top of the oven, which connect them by ports to two of the charging holes of the oven chamber. The object of this construction is to produce the initial heat for setting the battery first to work, for which purpose the crude coke oven gases pass directly through the charging opening, and vertical flue into the horizontal flues. Each horizontal flue e is an independent unit, and can be entirely shut off from the other flues by sliding damper bricks m. Furthermore, the air and gas which is admitted to each flue can be accurately regulated, and the latter can also be inspected throughout its whole length by means of spy-holes n in the end walls of the oven. Again, the heating gas does not travel through hot bricks, so that any chance of decomposition is obviated, and the control of the oven can be regulated from above ground, and all the pipes can easily be cleaned since they are readily accessible. (Four claims.)

106910. *Improvements in Means for Effecting the Removal of the Carbon Deposit from Retorts.* W. T. Bark, Gas Works, Tenterden, Kent.—The invention relates to improvements in or connected with means for effecting the removal of the carbon deposit from retorts employed in the manufacture of illuminating gas from coal. Fig. 1 is a vertical longitudinal section taken on the line 1—1 of fig. 3; fig. 2 is a vertical transverse section taken on the line 2—2 of fig. 1; fig. 3 is a front end elevation. a represents the retort, b* represents the loose or supplementary lid or door, and c represents the ascension pipe. According to the preferred form of the present invention, a loose or supplementary lid or door b* is provided for the retort, having an opening b¹ situated at or near the bottom of the retort a preferably controlled by a valve b², designed to admit a supply of air and in alignment with and in continuation of the opening b¹ in the lid or door b is provided within the retort a an air duct a¹. The supplementary lid or door b* is intended to be shifted about and used upon any retort in which it is desired to burn off the carbon deposit, and which can be accomplished by opening the ordinary lid or door b and fixing and making tight the supplementary lid or door b* in its place. The fixing may be accomplished in any suitable way but the method illustrated consists in providing the supplementary lid or door b* with lugs b³, by which it hangs on ears or projections a² on the mouthpiece of the retort a, and utilising the bar b⁴ which usually closes the ordinary lid or door b for closing the supplementary lid or door b*, luting being employed to make a tight joint as usual. The air duct a¹ is in this example preferably constructed of or formed by a wall or horizontal partition d of refractory material, which terminates short of the inner end a² of the retort a. The effect of the air duct a¹ is that when the ascension pipe c, which is situated at the charging end of the retort a, as is well known, is opened by the removal of the stopper (not shown), a current of cold air will be created or induced which will enter by the valve controlled opening b¹ in the supplementary lid or door b*, traverse the air duct a¹, and issue at the other end thereof, and return along the retort a above the wall or partition d and find an exit by the ascension pipe c, as shown by the arrows. This current of fresh air supplies oxygen to the heated carbon deposit on the interior of the walls of the retort a, causing combustion, so that said deposit burns away in the form of gas, which passes out at the top of the ascension pipe c. A sight hole b⁵, which may be covered with mica, is provided in the supplementary lid or door b, so that the progress of the operation may be viewed by the attendant. (Five claims.)



107044. *Improvements in Endless Belt Conveyors.* A. Dubber, 55, Harold-road, Leytonstone.—According to this invention, the conveyor belting comprises a series of multiple links hinged or pivoted together, each multiple link being formed of a strip of metal corrugated, crimped, or bent to form a denticulated, crenellated, or wavy outline and constituting two or more compartments, side by side, across the belting, the projections or teeth of each multiple link entering the correspondingly formed recesses in, and being in the same plane as, the adjoining multiple link, while holes are provided to receive rods or wires forming the pivots. The pivots suitably consist of rods or wires made a little longer than the width of the belting, suitable provisions being made to prevent the displacement of the rods in the direction of their axes. Fig. 1 is a side elevation of portions of three links of a conveyor belt constructed according to this invention; fig. 2 is a plan; fig. 3 is a plan of a pivot pin; fig. 4 is a similar view of another pivot pin; and fig. 5 is an elevation of a conveyor belt mounted on two drums. In carrying the invention into effect, and according to the construction shown in figs. 1 and 2, the multiple links a b c of the conveyor are made of flat steel or iron, which may be half an inch wide and a tenth of an inch thick. The strip is provided with holes d at suitable distances apart, so that when the strip has been crimped or corrugated, to form a figure resembling a number of rectangular parallel crenellations, the holes d to receive the pivots or rods e are in the longitudinal portions, and about half an inch distant from the end of each transverse portion. In the drawing some of the rods e for connecting the links b and c are omitted to more clearly show the holes d. Fig. 5 shows a conveyor belt a¹ mounted on two drums l and m. These drums may have sides of a peripheral length equal to the pitch of the conveyor links or to multiples of the pitch. (Seven claims.)

The French Government has granted a concession to the Société Civile de Recherches de Basse Normandie to mine for coal at Plessis (Manche).

THE COLLIERY GUARDIAN

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No. 2955.

COAL AND SHIPPING.

By F. J. WARDEN-STEVENS,
M.I.M.E., A.M.I.E.E., &c.

XX.—Coal Weighing.

It is perhaps hardly recognised, or at least not fully realised, that commerce is mostly based on weighing or measuring. The value of supplies, whether minerals, agricultural produce, manufactures, or other merchandise, depends either on weight or measurement; yet the literature available on the subject of weighing apparatus and means of ascertaining measurement is very limited. It is not within the province of this article to discuss such apparatus generally, but only so far as it concerns the coal industry; and it is intended to refer more particularly to types of apparatus used in connection with the export of coal or its supply for steamships' bunker requirements.

It may, however, be well to first indicate some of the general principles of the usual methods of weighing and measuring. The simplest arrangement is perhaps that of measurement by a graduated vessel as applied to liquids, or dry materials in receptacles of standard sizes. The application of this principle in connection with the bulk measurement of coal will be referred to later. There is also the simple balance beam with equal arms, an example of which is the ordinary suspended or pillar pan scales with level indication by pointer. This, by the way, is the primitive method used at Bombay in weighing coal bunker supplies, a considerable number of large equal-arm balance beams being suspended from rough wooden pole tripods, which are distributed over an open storage ground. The coal is carried in baskets from the stock piles to the weighing beams, and the weight of the coal contents of the baskets is adjusted to balance the weights in the wooden pan or tray suspended from one end of the beam.

Then, the spring balance is a principle of weighing by compressive or tensile force exerted on a spring, the weight being recorded, by means of a pointer connected to the spring, on a dial graduated according to the strength of the latter. Pressure exerted on a liquid by the weight to be noted, which is connected with a ram or piston, is the principle applied to the hydraulic suspended weighing machines mentioned later. Balancing is, however, the most usual principle applied to weighing machines, the equal-arm balance (already referred to) being supplemented by the unequal-arm and the radial-arm beam in several forms.

Weighing is as essential to the coal industry as to other industries, and from the time coal is obtained from the seam and reaches the pithead until it is used the weight is noted on several occasions, the first being to ascertain the weight on which the coal miners are to be paid for hewing the coal.

Weighbridges.

The unequal-arm beam, or steelyard, with graduated scale, along which the balance weight is moved to vary the leverage from the fulcrum or pivot, is the system mostly in evidence, and its application is found in many types of weighing machines. In the case of a weighbridge, the platform or table is supported by knife edges on the arms of levers, which are loosely jointed and coupled together. These levers are also supported on knife-edge rocking bearings, one lever being extended and connected by a vertical rod to the steelyard, which has a sliding weight. The usual pattern of pit bank weighing machine comprises a platform set in a pit constructed in the rail track, the platform supporting a section of the track, and being connected by lever with a pillar steelyard adjoining the track. This steelyard, which is usually of the double pattern, so that both the tare and net weights can be ascertained, is graduated or scaled, and is generally provided with sliding (not loose) weights. The machine is self-contained in a cast iron frame, and the platform also is of cast iron or steel. The capacity of this type of machine varies usually from about 1 to 2½ tons, the size of the platform being from about 3 ft. square to 8 ft. by 4 ft. 6 in. for the respective capacities. This type of machine is sometimes provided with a turntable platform, when the pit tubs are not required to travel beyond the bridge after weighing, but pass off in a different direction. The turntable plate, which is generally about 3 ft. 6 in. to 6 ft. diameter, according to the capacity of the machine, revolves on a central steel pivot, and is supported at its circumference by a ball or roller bearing ring. An addition to this pattern machine is an indicator attachment to the steelyard pillar, whereby the weights are noted by means of a pointer on a dial instead of by reading the graduations on the steelyard; and, the weights being set on the steelyards at the tare or weight of the pit tub when empty and at the minimum weight of the coal contents or net load, this enables the speed of weighing to be increased, and the actual weight of the coal to be noted. Not only can the net weight of each individual tub load be ascertained, but, by means of a counter mechanism, the total weight can be recorded as well as the number of trucks passed over the machine.

The pit tubs after being weighed pass on by creeper, haulage, or gravity tracks to the tipples, where they are discharged on to screens, the coal then being delivered either direct by loading jib belts or chutes into railway wagons, or into storage bins, or to a conveyor or elevator for delivery to the washery. In some cases, more particularly in the United States, the weighing of the pit tubs is effected at the tippie on a similar type of weighbridge to that referred to, but up to about four tons capacity. The weighing of the railway wagons after being loaded at the colliery is generally effected on a weighbridge of a pattern somewhat similar to that already mentioned, but of larger capacity, or by double weighbridges, so that either or both machines can be used together, and either ordinary or extra large wagons can be weighed with a single steelyard. The machines having separate balancing gear, either of them can be disengaged, and the steelyard automatically compensated. The weighing of trains of coal wagons, especially whilst moving slowly, saves a considerable amount of time, as it avoids the necessity not only of stopping, but of uncoupling and recoupling the wagons; and trains of wagons totalling about 2½ miles in length can be dealt with per hour by weighing whilst in motion. Here, again, an automatic indicator is usually provided, whereby the weights can be noted from a dial, generally graduated in 1 cwt. divisions. The mechanism can be disconnected when trains pass over the bridge and weight records are not required; and transfer rails to and from the weighbridge are

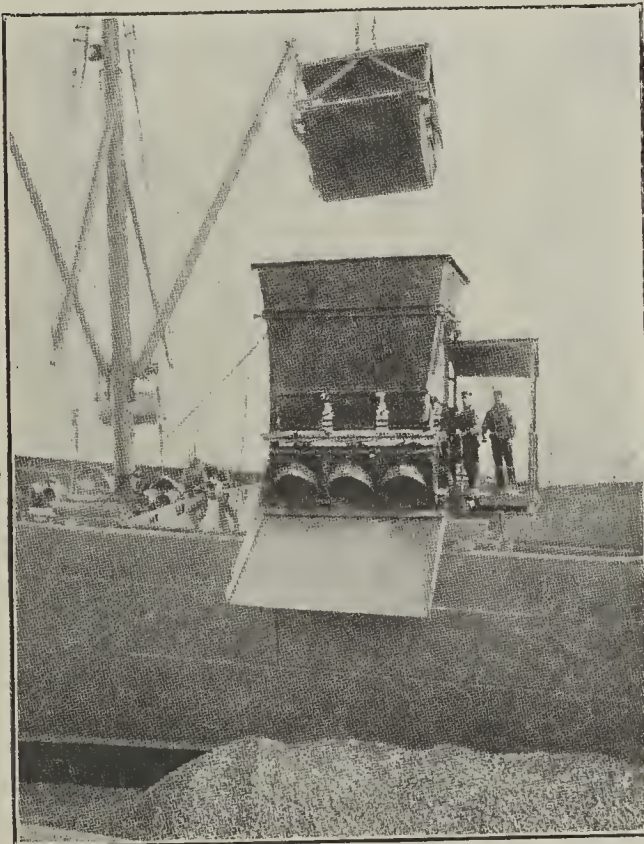


FIG. 1.—PORTABLE COAL MEASURER, USED WHEN DISCHARGING CARGOES, AT HAMBURG.

provided to reduce the shocks of the loaded wagons passing on and off. A ticket or tape record stamping attachment can also be provided for the steelyard of weighbridges.

We next find that coal for shipment, whether as cargo or bunkers, is weighed at the docks, the net and tare weights of the wagons being ascertained both before and after discharge by the shipping equipment. An equipment at one of the newest docks comprises six coal hoist tips, each of which is provided with two weighbridges. One, situated at ground level, has a capacity of 30 tons, and the other, of 20 tons capacity, is fixed at a higher level. The loaded wagons are slung on to the ground level weighbridge on their way to the hoist cradle, and after being hoisted and tipped, the empty wagons pass off at a higher level track on to the other weighbridge, by which the tare or empty wagon weight is taken. The steelyards of both weighbridges for each hoist are situated parallel and close together in a weighing cabin, so that only one attendant is necessary to note both the loaded and empty weights of the wagons dealt with by each hoist. The weighing of coal for shipment or bunkers is generally a dock charge, and in the case of South Wales ports the charge is ¼d. per ton.

Hopper Weighing Machines.

Reference may now be directed to hopper weighing, that is, when the coal is tipped from trucks or wagons.

or discharged by crane grab or skip into a hopper. The system has many applications, more particularly in the case of delivery from ship, barge, or storage. In the United States, a suspended hopper weighing machine is sometimes used at collieries in connection with the screens, the tippie discharging the pit tub first into the weighing hopper, which by a gate valve delivers on to the screen. A suspension double chute weigher, having a capacity of from about 4 to 10 tons, is also sometimes used in America for weighing the coal when loading into railway wagons, the coal, after passing the screens, falling into the suspended weighing chutes, which form the hopper.

In one form of hopper machine, the weighing receptacle is supported on the weighing beam or levers, and is fed by another hopper, which takes the shock of the coal falling into it. The machine has no feed valves, the coal passing direct from the receiving hopper to the weighing hopper, whilst a locking gear prevents any coal passing through the latter without being weighed. The loads as weighed and passed through the machine are automatically totalled and registered by a mechanism contained in a case adjoining the machine. As the coal falls from the receiving into the weighing hopper, a clutch is automatically thrown into gear, which moves the balance weight along the steelyard until the balance point is reached, whereupon the coal is released from the weighing hopper by means of a cam gear, and the balance weight returns to the zero position, the weight of the coal being recorded on the dial and added to the total of the previous loads weighed. The usual capacities of this pattern machine are from 10 cwt. to 4 tons, but they can be constructed for loads of up to 10 tons per discharge. They are intended for intermittent use, that is, for receiving the discharge from trucks, or from grabs or skips when unloading is effected by cranes or transporters. This type of machine can be adapted to various requirements; for example, it can be fixed at ground level or in an elevated position, or supported on a wheel base for movement to different positions at ground level or on an elevated track, or again be fixed on or suspended from a movable structure, such as a barge or transporter bridge.

Another pattern of automatic hopper weighing machine is designed with an equal-arm balance beam, one end being connected with the weighing hopper, and the other end having a weight box; these balance when the hopper is empty. The operation of this machine is as follows:—Weights are placed in the box according to the definite weights of coal required, the beam then tilting until the weight box reaches a stop. This movement brings a plunger into contact with a pendant which is connected with a lever that lifts a weight contained in an airtight cylinder, and, by means of connecting levers and links, the gate of the receiving hopper is opened by the weight, the coal falling into the weighing hopper. When the load has nearly reached the necessary weight, less the weight of the gate which is taken by the hopper end of the beam, the beam commences to descend, and also the gate of the receiving hopper commences to close, but does not quite do so until a compensating weight of coal has been allowed to pass, to make up for the weight of the gate. The gate then closes completely, stops the supply to the weighing hopper and the beam balances, the mechanism thereupon causing the weighing hopper gate to open, discharging its load and close again, this operation being repeated. The coal falling from the receiving hopper into the weighing hopper when the beam is just balancing is compensated for by an equalising weight. This machine can weigh 100 tons per hour, and can be provided with automatic recording mechanism. A feeding device can be added to the receiving hopper or chute of either pattern machine, to avoid "arching" and stoppage of the coal.

Bulk Measurement.

Measuring by bulk, of course, is not so accurate as weighing, the degree of precision varying according to the size and class of the coal. For example, loose Welsh coal heaped averages about 42.7 cu. ft. to the ton, the weight loose being about 52.5 lb., and solid about 82 lb. per cu. ft.; average loose Newcastle coal in the heap measures about 45.8 cu. ft. to the ton, whilst it weighs loose about 48.5 lb. and solid 78.3 lb. per cu. ft. The average bulk of British coals is about 44.5 cu. ft. to the ton loose in the pile, and the average weight loose about 50.5 lb., and 80 lb. per cu. ft. in the solid. Much depends, however, on the size, small coal naturally occupying less space in the pile per ton than large coal, the voids or air spaces being less. It will therefore be appreciated that bulk measurement of coal is really only suitable for small or graded coals, and it may generally be allowed as an average that 62½ per cent. of a pile or heap is solid coal the balance being air spaces or voids. An example of measurement by bulk is in evidence at Hamburg, where a portable measuring equipment used there. This shows a measuring equipment used there. The equipment consists of a large hopper with three delivery gates and a hinged apron, a control platform being situated at the side. A grab discharges the coal into

and the gate valves are opened from the by levers. This equipment is used for small it is claimed that the opening of the valves equal quantities to pass from the hopper, then averaged, giving an accurate record of the

Another form of coal measurer, illustrated in fig. 2, is provided with two circular gate valves, which are so arranged that when one is open the other is closed, and it is impossible to open both together. This ensures a correct measure. The coal passes through the upper valve, and, when the measuring hopper is full, that valve is closed and the lower valve is opened by means of a chain wheel operated by hand, the coal being delivered either direct or through one or two adjustable chutes. The valves, being balanced, are therefore easily operated, and the gearing is not exposed to the dust. Each delivery of the coal occupies about one minute, and is automatically registered by a counter, operated from the gear wheel which controls the valves. A small adjustable flap is connected with the measuring hopper for the purpose of slightly varying the capacity to compensate for various classes of coal. This type of measurer is mostly used for small quantities of coal, about 5 cwt. charges, and not

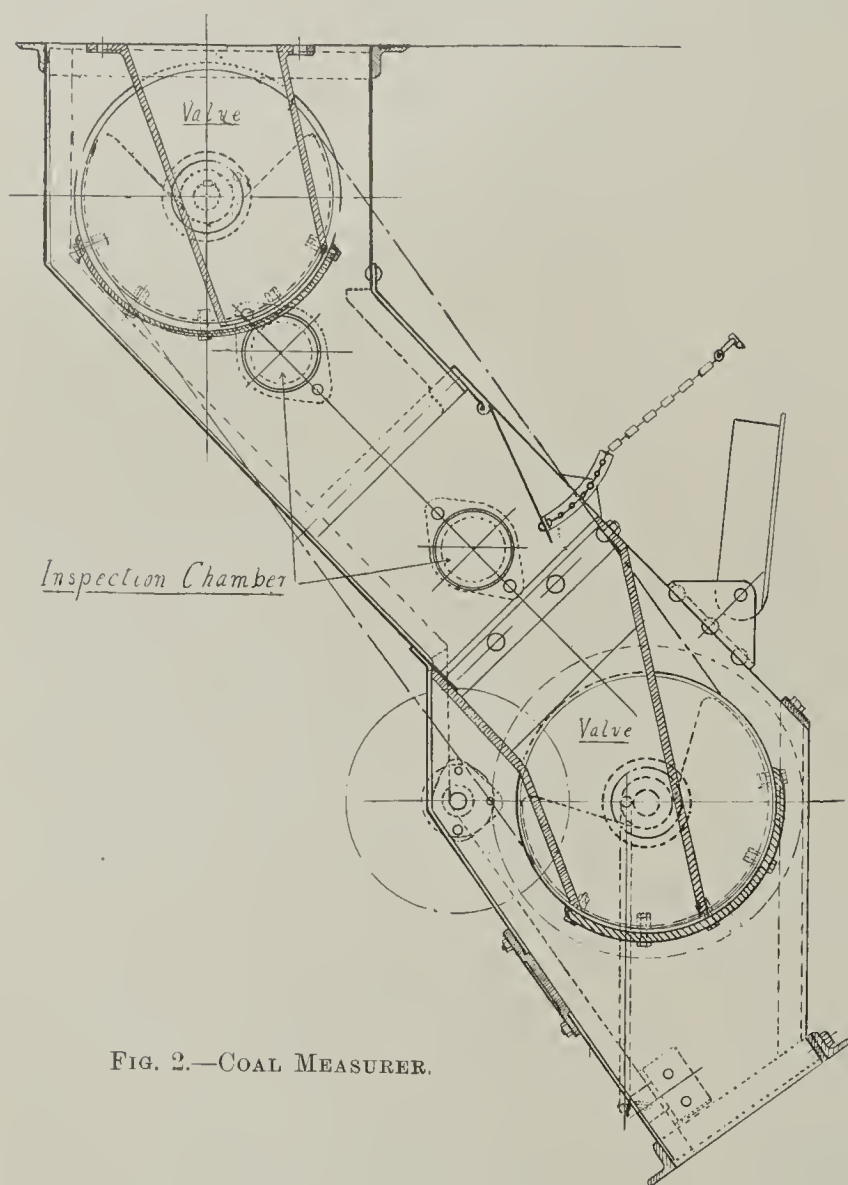


FIG. 2.—COAL MEASURER.

larger than nut size. It is suitable for deliveries from storage bunkers, either for supplies to rail or road wagons, light gauge trucks, etc., and for feeding boilers in factories or electricity works, also for charging machines or retort benches at gas works. Although this equipment is usually fixed, it can be made portable, in which case a feeding hopper is added and kept full of coal to ensure the measuring hopper obtaining a full charge.

Measurement or weighing in coal carrying vessels or barges can be effected by comparison with the displacement or submergence of the craft in the water, the displacement of the vessel or barge when light or empty being ascertained, as well as the ton-inch displacement, that is, the cargo tonnage which will submerge the craft an inch. The simplest method of applying this principle to the measurement of coal in barges is by protected vertical pipes, which are fitted generally fore and aft, and are graduated or scaled according to the tons per inch displacement of the craft. The stream water is admitted to the vertical pipe or gauge by a connecting pipe, and is controlled by a valve. The water rising to its natural level in the pipes affords a means of noting on the graduated pipe the quantity of coal loaded into or discharged from the barge, although, of course, it cannot be considered a very accurate method. Other weight than coal on the craft might be overlooked, and would affect the submergence, and the trim of the craft also affects the gauge measurement, discharging or loading unevenly causing either a side list or uneven keel fore and aft.

A more refined application of the water displacement principle of measuring cargoes was evolved and introduced as the Porhydrometer. This apparatus consists essentially of a float in a vertical pipe or cylinder which is fitted in the centre of the craft—both fore and aft and transversely—and is connected by a small pipe with the stream water, so that the water can be admitted to the cylinder and rise to its natural level. The float is suspended, by a rigid link, from a horizontal lever, which is supported by knife-edge rocking bearings, the other end of the lever being connected with a weighing steel-yard. The float is designed specially for each craft, so that its lower end reaches below the draught line of the craft when light, and is above the draught line when the cargo is loaded to its maximum, whilst its shape is such that its area at water level is proportional to the

area of the craft at that level, whatever may be the extent of submergence. The force exerted by the variation of submergence of the float in the cylinder is extended, through the lever from which it is suspended, to the steelyard which is graduated to read directly, according to the extent of submergence, the weight or cargo loaded or discharged. The float itself is counter-balanced by a weight attached to the opposite end of the lever, and when the weighing record is taken the steelyard is first set at zero by a movable weight. Balance having been obtained, the weight of the coal discharged or loaded is ascertained on a double scale, graduated in cwt. and tons respectively, heavy records being noted by the addition of weights (having a proportionate equivalent) to the end of the steelyard. It was claimed that this apparatus could be adapted to any size craft varying from a small barge of, say, 50 tons capacity to a large collier carrying a cargo of 10,000 tons; in the latter case, the float would be about 9 in. at its largest diameter, whereas for a barge of 200 tons capacity the float would be 2½ in. diameter at its lower and 3½ in. at its upper end. Inaccuracy of records caused by irregular loading or discharge, as mentioned in the case of gauges fitted fore and aft in a barge, were claimed to be obviated with this apparatus

by fixing the position of the float cylinder, or pipe, at the centre of the craft, the draught record by the submergence then being the mean of that forward, aft, and transversely. As far as the writer can ascertain, this apparatus has not attained the reputation anticipated for it; the cost of fitting was not excessive, and exhaustive tests showed that it was fairly accurate; possibly, however, the wear and tear which seagoing vessels, and even barges at ports, have to contend with, affected the reliability. As the approval of both parties, supplier and receiver, is necessary to the recognition of any one system of weight or measurement, the degree of accuracy must be fairly uniform and the percentage error known.

In the case of one mechanically-equipped barge, deliveries from which are usually in small quantities of from 20 to 50 tons, the error of this apparatus has been found to be from 2 to 8 per cent. under weight, but this may be an exceptional case, and doubtless supplies or deliveries of 200 to 1,000 tons or more would be recorded with greater accuracy. This system, it will be observed, introduces displacement measurement of bulk with the addition of weighing mechanism. It has been referred to rather fully, as being of considerable interest, and probably more will be heard of it; if not suitable for general application, there appears no reason why it should not merit adoption for at least some requirements not subject to such severe conditions as are seagoing vessels.

Continuous Weighing.

We may next proceed to the question of weighing coal whilst being transported, whether from storage for shipment, or vice versa. Weighing coal trains

whilst in slow motion by means of weighbridges has already been mentioned, and this method is also applicable to pit tubs. A system adapted to an elevated rail track is that of suspending a section of the track from a weighing mechanism, the moving trolley or carrier being stopped on this section and the weighing beam brought into operation. The net weight is recorded, and, if required, a counter attachment can be provided for noting the number of skips passing. This arrangement is suitable for independently operated electric trolleys, or carriers which are propelled by hand, so that they can be stopped on the weighing rail section. An adaptation of this system to aerial ropeways, or telfer tracks—whether operated electrically or by rope haulage—provides for the weight recording mechanism connected with the weighing rail to be brought into operation by the trolley itself on entering the section; in the case of ropeways, the weighing is effected on a section of the shunt rails at the terminal.

Another form of weighing mechanism, which actually is continuous, is applicable to conveyors of several types. With this form, a section of the conveyor frame or supports is separated from the rest, as in the case of overhead tracks previously mentioned, this section being supported at each end on knife-edge bearings, and suspended by a pair of levers from the short arm of a steelyard. The weight of the load on this suspended section of the conveyor is automatically counter-balanced by an iron float suspended, in a cylinder containing mercury, from the long arm of the steelyard. Any alteration in the load on the section will affect the float, the force being exerted through the suspension levers, and the float will rise or fall in the mercury cylinder until the alteration of load is compensated, the object of the float being to ensure that the movement of the steelyard from its zero position shall be proportional to the varying load. The long end of the steelyard is connected with a counting or totalling mechanism, which allows for the speed of travel of the conveyor, as well as the weight of the load on the section.

The special features of another design of apparatus include: The steelyard, which is balanced to the weight of the unloaded section of the conveyor, and is arranged to move in proportion to the load; a device to hold the steelyard each time a length of the conveyor, equivalent to the length of the weighing section, passes on to that section; a gauge which measures the distance the steelyard is out of balance, or the vertical height, depending upon the load on the section, this measure being

translated into weight; and a recorder to total up the loads. The steelyard is held by a cam operated by the conveyor, the gauge to measure the out-of-balance distance of the steelyard is also operated by another cam mechanism, and the recorder (which consists of a dial and pointer counter) is rotated by the back motion of the measure gauge.

These patterns of continuous weighing machines have not only been applied to various types of conveyors on shore, but also to barges equipped with conveyors. The speed of the conveyor is immaterial to the successful operation of the machine, and a slow speed is not essential, as in the case of the weighbridge already mentioned.

Crane Suspended Weighers.

To weigh loads handled by cranes, a portable apparatus is available which is suspended from the crane hook, the skips containing the coal being attached to the underside link or hook of the machine. There are different patterns of such machines, which operate either on the principle of the spring balance, the steelyard balance, or by hydraulic pressure. The steelyard suspension weigher has its levers protected and suspended from one end of an unequal-arm beam, the steelyard having a double scale with sliding weights, and a locking device being provided whereby the main lever can be raised from the knife-edge bearings when not in use. The steelyard itself can be protected by a hinged steel door, and a hinged seat attachment can be provided for the weighing attendant to travel with the machine when in use. This pattern of machine is used in a similar manner to an ordinary pillar weighing machine. Another suspended type of apparatus operates on the hydraulic or hydrostatic principle, and is self-indicating. The mechanism of this machine is simple; it is entirely enclosed, and the weight is immediately recorded on a dial. The weight is attached to the link or hook of the machine, which forms an extension to a piston rod, the upper end of this rod being connected to a piston which operates in a cylinder, and the application of the weight draws down the piston, pressure being thereby exerted on the hydraulic medium (usually oil or glycerine, not water) contained in the cylinder. This pressure, which is proportional to the weight, is recorded on a pressure gauge of the usual type.

Various other apparatus are available for different requirements, but it must suffice here to mention finally two other types of portable machines. One pattern of weighing machine, sometimes used when sacking small coal, comprises a combined equal-arm beam scale and sack holder. The machine is suspended from the filling chute, and the sack is attached to the

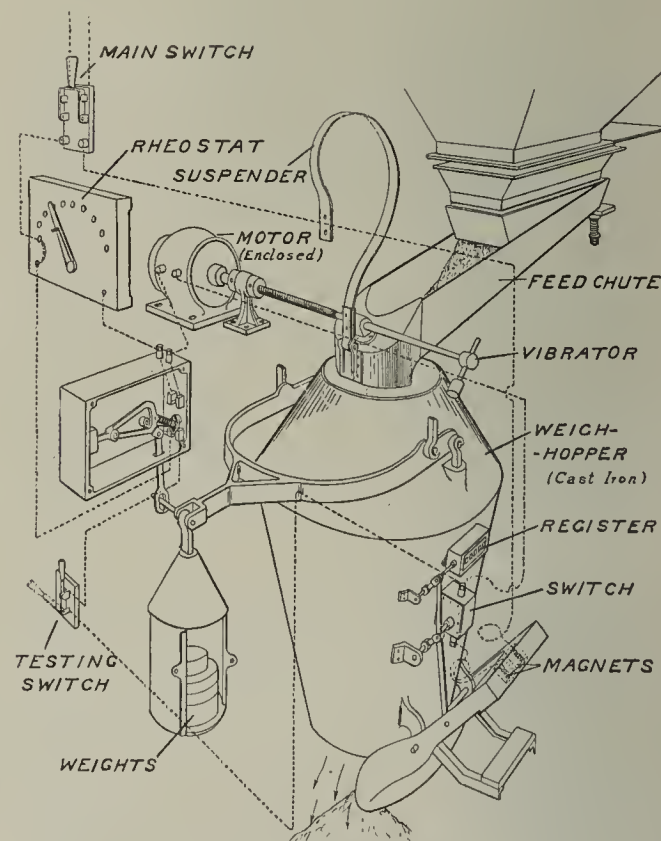


FIG. 3.—ELECTRIC SCALE.

discharge opening underneath. Weights are placed in the scale pan attached to one end of the weighing beam, and, by a movement of a lever, the coal is allowed to fall into the sack until the weight is balanced, the flow of coal being then stopped automatically. A counter attachment enables a record to be obtained of the number of sacks dealt with. The machine is supported on a stand or wheeled truck when the feeding hopper is filled by hand and not from a chute. The height of the machine is about 15 in., in addition to the height of the sack.

A portable electric scale (fig. 3), designed more particularly for feeding boilers from a bunker, consists of a hopper suspended from one arm of a weighing beam, the other arm or end supporting a receptacle for weights. The hopper is fed from an adjustable chute, inclined at the natural angle of repose of the coal, and this is vibrated by means of a small motor, the controlling switch being actuated by the scale beam; so that when the hopper is full, the beam descends, comes into contact with the switch, stops the motor and the vibration of the chute, and arrests the flow of coal into the hopper. The outlet from the weighing hopper is kept closed by a swinging gate held by an electromagnet. Directly the motor is stopped, the power of the magnet ceases, so that the gate falls open, and the coal is delivered, each charge of coal (usually about 200 lb.) being recorded by a counter. This machine is suitable for lump coal up to 6 in. measurement. The power required is about ½ horse-power, and the height of the machine is about 5 ft. 6 in.

No attempt has been made to describe in detail the mechanism of all the different types of weighing apparatus mentioned, and it has been necessary to omit reference to some patterns. The importance of weighing coal shipments and deliveries is beyond question, and re-weighing is really necessary to ensure satisfaction to both the supplier and receiver, for which reason weighing is effected at the collieries, again at the docks, on discharge at the receiving port, and when taken from storage or delivered for use.

PITWOOD SUPPLIES.

We are authorised by the Controller of Coal Mines to state that the Government have found it necessary, in order to economise shipping tonnage, to curtail drastically the importation of pitwood. This fact renders it of the utmost importance to the coal mining industry that home-grown sources of supply should be vigorously developed. It is believed that home-grown sources are ample to make the country self-supporting for a sufficiently long period, but it will not be possible to place these sources of supply at the disposal of the collieries unless a very determined attempt is made by the coal mining industry, assisted by the Government, to set up the organisation necessary for the purpose.

Accordingly, the Controller of Coal Mines has appointed eight District Pitwood Committees, of which particulars are appended. The area of supply allotted to each Pitwood Committee is shown on the accompanying map. It is the duty of each of these committees within its area of supply to develop to the utmost local sources of pitwood, and, as a first step towards this end, to set up in each area a Pitwood Association of Coal Owners to work the woods on the co-operative principle. It is anticipated that these District Pitwood Associations (of which a number have already been formed) will gradually concentrate in their own hands the purchasing of all the timber requirements of collieries within their respective districts. It therefore becomes the duty of all colliery owners to join the appropriate District Pitwood Association, as it is through this organisation that the Government will best be able to render assistance in the matter of obtaining woodlands and helping where possible in the matter of transport and the supply of petrol, and no sympathy will be felt for any colliery which, by refusing to join the appropriate Pitwood Association, may in the future find itself in difficulty in obtaining adequate supplies of pitwood.

In order to avoid competition between pitwood associations and needless railway haulage, it is necessary that each Pitwood Association should confine itself to the area of supply which has been allotted to it. As far as possible, it is not proposed to interfere with existing contracts for the supply of pitwood which may transgress the limits of any given area of supply, but no future contracts should be entered into which in any way transgress the limits appearing in the schedule appended. Now that the organisation above described has been set up, the Controller of Timber Supplies has arranged to take over from the Controller of Coal Mines the duty of developing home-grown supplies, and will deal directly with the Pitwood Committees and Pitwood Associations. The Controller of Coal Mines will, however, remain in close touch with the Controller of Timber Supplies and the Pitwood Committees.

District Pitwood Committees and Supply Areas.

(1) SCOTLAND.

Chairman—Mr. H. Walker, H.M. Divisional Inspector of Mines, 2, Kinnear-road, Edinburgh.

Technical Assistant—Mr. H. Johnstone, 28, Hamilton Park-terrace, Glasgow.

Forest Owner or Representative—Mr. T. H. Milne Home, Irvine House, Canonbie, Dumfriesshire.

Transport Officers—(1) Mr. A. H. Dunlop, 87, Union-street, Glasgow (Western); (2) Mr. J. Strachan, 8, North Bridge, Edinburgh (Eastern).

Representative of Controller of Timber Supplies—Mr. S. R. Sinclair, 1, Queen-street, Edinburgh.

Coal Owners—Messrs. C. A. Carlow (Fife Coal Company Limited), Leven; A. H. Crichton (Messrs. J. Ross and Company), Philipstown Oil Works, Lindithgow; J. A. Forgie (Bothwell Collieries), Bothwell; J. A. Hood (Lothian Coal Company Limited), Rosewell, Midlothian; R. A. T. Howie (Messrs. J. R. Howie), Hurlford, Kilmarnock.

Area of Supply—The whole of Scotland, with the exception of the counties of Kirkcudbright, Dumfriesshire, Selkirk, Roxburgh, and Berwick, but collieries in Dumfriesshire can draw pitwood from within a radius of 10 miles of the colliery.

(2) NORTHUMBERLAND AND DURHAM.

Chairman—Mr. J. R. R. Wilson, H.M. Divisional Inspector of Mines, Westfield-drive, Gosforth, Newcastle-on-Tyne.

Technical Assistant—Mr. R. S. Anderson, Bank Chambers, 26, Mosley-street, Newcastle-on-Tyne.

Forest Owner or Representative—Sir Francis Walker, Estate Office, Alnwick Castle, Northumberland.

Transport Officer—Mr. T. Edington, Irvine House, Westgate-road, Newcastle-on-Tyne.

Representative of Controller of Timber Supplies—Mr. J. L. Annand, 96, St. George's-terrace, Newcastle-on-Tyne.

Coal Owners—Mr. H. Armstrong, Collingwood-buildings, Newcastle-on-Tyne; Col. W. C. Blackett, Acorn Close, Sacriston, Durham; Messrs. E. J. George, Consett, Durham; T. E. Forster, 3, Eldon-square, Newcastle-on-Tyne; R. F. Spence, Beckworth, Newcastle-on-Tyne.

Ironstone Mines Representative—Mr. A. M. Hedley, Miners' Office, Eston, near Middlesbrough.

Area of Supply—Kirkcudbright, Dumfriesshire (excepting areas reserved for Dumfries mines), Selkirk, Roxburgh, Berwickshire, Northumberland, Durham, North Riding of Yorkshire, and the portion of Cumberland lying east of the London and North-Western Railway main line from Penrith to the border.

(3) CUMBERLAND.

Chairman—Mr. J. R. R. Wilson, H.M. Divisional Inspector of Mines, Westfield-drive, Gosforth, Newcastle-on-Tyne.

Technical Assistant—Mr. R. S. Anderson, Bank Chambers, 26, Mosley-street, Newcastle-on-Tyne.

Forest Owner or Representative—Mr. S. D. Stanley Dodgson, Somerset House, Whitehaven.

Transport Officer—Mr. J. Heaps, Moot Hall Chambers, Wigan.

Representative of Controller of Timber Supplies—Mr. J. L. Annand, 96, St. George's-terrace, Newcastle-on-Tyne.

Coal Owners—Messrs. O. H. Askew, No. 4 Pit, Brayton; J. Coates, Siddick Villa, Workington; L. H. Fletcher, Brigham-by-Cockermouth; W. Graham, Moresby Collieries, near Whitehaven; R. Steel, Colliery Office, Whitehaven.

Iron Ore Mines Representative—Mr. M. Kennedy, Stone Cross, Ulverston.

Area of Supply—The remaining portion of Cumberland, together with Westmorland, and Furness district of Lancashire.

(4) YORKSHIRE, DERBYSHIRE, NOTTS.

Chairman—Mr. T. H. Mottram, H.M. Divisional Inspector of Mines, Doncaster.



DISTRICT PITWOOD COMMITTEES.—AREAS OF SUPPLY.

1. Scottish Committee.
2. Northumberland & Durham Committee.
3. Cumberland Committee.
4. Yorkshire, Derbyshire & Notts Committee.
5. Lancashire, Cheshire & N. Wales Committee.
6. South Wales Committee.
7. Somerset, Gloucester & Bristol Committee.
8. Staffordshire, Warwickshire, Shropshire & Leicestershire Committee.

Technical Assistant—Mr. C. H. Cobbold, Moorland, Barnsley.

Forest Owner or Representative—Mr. W. A. Durnford, Elsecar, near Barnsley.

Transport Officers—(1) Mr. T. C. Roberts, Town Hall Chambers, King-street, Wakefield (Yorkshire); (2) Mr. E. Wright, Market Chambers, Mansfield (for Derby and Notts).

Representative of Controller of Timber Supplies—Mr. J. L. Annand, 96, St. George's-terrace, Newcastle-on-Tyne.

Coal Owners—Messrs. C. B. Crawshaw, Rufford Lodge, Dewsbury; J. P. Houghton (Bolsover Colliery Company Limited), near Chesterfield; J. G. Lees, Newstead Colliery, near Nottingham; Col. J. W. Mitchell, Wath-upon-Deane, near Rotherham; Mr. E. Mitton (Butterley Colliery Limited), Codnor Park, near Alfreton; Maj. Peake, Bawtry Hall, Bawtry; Messrs. P. C. C. Phillips (Halls Collieries Company Limited), Swadlincote, Burton-on-Trent; J. Turner, J.P. (Moir Colliery Company Limited), Ashby-de-la-Zouch; J. F. Warrington, Walton Grange, Wakefield.

Area of Supply—Yorkshire (excluding the North Riding), Derbyshire (excluding the portion south of the Trent), Nottinghamshire, Lincolnshire, Norfolk, and Suffolk.

(5) LANCASHIRE, CHESHIRE, NORTH WALES.

Chairman—Mr. A. D. Nicholson, H.M. Divisional Inspector of Mines, Astley, near Manchester.

Technical Assistant—Mr. F. Eckersley, 9, Kenilworth-avenue, Harrogate.

Forest Owner or Representative—Mr. R. T. Wickham, St. Werburgh Chambers, Chester.

Transport Officers—(1) Mr. J. Heaps, Moot Hall Chambers, Wigan (Lancashire); (2) Mr. E. A. Neele, Prudential Buildings, Foregate-street, Chester (North Wales).

Representative of Controller of Timber Supplies—Mr. Fraser Storey, University, Bangor.

Coal Owners—Messrs. E. S. Clark, Llay Hall, Wrexham; J. T. Browne, Pendlebury Collieries, near Manchester, or C. W. Eames, Ince Hall Collieries; A. M. Lamb, Tower Buildings, Wigan; Col. Lionel Pilkington, C.M.G. (Messrs. R. Evans and Company), Haydock, near St. Helens, Lanca-

shire; Mr. Jesse Wallwork, Bridgewater Office, Warrington, near Manchester.

Area of Supply—Lancashire (excluding Furness), Cheshire, Flintshire, Denbighshire, Anglessea, Carnarvonshire, Merioneth, and Montgomery.

(6) SOUTH WALES AND MONMOUTHSHIRE.

Chairman—Mr. J. Dyer Lewis, H.M. Divisional Inspector of Mines, 21, Stanwell-road, Penarth.

Technical Assistant—Mr. H. A. A. Phillips, Westmacote, Uplands-terrace, near Swansea.

Forest Owner or Representative—Mr. J. M. Randell, Dunraven Estate Office, Bridgend, Glam.

Transport Officer—Mr. J. J. Anthony, Prudential Buildings, St. Mary-street, Cardiff.

Representative of Controller of Timber Supplies—Prof. Pritchard, Chester-terrace, Lewis-lane, Cirencester.

Representative of Admiralty—Mr. A. J. Griffiths, c/o Messrs. Thomas Davy, Cardiff.

Coal Owners—Messrs. Finlay A. Gibson (the Monmouthshire and South Wales Coal Owners' Association), Cardiff; E. M. Hann (Messrs. Powell Duffryn Steam Coal Company Limited), Aberaman Office, near Aberdare; W. N. Lewis (Insoles Limited), Bute Docks, Cardiff; B. Nicholas (Tirpenty Collieries Company), Pontypool; W. Stewart, Brodawl, Caerleon, Mon.; Evan Williams, Glyth Dwr, Pontardulais.

Area of Supply—Cardigan, Radnor, Pembrokeshire, Carmarthenshire, Brecknock, Glamorganshire, Monmouthshire, Cornwall, Devonshire, Somersetshire, Dorsetshire, Wiltshire, Hampshire (including the Isle of Wight), Berkshire, but excluding the portion of Somersetshire and Wiltshire which lies within 10 miles of any Somersetshire colliery.

(7) SOMERSETSHIRE, GLOUCESTERSHIRE, AND BRISTOL.

Chairman—Mr. J. R. Felton, H.M. Senior Inspector of Mines, 298, Pershore-road, Birmingham.

Technical Assistant—Mr. M. Falcon, The Oaks, 88, Hermon-hill, Wanstead.

Forest Owner or Representative—Mr. L. S. Osmaston, Whitmead Park, Park End, near Lydney, Glos.

Transport Officer—Mr. Percy Caesar, 26, Baldwin-street, St. Anne's Park, Bristol.

Representative of Controller of Timber Supplies—Capt. Percival, 24, Fore-street, Taunton.

Coal Owners—Messrs. E. M. Heppel, Camerton, near Bath; G. E. J. McMurtrie, Radstock, near Bath; I. H. Fewings, Bream, Gloucestershire; W. R. Champness, Rock House, Cinderford; H. B. Napier, Ashton Court Estate Office, Long Ashton, Bristol.

Area of Supply—The remaining portion of Somerset and part of Wiltshire within 10 miles of mine fields, Gloucestershire and the portion of Herefordshire south of the Trent from Ledbury, eastward through Hereford to a point where Radnorshire, Brecknockshire, and Herefordshire meet.

(8) STAFFORD, WARWICK, SHROPSHIRE, AND LEICESTER.

Chairman—Mr. W. Saint, H.M. Senior Inspector of Mines, Glentworth, Staffordshire.

Technical Assistant—Mr. M. Falcon, The Oaks, 88, Hermon-hill, Wanstead.

Forest Owner or Representative—(not yet appointed).

Transport Officers—(1) Mr. H. Westcott, 25A, Paradise-street, Birmingham (South Staffordshire, Worcestershire, Warwickshire); (2) Mr. E. R. Arnold, 33, Newdegate-street, Nuneaton (Leicester); (3) Mr. W. T. H. Morgans, 26, Glebe-street, Stoke (North Staffs).

Representative of Controller of Timber Supplies—Capt. Millett, Llynder, Rossett, Durham.

Coal Owners—Messrs. G. E. Bramall, 6, Knighton-drive, Leicester; W. F. Clark, Aldridge, Walsall; C. F. Jackson (Exhall Colliery), Bedworth, near Nuneaton; G. A. Mitcheson (Stafford Coal and Iron Company Limited), Stoke; W. Perrott, Fairtrees Hall, Bridgnorth, Salop; P. C. C. Phillips (Halls Collieries), Swadlincote; C. Tryon or H. W. Hughes, Priory Offices, Dudley; C. A. Dickinson (Netherseal Colliery Company Limited), near Burton-on-Trent.

Area of Supply—Staffordshire, Shropshire, Herefordshire (north of the line described in 7), Worcestershire, Warwickshire, Oxfordshire, Buckinghamshire, Middlesex, Surrey, Sussex, Kent, Essex, Hertfordshire, Bedfordshire, Cambridgeshire, Huntingdonshire, Northamptonshire, Rutland and Leicestershire, together with the portion of Derby south of the Trent.

ASH ANALYSES OF SOUTH AFRICAN COALS.

By the courtesy of Mr. J. G. Hatchard, locomotive instructor, South African Railways, Bloemfontein, we are able to publish the following analyses of the ash of coals from the Vereeniging and Witbank collieries:—

Constituents.	Vereeniging Colliery (Transvaal). Per cent.	Witbank Colliery (O.F.S.). Per cent.
Silica	42.50	39.50
Alumina	19.50	35.35
Iron oxide (Fe ₂ O ₃)	16.95	15.00
Lime	10.65	4.30
Sulphuric anhydride	2.10	0.70
Magnesia	0.25	0.50
Titanic oxide, and other insolubles	4.20	2.50
Alkalies, etc., by difference	3.85	2.15
	100.00	100.00

The analyses were made by Prof. G. H. Stanley, of the South African School of Mines and Technology, Johannesburg.

Russian State Coal Monopoly.—The leading coal firms of the Donetz basin recently sent telegrams to the Russian Ministers of Trade and Industry, Ways of Communication, and of Labour, stating the necessity of handing over the mines of the Donetz basin to the Government, on account of the impossibility of producing coal at a profit, owing to the demands of labour. Representatives of the workmen in this region have demanded a minimum wage of 250 roubles a month, which was declared to be the cost of living for a family of four. They presented demands at a conference with the Assistant Minister of Labour, who was delegated to try to effect a settlement. It is now reported that the Russian Government has agreed to take over the mines in the Donetz basin, and is establishing a State monopoly. The Government will invest £5,000,000 of working capital for the industry, and all the profits will be used for the acquisition of machinery and for increasing otherwise the technical efficiency of the mines.

A NEW METHOD OF COAL ANALYSIS.

The present issue of the *Chemiker Zeitung*, Dr. H. Ludwigshafen, reviews the present methods of determining moisture, ash, yield of coke and tar in coal, and proposes the following modification, in which the whole of these determinations are performed in succession in a single apparatus:—

Moisture.

The essential part of the apparatus is illustrated in fig. 1, and consists of a flat retort of refractory glass *b*, drawn out at each end to form ascending tubes *a* and *c*, the latter of which is bent horizontally at the end. About 1 grm. of coal is weighed out quickly on a small card, and introduced into the body *b* of the retort through a tube of glazed paper inserted into the tube *a*

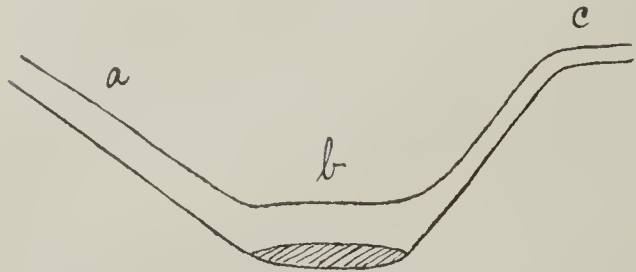


FIG. 1.

in order to prevent any of the particles adhering to the glass. The retort being weighed before and after filling, the exact weight of coal taken is known. The tail tube *a* is next clamped to a stand, and connected by rubber tubing to a large calcium chloride tube (fig. 2), for drying the gas to be passed over the coal. The neck *c* of the retort is connected to a weighed tube containing calcium chloride saturated with carbon dioxide, for retaining the moisture from the coal,

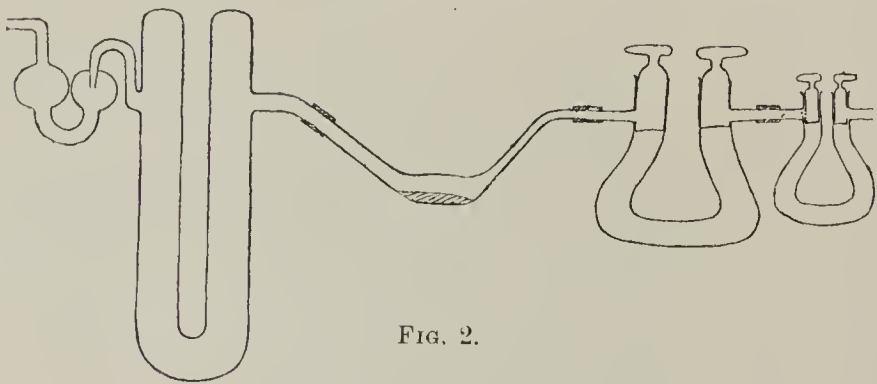


FIG. 2.

another calcium chloride tube being attached for security. Hydrogen is passed through the apparatus, the rate of flow being checked by watching the bubbles in the bulb tube in front of the large drying tube. When all the air has been displaced, the retort is immersed in a bath of sulphuric acid, which is gradually heated to 105 degs. Cent., the moisture given off by the coal passing, together with the hydrogen, through the absorption tube. Any drops of water condensing in the neck of the retort are preferably

attaching rubber tubes fitted with glass stoppers, which are, however, removed during the operation of weighing. The increased weight of the first absorption tube (and also the loss of weight of the retort), gives the moisture content of the coal, so that a direct and an indirect determination are obtained simultaneously, the former, however, giving the more accurate result. As a check, the water content of the same coal was determined in the drying cupboard at 105 to 110 degs. Cent., the figures being given in the subjoined table for comparison. Examination of the values obtained by the indirect and direct methods with the retort shows that the former are higher throughout, this being particularly the case with the cannel and brown coals. The deviations amount to nearly $\frac{1}{2}$ per cent., from which it would appear that, in addition to water, the coal parts with gases which are not absorbed by calcium chloride—a point which confirms the observations of earlier workers. The values obtained by drying in the ordinary way come out higher than those with the retort in some cases, and lower in others. This is not surprising, since, on the one hand, gases as well as water escape at 100 degs. Cent., thus increasing the (apparent) moisture content, whilst on the other, oxygen is absorbed from the air, and causes the moisture content to appear lower than the truth, the net result varying according as one or the other of these factors preponderates.

Yield of Coke.

After the water content has been determined, the tube *a* of the apparatus is again connected with the drying tube, and, the neck of the retort being supported by an iron rod held by a stand, a brisk current of hydrogen is again passed through until all the air has been expelled. The retort is then heated up gradually by a Teklu burner, the flame being increased as the tar distils over; and when all the tar is out, the temperature is raised to red heat, and the glass fuses. After cooling down slowly, to avoid cracking the glass tube, the retort is detached, plugged as before, and weighed, the difference between the weight of the retort plus the dry coal and the final weight giving the amount of gas, tar, and water of decomposition, whilst the coke is found by deducting the weight of the retort from the final weight. For comparison, the yield of coke from the same coal was determined by the Bochum test, the results included in the table showing that the retort method gives values about 1 to $1\frac{1}{2}$ per cent. higher. Since the figures furnished by the Muck method are 2 to 3 per cent. higher than those of the Bochum

method, the new method gives approximately the mean of both. The objection raised against the Finkener method (which also employs hydrogen), that it furnishes an incompletely burned coke, hardly applies here, or the yield of coke would be higher than it is. Consequently, degasification is complete; and as the coking is effected in an atmosphere of hydrogen, there can be no combustion of the coke itself. The degasification process can be observed in all its phases: the fusing, intumescence, and baking of the coke: whilst

the apparatus, the retort being heated until the coke ignites, after which the combustion will proceed without further application of the flame, though it is preferable to continue heating the retort, in order to prevent the glass from cracking. The intensity of the combustion can be varied by regulating the supply of oxygen. Since compact coke burns less easily than porous, care must be taken in the latter case to prevent particles of coke from being carried off by the current of gas and products of combustion. Finally, the retort is heated to redness, and, carefully cooled down, the oxygen is expelled by air, and the retort is weighed. The difference between this and the previous weighing gives the amount of the combustible matter of the coke, and the ash is found by deducting the tare of the retort from the final weight. For comparison, the same coal was incinerated in a quartz dish in the muffle. As will be seen from the table, the values obtained by the two

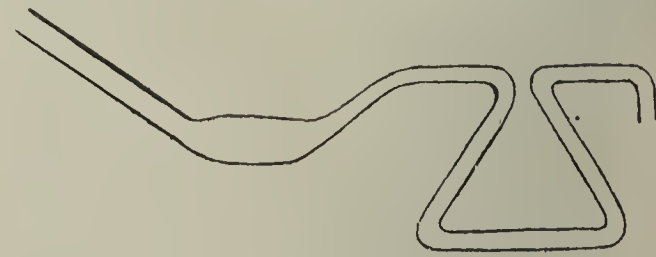


FIG. 3.

methods agree. The combustion in oxygen has the advantage over the muffle method of being complete in 20 to 30 minutes instead of two to three hours.

Tar and Water of Decomposition.

An attempt was also made to determine the amount of tar and water formed, in a manner similar to the Hiller method. For this purpose, the retort was first fused on to a glass tube, bent in the form of a triangle, and immersed in a cooling mixture (fig. 3). In spite of this arrangement, in which the effluent gases were bound to impinge on the sides of the tube, tar fumes were still observed to escape. A second tube, of the same shape, was then fused on (fig. 4), and bent to enable the whole apparatus to be suspended on the balance, this tube being filled with small glass balls held in place by constrictions. In this way the gases were compelled to travel a long distance and overcome considerable resistance, with the result that the whole of the tar was retained.

The analysis was performed in the following manner: After determining the moisture content, as already described, the absorption tube was immersed in a mixture of ice and salt, and the coal was coked in the usual manner, the tar settling down completely in the tube. Very little water is carried away in the effluent gas—as was ascertained by attaching a sodium sulphate tube, to dry the gas, at the end of the absorption tube. When degasification was complete, the absorption tube was wiped dry, and the whole weighed, the loss in weight giving the amount of gas formed. After detaching the absorption tube—breaking it off at a filed

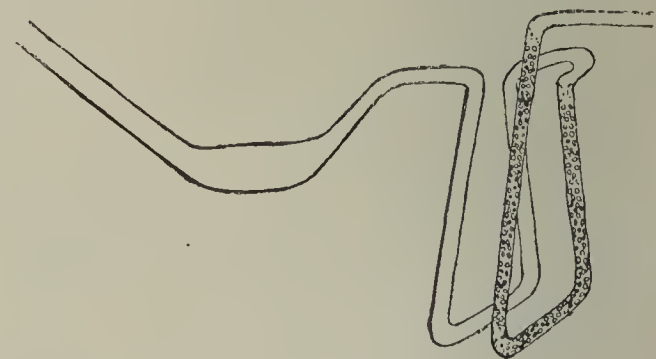


FIG. 4.

notch—the ash was determined in the retort, whilst the absorption tube was weighed, with the tar and water of decomposition, the tar being afterwards extracted with benzol and chloroform, and the tube weighed after drying. The loss in weight gave the tar and water of decomposition.

The following analysis of smithy coal (No. 2 in main table) shows the difference in the results obtained by means of the absorption tube method:—

	In retort.	In absorption tube.
	Per cent.	Per cent.
Hygroscopic moisture	0.98	1.07
Gas	11.72	9.06
Tar and water of decomposition	85.78	3.18
Coke	1.56	86.35
Ash	1.56	1.43
	100.04	100.09

The yield of tar obtained by this method is unusually high, and can never be equalled in actual practice on the large scale, for which reason the method is of little technical value. It is, however, of interest as showing that when coal is degasified in a thin layer, and the resulting tar is cooled immediately, the yield of the latter is relatively high. As the yield of tar increases, the amount of gas is necessarily diminished, and therefore low-temperature coking is requisite when the maximum output of tar is desired. For this system of coking, the method of tar determination outlined above will be useful.

Imports and Exports of Coal Products.—In July, the imports of coal products, not dyestuffs, amounted to 4,597 cwt., of the value of £49,420, compared with 5,809 cwt., value £53,139, a year ago. The total imports in the seven months just ended was 28,868 cwt., value £341,083, compared with 18,358 cwt., value £121,077, in the corresponding period of last year. The value of coal products, not dyestuffs, exported during July was £348,479, thus bringing the value of such exports during the seven months to £1,813,830.

ANALYSES OF COAL BY OLDER METHODS.

Kind of coal.	Moisture (drying cupboard) at 105 degs. Cent.			Coke, in platinum crucible (Bochum method).			Ash (muffles).			Gas + tar + water of decomposition (by difference). Per cent.
	Initial weight. Grms.	Final weight. Grms.	Per cent.	Initial weight. Grms.	Final weight. Grms.	Per cent.	Initial weight. Grms.	Final weight. Grms.	Per cent.	
1. Anthracite (from Gottfried Wilhelm Pit, Sedan seam)	1.0031	0.0125	1.25	1.0.53	0.9214	90.75	1.0000	0.0134	1.34	8.00
2. Smithy coal (Rosenblumendelle Pit, Girondelle seam)	1.0126	0.0098	0.97	1.0136	0.8755	86.38	0.9977	0.0143	1.43	12.65
3. Bituminous coal (Osterfeld Pit, Albert Ost seam)	1.0137	0.0127	1.25	1.0000	0.7825	78.25	1.0000	0.0247	2.47	20.50
4. Gas-flaming coal (Rheinbaben Pit, Sedan seam)	1.0045	0.0239	2.38	1.0000	0.6659	66.59	1.0000	0.0882	8.82	31.03
5. Cannel coal (Lohberg Pit)	1.0175	0.0153	1.50	1.0159	0.5976	58.83	1.0000	0.1722	17.22	39.67
6. Brown coal (Webau)	1.0000	0.1090	0.90	1.0000	0.2979	29.79	1.0000	0.0582	5.82	59.31
							Bare flame.			
							1.000	0.0739	7.39	

ANALYSES OF COAL BY THE NEW RETORT METHOD.

Kind of coal.	Moisture.					Gas, tar and water of decomposition (indirect).		Coke.		Ash.	
	Indirect (loss of weight in retort).			Direct (absorption in CaCl ₂ tube).							
	Initial weight Grms.	Final weight. Grms.	Per cent.	Wght. Grms.	Per cent.	Wght. Grms.	Per cent.	Wght. Grms.	Per cent.	Wght. Grms.	Per cent.
1. Anthracite (from Gottfried Wilhelm Pit, Sedan seam)	1.0076	0.0155	1.54	0.0115	1.14	0.0631	6.27	0.9290	92.20	0.0136	1.35
2. Smithy coal (Rosenblumendelle Pit, Girondelle seam)	0.9960	0.0127	1.28	0.0112	1.12	0.1156	11.61	0.0869	87.34	0.0155	1.56
3. Bituminous coal (Osterfeld Pit, Albert Ost seam)	0.9991	0.0137	1.37	0.0134	1.34	0.1949	19.51	0.7905	79.12	0.0261	2.62
4. Gas-flaming coal (Rheinbaben Pit, Sedan seam)	0.9940	0.0278	2.79	0.0267	2.69	0.2.67	29.85	0.6695	67.35	0.0926	9.32
5. Cannel coal (Lohberg Pit)	0.9968	0.0172	1.73	0.0130	1.30	0.3780	37.92	0.6016	60.35	0.1705	17.11
6. Brown coal (Webau)	0.9870	0.1123	11.38	0.1076	10.90	0.5789	58.65	0.2958	29.97	0.0588	5.96

by the application of a small flame. In about 10 minutes the coal will be perfectly dry, whereupon the retort is removed from the bath, and allowed to cool. The gas is then passed through the apparatus for 10 minutes, and the retort freed from the sulphuric acid by rinsing. After detaching the absorption and drying tubes, the retort is closed by

the troublesome attendant conditions, height of flame, and so forth, are precluded, and the use of expensive platinum is obviated.

Ash Determination.

After the coking test, the drying tube is once more attached to the retort, and oxygen is passed through

MINING INSTITUTE OF SCOTLAND.

A general meeting of the Mining Institute of Scotland was held on Saturday, August 11, in the Royal Technical College, Glasgow. Mr. R. W. Dron, vice-president, Glasgow, occupied the chair, in the absence of Mr. D. M. Mowat.

At the outset, Mr. Robert F. Rankin, colliery manager, Bonnyrigg, and Mr. Malcolm Mathieson, apprentice mining engineer, Langside, Glasgow, were elected to the membership of the institute.

The Higher Training of Colliery Managers.

Discussion was resumed on the paper read at a previous meeting of the institute by Mr. G. L. KERR, secretary, on "The Higher Training of Colliery Managers."

Prof. L. T. O'SHEA, in a written communication, observed that everyone would agree with Mr. Kerr that it was only a few amongst those who aspired to the position of colliery manager who were fitted by temperament and ability to fulfil that post and undertake its responsibilities. Those few, however, should be encouraged. It was essential for every colliery manager to obtain the first-class manager's certificate of competency, and the question seemed to arise: Did Mr. Kerr consider that this was the standard to be reached, or did he advocate a higher standard? He rather thought the author advocated a higher standard than this, and wished to see greater facilities for promising youths of ability in elementary schools to attend day classes. With that he (Prof. O'Shea) agreed. For this, however, he would urge that greater attention was required in the early training to the scientific subjects—namely, mathematics, physics, and chemistry—than could be obtained in the elementary schools. Mr. Kerr appeared to suggest that there was no necessity to prolong the school age beyond 14 years to enable promising youths to equip themselves educationally for this higher training, and considered that the experience gained in the pit during the years from 14 to 18 or 20 was so valuable that it was preferable to spend these years in the pit than at school. He ventured to disagree with Mr. Kerr on this point. Though it might be unnecessary to insist on all boys remaining at school till they reached 17 years, it was surely essential that boys of ability and promise, selected to proceed to the higher training schools, should do so. In the writer's opinion, the value of Mr. Kerr's suggestions would be enhanced if, in addition to scholarships tenable at universities and technical colleges, others of substantial value were offered to boys in the elementary schools. These scholarships should cover school fees and a certain proportion of maintenance while at school. The whole question was one of importance, and had been raised at an opportune moment. It was necessary, in discussing it, to come to an understanding as to what was meant by the higher training of the colliery manager. The writer personally advocated a training in the day classes of the technical colleges or the universities after the student had reached the required standard of education in a secondary school. In Germany, it was recognised that the education in elementary schools was not sufficient to equip a student for the higher education requisite for the mining engineer and the prospective colliery manager. A mining engineer must have been at a secondary school before he could enter a mining academy.

Mr. F. OXLEY (Sheffield) wrote that he quite agreed with Mr. Kerr that colliery managers should be more highly trained, and also that a large number of them must be obtained from the ranks of the workers. With regard to the training, he was of opinion that it should commence while the boys were still at school, these boys being chosen before they left the elementary schools. Suitable boys, of good physique and 13 years of age, should be selected on the advice of the schoolmaster, and should then be sent to a secondary school for three years before taking up work at the colliery. Reports of the progress of the boys at the secondary school would be given at least annually, and, if the reports were satisfactory, at the expiry of the three years the boys would enter on their studies at the mine. The course to be taken at the university subsequently would be of a somewhat higher standard than that required for the Home Office certificate—say, the equivalent of a diploma course. His reason for advocating a course of this standard was that a few might possibly rise to the position of general manager, and their higher training would be reflected on the industry as a whole. Further, the higher technical knowledge obtained, even if the students never attained a higher status than that of colliery manager, would make them more capable of appreciating new and progressive developments affecting the work and the industry generally. To provide suitable under-managers, a somewhat less ambitious scheme might be provided. He was of opinion that the higher course should contain a series of lectures on social questions, such as social and political economy.

The CHAIRMAN said it was doubtful if the provision of scholarships was the best way to attain the end in view. If such scholarships were established, a figure of £100 per annum, rather than £50, would be more likely to draw the best men. The general experience was that the best way to improve the status of any profession was to make the entrance examinations more difficult, and at the same time to take steps to make the position more attractive socially and financially. It was of the utmost importance to raise the whole standard of education, and with such a higher standard of general education, the training of the colliery manager would automatically be raised. Future legislation would probably interfere with a lad of 14 spending his whole day in underground work. The probability was that in the near future every lad would be required to attend day classes between the ages of 14 and 18.

Mr. WM. WILLIAMSON (Hamilton) said the training of a colliery manager was a dual operation. To be

successful, he must have an efficient practical training and also a thorough technical knowledge. The practical training was simple enough, and the technical training alone might also be easily accomplished. The difficulty arose in the dual combination, so as to give the best final results. The method of dual training outlined by Mr. Kerr for the higher training he proposed was usually adopted, viz., six months of the year in the mines, and the remaining six months in studying scientific and technical subjects. With regard to Mr. Kerr's implied suggestion that two years extra at school was a waste of time, he (the speaker) did not think that additional time was wasted at all. If a student had put in an extra two years at a higher-grade school, he must surely have done more useful and valuable work in scientific and other subjects than a student attending even the best organised courses for evening instruction.

Mr. D. L. SMITH (Glasgow) said he thought Mr. Kerr ought first of all to have outlined just what one had to understand by this higher training, and a brief curriculum of studies would have been advantageous as indicating the lines along which the training was to proceed. In a scheme of study, the first factor in training seemed to him to be scholarship. The scholarship standard should be the intermediate or leaving certificate, the candidate to be mentally and physically fit, potentially, for the duties of colliery management. The second factor should embrace some system of apprenticeship under which the youth would be engaged in specially selected courses of practical mining work for definite periods under the supervision of an acting certificated colliery manager. This apprenticeship system, if it could be organised and adopted by the mining industry, would enable a scheme of practical training to be carried out on a systematic and recognised basis. Mr. Kerr had outlined a course of practical work as part of the education of the highly-trained colliery manager, but it was difficult to see how the facilities he desiderated could be obtained by working lads—even those holding scholarships and bursaries—without the general adoption by the industry of such a system of apprenticeship as he (Mr. Smith) had attempted to indicate. Fourteen years was the legal age for leaving school, but he was of opinion that a boy could benefit greatly by two years more at school. Fourteen was too early an age for a boy to specialise, and it would be a decided advantage for him to remain at school until 16 years of age. To say that this difficulty was detrimental to the opportunities of the son of the working miner was to beg the question, as the highly-trained colliery manager must begin with a good general education, whether he was the son of a miner or a professional man; and surely the coal masters, the colliery managers' associations, the miners' unions, and the county councils could evolve a scheme for the provision of suitable financial assistance to clever apprentices. The statement made by Mr. Kerr that openings were few, and that many certificated men were never likely to hold a managership, was perfectly true; and it seemed to him to point to the necessity of raising the standard of examinations more than ever, and improving the method of training and selection in the early stages.

Mr. ROBERT McLAREN, retired inspector of mines (Airdrie), said they all agreed with Mr. Kerr that it was necessary that managers should be highly scientific men in possession of a good practical training. Whilst that was so, it seemed to him that one of the principal points a manager ought to keep before him was the labour problem. It was an appalling fact that for many years the output per person had been going back, and to-day the position of matters in that respect was nothing short of a scandal. He was afraid that some of the managers themselves who were called in as arbiters in disputes were a little to blame for what happened and was happening. The future colliery manager should be well grounded in labour problems, so that he could, where necessary, insist upon a fair day's work for a fair day's wage. It was apparent from what the author said in his paper that the money for this higher education was not to be provided by the students themselves or their parents, but by the Education Department, the county councils, the colliery owners, and possibly the miners' unions. His advice to them was, "by all means don't." Had they not already had quite enough of Government departments, without permitting them to interfere further in their business? Let the Government deal with the general education of the people, but could they not themselves look after the training of their colliery managers? They ought to remember they were Scottish people who, he trusted, had not yet lost all their independence. It used to be the proud boast of the parents of Scotland that they could sacrifice something for the sake of their boys in order to send them to the university. Frankly, he was entirely opposed to this pauperism which was going on in the country, and which had been largely encouraged by Carnegie and his millions. That was a sort of pauperism which was turning them into serfs in a great many respects. Then he would never dream of asking the miners' unions to contribute towards the cost of scholarships for "lads o' pairs." In the past, the miners' unions had always been opposed to managers doing what was right, and the moment they gave the unions a chance to make managers, these same unions would expect the managers ultimately to come under their domination.

Mr. W. H. KILPATRICK (Larkhall) said that, having read Mr. Kerr's paper, he felt in perfect accord with the root spirit which he believed prompted it. He agreed that the practical training a mine manager needed was such training as he might acquire in the first seven years or so of his mining experience, when he was not getting that experience with the direct ulterior view of becoming a mine manager. He always had a sympathy with the young prospective mining engineer, who was sent into the mine to gather up the ends, as it were, in his three years or so of experience necessary to fit him for the mine management. He had so much before him with respect to which he would

fain learn something that he might well as go to a man lost in a forest looking for timber whom he could not see for trees growing. Doubtless some of these engineers had succeeded, just as they might have succeeded, say, either as merchants or diplomats, or their father or some other good influence had started them off. He took it, however, that that was not the kind of student Mr. Kerr wished to make provision for, but rather for the actual miner drawn out of the mines from amongst his mates. Between 14 and 20 years of age many young and promising miners did not themselves know what they wanted to be at. It was after the realisation of their latent capacity dawned upon them and a thirst for knowledge was felt, that the very best mining students evolved. This was the class from which the great mass of Scottish colliery managers had come, and in their capacity as mine managers he thought they could take a place worthy of their country. Short and facile roads entering to a study of their subject ought to be given to this class, instead of the dreary round of the schools with their affiliated courses. As matters stood now, mining education was so arranged that a working lad was either offered in the mining classes the same kind of education pabulum given to grown men of observation and experience at the university, or the door was shut in his face.

Mr. GEORGE MURDOCH (Coatbridge) said that, in his opinion, the greatest defect of our present system was premature and excessive specialisation. In the majority of cases, there was not a sufficient ground work of good general education on which to build up a stable and satisfactory superstructure of technical and scientific knowledge. Mr. Kerr desired that the future colliery manager should enter the pits at 14 years of age, but, personally, he thought it would be a far better plan to encourage the boy to continue at the higher grade or secondary school until he had at least reached the standard of the intermediate certificate. If he could remain until he had received his leaving certificate, so much the better. Under such conditions, his future training in technical and scientific knowledge would be comparatively easy, while he would bring to his work a trained mind, capable of working out the most difficult problems likely to arise in his career. The removal of this disability—the lack of a good general education and a trained mind—from the course of training at present in vogue, was the crying need of the situation, and no provision of scholarships would be of any avail until it had been completely removed. He was surprised that the author had omitted, from the agencies which might be expected to co-operate in the promotion of the higher training of colliery managers, all mention or reference to the duties of that important Board called the Board for Mining Examinations. He (Mr. Murdoch) could not help thinking that it was very unfortunate for the well-being of mining education that the Mining Board should be so completely isolated from the educational bodies carrying on this work. One would expect that, from the intimate knowledge which the Board must possess of the condition of mining education all over the country, it would be in a position to give very valuable counsel to those who were trying to keep the educational part of the training well ahead of the requirements of the country, and to make for continued progress. Nothing of this kind was done. Indeed, the most meagre reports were issued regarding the results, and there was no chance for the exchange of ideas between the teachers and the examiners.

Mr. JAMES BLACK (Shettleston) said the suggestions put forward in the paper were on right lines, so far as they went, but he was certainly not convinced that the establishment of an adequate number of scholarships would of itself achieve the very laudable object that Mr. Kerr had in view. It appeared to him that, before what the author had in view was attained, employers would require to be taught to appreciate more fully the value of technical training, and to realise that the young man possessing practical experience and a knowledge of mining science was an asset of national importance who was entitled to be rewarded for his ability in a manner commensurate to his worth in the mining industry.

Mr. D. B. GEMMELL (Westrigg Collieries) remarked that it had been rather fashionable of late to deride practical men. Theory had been exalted while practice had been degraded. It seemed to him that Mr. Kerr's paper came as a corrective to such a pernicious doctrine. Highly-trained managers would be more essential than ever in the great industrial struggle that lay before the nation. It ought to be the duty of the nation, and the nation alone, to provide money for the training of promising students. There was, however, a question present in the mind of every colliery manager in the country, and it was this: Was the game worth the candle? It was too late in the day for the most of them to reconsider their position, but they could ask themselves if this was a profession to which they should put their sons, and did it offer a reward such as would repay the many years of practical and technical experience necessary?

Mr. G. L. KERR said he thought that some of those who had taken part in the discussion were under a misconception in regard to several of the points in the paper. When he had an opportunity of going over the criticisms and suggestions that had been made, he would reply more fully to them.

A Fresh Aspect of Intensive Mining in Thin Seams.

Mr. G. GIBB read a paper on the above subject (see page 304 of this issue), discussion of which was adjourned till the next meeting.

Hong Kong Coal Imports.—According to the trade of Hong Kong for the year 1916 (Colliery Guardian, No. 933), the imports of coal exceeded those of the year by 62,811 tons: this was due to local demand for manufacturing concerns laying in stocks as a protective measure against advancing prices due to shortage of tonnage. A large part of the surplus coal is from Formosa and Yae-yama.

CURRENT SCIENCE AND TECHNOLOGY.

Ignition.

Attempting to check the results obtained by Thornton in the experiments which led that worker to formulate his theory of "stepped ignition," Dr. R. V. Wheeler (*Journal of the Chemical Society*), using a method of experiment apparently similar to Thornton's, has been unable to detect any discontinuity, although the curve has been traced over a wide range half a-dozen times or more, and no discontinuity could be observed with mixtures of air with hydrogen or with any one of the gaseous paraffin hydrocarbons, the only gases with which experiments were made.

A curve representing the results of Thornton's experiments with a 9.5 per cent. mixture of methane and

gases: a contraction in volume occurred at 50 mm. pressure (curve A) with an igniting-current of about 10 amperes.

Calcium Cyanamide from By-Product Ovens.

Mr. J. W. Knowlton (*Coal Age*) suggests that coal-mining companies can prepare nitrogen, so that it will be available for absorption by growing plants, by converting the inexhaustible supplies of free nitrogen in the atmosphere into calcium cyanamide in by-product oven plant at the mines. Without going into details calcium cyanamide is prepared commercially as follows:

Calcium carbide is made by heating a mixture of coke and limestone in an electric furnace ($\text{CaO} + 3\text{C} = \text{CaC}_2 + \text{CO}$). A mixture of coke and limestone is fed into a furnace connected with alternating current, the amperage being so regulated as to give a temperature of about 2,000 degs. F. At this temperature carbide is formed, and settles to the bottom of the furnace in a liquid state. Calcium cyanamide is formed by passing nitrogen over this calcium carbide ($\text{CaC}_2 + 2\text{N} = \text{CaN}_2\text{C} + \text{C}$). The nitrogen is obtained by passing air over sodium hydroxide to remove the moisture and carbon dioxide and then over red-hot copper to remove the oxygen. The resulting nitrogen is passed over carbide packed in tubes through which extends a carbon rod, the heat necessary for the reaction being generated by passing an electric current through the latter. The reaction takes place most readily at about 1,200 degs. F.

With the by-product oven plant at the mines, and the usual proximity of limestone deposits, calcium cyanamide could be made at a low cost through the utilisation of surplus gas. The demand for this product would be practically unlimited, and would become greater as the cultivation of land became more intensive.

At some mines within easy access of limestones of high purity, 4 ft. of coal is being mined and 2 ft. left in the ground because it is too high in ash and sulphur for the market. This coal would make excellent producer-gas fuel which, with the limestone, would furnish the raw materials for the economical manufacture of calcium cyanamide. Not only would this result in the saving of the coal, but the whole 6 ft. of coal could be mined, 4 ft. being sold on the market as good coking coal and the rest sent to the producer, resulting in much cheaper fuel coal than is secured at present. The demand for nitrogenous products will soon be as great as that for coal itself. Of this there can be no reasonable doubt. A combination between lime and nitrogen is almost ideal as plant food, and under present world conditions the demand for it will soon be practically unlimited.

EXCESS MINERAL RIGHTS DUTY: RELIEF UNDER THE NEW ACT.

By JOHN BURNS, W.S.

Some mineral rents and royalties contribute to Excess Profits Duty and some do not, whilst only a portion of the latter contribute to Excess Mineral Rights Duty. The only mineral returns which pay Excess Mineral Rights Duty are those which fluctuate with the selling price of the mineral—and not all of these. The rate of the tax is, and has been since it was imposed in 1915, the same as the rate of Excess Profits Duty, for which it is a substitute. The same income, needless to say, never pays both taxes.

The peculiar thing about the tax is the basis on which up to now it has been determined whether there is any excess income on which to charge it. On the analogy of Excess Profits Duty, one might imagine that the income of the accounting year would be compared with the average income of two (selected by the taxpayer) out of the three years immediately preceding the war. But no. The language of the 1915 Act was as obscure as it could well be, and, indeed, in the Scottish Courts it has very recently been observed from the Bench that, read grammatically, it is meaningless. However, the judges gave effect to it in accordance with the Crown's claim, on the theory that it was more probable that the Parliament draftsman had committed many, even elementary, errors, than that Parliament passed even a subsection which meant nothing at all.

As so interpreted the basis was that one was to compare the actual royalties of the accounting year, not with the actual average of two pre-war years, but with the average of two fictitious incomes of those pre-war years. This fictitious income of each pre-war year was to be reached by assuming that in those years the output had been the same as in the accounting year, but the price what it actually was in each pre-war year. Thus—

Accounting year—the actual income.

Each pre-war year—post-war output but pre-war price.

Obviously, one possible result of this was that Excess Mineral Rights Duty might be demandable when the income from royalties was no greater, or was even less, than before the war. This was considered to be absurd, and it has now been altered by the Finance Act of this year, so that if there is no rise in actual income, there can be no tax.

At the same time, the writer is not at all convinced that the 1915 law was passed inadvertently; firstly, because it must have been manifest that it would operate as it did; secondly, the language of the Act is such as to make this intention almost obvious, though in a very obscure way, which also the writer is inclined to think may have been intentional; and, finally, because there is

something to say for the law as it stood before the recent amendment. Returns from minerals are different from all other income. If you don't get it this year owing to reduced output, your mineral lies there with its income-yielding properties to gain income next year and in subsequent years. It may have appeared anomalous that a royalty-owner was liable to pay duty on excess income which had no existence; but it is an anomaly that whether he shall, or shall not, be liable may now depend on whether the minerals are worked at the same rate as before the war or more slowly. The best illustration is where one year's output at the pre-war rate would exhaust the field; if thus exhausted in one war year there will be a claim for Excess Mineral Rights Duty. If, on the contrary, say three years, though all war years are taken for the same output, the tax is evaded, or, at any rate, avoided.

The new change is not retrospective.

INTENSIVE MINING IN THIN SEAMS.*

By GEORGE GIBB.

The writer is associated with the working of thin coal seams, a very large portion of which are controlled mechanically, and are worked on what may be considered the accepted practice in longwall working, but the need for some further change in method is daily in evidence, on account of the disabilities of this system, with the consequent irritation to labour. Interruptions to normal and steady working tend to alienate the interest and sympathy of labour, and so vital is the co-operation of labour in successful working, that this factor has had to be considered, and has largely influenced the change to the system discussed. The larger areas which must be developed in dealing with thin coals at considerable depth are so extensive as almost to preclude from the horizon the possible economic application of longwall in its entirety on the outward journey. The need for efficient transport has increased because of these larger areas and outputs, which require to be dealt with; and having secured the general safety of the mine as regards ventilation and so forth, transport stands out pre-eminently as the one factor governing co-ordination of method and continuity of operation. But the inherent defects in ordinary longwall working are such as to prevent the fullest advantage being taken at all times of the electrical and mechanical facilities now available for transport work, etc. This inability is occasioned by roof and pressure troubles, which are intensified in rapid mining according to longwall practice, and increase with the depth, more especially where the seams are associated with soft adjacent strata; it is also occasioned by intersectional roadways over the exhausted area in longwall workings.

It has been the custom in longwall working with machine mining to send out exploring headings several hundred yards in advance preparatory to the resumption of, and complete exhaustion by, longwall working. This development is accompanied by the advantages of relieved pressure, but the resumption of longwall at this stage brings on the working all the disadvantages associated with that practice. In other words, the disadvantages of pressure accompany the mining, and throw away the actual advantages presumed to be gained.

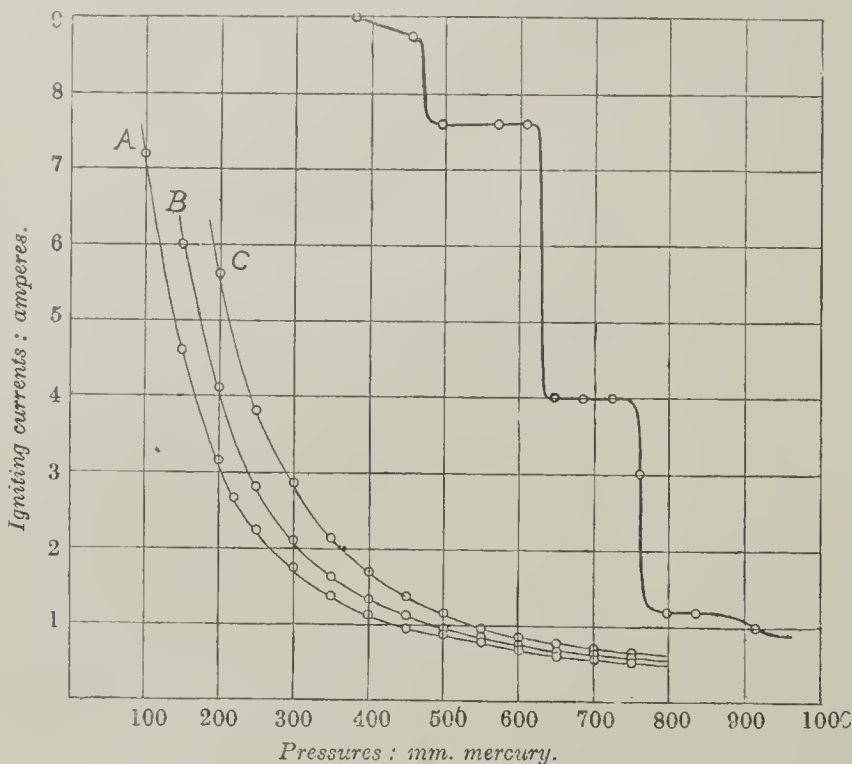
The scheme detailed by the writer aims at retaining the advantages of relieved pressure. Exploring headings are carried ahead and at right angles to the main lines of development, so laying out the whole coal field into parallelograms determined in size by the power to ventilate and by the geological features disclosed. The speed of development by this method is easily 400 to 500 yds. per year in moderate ground, and but a few years are required to open up the necessary territory and to disclose the geological characteristics of the coal field, as also to provide the openings which will give continuity of operation and the necessary possibilities of economic output, also the power of approaching and working the most distant coal conjointly with territory adjacent to the shaft.

On the outward journey the subsidence ranges from 20 to 25 per cent. of that obtained in longwall. The making of slope roads is avoided, and the haulages, instead of continually lagging behind, are brought alongside and into touch with the working face, in many cases preceding necessity. The partial absence of movement at the face conduces to freer and more accessible conditions of labour, and adds enormously to the general safety: this has been evidenced by accidents having decreased by 75 per cent. Little or no second ripping of roadways is necessary. The labour formerly employed in making and maintaining roads and airways, with its continual burden of expense, falls, interruption, etc., has largely decreased. In the years in which the author's colliery has been working longwall in one seam, the repairers were required to maintain 7,000 yds. of roadways, representing a figure, say, of 6, and now with 26,000 yds., the figure is 2.4. The timber and girders in the longwall exhausted area for the corresponding period may be represented by 3, and now, with four times the length of roadway, it is almost zero, on the same basis, and, further, while the roadways have increased by only four times, the length of haulages has been extended six times.

Stoop and Room Work.

The scheme is simply stoop and room by machines in thin coal seams, and so laid out that one can retreat with machines and conveyors if desired. It is repetition work, and makes for standardisation of method and plant. It makes for a recurring cycle of operations in coal cutting, conveying, and hauling; and the labour, instead of being directed towards unproductive work, and dissipated or placed by emergency all over the coal field, alleviating difficulties which the method advanced has almost entirely obviated, is employed towards the production of coal.

* From a paper read before the Mining Institute of Scotland.



air, ignited at different pressures by the impulsive electrical discharge, is shown in the drawing (the curve on the right-hand side of the diagram). The "igniting currents" recorded are those currents passing through the primary circuit of an induction coil which, when broken, gave secondary discharges just capable of igniting the mixture.

The author's own results are shown in the curves on the left. The mixture of methane and air contained 9.51 per cent. of methane (by analysis) in the case of curves A and B, and 9.52 per cent. in the case of curve C. A different explosion vessel was used for each curve, the spark gaps of which differed slightly one from another, but were approximately 1 mm. in each case. Each curve is hyperbolic, and there is no sign of discontinuity. It would seem, therefore, that the production of "stepped ignition," as recorded by Thornton, requires some condition of experiment which the author was unable to reproduce or had excluded.

The experiments were conducted in an explosion vessel, consisting of a globe of stout glass of about 75 c.c. capacity, with fixed electrodes of stout platinum wire fused in, so as to reach to the centre of the vessel, and covered with glass to within 1 mm. of their ends, which were sharpened to fine points. A three-way tap served to make connection with (1) a gas-holder and mercury manometer, and (2) a vacuum pump. In the arrangement used for ensuring an unvarying rate of break of the primary circuit, the circuit was completed when a rod touched a flat steel spring, remained established while a turntable revolved, and was suddenly broken as soon as the rod slipped at the end of the spring. The turntable was driven by an electric motor geared down to a slow speed, so that a break of circuit in the primary of the induction coil occurred every two seconds. A condenser of 0.25 microfarad was placed across the break to minimise sparking at the contacts. The coil used was an "8-inch" X-ray coil. Current was obtained from a battery of accumulators at 30 volts, and was measured (regulation being made by a sliding rheostat) with "Weston" ammeters. The gas mixtures were stored over glycerol and water in glass gas-holders, and were analysed before use. The same supply (containing 9.51 per cent. of methane) was used for the experiments recorded in curves A and B; the supply used for curve C contained 9.52 per cent. of methane. The gas was prepared by purifying and liquefying fire-damp, obtained, compressed in cylinders, from a coal mine in South Wales, and contained 99.8 per cent. of methane (C/A on explosion analysis 200). Three different explosion vessels were used, one for each curve, the spark gap in each case being about 1 mm.

The method of experiment was that of trial and error. The explosion vessel was thoroughly exhausted of air, and some of the gas mixture admitted until the pressure as read on the mercury manometer was that required. An arbitrary current was established in the primary circuit of the induction coil, and 10 secondary discharges passed at the spark gap by setting the revolving contact in motion. If ignition did not take place before 10 discharges had passed, the explosion vessel was exhausted, a fresh charge of gas mixture introduced, and a lower current tried; and so on, until ignition took place. The pressure was then fixed at each pressure within 1 mm. of the required figure, and the igniting current was checked three or four times to ensure accuracy. At pressures above that figure, no ignition was observed. At pressures below that figure, it was difficult to decide by the manometer whether ignition took place or not, the discharge masking that of the ignited

Legislative changes and labour organisation have tended so largely to increase the ratio of officials and oncost workers to producers that, to restore anything like the former balance of cost, instead of mining with single output units, co-ordination is required in such a way that two or more are producing to a common centre, dealt with by one administrative unit. In the retreating journey this is secured, and distant straggling sections are eliminated.

Transport is easily established when and where desired, and even ahead of requirements. Without reverting to longwall, owing to the amount of coal reserved in proved areas, the output is limited solely by the power factor, the labour factor, or what may be desired. Areas and distances are largely neutralised by the increased accessibility, and, moreover, ventilation is simplified.

With longwall, the pressure resulting from complete exhaustion accompanies the working, but by the system outlined complete exhaustion is delayed until the predetermined point for withdrawal is reached. At this point and during the exhaustion of the panels or pillars, one is naturally subjected to longwall conditions, but this, as proved by working, lasts only during the short period of, and over the limited area subject to, exhaustion; and, further, one retreats from the pressure.

The writer's experience on several occasions has been that where extensive developments have been effected towards an objective on the semi-longwall method, and then on reaching same opened out extensive longwall, he has forthwith stepped into the burdens associated with that system. On again reverting to the system as outlined, freedom of movement and continuity of operation have been restored.

When dealing with seams 3 ft. thick, very often good comparative results are obtained by hand, but in seams 2 ft. to 2 ft. 6 in. in thickness machines invariably give the better developing results in output and cost.

Mechanical Transport.

Recently a great deal has been heard of the desirability for a wider application of mechanical transport up to the working face, but the complete attainment of this is continually menaced, as this zone is invariably subject to movement and pressure, and it is only by working towards the elimination of the disturbing factors that the highest attainment is possible. At a depth of some 200 fms. the system can be applied with impunity. Accredited authorities are repeatedly calling for a wider application of mechanical means in general to mining. The writer agrees with them, and claims that the system outlined lends itself to the attainment of this. In speaking of transport, what is meant is the carrying of coal from the workings; the dirt being left behind, and not such developments as the application of aerial ropeways for the removal of refuse and depositing it in miniature mountains around the colliery. He has had under consideration

HOUSEHOLD COAL DISTRIBUTION ORDER, 1917.

The Household Coal Distribution Order, which has just been issued, is a document of very great importance, although for the present it is only to be applied to the London area. An explanatory memorandum sets forth that the Order does not extend to coal used for industrial purposes, such as the production of gas or the generation of electricity or the raising of steam, except where such industrial purposes are subsidiary to the use of coal for household or domestic purposes, as may be the case with large hotels, blocks of residential flats, theatres, churches and chapels, clubs, meeting rooms, baths, public buildings and institutions, &c., to all of which the Order extends. Briefly, the main features of the scheme are as follow:—No cards or tickets are required. The work of distribution is to be left to the retailer. In case of a coal shortage local authorities are to control the detailed operation of the scheme. Coal supplies for dwelling-houses, flats, greenhouses, garages, outbuildings, &c., are to be limited after October 1. Coke or anthracite may be substituted for coal. No more than a year's supply may be stored. Instructions as to prices are to be issued immediately.

The principles underlying the Order are three:—

(a) That the routine or machinery of the scheme, as far as regards the consumer, shall be of the simplest character, and follow as closely as possible the ordinary routine or machinery of sale and purchase. No cards or tickets are required for the purchase of coal, the procedure being by requisition, subject to check and approval, to be placed with any coal merchant, and to be followed up by orders thereunder in usual course, extending over a whole year, and capable of being renewed from year to year.

(b) That the execution of the scheme shall be left in the hands of the coal merchants and retailers, so as to occasion as little disturbance as possible to the ordinary channels of trade.

(c) That to safeguard the interests of the whole body of consumers if there should be a shortage the control of the detailed operation of the scheme so far as regards the consumer shall be vested in the local authorities acting through a specific representative, subject to the approval and inspection of the Controller of Coal Mines or his representatives.

The essential basis of the scheme comprises the establishment of minimum stocks of coal to be held in reserve and maintained throughout the winter by coal merchants, or, in default, by the local authorities.

In the section of the Order dealing with coal allowances to consumers, it is stated:—

Subject to the provisions of this Order, no person shall, after October 1 next, sell, deliver, purchase, or acquire for consumption in a dwelling-house, or part thereof, or flat or tenement, including any greenhouses, garage, outbuildings, or other premises attached thereto, or used in connection therewith, coal exceeding the quantities allowed in the following table:—

From October 1 to March 31.			From April 1 to September 30.			Whole year.		
No. of rooms.	T. c. q.		T. c. q.			T. c. q.		
1, 2, 3 or 4	0 2 0	per week	2 12 0			3 18 0		
5 or 6	0 3 0	"	3 18 0			5 17 0		
7	1 0 0	"	6 0 0			9 0 0		
8	1 3 0	"	6 18 0			10 7 0		
9 or 10	1 7 0	per calendar month.	8 2 0		per six months.	12 3 0		per annum.
11 or 12	1 10 0		9 0 0			13 10 0		
13, 14 or 15	2 0 0		12 0 0			18 0 0		
over 15	2 10 0		15 0 0			22 10 0		

a few years ago this means of depositing refuse on the surface, but the change of system has obviated the necessity, the dirt having decreased by over 80 per cent. since the inauguration of the scheme.

The scheme is not put forward as embodying great originality, but it is claimed that, by applying the mechanical facilities now available and in this manner, a fresh aspect of intensive mining in thin seams has been evolved.

In the writer's view, the scope and adaptability of the system are not limited to the seams at present being treated, but can be applied to seams of much greater depth and thickness, and as his experience embraces work at much greater depths than those referred to, he has no doubt of the successful result of a modified application of the system. The change was not inaugurated for novelty, but from necessity. The scheme is no longer experimental, large areas having been developed and being under way at various depths, and the results so far attained as regards uniformity of working and consistency in output runs in parallel with better and safer labour conditions.

Imports of Pit Props.—In July, 83,947 loads of pit props, of the value of £334,330, were imported into the United Kingdom. The imports in July last year were 220,713 loads, value £846,781, and in July of the preceding year 197,736 loads, value £372,261.

Russian Coal Production in 1916.—The Russian Chamber of Commerce in Paris has published the following figures for the output of mineral fuel in the Donetz basin in 1916, showing a slight increase over the previous year:—

	1915.	1916.
	Tons.	Tons.
Coal	21,591,250	22,524,600
Anthracite	5,084,650	6,212,300
Coke	4,178,700	4,418,650

The deliveries for the corresponding periods amounted to:—

	1915.	1916.
	Tons.	Tons.
Coal	12,927,000	14,352,500
Anthracite	3,974,700	5,172,100
Coke	2,248,300	2,441,300

19,150,000 ... 21,965,900

By rooms are meant kitchens, living rooms and bedrooms, and these only when they are furnished and in actual occupation. The following cannot be counted as rooms: Sculleries not containing a copper heated with coal or a fireplace, bath-rooms, halls, passages, landings, box-rooms, cellars, pantries, storerooms and outbuildings; nor can allowances be made in ordinary course in respect of greenhouses, garages, stables or coachhouses. Allowances cannot be made in respect of any period during which a house is shut up or unoccupied.

Certain additional allowances may be obtained to meet hardships occasioned by various causes set out in the Order, but in view of the liberal character of the ordinary allowances claims for such additional allowances will be very critically considered.

When coke is consumed, substitution may be made in the table in the proportion of 4 cwt. of coke for 3 cwt. of other coal, but not so as to increase the total allowance by more than 6 cwt. in any one month, and where anthracite is consumed anthracite shall be substituted for coal in the table in the proportion of 2 cwt. of anthracite for 3 cwt. of other coal. Separate quantities shall be allowed in respect of each separate household. The Order requires that an ordinary consumer of coal must not deal with more than one coal merchant, except for the purpose of coke from a gas company. Also that the consumer must not store more coal at any time that will last him a year if he burns no more than his allowance.

A consumer requiring no more than 2 cwt. of coal or 3 cwt. of coke in a week can purchase these quantities weekly without any formality. A householder requiring no more than the weekly or monthly allowance as set out in the scale given has only to fill up a requisition form to be obtained of his coal merchant and then leave it with the latter when filled up. Only consumers requiring special allowances of coal or calling for special assessments will be troubled with enquiries, and may experience delay in obtaining the necessary certificates for their supplies.

The important question of the prices to be charged for coal and for various services usually rendered in connection with coal supplies, it is notified, will be the subject of a separate instruction to be issued almost immediately. The position of the consumer will be safeguarded in this respect by the direct action of the Controller. Local authorities are requested to appoint,

in so far as they may find it convenient, a local surveyor or one of his principal assistants to act as the local coal overseer. The local authority is not required to establish stocks of coal for retail to small consumers, except where there has been a failure on the part of the registered coal merchants to provide such stocks. The provisions of the Order relating to restricted deliveries may be relaxed by the Controller at any time that the situation is thought not to demand them. There is no intention to unduly restrict the volume of trade except in so far as the national interest requires it. The aim of the Order is to secure an equitable distribution of coal to all consumers whatever may be the position of the stocks available. The maximum penalty which may be inflicted for an offence against any regulations made under the Defence of the Realm Consolidation Act, 1914, may be imprisonment with or without hard labour for a term of six months, or a fine of £100, or both such imprisonment and fine. The Order comes into force on October 1 next.

SOUTH WALES MINING TIMBER TRADE.

For the week ending August 10 the imports of foreign mining timber into South Wales and Monmouthshire were upon a good scale, amounting to 14,337 loads, of which the agents supplying the Admiralty collieries received 9,326 loads. The actual quantities received by consignees were as follow:—

Cardiff (Barry and Penarth):—

Date.	Importer.	Loads.
Aug. 4	W. H. Williams	330
" 7	Lysberg Limited	2,041
" 7	Lysberg Limited	780
" 7	Lysberg Limited	840
" 8	Budd and Company	134
" 10	T. P. Thomas and Company	1,920
" 10	Lysberg Limited	840
" 10	W. Harry and Company	700
" 10	Grant Hayward	96
" 10	Grant Hayward	150
" 10	Morgan and Cadogan	156
" 10	Morgan and Cadogan	156
" 10	Lysberg Limited	2,880
" 10	Lysberg Limited	1,320

Total.....12,343

Pitprops:—

Aug. 10	Montague Meyer	991
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Swansea:—

Aug. 7	Unenumerated	162
" 8	"	256

Total..... 418

Port Talbot:—

Aug. 8	Lysberg Limited	625
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Three cargoes were imported from Portugal, but the most interesting shipment was a cargo of pitprops from Archangel to Cardiff amounting to 991 loads. No cargoes have been received from Russia for a very long time past. The question of towing huge rafts of wood from the French Bay ports has been discussed here, but opinions were very divided upon the feasibility of such a scheme. The idea emanated from Scandinavia, but the Government authorities view the project with disfavour. In summer, the scheme might be possible with a strong tug and a patent tow rope which will pay out automatically with the dip of the sea. For timber for ordinary purposes this might suit, but as for pitwood, collieries would rigorously shun sodden wood. Market quotations were rather easily inclined, and although 60s. to 62s. 6d., ex ship Cardiff or Newport, was quoted in places, sellers put forward 58s. in order to secure a quick clearance. At such a figure there is little remuneration left for collieries.

Spanish Timber.

There are thousands of tons of mining timber awaiting shipment at Spanish ports, for which steamers cannot be found, and thus the trade has been at a standstill this year. Meanwhile, many thousands of pounds worth of timber are reported to be lying on Spanish quays and rapidly deteriorating.

Home-Grown Timber Difficulties.

There have been loud complaints against the extreme difficulty of obtaining petrol licences for those who some time ago endeavoured to solve the problem of transporting wood by the utilisation of motor lorries. Applications made to one Government department are referred to another department, and while there is evidence of plenty of joy-riding, there is a lack of petrol for work of prime national importance. The heavy rains of the past week have stopped a large amount of work in the plantations. The condition of some of the roads is deplorable, for many highways were never constructed for continuous and heavy traffic. There is no doubt that road damage claims by the authorities will be particularly heavy this winter.

Zirconia as a Lining for Open Hearth Furnaces.—Zirconia has proved to be a satisfactory lining for open hearth furnaces. High-temperature experiments carried out in Germany during four months produced excellent results, and it was estimated that the linings would last another four months without any need of renewal. Favourable opinions have also been expressed on the use of zirconia in connection with electric furnaces.

Russia and Spitzbergen Coal.—Since the construction of the Baltic-White Sea Canal, which has enabled Spitzbergen coal to be delivered direct into Petrograd via the White Sea, and thus supply the capital with the fuel previously imported, a movement is on foot to obtain coal concessions on the island, or buy mines already at work, and work them energetically, in order to accumulate large stocks by the end of the war.

Coal Prices in Russia.—The rates for coal on the Kharkoff Exchange in June were:—Yousovka district: Through-and-through boiler coal, 33½ cpk.; smithy coals, 36 cpk. Mouchketovo: Through-and-through boiler coal, 33½ cpk.; smithy coals, 36 cpk.; screened, washed, 3 mm. and over, 36 cpk.; washed smithy nuts, 42½ cpk. Central: Through boiler coal, 31½ cpk.; same prices ruled in Mouchketovo. Almaznaia: Through boiler coal, 33½ cpk.; screened, washed, 3 mm. and over, 34½ cpk.; washed smithy nuts, 42½ cpk. Mariinsk: Through-and-through boiler coal, 32 cpk.; flaming coal, 34½ cpk. Lissitchansk: House coal, 40½ cpk. Coke Metallurgical, 47 to 50 cpk.; foundry, 52 to 55 cpk. Anthracite, uniform prices, large, 41 to 43 cpk.; nuts, 30 to 32 cpk.

CONTENTS.

ARTICLES:—	PAGE
Coal Supply for London	307
Coal Bill	307
Shipping	299
Coal Supplies	301
Ash Analyses of South African Coals	301
A New Method of Coal Analysis	302
Excess Mineral Rights Duty: Relief under the New Act	304
Intensive Mining in Thin Seams	304
Household Coal Distribution Order, 1917	305
South Wales Mining Timber Trade	305
Miners and Recruiting	308
Mining Industry and Military Service	312
Coke Oven By-products in 1916	312
Book Notices	314
Obituary	315
Labour and Wages	316
Open Contracts	318
The Freight Market	318
Abstracts of Patent Specifications Recently Accepted	318
Government Publications	320
New Patents Connected with the Coal and Iron Trades	320
Publications Received	320
REPORTS OF MEETINGS:—	
Mining Institute of Scotland	303
THE COAL AND IRON TRADES	303-312
The Tin-plate Trade	308
The London Coal Trade	311
The By-Products Trade	312
CURRENT SCIENCE AND TECHNOLOGY	304
PARLIAMENTARY INTELLIGENCE	311
NOTES FROM THE COAL FIELDS	314
COAL, IRON AND ENGINEERING COMPANIES	316
MISCELLANEA:—	
Russian State Coal Monopoly	301
Imports and Exports of Coal Products	302
Hong Kong Coal Imports	303
Imports of Pit Props—Russian Coal Production in 1916—Zirconia as a Lining for Open Hearth Furnaces—Russia and Spitzbergen Coal—Coal Prices in Russia	305
Coal Output of the Loire Basin—Alexandria Coal Trade—New Coal Wharf for Rouen	310
Sulphate of Ammonia—Pekin Syndicate: Coal Output Satisfactory	312
Certifying Surgeon Appointed—Exports and Imports of Mining Machinery	315
Jersey's Winter Coal—Spanish Coal Syndicate	316
Kharkoff Coal: Reduced Output	318

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No objectional fumes or effluent in the above manufacture.
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Brattice Cloth. — Gentleman Wanted
with influence amongst colliery managers and proprietors, to sell
BRATTICE CLOTH on good commission only.—Address,
FAIRCLOUGH & SONS, Bank-lane, Clayton, near Manchester.

At Liberty for Engagement. An experienced COLLIERY MANAGER: especially accustomed to difficult mines; all systems of work, haulage and other details; output raiser and cost reducer. Over military age.—Fair offers to Box 6790, Colliery Guardian Office, 30 & 31, Furnival-street, Holborn, London, E.C. 4.

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SEEKS POSITION. Experienced home and abroad, thick and thin seams, and coal-cutting. Certified surveyor. Good mechanical and electrical knowledge. Excellent references.—Box 6805, Colliery Guardian Office, 30 & 31, Furnival-street, Holborn, London, E.C. 4.

First-class experienced Colliery Manager
(M.E. and E.E.) DESIRES RE-ENGAGEMENT; 25 years' wide experience, and testimonials with leading collieries; experienced in new developments, coal-cutting, heavy outputs, and extensive haulage systems.—Apply, **W. H. HAGUE, Park Field, Catherine-street, Elland, Yorks.**

The Cwmaman Coal Company Ltd. have
a vacancy for the POSITION of Certificated RESIDENT AGENT at their collieries.—Applications to be made to the SECRETARY, **CWMAMAN COAL CO. LTD.,** Bute Docks, Cardiff, stating salary required, and giving full particulars of experience, with references and copies of testimonials.

Wanted, two Draughtsmen with colliery
plant experience, ineligible for military service and not engaged on Government work.—Apply, stating age, qualifications and salary required, to **THE ROTHER VALE COLLIERIES LTD.,** Treeton, nr. Rotherham.

Wanted, Miners accustomed to Rock
Drills, to drive an incline tunnel by the yard, or would contract out the job.—Apply, **CWM-YSTWYTH MINES LTD.,** Cwm-Ystwyth, Devils Bridge, Cardiganshire.

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TO COAL MERCHANTS AND OTHERS.

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supply of COAL to their Electricity Supply Station.
Particulars may be obtained upon application to the Borough Electrical Engineer.

Sealed tenders, endorsed "Tender for Coal, Electricity Works," should be sent to the Town Clerk.

No pledge is given to accept any tender.

Town Clerk's Office:

Municipal Office, Southampton.

14th August, 1917.

R. R. LINTHORNE,

Town Clerk.

Wanted, pair of Winding Engines, 42 in.
cylinders.—Apply Box 6810, Colliery Guardian Office, 30 & 31, Furnival-street, Holborn, London, E.C. 4.

For Sale, Second-hand Pumps:—

Vertical 3 throw, 7½ in. gunmetal plunger, engine-driven, 10,000 gals., by Hayward Tyler.
Horizontal Compound Duplex, cyls. 10 in. and 16 in. dia. by 8 in. g.m. plungers, 200 lb. pressure.

Hor. Tangye, 21 in. by 12 in. by 36 in. stroke.

Vert. Pearn, double ram, 7 in. plungers.

Ditto ditto 4 in. plungers.

2 Vert. Belt driven, geared, 6 in. g.m. plungers.

10 in. Gwynnes Centrifugal, engine-driven.

Steam FIRE PUMP, Shand Mason, three 8½ in. cyls., g.m. pump 8 in., buckets, and 5 in. plungers.

Others, all sizes, in stock.

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Following sizes happen to be in stock:—

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Wanted, Three-throw Pump, suitable
for motor drive, 30-g.m.p., 600/1 000-ft. head.

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Three Evans Cornish Steam Pumps for
Sale, capacity 7,340 gallons per hour, steam 12 in., bucket 6 in., length of stroke 24 in. On view—
TURNOAK COLLIERY, Boythorpe, Chesterfield.

Wanted, a pair of Winding Engines,
second-hand, 10 in. cyls. or thereabouts, 5 ft. drum, or nearest, with link-reversing motion, direct acting, complete with indicator dial.—Box 6813, Colliery Guardian Office, 30 & 31, Furnival-street, Holborn, London, E.C. 4.

Girders, 2 for Sale, each about 59 ft.
long over-all 26 ft. 6 in. (with web about 4 ft. 8 in. deep), 32 ft. 6 in. (with web about 4 ft. 8 in., tapering to about 2 ft. 6 in.), flange 15 in.; suitable for cantilever crane, etc., etc.—Write, Box 6812, Colliery Guardian Office, 30 & 31, Furnival-street, Holborn, London, E.C. 4.

For Sale, Lancashire Boiler, 34 ft. by 8 ft. dia., 100 lb. press.; CORNISH BOILER, 26 ft. by 6 ft. dia., 110 lb. press., with fittings; now fixed; immediate delivery.—Address, Box F 750, c/o DAWSON'S, 121, Cannon-street, E.C. 4.

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4-ton Road Weighbridge, platform 12 ft.
by 6 ft. 6 in. Made by Messrs. Watson, of Gateshead. Can be inspected Elswick Gas Works, Newcastle.—Offers to **NEWCASTLE & GATESHEAD GAS CO.,** 35, Grainger-street West, Newcastle-upon-Tyne.

Wanted, Second-hand Electric Gene-
RATING PLANT, 100-kw., 3-phase or continuous current, 500 volts, steam pressure 50 lb. on engine.—Address, Box 6814, Colliery Guardian Office, 30 & 31, Furnival-street, Holborn, London, E.C. 4.

For Sale, Winding Engines, pair 10 in.
cyls., 18 in. stroke, with two drums 4 ft. 6 in., by Holman.
A. UNDERWOOD, 3, Queen-street, E.C.

For Sale, Capstan Winch, pair 7 in. cyls.,
2 drums, by Joseph Evans.
A. UNDERWOOD, 3, Queen-street, E.C.

For Sale. — Cornish Boiler, 22 by 6,
90 lb. steam.
CORNISH BOILER, 24 by 5 ft. 6 in., 100 lb. steam.
CORNISH BOILER, 16 by 6, 100 lb. steam.
ECONOMIC BOILER, 14 by 9, 100 lb. steam.
LANCASHIRE BOILER, 24 by 7, for 120 lb. steam, no cross tubes, by Adams.
LOCOTYPE, 30-h.p., by Robey, 100 lb. steam.
All immediate delivery.
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* * For other Miscellaneous Advertisements see Last White Page.

The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc. M.I.M.E.

(At present on Active Service)

LONDON, FRIDAY, AUGUST 17, 1917.

The supplies coming forward into the London market are showing an appreciable increase since the holidays, and more particularly in the seaborne department. All kinds of house coals are in strong demand, and strenuous efforts are being made on all sides to overtake the public orders. Hard steam coal and kitchen cobbles are very scarce. Slacks are more plentiful, and cokes are selling freely.

The late improvement noted in Northumberland last week has not continued; shipping facilities fell away sharply, and the amount of export business being done is small. Coke is in good request at steady prices, but the bunker market is flat. Allied and official demands continue at Humber ports, and

neutral orders owing to various causes are not prominent.

There is no change in conditions in Lancashire, Yorkshire and Midland markets; great pressure continues upon every colliery for the delivery of every class of coal.

A decided change for the better is to be noted in South Wales, and a further improvement is looked for in the near future. Anthracite continues a brisk market, and machine-made sizes are scarce at the moment.

The Scotch coal trade continues in an unsatisfactory state, and prospects are not encouraging. Employment at the mines is irregular; local demands are quickly satisfied, and shipping orders are scarce.

In Ireland demand remains good; at Dublin stocks of Welsh steam coal have run out in some instances, while at Belfast stocks of best coal are very small, although there are fairly good supplies of Scotch steam sorts.

The outward freight market is still suffering from lack of tonnage, and chartering on the north-east coast has been wholly confined to coasting and near French ports. South Wales business also is restricted to near ports; although very high rates are available for long-distance voyages, ship owners at present are preferring a quick turn round.

Winter Coal Supply for London. THE Coal Controller has published an Order for the distribution of coal in London and the surrounding district during the forthcoming winter season and beyond—that is to say, so long as it may be deemed necessary to regulate the supply of house coal within this area. The Order does not apply to industrial coal, except so far as the industry in question is carried on in a dwelling house or a building connected with it. The Controller has wisely kept in view certain fundamental principles which include the maintenance, as far as possible, of the existing machinery of distribution. The execution of the scheme is left largely in the hands of the coal merchants and retailers; but in the event of any shortage involving a difficulty in maintaining the supply, the interests of consumers will be placed in the hands of the local authorities acting through specific representatives called "local coal overseers," who will probably in most cases be the existing surveyors. The number of these officials is not definitely fixed, and where convenient two or more local authorities may combine for the purpose of appointing an overseer in common. The only new machinery created, in addition to certain "coal merchants' supervisors," will be these local coal overseers, each of whom will be furnished with an office, and, it is presumed, the necessary staff for conducting business. The whole organisation will be under the general supervision of the Coal Controller, to whom there will be a right of appeal in certain contingencies. The local authorities are used mainly for the purpose of defining the separate districts, and localising the chief centres of distribution; but in the last resort they will become responsible for the maintenance of stocks.

The scheme, under the most favourable circumstances, will involve no great disturbance of the ordinary channels of trade. The limitations imposed by the Order are merely those which are deemed essential for the maintenance of the necessary stocks of coal. For it is obvious that the best schemes of distribution that can be devised will break down in the event of there being no coal to distribute. The difficulties experienced last winter arose mainly from the unusual prolongation of the cold weather, combined with the shortage of labour at the disposal of the coal merchants. Stocks were unequally distributed, so that while there was enough coal in certain areas, the reserves were not always where they were most needed.

The stocks to be held in reserve at the depots by the coal merchants, or in default by the local authorities, are to be not less than two full weeks' demand by October 1, and five full weeks' demand by November 1. The coal merchants will be required to take steps forthwith to secure these minimum stocks, from which they will be permitted to draw supplies so long as the stock does not fall below four full weeks' output in sales and deliveries, in which event automatic restrictions come into play, mainly at the expense of the larger consumers, *i.e.*, those requiring more than one ton per month, whose

demands will be at once cut down by one-half. The small consumer, taking supplies not exceeding 2 cwt. per week, will have priority in distribution in the case of shortage. Should the available stocks shrink to within two full weeks' demand, all consumers will be temporarily reduced to a common level and will be supplied only with 2 cwt. per week. Coke is placed upon a similar footing to coal, except that 3 cwt. of coke are taken as equivalent to 2 cwt. of coal. This, however, is not all. Strict economy of consumption is to be enforced by means of a system of allowances for each household, based upon the number of occupied rooms. The Controller will also issue shortly a leaflet of advice on the economical consumption of coal, and the consumer is enjoined to give every assistance in checking extravagance in the use of fuel.

The scale of allowances, which will be found elsewhere in this issue, is undoubtedly liberal enough for ordinary requirements, but additional allowances may be granted under certain specified circumstances, such as the requirements of infirm persons or young children, the occupation of separate rooms by lodgers, the conduct of business in a dwelling house, the absence of any provision for heating or cooking by gas or electricity, or temporary cases of illness.

A necessary part of the scheme involves the registration of coal merchants and the licensing of coal retailers. This step is designed not only to prevent consumers from duplicating their orders, but also for the purpose of controlling prices, which will be fixed by the Coal Controller.

A few words are necessary with regard to the relationship between the local coal overseers and the coal merchants' supervisors. As far as can be judged, the former will act mainly in the interest of the consumer, while the latter will deal chiefly with the coal merchants. The local coal overseers will not interfere in any way with the coal merchants, and any representations they may desire to make to the latter can only be made through the coal merchants' supervisors. The latter will be responsible for reporting to the Coal Controller upon the adequacy or otherwise of the arrangements of the coal merchants for storing and delivering coal; and it will be their duty also to take steps for the supply of coal to the depots. The overseers, on the other hand, in addition to the maintenance of supplies within their districts, including any reserve stocks held by the local authorities, will be charged with the duty of seeing that proper provision is made for the supply of coal to the licensed retailers, as well as to blocks of tenement dwellings and coal clubs. They will also deal in the first instance with all complaints, either of consumers or licensed retailers.

Although there may appear to be a certain amount of overlap in the functions of these two offices, they are required to act together in all matters concerning their districts, and in the event of any dispute between them the Coal Controller is to be the final adjudicator. It is probable that the creation of these two distinct intermediaries was deemed to be necessary, owing to the possibility of a conflict of interest between the merchants and retailers in the event of a shortage of supplies.

From the consumers' point of view the procedure is as simple as could be devised. The smaller consumers purchasing weekly supplies are not required to comply with any formality whatever; but householders taking more than 2 cwt. per week will have to fill up a simple requisition form and hand it to their selected coal merchant. They can then order their legitimate quantity of coal as required by giving their orders in writing. It is only in the case of special allowances being wanted that a certificate must be procured. So far as the consumers are concerned no further steps are needed. The main work of the scheme will devolve upon the overseers and supervisors, who will have to see that the coal is available for distribution. Although it is essentially a rationing scheme, the allowances are made more with a view to regulating distribution than to curtailing essential requirements.

In the meantime there is a widespread dissatisfaction amongst consumers owing to the delay in executing orders which have already been given in accordance with the recommendation of the Board of Trade. Some of these orders, given as long ago as two months, have not yet been executed, and the public is beginning to realise that the most perfect system of distribution will be unavailing if supplies are not at hand. In connection with this matter, also,

it is not clear as to what the term "coal depot" used in the Order really includes; and, consequently, what is the meaning of a five weeks' stock. Does this mean the pooled stocks of individual merchants? If so, the scheme may not prove so simple as it looks.

The Education Bill.

MR. FISHER'S statement in the House of Commons on Friday last, on the occasion of the introduction of his Education Bill, stands out as one of the most important features of the present Session. As a national question, the better education of our young occupies the very first place in any scheme of reconstruction that the ravages of war have rendered necessary; but the chief merit of the new Bill lies in the care which has been taken to steer clear of those controversial matters which have done so much to retard true educational progress in this country. The Bill is framed with the view of making a real advance in national education with the least possible interference with existing machinery. The denominational issue, upon which former attempts at educational reform have been either wrecked or emasculated, is not even raised. The settlement effected by Mr. BALFOUR'S efforts, and embodied in the Act of 1902, will continue to form the basis of the administrative groundwork of the new scheme. But Mr. FISHER hopes that whatever modifications his Bill may make in the existing Act will be found only to increase its efficiency without impairing its fundamental principles. He points out that in the course of the past three years some 600,000 children have been withdrawn prematurely from the schools and are working on munitions, in the fields and in the mines. The case of these children demands special consideration at the present time.

The time is not yet ripe for the full consideration of the details of the new Bill, and we propose, therefore, only to consider at present its main provisions so far as they touch the industrial life of the country. It is proposed to extend the elementary school life of the children to the age of 14 untrammelled with industrial work, and hence to abolish the half-time system which still flourishes, mainly in Lancashire and Yorkshire, to the detriment of the healthy development both of the mind and body of the children. There will also be a strict limitation to the employment of children outside the school hours, which has been proved to be responsible for many cases of impaired health and physical growth. Under the provisions of the Bill no child between 12 and 14 may be employed except between 6 a.m. and 8 p.m. on Saturdays, and during school holidays. The most striking provision of the Bill, however, is that which demands compulsory attendance at a continuation school up to the age of 18 for a period equivalent to eight hours a week for 40 weeks in each year. Exceptions will be made in the case of those who have received suitable full time instruction up to the age of 16, or who pass an examination equivalent to the matriculation standard. The continuation school must also be a day school, and the attendance must be taken out of the employer's time. A plain hint is also thrown out that the hours to be devoted to continuation schools will probably need to be extended in the future, the limit of 320 hours a year now suggested being considered insufficient upon purely educational grounds, and imposed in the first instance as being as much as would be practicable without too great a disturbance of the juvenile labour market. Mr. FISHER'S contention is that young people should primarily be regarded as subjects for education and not as parts of the industrial machine.

From the standpoint of the coal mining industry, Mr. FISHER'S Education Bill will materially affect the boy-labour question. The history of legislation upon this subject is interesting. Previous to 1842 there were practically no restrictions either as to age or sex in the employment of children in mines. An Act was then passed prohibiting the employment underground of all females, and of males under 10 years of age. It had been intended to fix the limit at 13, but this had to be modified during the passage of the Bill. In 1860 further restrictions on boy labour were imposed, and no boy under 14 was allowed to be employed unless he possessed a school certificate, in which case the original limit of 10 was permissible. At the same time, the minimum age of persons to be entrusted with the care of steam engines was raised from 15 to 18. In the Coal

export position uncertain owing to tonnage difficulties, the market remains firm. Middlesbrough G.M.B. for export to the Allies is 102s. 6d., No. 15s. extra. Hamatite mixed numbers nominally 137s. 6d. f.o.b. for France, 142s. 6d. for Italy, net cash, these prices being retrospective in the event of readjustment as anticipated. Home rates as fixed by the Government. Stocks in Connal's stores here remain the same as reported last week—viz., 1,137 tons of No. 3. In Scotland there are 756 tons. Finished iron and steel prices are:—Steel ship plates, £11 10s.; iron ship plates, £15 10s.; steel ship angles, £11 2s. 6d. net cash f.o.t.; iron angles and crown bars, £13 15s. net delivered for home consumption.

The coal market is in a depressed condition owing to the increased scarcity of tonnage. Best Northumberland steams, nominally, Blyth are 30s., Tyne primes 29s. 6d., best Blyth smalls 20s., Tyne prime smalls 20s. 6d., Durham unscreened bunkers, ordinary, 24s. f.o.b. Tyne. Blastfurnace coke, medium kinds, is 30s. 6d. per ton, with low phosphorus qualities up to 33s. per ton, delivered Tees-side works, upon Government basis for controlled consumers.

Cumberland.

Maryport.

COAL.

The coal trade in this district is much brisker this week, the demand for fuel is growing stronger, and all branches are beginning to show signs of expansion. The home market is firmer, landsale is picking up, and the outlook all round is now more hopeful than it has been for some time. As far as landsale is concerned, the past season has probably been the quietest period experienced for many years. During June and July more coal was being raised than could be dealt with. Since the beginning of the month, however, there has been a marked improvement on all accounts. The demand for fuel for both shipping and home consumption is much keener, orders are coming in more freely, and at the moment the collieries have as much business on hand as they can comfortably cope with. Engine fuels are very steady, gas coal is firm, manufacturing fuel for local use is in very strong request. All the collieries are in full swing again, but production is not yet as large as it was before the holidays. The export trade is very active, and in spite of the restrictions at the ports and the scarcity of tonnage, the shipments to Ireland are still fairly satisfactory. Business on Irish account is very firm, but the amount of fuel available for shipment is growing smaller. For some weeks Irish needs have been well satisfied, and frequently more coal was sent to the docks than could be shipped, but with the increased pressure in the home market the collieries are now unable to cope with all the business that is being offered on Irish account. During the week 11 vessels have sailed with coals, all for ports in Ireland, and the shipments have amounted to 2,400 tons, compared with 5,600 tons at the corresponding period of last year, or an increase of 135 tons compared with last week. No coal has been consigned to Dublin or Londonderry this week, but good cargoes have been shipped to Belfast, Cork, Carrickfergus, Donaghadee and Coleraine. The coke industry is exceedingly busy, and all the by-product coke ovens from Oughterside to Whitehaven are in full operation. Production is large, but it is insufficient to satisfy the needs of local smelters, who are still importing large quantities of coke from the east coast. The chemical trade is brisk, and all the plants in this district are very fully employed. Prices of all sorts are firm but unchanged.

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " ...	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise)	25/	25/	25/
Do. (for foreign-going steamers)	30/	30/	30/
Bunkers (mixed nuts and steam coal) (coastwise)	21/6	21/6	21/6
Do. (foreign)	25/	25/	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gasworks	19/	19/	19/

IRON.

The Cumberland and North Lancashire hematite pig iron trade remains in an exceedingly brisk condition. The demand for special, semi-special and ordinary iron is as great as ever, and the requirements of both local and outside users are still on a very extensive scale. Makers have sufficient orders booked to keep them busy for months ahead. The number of furnaces lighted in the whole district is 30, and the entire make is going into immediate consumption. Important consumers in Scotland and the Midlands are taking the bulk of the special and semi-special brands of iron, and practically all the ordinary iron made is being absorbed by local steel works. Prices are still at the maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at cash at 115s. per ton. Special iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton f.o.t. The market for ferro-manganese is very strong, but supplies are scarce, and at the moment very little business is being transacted. The steel trade is remarkably brisk, and all the plants at Barrow and Workington are in full swing. A big proportion of the output is for the Government. There is little opportunity for ordinary business. Engineering is very busy, and most of the shops in this locality are heavily employed on Government account.

South-West Lancashire.

COAL.

The August stoppage at the pits has had the effect of increasing the arrears for house coal orders, as there has been no easing on the part of the consuming public to get

some fuel into stock. With regard to shipment, supplies of coal have not been too plentiful since the holidays, and after the heavy Government requirements have been met, the quantities available for ordinary bunkering and export do little more than keep things going. There is fair enquiry in the open market and prices are according to the Controller's schedule. In the coastwise and cross-Channel trade there is much pressure for supplies. In slacks and small fuel generally, the demand is quite equal to the present supply, notwithstanding that at the moment the consumption at the manufacturing towns is interfered with by the stoppage for holidays.

Prices at pit (except where otherwise stated).

House coal :—	Current prices.	L'st week's prices.	Last year's prices.
Best	21/-22/	21/-22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/upwds.	23/upwds.	24/upwds
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—	—	23/6-24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds

* As per official list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. There is still a heavy demand for house coal, and supplies are short. The call for manufacturing fuel is also strong, but in slack there is a little easing owing to the various regular holidays. Shipping coal is in good demand, mostly on account of contracts.

Prices at pit (except where otherwise stated).

House coal :—	Current prices.	L'st week's prices.	Last year's prices.
Best	22/-23/	22/-23/	22/-23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/-18/6	18/-18/6	18/-18/6
Furnace coal	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	—	—	25/-26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

IRON.

There is no change in prices of foundry iron to report. No. 3 Derbyshire seems to be about the cheapest in the market, the price being about 99s. delivered here. The ordinary jobbing foundries are none too busy, but still they seem to have enough work for the limited number of hands employed. The iron works are all busy and the demand has not decreased. Steel works are fully employed and every ounce is allocated by the Government. Engineers are full of work and experience great difficulty in getting supplies.

Yorkshire and Derbyshire.

Leeds.

COAL.

The market on Tuesday was moderately well attended and animated, with an exceptionally strong demand for all descriptions of fuel. The pressure for supplies appears to be greater than ever, being intensified by the efforts that are being made by those areas, such as the west of England and the western portion of Lancashire, to which supplies of Yorkshire coal are to be prohibited, to secure as large deliveries as possible before the scheme comes into operation in September. Quite apart from this, however, every ounce of coal that can be raised is needed to meet the ordinary requirements. Thus the call for supplies is far in excess of the quantity available, especially as the output is in many cases suffering through the holiday spirit. Last week's stoppage for the Bank holiday affected the output more than had been anticipated, and sufficiently to appreciably affect the position, deliveries being considerably reduced in consequence. Most collieries are abundantly supplied with empty wagons. The keenest pressure is for house coal and gas coal. London merchants and factors are still anxious to secure increased supplies of house coal, there being no signs of change in this respect. Fair deliveries are going by rail, but very little coastwise from the Humber ports. A feature of the coastwise shipping is that the bulk of it, quite two-thirds, is from Goole. In the West Riding, the house coal trade follows recently indicated lines, with pit prices more or less nominally as follow:—Haigh Moor selected, 21s. to 22s.;

Current pit prices.

House coal :—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London) :			
Haigh Moor selected ...	20/-21/	20/-21/	20/-21/
Walsend & London best	19/	19/	19/
Silkstone best	19/-20/	19/-20/	19/-20/
Do. house	17/-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull :—			
Haigh Moor best	23/-24/	23/-24/	23/-24/
Silkstone best	22/-23/	22/-23/	22/-23/
Do. house	20/-21/	20/-21/	20/-21/
Other qualities	19/-20/	19/-20/	19/-20/
Gas coal :—			
Prices at pit :			
Screened gas coal	16/-17/	16/-17/	16/-17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/	15/-16/	15/-16/
Other sorts :—			
Prices at pit :			
Washed nuts	17/-18/	17/-18/	17/-18/
Large double-scrned engine nuts	16/-17/	16/-17/	16/-17/
Small nuts	15/-16/	15/-16/	15/-16/
Rough unscreened engine coal	15/-16/	15/-16/	15/-16/
Best rough slacks	14/-15/	14/-15/	14/-15/
Small do.	12/-13/	12/-13/	12/-13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke :—			
Price at ovens :			
Furnace coke	25/8	25/8	25/8

Silkstone best, 20s. to 21s.; Silkstone house, 18s. to 19s.; other qualities, 17s. to 18s. There is plenty of gas coal, but after meeting contract requirements there is little or no surplus to offer for prompt business. Supplies of manufacturing fuel are in strong call, with the exception of small steam slacks, which are relatively easy, although less plentiful than before the holidays, the reduced output having affected the position a little. Coking slacks are still difficult to obtain in sufficient quantities to satisfy the makers of coke, whose output is quickly absorbed. The pit prices in the appended list are all more or less nominal.

Barnsley.

COAL.

Although wiser counsels have prevailed amongst the younger members who stopped work at several collieries during last week owing to alleged inequalities regarding the further call to military service, the loss of output was particularly felt. Fortunately the holidays fell in the munition areas, which minimised the effect, but with the output so fully required the stoppage was serious. However, the position is more settled, though holidays in various districts in this area are falling due. Generally speaking, there is an absence of any new feature so far as business is concerned, but collieries are fully engaged in meeting the demands which continue to fall upon them. The pressure for all descriptions of fuel is particularly keen, with reduced contract deliveries still generally the rule. The export of large steams is of a substantial description on behalf of the Allies, but so far as neutral countries are concerned there is little activity yet. The enormous demands for the purposes of the Admiralty and for home use claim a big proportion of the output. The scarcity of steam nuts continues to be experienced, and the large consumption by the munition and other engineering concerns still calls for a bigger supply of hards. The supply of gas coal is on the whole maintained, considering the abnormal times, but concerns who find the need for larger deliveries owing to the heavier consumption of gas are making stronger efforts to obtain larger deliveries. The enquiry for all descriptions of small steam fuel continues to be very active, and nut slacks are difficult to procure. The demands of the electricity plants are heavier, whilst the greatest pressure is still necessary to obtain anything like an adequate supply of coke-making slacks. The pressure for furnace coke is also exceedingly keen, but the requirements of the pig iron districts continue to be very heavy, especially for the North Lincolnshire districts. The problem of meeting the pressure for supplies of house coal is no nearer solution. Despite all efforts of the collieries, it is impossible to keep up the contract supplies in all districts, owing to the continued heavy requirements for London and the south to enable stocks to be laid in for the winter. Values practically show no variation, and are largely nominal, as follow:—

Prices at pit.

House coals :—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	17/-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals :—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/6-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals :—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.

COAL.

Business is again running upon more or less normal war-time lines. So great, however, is the demand upon output for official and Allied purposes that there is very little "free" coal available for anybody else. Any surplus of large steam coal which formerly found its way into the export market is now readily taken up for industrial purposes to supplement usual supplies of nuts, etc. Owing to various causes neutral buyers are not prominent in this market, trade done being for the most part on account of the Allies. In what little prompt business there is passing, values are fully maintained, though there does not yet seem to be any marked movement beyond the official minimum prices.

Chesterfield.

COAL.

There is no change in the condition of the coal trade of this district. Great pressure continues upon every colliery for delivery of every class of coal. Now that the holidays are over, the cry for fuel for manufacturing is loud and persistent, especially for cobbles and nuts for gas producers. Slack for boiler firing is in fair demand, and supplies are less difficult to find. Should the cotton mills of Lancashire be placed on short time, small fuel will be more plentiful, and will, to some extent, relieve the pressure upon collieries. There is no change in the export trade, so far as the Derbyshire coal field is concerned. Licences are still unobtainable, and there is no prospect of any change in this direction. Gas coal and locomotive coal continue in strong demand. The coke market is as active as ever, and all qualities of coke are in good request. There is some shortage of coking fuel.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

Great activity is apparent in every section of the trade, and work is abundant.

Nottingham.

COAL.

Trade in this district has assumed its normal character, activity and collieries are making strenuous efforts to maintain a good output. The coming out of eligible men who entered the pits after the outbreak of war has tended

The output in most cases, but the daily tonnage satisfactory, taking into consideration the fact that collieries have to contend with the fact of doing a good steady business in household goods. There is no particular pressure on the part of the many householders have already secured winter orders from small householders who have little accommodation for taking in stocks are on the increase. The demand on collieries for all classes of households from merchants is brisk, and discrimination has to be rigorously exercised in the allocation of supplies. There is no marked change in the steam coal branch, nearly all qualities being in eager request. Nuts are still in big demand. Slacks are in rather better supply, but there is no difficulty in disposing of the better class sorts.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/-16/6
Best hard coals.....	16/9-17/6	16/9-17/6	17/-17/6
Secondary do	16/-16/6	16/-16/6	16/-16/6
Slacks (best hard)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

Leicestershire.

COAL.

Excellent progress is being made under the coal-transport reorganisation scheme for the allocation of the surplus coal. The local committees are now hard at work, and as far as a considerable number of collieries are concerned the scheme is complete and ready to be put into operation as soon as the period arrives. The work has been enormously simplified in this district by the inclusion of the south-west of England (area No. 13) for household. This has not only saved a great amount of labour on the part of the local committees, but has avoided a great deal of confusion and worry on the part of colliery administrations. Work was very promptly resumed after the holidays, and there were very few absentees. There are very large supplies of privately-owned wagons in the colliery sidings, and the waiting period is often somewhat prolonged through the want of coal to fill them. There is now a very strong demand from public works and institutions for larger deliveries to create reserves for the winter, and country merchants are in a very tight place, having no stocks on hand at the coal yards. There is a very extensive demand for all classes of household for London and district, and preferential deliveries are being very fully maintained. Both deep and main cobbles and nuts command a very free sale, while bakers' nuts are cleared rapidly on account of their facility in handling and the absence of waste. Small nuts for mechanical stokers sell well, and the whole of the output at the collieries is cleared off day by day, there being no stocks of any kind.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	17/-19/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-17/
Deep screened cobbles ...	16/-17/	16/-17/	16/6-17/6
Deep large nuts	16/-16/6	16/-16/6	16/-17/
Bakers' nuts	15/-15/6	15/-15/6	15/-16/
Small nuts.....	14/6-15/	14/6-15/	14/6-15/6
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/	6/-7/	6/-7/
Main nuts for London kitcheners	13/6-14/	13/6-14/	13/6-14/6
Stems, best hand picked	14/-14/6	14/-14/6	14/-15/
Stems, seconds	13/-13/6	13/-13/6	13/-14/6
Main cobbles for kitcheners	13/6-14/	13/6-14/	13/6-14/6
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The shortage of supplies has been accentuated owing to the stoppage of the collieries being longer last week than was anticipated. Some did not resume until Monday and in cases where an attempt was made to start at the end of last week, the output was negligible. Better class slacks are in demand and it is impossible to meet the continuous enquiry for nuts and other grades of manufacturing fuel. There is no sign of any slackening of orders for winter stock of house coal.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

The suspension of consumption during the holidays has enabled manufacturers to get their supplies of raw material put on a more satisfactory footing, and production is again in full swing this week. Supplies of pig iron are not over the top, but the relief can only be obtained by the further demands for basic iron. The trade is claiming precedence for the mills and forges have a full order book. The orders already in hand are cautious about entering into new

commitments. Most of the bar mills have as much work on hand as will keep them fully occupied up to the winter, and a good deal of additional business which is offered cannot be unconditionally accepted. Values are very firm. A large proportion of the bar iron which is being turned out is for special purposes carrying special rates. Marked bars command the full maximum of £15 10s. less 2½ per cent., and standard unmarked bars £13 15s. net at makers' works. All the available nut and bolt iron is readily absorbed, prices ruling at from £14 5s. to £14 11s. 3d net delivered in the Black Country. The sheet trade is utterly devoid of animation, and the proportion of unutilised mill power is increasing. Galvanised corrugated sheets are still quoted at £28 10s. for 24 gauge and black sheets at £19 10s. but current business relates almost exclusively to official requirements. The Midland Iron and Steel Wages Board has raised the war bonus to men in affiliated works who do not come under the sliding scale by 3s. a week, making the total granted since the war began 15s. An advance of 1s. 6d. has been granted to youths.

Forest of Dean.

COAL.

A heavy demand continues for all grades of this district's house coal, but it is clear that a good portion of the so-called urgent requirements is by way of preparation for the winter. All the collieries have a heavy list of accumulated orders, and there is consequently much delay in executing the needs of merchants. Orders from the rail-borne districts are very numerous, whilst a good number of boats are patiently awaiting their cargoes. Steam coals are moving off well, works under Government control being responsible for a heavy tonnage.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	13/6	13/6	13/
Steam coal:—			
Large ..	20/-21/	20/-21/	18/-19/
Small ...	16/-17/	16/-17/	16/-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

COAL.

Messrs. W. Wade and Son report there is little alteration in the south of England coal market. House, steam and gas coals are coming to hand by rail in moderate quantities, chiefly against contract purchases. Considerable speculation is entertained as to the amount of autumn coal that will be obtainable after September 8, when several sources of supply will be cut off by the new traffic arrangements. While buyers appreciate the practical common-sense underlying most of the new rules, they cannot see in what manner they are going to obtain their autumn reserve stocks. In most cases all the coal that is now being received is at once sent away from the railway sidings to customers, leaving little or nothing for stocks. Should coal be forwarded more plentifully in the next few weeks, the local buyers would not have the facilities for handling larger quantities, or for cartage from the rail to their stores.

THE IRISH COAL TRADE.

THURSDAY, AUGUST 16.

Dublin.

There is no further change in prices so far, but should any take place it will most probably be in an upward direction. The demand continues to be good, both locally and inland. Prices are as follow:—Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s., all less 1s. per ton discount; coke, 45s. per ton; Scotch steam coal, 41s. Stocks of Welsh steam coal are, in some instances, run out at present. Irish coals at Castlecomer collieries, co. Kilkenny, are:—Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d., all at the pithead. Coals from the Wolfhill collieries, Queen's County, are:—Malting coal, 46s. per ton; house, gas and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton, all f.o.r. Athy, the nearest railway connection with the mines.

Belfast.

Business is still brisk in this port, and there are fairly good supplies of Scotch steam coal available, although stocks of best coals are only small. Current quotations for house coals are:—Best Arley, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Cheapest Scotch steam coal is 29s. per ton, and best qualities up to 35s. and 37s. 6d. per ton. The price of gas coke ranges from 37s. 6d. to 40s. per ton; foundry coke, 60s. per ton for second quality; and 65s. for best beehive oven. From July 13 to August 4, the total number of coal vessels arriving in the harbour was 160. A company in the north is at present engaged in the development of the Ballycastle coal mines, in County Antrim.

Coal Output of the Loire Basin.—According to the *Echo des Mines*, the total output of the collieries in the Loire basin in 1916 was 3,604,545 metric tons, as against 3,287,363 tons in 1915.

Alexandria Coal Trade.—The importation of coal into Alexandria from January 1 to July 12, 1917, was:—Welsh, 72,410 tons; Newcastle, nil; Scotch, 3,452 tons; Yorkshire, 20,816 tons; other qualities, 16,914 tons; total, 113,592 tons. Total for the same period last year, 228,991 tons.

New Coal Wharf for Rouen.—A Decree, dated July 11, authorising the establishment at the port of Rouen of a wharf and plant capable of unloading 2,500 tons of coal in 24 hours, and of accommodating two vessels at a time, approves the contract concluded between the Ministry of Public Works and Transports and a British firm for the construction and operation of these works on terms and conditions, specified in the *cahier des charges* annexed to the Decree.

THE WELSH COAL AND IRON TRADES.

THURSDAY, AUGUST 16.

North Wales.

Wrexham.

COAL.

The demand for house coal continues to be good, and merchants are purchasing all they can with a view to getting some stock together to meet the winter demand upon them. There has been much interest shown in the Coal Rationing Order which applies to London and district, especially in the Liverpool area, where no Order has yet been published. Presumably a somewhat similar scheme will soon be forthcoming, and if it is the same as London it is considered that it will be fairly generous, as it would give 3 cwt. per household per week, always assuming that the supplies are available. The stocks at present held by merchants are reported to be exceedingly small, and the task of replenishing them is difficult. There is a keen demand for all steam coal raised, priority being given to orders for munition works and railways. A fair tonnage has also been disposed of for shipment ex the Mersey ports. It is stated that the Mersey Shipbuilding Company intend to open a new shipbuilding yard at Wallasey, and have been granted a 14 years' lease of the necessary land by the Mersey Dock and Harbour Board. This will further increase the importance of the Cheshire side of the Mersey as a shipbuilding centre, and the only trouble appears to be the housing of the workmen in the locality of their work. There is no change in the gas coal trade. Buyers are pressing for all the supplies they can get, especially works outside the area, before the end of this month arrives and they have to go to other collieries for their requirements. Gas companies still have a good sale for gas coke. Slack continues to be fairly plentiful, but there is not a great amount taken into stock, the bulk being disposed of as it is raised. The following is a complete list of the week's prices:—

	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit f.o.r.:—			
Best house coal	21/-23/	21/-23/	—
Secondary do.	20/-22/	20/-22/	—
Steam coal.....	19/-22/	20/-22/	—
Gas coal.....	19/-22/	19/-21/	—
Bunkers	19/-22/	19/-22/	—
Nuts	18/-20/	18/-20/	—
Slack	12/-14/6	12/-14/6	—
Gas coke (at works).....	21/8-23/4	21/8-25/	—
Prices landsale:—			
Best house coal	27/6-30/	27/6-30/	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

There was a fair arrival of tonnage soon after last week's holidays, and with the collieries working well this week the stocks of coal, which had been considerably diminished, are now being replenished. There was a scarcity on the market of superior coals, but other sorts were in sufficient supply to meet all demands. Smalls were offering freely. A spirit of optimism prevails, the general feeling being that the market is likely to show considerable improvement in the near future.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	30/	30/	40/-42/
Western-valleys, ordin'y	29/	29/	39/-40/
Best Eastern-valleys ...	29/	29/	37/-38/
Secondary do.	28/	28/	34/-36/
Best small coals	21/6	21/6	27/-28/
Secondary do.	20/	20/	24/-25/
Inferior do.	18/	18/	20/-21/
Screenings	23/	23/	27/6-28/6
Through coals	27/	27/	25/-27/
Best washed nuts.....	30/	30/	29/-31/
Other sorts:—			
Best house coal, at pit...	33/	33/	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/
Patent fuel	32/6	32/6	47/6-50/
Furnace coke.....	47/6	47/6	52/6-55/
Foundry coke	47/6	47/6	62/6-65/

IRON.

There is still the same steady output from the iron and steel works of the district, but as most of the operations of the various works are on Government account prices are nominal, and there is little possibility of fresh orders being taken. The tin-plate trade shows an upward tendency. Orders are increasing. The difficulty still is to obtain sufficient raw material. There has been a considerable arrival of pitwood, which is steady at from about 58s. 6d. to 63s.

Cardiff.

COAL.

Although the official holiday at the collieries terminated on Wednesday of last week, there was a considerable percentage of absenteeism throughout the remainder of the week, due to the fact that many of the miners took their annual vacation at the seaside and elsewhere and did not return to work at the end of the three days. This is quite in accord with previous experience, and it is not anticipated that outputs will reach their normal level until the end of August or the beginning of September. Fortunately there has been a marked improvement in the tonnage position, and at the commencement of the week the pressure for loading was so great that vessels were lying in the docks waiting turns to proceed to the loading berths. The excessive stocks which had accumulated prior to the holidays have now been greatly reduced, and of some descriptions, especially of better class large coals, there is a pronounced scarcity. Admiralty requirements have been heavy, and the great bulk of the tonnage which has come forward has been requisitioned to meet Government demands. Fortunately the week opened well at the collieries, and, although outputs did not reach the normal production, there has been sufficient coal coming down to satisfy urgent needs. It is reported that the request put forward by the collieries on the Admiralty list for increased rates has been met by compromise. No actual figures have been allowed to leak out, but it is generally known that, whilst suggestions that limitation prices should be paid has not been

accorded to, a substantial advance has been granted over the contract prices of 1916, and these rates will be governed by the wage rate, and increased or decreased as the wages may rise or fall during the currency of the contracts. The long expected classification list has not yet been published, but it is reported that several important alterations have been made which will affect particular grades of coal, more especially of a bituminous or semi-bituminous description. The various committees, of which there are about a dozen dealing with the numerous problems which are continually arising, continue to sit almost daily, and whilst the official regulations and restrictions are being loyally recognised and carried out, there is an undercurrent of feeling that the trade is being hampered and harassed unnecessarily. The release of wagons caused by the increased shipments has considerably eased the situation, and the temporary stoppages at many collieries which were reported a week or so ago do not now occur. Work is proceeding regularly, and this fact alone will tend in great measure to alleviate the strain and abolish the dissatisfaction which undoubtedly existed. The coal washery at the Cardiff Docks, which has been practically idle since the commencement of the war, has been restarted, and this will also help to release a great number of wagons which were standing in the sidings, filled with small coal. There has been a considerable demand for best bunker coals, which have become rather scarce, but of cargo descriptions there is a plentiful supply. The patent fuel market is strong, and most makers are well booked for several months ahead. Prices are steady at 30s. to 32s. 6d., according to quality. Coke is in good demand at schedule prices. All descriptions of coal are being dealt in at the rates fixed by the Controller, subject to any revision which may be necessary when the classification scheme is published. Pitwood is steady at 58s. to 60s. per ton. A point worth recording is the fact that open chartering last week was an absolute blank, an incident without precedent in the trade.

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	40/-41/-
Ordinary	30/	30/	39/-40/-
Best bunker smalls	23/	23/	29/-30/-
Best ordinaries	21/6	21/6	27/6-28/6
Cargo qualities	20/	20/	21/-24/-
Inferior smalls	18/	18/	20/-23/-
Best dry coals	30/	30/	34/-35/-
Ordinary dries	28/6	28/6	32/-33/-
Best washed nuts	30/	30/	33/-35/-
Seconds	28/6	28/6	31/-33/-
Best washed peas	27/6	27/6	30/-32/-
Seconds	26/6	26/6	28/-30/-
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	40/-41/-
Western-valleys	29/	29/	39/-40/-
Eastern-valleys	29/	29/	38/-39/-
Inferior do.	28/	28/	35/-36/-
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	38/-40/-
Through-and-through	—	—	34/-35/-
Small	26/	26/	32/-34/-
No. 2 Rhondda—			
Large	27/	27/	35/-36/-
Through-and-through	25/	25/	28/-30/-
Small	20/	20/	24/-25/-
Best patent fuel	32/6	32/6	47/6-50/-
Seconds	30/	30/	45/-47/6
Special foundry coke	47/6	47/6	62/6-65/-
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	52/6-57/6
Pitwood (ex-ship)	58/-60/-	60/-62/6	45/-47/-

* Nominal.

IRON.

In the iron and steel trade there is no diminution in the requirements for war purposes, and all works are turning out maximum outputs. Many extensions are taking place in various localities, and these are being pushed forward at the greatest speed so as to increase the production as much as possible. The various tin-plate works of the district resumed operations on Monday after a week's holiday, and as the allocation of tin-plate bars is not suspended during the vacation it is assumed that full work will be assured at all the mills for several weeks to come. This is decidedly necessary, as stocks have now reached the lowest level on record, being now only 44,822 boxes compared with 136,740 boxes at the corresponding date of last year. Receipts from works only amounted to 6,917 boxes, whilst shipments totalled 36,940 boxes. There are numerous enquiries on the market, especially from Norway, where the canning industry is being jeopardised owing to the pronounced shortage. Manufacturers, however, state that their order books are well filled, and they cannot undertake further commitments in the present unsettled condition of the industry. All new business is on the fixed basis of 30s. for standard sizes, and other grades in proportion. There is no change in the galvanised sheet trade, but works are busy on painted sheets, trench plates and black plate, for which there is a strong and continuous demand. Prices in all departments are nominal. Iron ore supplies are satisfactory.

Swansea.

COAL.

There was a slight improvement in the trade of the port last week compared with the preceding period. Exports of coal and patent fuel were slightly increased, totalling together 76,150 tons. The anthracite market to-day continued brisk for all classes with the exception of duff. Machine-made sizes in particular are extremely scarce at the moment. Steam coals and bunkers were firmer. All values were on scheduled rates.

Llanelli.

COAL.

Owing to the holidays of last week supplies of machine-made anthracite qualities are very scarce, and buyers unable to book their full quantities. Inland orders for these sorts are also being executed very slowly, and consumers are complaining strongly over the delay in coal reaching them. Large anthracite quantities have been a shade stronger in demand during the past week, but as stocks of some grades were heavy, there is little delay in

execution of orders. Culm and duff are slow, with supplies offering fairly freely. Steam coals are not very firm, and although stocks have been much reduced during the past week, buyers have no difficulty in securing full supplies of practically all grades. Manufacturing coals are firm, and house coals are also very active.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	30/-32/-
Seconds	29/	29/	27/-29/-
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	25/6-27/6
Machine-made cobbles	42/6	42/6	38/-39/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles	36/	36/	—
Machine-made nuts	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-32/-
Seconds	34/	34/	—
Thirds	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/-
Rubbly culm	13/	13/	15/3-15/6
Red Vein culm	11/	11/	—
Breakers duff	10/	10/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	36/6-38/6
Seconds	27/	27/	—
Bunkers through	25/	25/	27/6-31/6
Small	19/	19/	20/-22/-
Bituminous:—			
Bituminous through ...	27/	27/	—
Small	24/	24/	—
Coke-oven coke	47/6	47/6	26/6-28/6

THE LONDON COAL TRADE.

THURSDAY, AUGUST 16.

The London coal trade is slowly emerging from the mass of orders on hand unexecuted, and struggling hard to get as much coal delivered during the best of the working days and before the bad weather sets in. Colliery representatives are still declining all orders on the open market, but the tonnage coming forward since the holidays has shown a marked improvement. Feasts, wakes and festivals have stopped the output in some directions, but as a whole the quantities coming forward are well maintained, and in the seaborne market the unusual number of 57 contract cargoes entered for Monday's market as arriving in the River Thames was almost a record, especially for this season of the year. On Wednesday the number of vessels was only nine, but the tonnage is well over double the quantity of the week previous. Very little coal is offering on the open market, but if the monthly quantities are sustained the pressure for the winter's supply is considerably modified. A strong demand is everywhere apparent for all classes of fuel, and especially for hard steam coal and hard screened cobbles. Slacks are somewhat neglected, but coke is moving strong. The principal topic of the conversation on the London market is the new regulations of the Coal Controller, which are to come into force on October 1 next, with reference to the rationing of coal to all the London consumers. So far the question as to how much will be allowed to be used by each householder is giving very little concern, the chief point being the difficulty of securing the reasonable allowance. Very few winters pass without some periods of difficulty in obtaining coal, and one of the principal points in the Controller's scheme is that in the event of a shortage of coal, the local authorities are to take the matter in hand and produce the required tonnage, but, with the diminished quantities coming forward and the difficulty to obtain a sufficiency now, it is asked where the surplus is to come from. The London Coal Merchants' Society have called a special meeting at Cannon-street Hotel to-morrow (Friday) at 11.30, to fully discuss the whole problem. Another notice was exhibited on Monday on the Coal Exchange board, urging all merchants who could provide wagons for emergency coal to put themselves in communication at once with the Coal Control Board. There has been a good deal of the emergency coal brought forward into London during the past few weeks, but, unfortunately, the main object has been neutralised. The orders unexecuted in the merchants' hands have had the first claim to this emergency coal, and it has gone to the cellars of the householder rather than into stock, as was originally intended, at the various depots, in case of the emergency arising during the coming winter. The bulk of the merchants report an overwhelming number of orders on hand in response to the Board of Trade suggestion that they should take advantage of the summer months to store coal for the coming winter; but now that the date given, August 31, is rapidly drawing near, those of the general public who have not had their summer supply are becoming anxious, and one large firm have reported that their daily average recently has been 14,000 tons, as against 3,000 tons during last year. This will show at once the vast increase in orders for stock coal during this summer period.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, AUGUST 10.—Owing to weather conditions in the north, supplies have been detained, causing some inconvenience to the trade generally. No cargoes were on offer to-day, but the demand for seaborne house coal still remains good. Cargoes, 4.

MONDAY, AUGUST 13.—Although there was a large arrival of colliers to-day, there were no undisposed cargoes of seaborne house coal on offer at to-day's market, but the demand still keeps good. Cargoes, 57.

WEDNESDAY, AUGUST 15.—The seaborne house coal market was steady to-day, with no cargoes reported sold. Cargoes, 9.

It is stated that during the months of May, June and July the quantity of coal conveyed from the pit mouth to London exceeded by a quarter of a million tons any recorded supply during the same period of the year. Reserves are being steadily built up in the Metropolitan area, the existing reserve being about 70,000 tons, which it is expected will be increased to 200,000 tons by the end of September, and by at least 100,000 tons each succeeding month of the autumn and winter seasons.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—August 13.

Timber Measurers (Women).

Mr. ROWLANDS asked the Parliamentary Secretary to the Board of Trade whether the Timber Supply Committee proposed training women as timber measurers; whether there were experienced men available who were over military age; and, if so, whether these men would be given the opportunity to fill the positions and save the expense of training women while this labour could be obtained.

Mr. ROBERTS said that in view of the scarcity of timber workers, a limited number of women were being trained experimentally as timber measurers and clerks and as cutters of pitwood and tops, both of which were comparatively light occupations. Men with timber-working experience were required for work of a more arduous nature for which women were unfitted, and applications from men timber measurers were being absorbed as vacancies occur.

Tower Collieries (Hirwain), South Wales.

Mr. W. THORNE asked the Parliamentary Secretary to the Board of Trade if 14 members belonging to the National Union of General Workers employed at the Tower Collieries, Hirwain, South Wales, had received 14 days' notice to leave their employment because they refused to leave the union, of which they had been members for many years; and if he would take action in the matter.

Mr. HODGE, who replied, said that no intimation of the dispute referred to had been received at the Ministry of Labour, but enquiries were being made into the matter.

Peat Fuel (France).

Mr. ROWLANDS asked the Under-Secretary of State for War whether any action had been taken by the Government, and, if so, would he state the nature and extent of such action, with regard to the utilisation of the French peat deposits so as to relieve the coal supply from England in respect of fuel to the armies in France.

Mr. MACPHERSON, in replying, said the matter had been the subject of close investigation for some time by the War Department, and arrangements had now been made for the erection of a peat fuel factory in France to help to supply the Army in France with trench and other fuel in substitution for charcoal, coke, and coal, and to that extent to relieve the coal supply from England.

Clay Cross Iron Company.

In reply to Mr. W. THORNE, who asked the Minister of Munitions if he was aware that the Clay Cross Iron Company, which was a controlled firm, were refusing to pay overtime rates in accordance with trade union rules and conditions, Mr. KELLAWAY said that enquiries were being made, and he would communicate the result as soon as possible.

Transport Facilities (Pit Work).

Mr. WING asked the President of the Local Government Board if his attention had been called to the report of the Commissioners of Industrial Unrest on the North-East Coast, which pointed out that the earnings of miners, owing to the absence of transport facilities, were such as fall short of a living wage, and recommended that such should be assisted by grants; and, if so, would immediate steps be taken to give effect to such recommendation.

Mr. HAYES FISHER (President of the Local Government Board) replied that he had seen the report referred to. As the Commissioners pointed out, the remunerative employment of the workers on some form of national work would seem to be the most appropriate remedy. Grants had, however, been made for the assistance of miners in the north-east coast district in cases of distress, and the policy would continue to be pursued. He hoped that before long it might be possible to employ these men in some remunerative employment.

Replying to a question in similar terms addressed by Mr. WING to the Coal Controller, Mr. ROBERTS said the Controller had for some time been devoting attention to measures of relief in cases in which steps which had been taken with a view to securing economy in transport had prejudicially affected individual collieries. The root of the problem was lack of shipment trade due to shortage of tonnage, and the Departments concerned were looking into the possibility of allocating more of this trade to the districts to which the report referred. Remedies on the lines suggested by the Commissioners had already been adopted to some extent, and the question of further similar action was receiving consideration.

August 14.

Electrical Power and Coal Conservation (Report).

Mr. MACCALLUM SCOTT asked the President of the Board of Trade whether he would make available to local authorities the report of the Electrical Trades Committee of the Board of Trade and the interim report of the Coal Conservation Sub-Committee of the Reconstruction Committee, in view of the fact that it was not possible for witnesses who were to give evidence on behalf of local authorities before the Board of Trade's Committee on Electrical Power Supplies to make such evidence full and complete without a perusal and consideration of these reports.

Mr. ROBERTS replied that the War Cabinet had decided that the reports of Committees appointed to consider questions affecting trade after the war should not be made public at present.

Coal Distribution (Scotland).

In reply to Mr. MILLAR, who asked what arrangements had been made for the distribution of coal in the industrial centres in Scotland during the coming winter, Mr. ROBERTS said that the District Coal and Coke Supplies Committee for Scotland would continue to be responsible for meeting any difficulties in connection with supplies of coal from the collieries. The problem of the distribution of house coal in industrial centres would be dealt with by local committees which were being established at the instance of the Controller of Coal Mines in all areas where a population of 20,000 or more. These committees would be understood to be in process of appointment, and particular attention to the supply of coal to the industrial classes.

Afforestation Reconstruction Committee.

Mr. MILLAR asked the Prime Minister whether his attention had been drawn to the fact that a *résumé* of the report of the Afforestation Reconstruction Committee was pub-

Civil Service Gazette on July 25; whether it was published with the consent of the Government, whether, as the contents of the report had now been prepared to have the Government was prepared to have the report and circulated.

MR. LAW said that his attention had not been called to the matter referred to in the first part of the question. If there had been any publication of the report, it was without the knowledge or approval of the Government. This was one of the Committees appointed to advise the Government, and he thought that the House would agree that they should at least have an opportunity of considering it before it was discussed in public.

August 15.

Housing Working Classes.

Col. ROYDS asked the President of the Local Government Board if, in connection with the provision of houses for the working classes at the conclusion of the war, and in view of the fact that private enterprise had hitherto supplied 95 per cent. of the existing houses, he would make special enquiry of town councils, councils of Metropolitan boroughs, and district councils, as to the cause of the failure of private enterprise during the four years preceding the war to meet requirements, and invite their opinion as to the steps which could be taken to again encourage private enterprise.

Mr. FISHER replied that if the form of questions addressed to local authorities in England and Wales on July 28 was examined, it would be found that their opinion had been asked as to the extent to which private enterprise might reasonably be expected to provide houses for the working classes, and that they had further been asked to give any other information which, in their opinion, might bear on the question of the adequacy of accommodation for persons of the working classes. It was obviously open to local authorities to express opinions as to the cause of the failure of private enterprise.

Petroleum (Production).

Mr. LONG (Secretary of State for the Colonies) asked leave to introduce a Bill "to make provision with respect to the searching and boring for and the getting of petroleum in the United Kingdom, and for purposes connected therewith." At the request of the Prime Minister, he had dealt with this question, because his Department was not concerned with the consumption of this article. He secured the services of Sir Walter Egerton, Sir Evan Jones (the Controller of Petrol Supplies), and Prof. Cadman. He had received valuable assistance from Lord Northcliffe, and had sent Sir Frederick Black to the United States to represent the Government. While, of course, our primary duty was to get the various oil products from other countries, there was also the question of the development of possible supplies here at home, both in regards to shale and possibly in regard to oil itself. A Committee, presided over by the Civil Lord of the Admiralty, had discussed some of these questions, and had been advised that it was quite probable that oil existed in parts of this country, though it was not easy of allocation, nor was it easy to deal with it if it was left entirely to private enterprise. Experience had shown that in other countries where the boring for oil was left entirely in private hands there was a great deal of scrambling competition to be first in the field, a great deal of very bad work, and, as a consequence, grave national loss. Therefore the Government had determined to bring in a Bill dealing with this question with as little delay as possible. He was advised by those who were competent to judge that there had been a prodigious waste of capital, a premature depletion of the oil fields, and a terrible waste of oil had resulted owing to competitive drilling; and it was in order to prevent that, and to secure economy in exploration, drilling and boring, and a maximum supply for the nation that they asked the House to give leave for the introduction of this Bill. The objects of the Bill were very simple. The Government reserved all rights to get petroleum, and in this way was enabled to lease defined petroliferous areas, and thus prevent waste and loss of time. Provision was made for the payment for oil won within a petroliferous zone or pool to the various surface owners within the zone, by way of a fixed royalty; for the getting of oil by persons or companies on terms and conditions to be fixed by the Board of Trade, and all the necessary machinery for this purpose was to be set up. Any work done during the war could be done under the Defence of the Realm Act, but after the war the acquisition of surface upon which to drill or erect works could be done under those provisions, or by private Bill or by Provisional Order. The first clause provided for vesting in his Majesty the right to bore; secondly, for the payment and distribution of royalties; and thirdly, for schemes. A Petroleum Royalty Fund was set up out of which to pay certain expenses and to meet the demands of the different royalty owners, as to which there might be some difficulty in allocation at the moment. While the Board of Trade would prepare the schemes and do the greater part of the work, the Railway and Canal Commissioners were empowered to decide certain questions on hearing evidence. It was not proposed to proceed further with the Bill before the adjournment, but the Government thought it right that their policy should be put before the country at once, in order to check unfortunate enterprises.

The Bill was presented, and read a first time.

THE BY-PRODUCTS TRADE.

Tar Products.—Interest still centres on next season's pitch supplies, owing to the high prices which are quoted: at present there is no desire to cover requirements, and for some time buyers may keep out of the market, although the contracting period is, of course, in sight. The present price is about 45s. per ton net in bulk f.o.b. makers' works. The market shows practically no change. The average quotations for gas works products are as follow:—Coal tar, 23s. 3d. to 28s. Pitch, east coast, 16s. to 17s. per ton; west coast, Manchester, 15s. to 16s.; Liverpool, 16s. 6d. to 17s. 6d.; Clyde, 17s. to 18s. Benzol, 90 per cent. north, 10½d. to 11½d.; 50-90 per cent. 3d. to 4s. 4d. Toluol, naked, crude naphtha, in bulk, north, 1s. 11d. to 1s. 12d.; th. naked, north, 1s. 11d. to 1s. 12d. Heavy oil, 1s. 1d. to 1s. 2d. Carbolite acid, 60 per cent, 3s. 4d. naked, Naphthalene Anthracene, "A" quality, 3d. 1½d. to 2d.

Ammonia.—Supplies are being readily obtained for agricultural use on official terms.

MINING INDUSTRY AND MILITARY SERVICE.

At Newburn, a coal screener applied for a continuance of his exemption. Reference was made to the new recruiting scheme for miners, under which Northumberland is to provide 995 men. Of this number, the colliery at which the screener works has to send 18. Twenty-one men from the colliery have enlisted voluntarily since the year commenced. It was decided to adjourn the case for two months.

Richard Main, 39, and John Richard Cable, 25, the two conscientious objectors with whom the miners at Hebburn Colliery have declined to continue to work, were called up following their dismissal from the colliery, and, not responding, were ordered by the local magistrates on July 23 to pay a fine of 40s. each as being absentees, and were remanded to await an escort. Next day, however, the local military authorities received a telegram from the War Office ordering their immediate release. They were relegated to Army Class Reserve B. At the time of their release they were at Newcastle awaiting a court-martial for having refused to put on uniform. On Monday of this week they were again called before the magistrates, and charged with being absentees. It was explained that fresh instructions authorising their calling up had been received. Main informed the Bench that he was satisfied that the War Office did not want him. The miners, led by officials, had brought pressure to bear; but he would rather suffer death than be a soldier. Both men were remanded to await an escort, but no fine was imposed.

The Chopwell lodge of the Durham Miners' Association has passed a resolution condemning the "combing out" system in mines as put forward by the Coal Control Board, and asking that the country be balloted on the subject, and, further, that no man shall be taken from or about the mines until the men who have gone to work in or about the mines since the outbreak of war are taken by the military authorities.

Hearing an appeal for the exemption of a man employed in felling timber, a member of the Sedgfield tribunal remarked that if such men were taken away the collieries would have to stop. The chairman agreed that it was a very difficult matter to get timber, and exemption until October 1 was agreed to.

At the West Riding (Northern Division) appeal tribunal at Leeds, an incorporated accountant of Leeds sought exemption for a senior audit clerk, who was engaged in supplying particulars to the Government for a large colliery firm under the recent Control Order. The military representative said that applicant had worked brilliantly in the national interests, and no firm could do more. Applicant's counsel (Mr. A. Willey) said that eight of 19 men had gone up, including applicant's brother and partner. The appeal was, however, dismissed, but time was given till December 31.

At Dewsbury local tribunal last week, the exemption of a clerk employed by the Mirfield Colliery Company came under review. Mr. T. Nevin, on behalf of the company, explained how difficult it was to obtain a competent colliery clerk now. Lieut. Strachan, the military representative, confirmed this view, and said he had submitted the case for the opinion of a colliery recruiting court, which had agreed that a substitute for the man could not be trained in less than from nine to 12 months. Lieut. Strachan further mentioned the increasingly complicated returns which were required by the Government since the mines became controlled. The tribunal confirmed the conditional exemption of the clerk concerned.

At the Linnithgow county recruiting tribunal, the military representative applied for withdrawal of certificates of exemption which had been granted in the early days of compulsory service to a large number of shale miners, on the ground that as these men were in a certified occupation they did not require to hold exemption certificates from both the tribunal and Munitions Department. He added that unscrupulous men could give one of their certificates to others. The tribunal held that the military representative had not made out a sufficient case for the withdrawal of the certificates.

Application for exemption was made to the Monmouthshire colliery recruiting court on Tuesday on behalf of a man who, in lieu of receiving compensation from the proprietors of the Ebbw Vale Colliery in consequence of injury accidentally received, was stated to be allowed to pick coal off the colliery tips. He paid the proprietors a certain sum annually for this, and retailed the coal with the assistance of boys. The man was in medical category C2. Exemption was granted.

At the Abertillery tribunal, the chairman referred to a case of a married man, 37 years of age, and commented upon the fact that men with family responsibilities who had entered the mines in 1915 were being "combed out" by the military, whilst single men of 18, passed Class A, were allowed to remain; and said that, in all fairness to boys who had left good positions in other spheres of life, the "combing out" should apply to youths in the mines as well as in other industries. Present arrangements were far from satisfactory, and were unfair. The burden should be borne equally. — Messrs. Lancaster, of Cwmillery, appealed to the tribunal for three clerks, all of them in Class C. Conditional exemption was given to one, and the others were given a delay of six months.—The Ebbw Vale Company appealed for two of their pay clerks at the Arael Griffin Colliery. The appeal of one, a single man, 27 years of age, Class B3, was dismissed; and the other one, who was married, was given six months.

Pekin Syndicate: Coal Output Satisfactory.—The directors of the Pekin Syndicate, in accordance with their usual custom, have issued a short interim report, wherein it is stated that the works at the mines have been and are being maintained in a condition of efficiency, and the output of coal and trade may be regarded as satisfactory, in view of the disturbed conditions at present existing in China. The operations of the Fu Chung Corporation are eminently satisfactory, and the improved feeling between the Chinese and the syndicate's interests, arising from this co-operation, is highly gratifying to the directors, and demonstrates the wisdom of the formation of the Fu Chung Corporation. The directors feel confident that the visit of the chairman to China will also greatly strengthen this good feeling. The sales of coal for the past year show a satisfactory increase on the tonnage disposed of for the preceding 12 months, and better prices have been obtained. The corporation has established a number of additional agencies and depots, and is being organised for the further extension of its markets, which extension, given normal trading conditions, may confidently be looked for in the immediate future.

COKE OVEN BY-PRODUCTS IN 1916.

REPORT UNDER THE ALKALI WORKS ACT.

The fifty-third annual report of the Chief Inspector of Alkali, &c., Works (Mr. W. S. Curphey), states, with reference to sulphuric acid works, that much credit is due to the management in the great majority of these works, where, despite difficulties and the stress of the fullest production, a high standard of proficiency was thoroughly maintained. The general average was affected by a comparatively small number of works where the standard reached when working formerly under less strenuous conditions was not maintained. It is worthy of note that the more prominent examples of this kind were works where properly-qualified chemical aid was not at command and where proper records of working data were not kept. Where the contrary policy was pursued the highest efficiency was attained. In some cases where this manufacture was entered into subsequent to the beginning of the war, and where the value of the chemist was appreciated and the policy of keeping proper records was followed, much greater efficiency has been attained than in others with a generation of experience but with inferior organisation.

The works continued under great pressure for production throughout the year. The demand for acid, combined with difficulties regarding skilled labour and supply of material, was even more marked than in 1915. The necessity for repairs in many instances became urgent, and was given special consideration, much being done to put those plants requiring attention into better condition. Apart from the deterioration consequent upon prolonged working of the various plants at their utmost capacity, there was loss from fire, storm, and accident to make good, as well as extension of existing plants and erection of new to be provided for. Constructive effort was actively maintained, so that at the end of the year the general conditions were better than at the end of 1915.

The number of works producing sulphate and muriate of ammonia and gas liquor continued to increase; 722 processes were under inspection, an increase of 36 over the total for 1915, which arose partly from first registrations of new works and partly from the introduction of manufacture of concentrated ammoniacal liquor in works where previously only sulphate of ammonia was made. The following table shows the quantity of ammonia recovered in the United Kingdom as a by-product, expressed in terms of sulphate:—

	1916. Tons.	1915. Tons.	1914. Tons.
Gas works	172,269	173,675	175,930
Iron works	15,154	15,142	16,008
Shale works	57,988	58,826	62,749
Coke oven works	159,506	145,406	137,430
Producer-gas and carbonising works (bone and coal)	28,786	33,218	34,295
Total	433,703	426,267	426,412

Of the above aggregate 70,987 tons were produced in the form of concentrated ammoniacal liquor, the balance of 362,716 tons expressing the total of all other ammonia products (sulphate, chloride, nitrate, &c.). The production in gas works and shale works shows a slight falling off from the 1915 figures. The production in iron works may be regarded as unchanged. In producer-gas and carbonising works there was a marked decrease, but in coke oven works a further increase of over 14,000 tons sufficed to make the aggregate for 1916 exceed 1915 by 7,436 tons—a most satisfactory result on many considerations. The change from production of sulphate to preparation of concentrated ammoniacal liquor noted in the report for 1915 continued in greater measure and amounted at the end of the year to the considerable quantity mentioned above. It is probable that a further expansion in the quantity of this product will take place. The use of a cheap oil, crude tar or the like, so long in general use in Scotland, for facilitating the removal of those metallic sulphides precipitated in the saturator when crude pyrites acid is used for production of sulphate from gas liquor, is now in limited use in England. By this means the production of a white high-grade salt with the lower-priced unpurified acid is facilitated through agglomerative effect of the oily material floating the impurities to the surface of the liquid in the saturator, whence they are easily removed by simple means, whilst the crystals of sulphate collect at the bottom for removal in the ordinary way.

Further study of the "direct process" for sulphate making in gas works was made during the year. Owing to the prevailing war conditions, operations throughout the industry have been extremely irregular with respect to make of gas and the quantity and quality of acid supplied; labour shortage has been serious, and the time of works' managers and their staff has been fully occupied elsewhere than in the sulphate house. A complete survey of the field has therefore been impossible, and attention has been concentrated on the conduct of operations in two works, widely different with respect to scale of operations, but of representative character.

In 1915 it was found that the "direct process," as then conducted at 21 works, was, with few exceptions, yielding a return of sulphate far below expectations. In place of the 25 to 30 pounds of sulphate which was looked for when the process was first adopted seven years ago, the recovery barely exceeded 15 to 20 pounds, and not only was the recovery of ammonia poor, but the whole system of oxide purification in certain works was subject to mysterious and anomalous periods of disorganisation. It was found, in general, that such disorganisation was most frequent when the oxide was highly charged with moisture. At such times it was apt to "sour" in the boxes, and the by-passing of a large amount of ammonia often failed to activate the sluggish material.

Various suggestions were made to effect the desired improvement: careful regulation of the moisture content of the oxide, the use of a washer to control the ammonia content of the gas entering the purifiers, the use of steam pipes below the bottom grids to maintain

the working temperature of the boxes during the winter months, protection of the boxes from rain and cutting winds, and the use of control thermometers in the system. During the past year opportunity has been found, through the willing co-operation of the management and their staff, to test the value of these suggestions. Substantial advance has already been made towards a more scientific control of plant, the recovery figure for sulphate shows improvement, and periods of disorganisation can now be anticipated with some degree of certainty, even if they cannot always be prevented owing to causes beyond the power of those in charge to control—causes due to irregularity in the delivery and quality of necessary material and to fluctuations in the make of gas, which varied abnormally during the winter. The elucidation of the problem, however, is by no means complete, and further work remains to be done before the effect of the varying factors is satisfactorily determined. The problem was fully discussed in its theoretical aspect in the annual report for 1915, and the considerations there set out led to infer that the following conditions were those best suited to maintain the purifying material at its highest state of efficiency, and such conclusions were believed to be in harmony with the best modern practice.

1. *Due Hydration of the Oxide*, say, 5 to 10 per cent. of moisture, such hydration having regard rather to the reactive ferric hydrate content of the mass than to the total mass of material, active and inert.

2. *Temperature*.—(a) Crude gases entering the system to be dry and cool rather than moist and warm. Low moisture content is the essential requirement.

(b) Oxide.—Temperature in the "sulphiding zone" to be such as to enable the gas to carry as vapour the whole of the moisture equivalent to the sulphuretted hydrogen absorbed, say, 70 degs. Fahr. (21 degs. Cent.). Temperature in the "oxidation zone" to approximate to this, so that water of hydration set free in the "sulphiding zone" and retained in the sulphided mass may be reabsorbed through hydration of reformed ferric oxide and not carried away in the exit gas and lost to the system.

3. *Impurities*.—The crude gas should be freed, as far as possible, from tar fog, oils, naphthalene, and hydrocyanic acid, and should contain a trace of ammonia, say, 0.5 to 1 grain per 100 cu. ft., and oxygen equivalent to half the volume of sulphuretted hydrogen present.

4. *Purifier Boxes*.—These should be protected from the cold and should be worked in rotation in such a way as to bring the material richest in ferric hydrate into contact with gas richest in sulphuretted hydrogen, and the material richest in sulphide into contact with gas poorest in sulphuretted hydrogen (but relatively rich in oxygen).

5. *Direction of Flow*.—This should be downwards, not upwards. Area of contact is thus increased, risk of caking diminished. Pressure tends to equalise itself, and rate of flow is rendered more uniform.

6. *Regularity of Working*.—Conditions throughout should be as regular as possible. Material assistance would be afforded were it possible to record the temperature of the oxide in the boxes and in the inlet and outlet gas mains.

Such were the conclusions reached with respect to the principles that should govern the working of a purifier system under ideal conditions. Unfortunately, in the "direct process," as usually worked, ideal practice is departed from in almost every particular. Oxide of iron is sometimes delivered at the works and has to be put into immediate use with a moisture content of over 50 per cent. and at a time when the make of gas is at a maximum; the crude gas leaves the acid "bubbler" at a relatively high temperature and highly charged with moisture; the acid content of the bubbler varies within wide limits and the surface layer—that last in contact with the coal gas as it leaves the system—has on occasions been found alkaline, while the bottom layer has been found highly charged with acid; the purifiers are in exposed conditions and subjected to great changes in temperature, and work in sequence with upward flow of gas. Conditions of working are thus often far from ideal, and each manager has his own special difficulties to contend with.

Irregularity of working has undoubtedly been one of the main causes of disorganisation, and sufficient regard has not been paid to the fact that the process is essentially one that calls for chemical supervision.

Investigation during the past year has been specially directed to the attainment of two ends:—

(1) To determine the conditions best suited to maintain the efficiency of the oxide purifiers at a maximum.

(2) To determine the cause of the relatively low yield of ammonia in the "direct process" and to devise means for the prevention of loss.

Conditions Controlling the Efficiency of Oxide Purifiers.

(a) *Hydration of Oxide*.—The importance of maintaining the purifying material in a condition of suitable hydration has long been recognised in practice. The annual report for 1915 pointed out that, apart from the physical condition of the oxide originally charged into the purifiers—bog ore or artificial—the character of the material is progressively undergoing change as the proportion of free sulphur and associated impurities increases, and that an oxide that contained at the start, say, 60 per cent. of reactive hydrate ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$) at the end, and, when fully spent, may contain less than 25 per cent. Experience of the working of the "direct process" has been in favour of using an oxide with low moisture content, and especially avoiding the use of fresh oxide highly charged with moisture. Periods of disorganisation have been most frequent with a very moist material, less frequent when oxide has been dry. Nevertheless, it is doubtful whether any general rule is applicable in view of the varying conditions of practice, since not only the use to which an oxide has to be put, but also the conditions under which it is employed have to be considered. With the "direct process," as ordinarily worked, the direction of flow is usually upwards, and the boxes are worked in sequence. The

crude gas leaves the acid bubbler at a relatively high temperature (often exceeding 90 degs. Fahr.), and is subjected to very imperfect cooling before entering the purifiers, and where cooling is more efficient the condensed moisture removes much of the residual ammonia, the presence of which is so essential for the desired reactions in the boxes. The boxes, finally, are often placed in the open air and in exposed positions. Working under these adverse conditions, moisture tends to condense within the system, and water evaporated in the forward boxes condenses in those that follow. The policy of ensuring the use of a relatively dry oxide in the "direct process," therefore, is certainly one that fully justifies itself in practice, but it is not contended that the same procedure is applicable in works where conditions may be different. Each manager must determine the necessary degree of humidity for himself.

Temperature.—Experience is lacking with respect to the working temperature of oxide purifiers. In the annual report for 1915, the conclusion was reached that a working temperature of 70 to 80 degs. Fahr. (21 to 27 degs. Cent.) should be suitable under ideal conditions of work. However, results obtained at two works operating the "direct process" indicate that under the special conditions existing in this class of work temperatures much exceeding the limits named above are consistent with efficiency. No similar data have yet been obtained with respect to ordinary coal gas purifiers. This is a problem that might well engage the attention of those in charge. Undoubtedly purifiers, generally, would be far better under control, more especially during the winter months, were the boxes better protected from the weather, and maintained at a steady temperature, controlled, if need be, by means of steam pipes. In this connection the adoption of a "rotation" system of working would appear to offer advantages, since the cyclic movement of the boxes brings them successively into the reaction zone, and thus helps to maintain an even temperature throughout the system, and minimise the deposition of moisture, which is such a source of trouble during the colder weather. Where adopted, the "backward rotation system" is well spoken of in the "direct process."

Ammonia.—The part played by ammonia in oxide purification still remains obscure, but experience confirms the view that while purifiers will undoubtedly work well under conditions which result in the formation of "soluble salts of iron" (ferrous sulphate) the activity of the oxide is markedly higher when sufficient ammonia is present in the crude coal gas to maintain the oxide in a neutral or slightly alkaline condition, and in some works the life of the oxide has been markedly extended by the supply of a controlled amount of ammonia to the boxes. Special attention has been directed to determine the minimum amount of ammonia necessary to maintain the purifiers at maximum efficiency; analysis of the crude gas has been made, and the supply of ammonia carefully regulated by means of a by-pass tap or rotary washer fed with ammonia liquor. Results are difficult to interpret, but there is reason to believe that the amount of ammonia required to maintain the oxide in a state of neutrality bears direct relationship to the amount of ferrous sulphate formed, and that the formation of ferrous sulphate is favoured by excessive moisture and possibly by low temperature. Ferrous sulphate is a normal sulphiding reaction product, though in small amount; during revivification under suitable conditions it is reconverted into ferric hydrate by the agency of alkalies or carbonates in the oxide ("Lux" is especially rich in soda; bog ores contain calcium carbonate). During sulphiding, however, it appears to be capable of coexisting in the mass with sulphide of iron unless sufficient ammonia be present to decompose it; revivification seems to proceed more slowly when ferrous sulphate is present. It is possible that the presence of ferrous sulphate tends to inhibit the action of oxygen upon the sulphided mass, and that its removal by the addition of an alkali, such as ammonia, is favourable to the reactions which result in the regeneration of ferric hydrate in the "oxidation zone." The amount of ferrous sulphate actually present at any given moment in the mass appears to be small, probably a fraction of one per cent. in normal working, but in relation to the actual reacting weights of sulphuretted hydrogen and ferric hydrate the amount cannot be regarded as negligible; during any given period of working that precedes fouling, a proportion only of the oxide takes part in the reactions; it is the surface layer that acts, rather than the denser substratum, and if ferrous sulphate be formed on the surface layer its conversion into ferrous hydrate or sulphate may have a profound effect upon the catalytic activity of the material. In any case, and apart from catalytic considerations, reconversion of ferrous sulphate must directly actuate a relatively large amount of material otherwise incapable of absorbing sulphuretted hydrogen. The analyses of spent oxide indicate that under suitable conditions an amount of ferrous sulphate may be formed cumulatively exceeding 4 per cent. of the total sulphur in the revivified product; no doubt a large proportion of this is derived during revivification from the disulphide normally present in spent oxide.

Exact data are lacking to determine the amount of ammonia present in the crude coal gas entering the purifiers in the older process, but, in the "direct process," tests show that a quantity far exceeding this amount is required during periods of disorganisation; during regular working $6\frac{1}{2}$ grains should suffice.

If the need of admitting a certain proportion of ammonia to the purifiers be accepted, the question arises at what point in the system we are to introduce it. While, undoubtedly, the bulk of the work must be done in the first purifier, temperature records indicate that the bottom and middle layers of the second purifier are by no means inactive, and at works where an exit test at the exit of the third box is relied upon, all three layers in the second box should be operative. It would appear desirable, therefore, to admit a certain proportion of the ammonia direct to the second box in addition to that supplied to the first, in place of supplying an excess to the first box in the hope that some of it may escape absorption in the upper layers of oxide and enter the second box.

Impurities.—The importance of freeing the gas from tar fog, oils and naphthalene is generally recognised. Cyanogen recovery—by scrubbing with ferrous sulphate—is now regularly practised at one works, but recovery of the hydrocyanic acid has not obviated purifier troubles. Improvement has resulted, but this is mainly attributed to the use of drier oxide and more careful control of the ammonia by-pass aided by the use of steam.

Consideration of all the results hitherto obtained has led to the conclusion that in large scale practice exact control of working with a view to determine the effect of varying factors on efficiency is practically impossible, and that it is essential that large scale tests should be repeated in the laboratory under simpler conditions, if reliable data are to be forthcoming.

Recovery of Ammonia in the "Direct Process."

The relatively low yield of ammonia in the "direct process" was adversely commented on in the report for 1915. At that time ammonia was being supplied to the purifiers in certain works with little regard to the requirements of the process in an endeavour to secure greater freedom from purifier troubles, and the uncontrolled use of ammonia generally was considered responsible in great measure for the low yield of sulphate at works where it was practised. At a later date opportunity was found to examine the working of the virgin liquor stills. Exact data were not available to decide the amounts of ammonia supplied to the "bubbler" by the still and crude coal gas relatively, but it was evident that at certain works at least 50, perhaps 60 per cent. of the total ammonia was supplied by the virgin liquor, an amount far in excess of that previously supposed. It was further found that the stills were too often worked with little regard to the need of maintaining a regular and adequate supply of lime to the "fixed" section, and generally that the due regulation of steam and the efficient working of the condenser received too little attention. Examination by test of the effluent spent liquor showed that very serious loss of ammonia was taking place at some works and that this ammonia was chiefly present in the "fixed" form, and that insufficiency of lime was responsible: at one works ammonia equivalent to no less than $5\frac{1}{2}$ lb. s/a per ton of coal carbonised was being run to waste, 97 per cent. of which was in the "fixed" form; at a second works ammonia equivalent to 5 lb. s/a (99 per cent. "fixed"); at a third 3 lb. (83 per cent. "fixed"). It is only fair to state that the management in every case at once took steps to remedy this condition of things, so regrettable in view of the importance of conserving national resources. Efficient working of the still is not a difficult matter even for an unskilled man, if the precaution be taken of applying simple qualitative test to the effluent. A distinct odour of ammonia in the hot liquor as drawn denotes insufficiency of steam or too rapid a flow of liquor; an increased odour on addition of a pinch of lime denotes the presence of "fixed" ammonia and deficiency of lime. Managers would be well advised to test their effluents periodically; the quality of the slaked lime is apt to vary, and a supply that may be adequate with lime of good quality may be seriously deficient with a poor material. Such test is automatically applied when a portion of the effluent is used hot for preparation of the milk-of-lime feed; such practice has the added advantage of minimising the volume of spent liquor to be dealt with. It is worth considering, also, whether the Liebig condenser might not be used as a preheater where the still is of the continuous type.

Even where every attention has been paid to prevent loss of ammonia, the yield of sulphate is still low, judged by relative standards, and the question arises, are we justified in assuming a recovery figure of 28 to 30 lb. s/a per ton of coal in the absence of reliable data regarding the actual amount of ammonia that leaves the retorts? Late in the year an attempt was made to determine the amount of ammonia in the virgin liquor and crude gas entering the bubbler at one works, and the results indicate that further enquiry is called for. Those who are interested in gas works problems are invited to assist in elucidating some of the many questions that call for study; the field is a wide one; there must be many works chemists with expert knowledge who have facilities for research far exceeding those available to those who, in a sense, have to attack these problems from the outside.

Sulphiding Hydrated Oxide in a Model Purifier.

Experiments have been made with a sample of unused N.E. Dutch bog ore, the purifier consisting of a glass cylinder about 305 mm. (12 in.) long by 45 mm. ($1\frac{3}{4}$ in.) diameter, fitted at each end with a rubber stopper carrying the necessary connections; a glass rod, centrally placed, carried four superimposed rubber discs to serve as "grids"; the discs were pierced with holes and covered with a thin layer of cotton wool to support the oxide. About 58 c.c. of oxide were used in each experiment, allowing a depth of rather more than 12 mm. ($\frac{1}{2}$ in.) on each "grid." The gas used was crude coal gas leaving a scrubber fed with gas liquor containing about 1.95 per cent. "free" ammonia, and in one experiment, with a scrubber temperature of 8.5 degs. Cent. (47 degs. Fahr.), the ammonia content of the gas was found to be 6.3 grains per 100 cu. ft. of gas. Air is injected into the coal gas for use in the purifier at a later point in the system; no estimation of oxygen was made during the tests; the amount present would, doubtless, be small. Direction of flow was downwards through the cylinder. Contrary to expectation, it was found that the greater part of the sulphiding proper occurred in the top layer of oxide, the remaining three layers being mainly effective in absorbing the residual traces of sulphuretted hydrogen. Observed through the glass, the oxide on the top grid was seen to blacken progressively downwards; the oxide on the bottom grid began to blacken towards the end of an experiment, but on the two lower grids showed no change of colour. But it is significant that, with the selected rate of flow, which was about one and a-half times that of ordinary through an oxide purifier per unit of area at maximum rate (1,000 cu. ft. per square feet superficies per 24 hours)—traces of sulphuretted hydrogen were invariably found in the exit gas leaving the bottom

It was impossible, therefore, to determine the effect of sulphiding by means of a lead-paper test, a very practice, and recourse had to be made to iodine. A satisfactory indicator was provided by the exit gas through a Drechsel's bottle containing 15 c.c. of N/10 I and 100 c.c. of water; the iodine was stopped as soon as the iodine was exactly decolorised, and the volume of gas needed to effect the change taken as a measure of the efficiency of the oxide under the observed conditions.

It was finally decided to operate always with the same volume of material, whatever its density and degree of humidity. Samples of the oxide, therefore, were dried at various temperatures, and their efficiency compared with that of an equal volume of the undried material (58 c.c.) at different temperatures and varying rates of flow. The following results indicate:—(1) That oxide of 16 per cent. moisture—corresponding approximately to $\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ (16.8 per cent. moisture) is markedly more efficient than equal volumes of oxide containing 37 per cent. moisture ($\text{Fe}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$) and oxide dried at 100 degs. Cent. (Fe_2O_3) respectively, at both high and low temperatures; (2) that the efficiency of oxide shows marked increase with rise of temperature under all conditions of hydration.

EFFICIENCY OF BOG ORE.

EFFECT OF HYDRATION AND TEMPERATURE.

Oxide charged.	Time.	Total gas passed.	Rate of flow.	Relative efficiency.
58 c.c.	Min.	c.c.	c.c. per min.	
1. Temperature. — 36° C. (97° F.):—				
Air-dried, 47 grammes (16 p.c. moisture) ...	125	67,000	535	100
Undried, 40 grammes (37 p.c. moisture) ...	116	59,800	515	89
Dried at 100° C. 47 grammes (moisture, nil) ...	69	38,400	555	57
2. Temperature. — 5° C. (41° F.):—				
Air-dried, 46 grammes ...	52	26,200	505	39
Dried at 100° C. 47 grammes ...	37	19,700	535	29
Undried, 40 grammes ...	33	15,700	480	23

In Scotland the quantity of salts of ammonia (expressed as sulphate) produced at gas works was 21,365 tons; at iron works, 14,310 tons; at shale works, 57,988 tons; and at bone, producer gas, coke and carbonising works, 21,030 tons, a total of 114,693 tons, as compared with 118,178 tons in 1915. The tar distilled amounted to 265,482 tons (285,101), including gas and coke oven works, 139,197 tons; and other works, 126,285 tons. The pitch produced totalled 146,153 tons (143,011 tons)—viz., at gas and coke oven works, 70,879 tons; and at other works, 75,274 tons. Of the above total quantity of sulphate of ammonia, the equivalent of 7,246 tons was manufactured as concentrated ammoniacal liquor; the balance of 107,447 tons consisted of other ammonia products (sulphate, chloride, nitrate, etc.). The liquor distilled from gas works was equivalent to 21,365 tons of ammonium sulphate, and the noxious gases were destroyed as follows:—In oxide of iron purifiers, 72 per cent.; by combustion, 16 per cent.; by Claus process, 11 per cent.; and by precipitation by metallic salts, 1 per cent. In a few cases oxide purifiers were found to be foul, but there was little cause for serious complaint. At one works the stock of oxide was renewed after 14 years' continuous service; during this long period it largely increased in bulk and value. It was necessary to use exceptional means to maintain its vigour. Plans are in progress for conversion of several large sulphate of ammonia units to the production of concentrated ammoniacal liquor.

BOOK NOTICES.

How to do Business with Russia. By PETERSSON and STEVENI; with a foreword by CHAS. E. MUSGRAVE, secretary to the London Chamber of Commerce. 8 in. x 5 in. pp. 195 + 4, with appendix and map. London: Sir Isaac Pitman and Son Ltd. Price 5s. net.

Whether from a military, political, or commercial point of view, Russia is the centre of attraction. All eyes turn towards her, naturally, for there is hardly any other country which at this moment is so heavy with possibilities. Commercially, as in some other respects, Russia has the attraction of the little-known, a condition which scarcely inspires confidence, though it offers great scope to the imagination. Efforts have been made of recent years to place Anglo-Russian relations on a sounder footing of intimate and accurate knowledge, but the subject, like the country, is so vast that there is room for much greater and more continuous effort. In this direction, advice, suggestion, and information, such as abound in this eminently practical volume of Messrs. Petersson and Steveni, are of the highest value. The average Britisher, whether on business or pleasure bent, is apt to find himself quite at sea in Russia from sheer misunderstanding of the character and temperamental traits of the Russian people. The authors are careful to indicate this, and scatter with a liberal hand hint and warning of a kind that comes only from personal experiences. They give an excellent *aperçu* of the productive riches of the various sections of Russia in Part I.; but the great value of the book lies, in our opinion, in the pointed, yet full, survey of the nature of business in Russia, its mechanism, its requirements, its dangers, and its prospects, in Part II. Only experienced business men could have written this section, and we recommend its careful study to any Britishers who are dreaming of business with Russia. We are glad to note the insistence of the authors on the necessity for the study of the Russian language, social habits, and manner of thought by those who intend to do business in Russia; where the German has stolen a march; but it is an advantage that the authors, under the changed régime the world has seen, have placed that German advantage in its proper perspective of real practical value, and have crammed into a small space a mass of useful information that seems almost

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

There being a desire that the Coal Controller should be approached with a view to securing better distribution of trade as between district and district, also between colliery and colliery, the South Wales executive requested that the Miners' Federation of Great Britain would make representation to the Controller on the subject; and at last week's sitting of the executive in Cardiff a reply was read which intimated that action in the desired direction was being taken by him.

The mining school which has been held during the week at Swansea Technical College is the 13th annual gathering for instruction in mining and engineering; and it is noteworthy that, notwithstanding Army difficulties, the number of students closely approximates to that of preceding years. As previously stated, this school is intended to meet the requirements of employers for a better educated class of subordinate officials, and it has been organised upon the best systems operating in Europe and America. That the value of the school's work is recognised may be gauged from the fact that some hundreds of previous students have secured official appointments in the mines, the employers being very prompt to give positions to young men who have distinguished themselves in the school. Beside the work in the classes, there are competitions in timber and shot-firing and in ambulance work. In connection with the mining and mechanical engineering and electrical engineering, there is a special course of lectures and demonstrations in electro-technics, as well as experiments in all types of colliery signalling. Prof. Daniel Burns, of Glasgow, deals with haulage and winding and the other applications of electricity to mining. The staff at the School of Mining Engineering consists of Mr. Daniel Davies, M.E., Mr. M. D. Williams, M.E.; electro-technics, Mr. J. C. Kirkman, B.Sc.; mechanical engineering, Mr. T. Gilbert Jones, M.Sc., and Mr. W. Firth, M.Sc.; electrical engineering, Dr. Mansergh Varley, M.A., and Mr. Reg. Richards, B.Sc.

The Gvaun-ae-Gurwen Colliery Company, suing several of their hauliers in Neath County Court for damages, suggested, through their solicitor, that the defendants had deliberately and designedly restricted the output, with the object of forcing the employers to come to a certain arrangement. The pit was stopped on March 3, and after a week's idleness the men achieved their object, and on resumption of work the output was greatly increased. The serious condition of things described constituted a breach of contract for which the men concerned were liable. During the period of low output they claimed the minimum wage, and the claims of the hauliers and colliers were referred to arbitration. In consequence of the hauliers not supplying the colliers with trams, the company had to pay the minimum wage for the third week in March all through the district in which the defendants were employed; in connection with the arbitration, it had been decided that the hauliers were not entitled to the minimum wage, as they had not worked with diligence and efficiency. For the defence, it was contended that the reduction in output had been due to an excessive quantity of rubbish among the coal. Judgment was given for the plaintiff company for £27 14s. 2d.; and his Honour said there was no doubt in his mind that three men who had been ordered out did not, in his opinion, pursue their calling with the diligence expected of them, and that the other men went out with them on sympathetic grounds.

The Newport Harbour Board had before it at its last meeting a report that the joint committee with the Alexandra Dock Company are now engaged in dredging 400 yds. above the new channel boundary, in order to improve the approach. There had been during the month of July a decrease of £109 in dues, as compared with the corresponding month of last year. The whole of the men engaged on the dredging plant are being paid 15s. a week war bonus.

Maj. Watts Morgan, addressing a meeting at Tonyrefail called by the local Trades and Labour Council, spoke of the work of the Welsh soldiers, and appealed for closer unity at home. In the course of moving a vote of thanks to him, the speaker expressed hope for his early return to the district as miners' agent.

A Neath collier and a shot-firer were brought up at Neath Court on Friday of last week on a serious charge. It was stated by the prosecution that the fireman at the pit found on July 21 that the collier's working place was crossed, showing that it was dangerous, and on examination he discovered that a shot had missed fire. The collier was told that he would have to bore a fresh hole, but subsequently the fireman found that the shot had been fired without a fresh hole having been drilled. Both men might have been blown to pieces. The defendants pleaded guilty, and they were each fined 4 gs., including costs, for removing the stemming after the hole had been charged; they were ordered to pay costs in the second case against them, for having placed the second charge in the same hole after the shot had missed fire.

At an inquest upon a fireman carpenter employed at Llanbradach Colliery, who died at the Cardiff Hospital from a fractured spine, it was stated that deceased and three other men were repairing the shaft. When descending, the deceased was caught between the box in which they were being hoisted and a beam, and sustained the serious injury mentioned. The jury returned a verdict of "Accidental death."

The new manager of Messrs. Lancasters' North Blaiza Collieries is Mr. Thomas Williams, M.E., who has been one of the examiners for firemen's certificates under the Breconshire Committee, and gained the medal for efficiency in handling rescue work apparatus. He was trained in the Monmouthshire technical classes and at Crumlin, and has a very high reputation for work already accomplished.

Messrs. Richard Thomas and Company, one of the leading tin-plate and steel firms in South Wales, have taken over—in conjunction with Mr. Forster, of Darlaston—the Capon Field Iron Works at Bilston, near Wolverhampton, and they will supplement the existing blast furnaces there with steel works of fully up-to-date type.

The return of trade for last week at Swansea showed a decline of 25,000 tons as compared with the corresponding week of last year. Coal shipments totalled 60,805 tons, and patent fuel 15,345 tons.

The monthly meeting of Swansea Harbour Trustees on Monday had before it a report which showed that the deficiency for the month amounted to £2,539; and Mr. Roger Beck, who moved the report of the Finance Committee, described this as a much better result than he had anticipated. This fact was largely due to the increasing connection which the Trustees were building up with the Government. Their prospects were encouraging; but they had lost immensely in the general staple trade and coal ship-

ments. He looked forward hopefully to the Government's recognition of Swansea's importance as a port. Huge stores were being put up for Government use, and those buildings would be required for three years after the war; so that Swansea, in that particular respect, would become a very valuable port for the Government. In the course of further remarks, Mr. Beck referred to important developments which it is intended to bring about at the port.

A singular accident which might have had serious results took place near the Rose Heyworth Colliery, Abertillery, during Friday night of last week. The Great Western Railway at this point runs between the colliery and its tip, being crossed by a wooden bridge. Two men with a horse were taking 10 trams across the bridge, when part of the structure collapsed, and the men with the horse and six of the trams fell to the railway below. One man was badly shaken, but the other was not seriously hurt. It was a dark night, raining, with heavy wind, and a late passenger train from Newport was approaching. One of the men ran down the line towards the train waving an electric lamp, with the result that he succeeded in bringing the train to a standstill within 40 yds. of the obstruction.

Col. Hepburn, chief of the Western General Hospital, who before the war held the chief position in Cardiff Medical School, spoke on Saturday last in Cardiff, and paid a tribute to Welsh colliers. He said that there were difficulties among them in civil life, but of this he knew nothing. He had, however, the greatest admiration for those with whom he had come into contact during the war. Many of them were on the staff. They had sacrificed good wages, and were working for 1s. 2d. a day; and, more than that, they did their work most efficiently; and during the whole period he had not had a single case of misbehaviour reported to him. At the hospitals under his control they had had nearly 40,000 patients since the war began, and the death rate was only four per 1,000. A healthy community was considered to be doing well at a death rate of anything like 2 per cent.; and it was something to be proud of that they had had their hospital death rate pulled down to nearly four in every thousand.

At Aberavon, the Argoed Colliery Company, Pont-rhydyfen, were summoned for a breach of the Explosives Act, and the manager, Gwilym Llewellyn, for aiding and abetting. On the occasion of a visit of inspection to the colliery, 1,135 lb. of explosives were found in the magazine. The building was an ideal one for the purpose, but it had not been registered. The company were fined £1 and the manager 10s.

Ten colliers working at Gellicidrim Colliery, Glan-aman, were at Ammanford summoned for riding on a full journey of trams at the end of the night shift. Two were fined 7s. 6d., and the others 10s.

The inquest on David John Roberts, 24, and Evan James Roberts, 16, brothers, of Nantycwmmer, who were killed on Thursday of last week whilst working as colliers at Nine Mile Point Colliery, took place on Tuesday. Evidence showed that a tram struck against a post and displaced it, causing a fall, under which the men were caught. It was officially stated that proper precautions had been taken in an endeavour to ensure safety, and the men's father said he had been employed at the colliery, and had no complaint to make as to its condition. The jury returned a verdict of "Accidental death."

Northumberland and Durham.

By 21 votes to 15, the Sunderland Town Council has declined to accede to the request of the Board of Trade for the part services of Mr. A. E. Blackmann, the general manager of the municipal electrical undertaking, in connection with the steps the Coal Mines Department are taking to ensure economy of coal consumption. It was explained that Mr. Blackmann would only be required by the Department for about three days a week for a month or so, but the majority of the members were of the opinion that the present position of the electrical undertaking was such as necessitated Mr. Blackmann's personal and constant supervision.

Mr. George Sweetman, of Stanley, assistant surveyor with the South Moor Colliery Company Limited, has obtained a first-class certificate for mine surveying, in connection with the City and Guilds of London Institute, and has been awarded a first prize and silver medal—so heading the list in all England. Last year he qualified as first-class surveyor by passing the final examinations under the auspices of the Home Office.

Mr. John James Stobart, coal and coke merchant, of Darlington, left estate of the gross value of £5,998 16s. 5d., with net personalty £5,820 15s. 1d.

The members of the Newbiggin branch of the Northumberland Miners' Association have passed a resolution protesting against their officials, both local and central, associating themselves with the statements of the recent Leeds conference, believing that such are detrimental to the country's welfare, and not conducive to bringing the war to a successful issue, and requesting those officials, both local and central, to resign their positions.

When sending Thomas Matthews, putter, to prison for one month's hard labour for having hewed coal from the wall side at Ryhope Colliery, the chairman of the Sunderland magistrates stated that such offences must be stamped out, and fines apparently had no effect.

At the annual meeting of the Conssett Iron Company Limited, held at Newcastle on Saturday last, Mr. Mark Fenwick, presiding, stated that they had been negotiating with the Coal Controller, and, while the agreement came to was confidential, he could say that it meant a further considerable payment from their profits. Maximum prices had been fixed by the Government for most of their products, and with the coal usually exported diverted inland at lower rates, there was no likelihood of their average selling price increasing, while the costs were steadily going up, and this would be reflected in the accounts for the current year. They were helping the Government in the production of more iron and steel, and had already blown in one extra blast furnace, and were preparing to blow in a big one, but he thought that, when that was done, it would be necessary to close one of the seven now working on account of traffic difficulties, and because it was not good policy for them all to be worn out together.

At Durham County Court, Henry Bell, of Old Cassop Farm, claimed £87 from Walter Scott Limited, coal owners, in respect of loss and damage sustained by a horse by reason of the defendants' mining operations. Whilst ploughing in a field which had been considerably affected by mining operations, the animal walked upon ground adjacent to a pitfall. The ground gave way, and the horse fell into a hole, with the result that its back was injured, and it had to be laid idle for 22 weeks. The defendants contended they had no liability to fence or fill in the hole; they paid damages yearly in respect of the crops; the accident was due to plaintiff's own neglect, as he knew that the hole was there, and should have taken proper precautions. Judgment for defendant company with costs.

Whilst it is not anticipated that Newcastle, being in the centre of a coal field, will be "rationed" in respect of the winter coal supplies in like manner to London, there are indications that many Newcastle residents are laying in considerable stocks of fuel. At one private house 60 tons have been laid in, and orders for quantities varying from five to 20 tons are stated to be fairly numerous.

Cumberland.

At the Cocker-mouth County Court on Friday of last week, Leopold Berginans, a Belgian refugee, a labourer, or Workington, who met with an accident at the West Cumberland Iron and Steel Company's works at Workington on September 30, 1916, and had his left hip joint dislocated and his knee injured, sought for an award against the company under the Workmen's Compensation Act. It was stated that he was now able to perform only light work, at which he was making £2 2s. 3d. a week on an average; his average earnings before the accident were £2 6s. 7d., and the application was for an award of 4s. 4d. per week. For the company, it was contended that the man had been misinstructing his solicitors all through. There was a dispute as to wages, which was referred to the Ministry of Munitions, who decided that these men should have another war bonus. They made that payment retrospective, and he was paid in a lump sum £5 6s. 7d. That put his earnings more than before. Ultimately the company agreed to a declaration of liability, with costs to date, which offer was accepted.

An official announcement was made at Barrow on Friday of last week by the Controller of Coal Supplies, that there would be no increase in the price of household coal at Barrow.

Yorkshire.

Bradford Board of Guardians have accepted the tender of Messrs. W. Fletcher and Son Limited, to supply a further 1,000 tons of engine coal, to be delivered during the three months ending November 30, on the same terms as the existing contract.

Tons of roof collapsed at Nunnery Colliery, Sheffield, on Saturday last, and buried Charles Fearn, 21, a collier, of Sheffield Park.

A Maltby pithand, Laurence Daniels, was fined £5 at Doncaster for a breach of the Mines Act. He had left 63 full tubs standing in the haulage road, blocking it and other roads. He was found at the pit bottom, three-quarters of an hour before the termination of the shift, and the deputy asked him several times to move the tubs, but he refused. The chairman said the Bench felt very much inclined to send defendant to prison. But for the fact that his work was of importance he would have been.

A very interesting communication concerning the water supply of a large and important colliery district around Doncaster was read at last week's meeting of the Adwick-le-Street Urban District Council. It was signed by Mr. P. T. Davis Cooke, and, on behalf of the Bullcroft Colliery, by Mr. Wm. Humble; and the Brodsworth Colliery, by Mr. J. T. Greensmith. They suggested the time had arrived when the water supply of the district should be placed upon a more satisfactory and permanent footing. They had considered the formation of a joint water company to provide a scheme for supplying the whole area of the Council, including Adwick, Woodlands, and Carcroft, and offered to wait upon the Council to discuss it. It was decided to ask the signatories to the letter to put their scheme in writing.

At a mass meeting at Attercliffe (Sheffield) of the mine workers of the Nunnery 1 and 2, Waverley, Woodthorpe, Birley, Orgreave, and Tinsley Park collieries, Mr. Thomas Smith (Nunnery No. 2 branch of the Yorkshire Miners' Association) presiding, a resolution, proposed by Mr. G. H. Rowland (Nunnery No. 1), was passed expressing belief that all classes of labour in or about the mines should combine on the principle of organisation by industry, in accordance with the policy of the Miners' Federation and the Yorkshire Miners' Association.

Lancashire and Cheshire.

Mr. Alfred Worswick, formerly of Wigan, and late of The Nook, Woodcote Green, Wallington, Surrey, engineer, left £11,309.

The Blackpool Electricity Committee has considered an application from the Coal Mines Department for the services of their electrical engineer, Mr. Charles Furness, to render part-time service in visiting certain local authorities in Cumberland and North Lancashire, with the object of discussing fuel economies, and submitting reports thereon to the Board. Mr. Furness was given permission to do what he thinks best.

Many mill owners, bleachers and dyers, engineers, chemical manufacturers, paper makers, and other large coal consumers in Bury, Heywood, Rochdale, Oldham, Manchester, Ashton, Stalybridge, Salford, Eccles, Swinton, Walkden, Farnworth, and Bolton districts are now laying in big stocks of fuel in case there is a shortage of coal during the coming winter months. Special provision for storage is being made at many works.

One of our correspondents learnt on Monday from representatives of the Lancashire and Cheshire Coal Owners' Association, and from members of individual colliery firms in Wigan, Leigh, and Bolton districts, that important electrical developments at collieries (including new undertakings) in those areas are being seriously delayed through lack of materials and shortage of labour in consequence of the war. Many important and costly contracts have been held up for some time past.

The holidays now being taken in the great industrial centres of Lancashire are causing a greatly decreased demand for steam coal in those particular areas, which explains in a measure the apparent slackness now manifest in some parts of the Lancashire coal fields.

Upon the publication of the coal rationing scheme in the public Press at the beginning of this week, there was an extraordinary rush of orders from householders in Manchester and surrounding districts, who did not know that the scheme affects London and the Metropolitan area only. Many of them were openly sceptical when informed by their coal dealers of the true state of affairs, and insisted on having extra stocks delivered in case, as they put it, the rationing scheme is made to apply all round.

A new coal company, Messrs. Richard Bather and Company Limited, of 6, Castle-street, Liverpool, has been registered as a private company, with a capital of £20,000. The directors are Mr. Thomas Wilton, chairman, and Mr. Fredk. Dobson (chairman and director respectively of Messrs. Renwick, Wilton and Company Limited, Torquay). The managing director is Mr. Richard Bather, who has been connected with the coal trade in Liverpool for the past 20 years, and was for a great part of that time Liverpool manager for Lord Ellesmere's Bridgewater Collieries.

Mr. J. Cooper has resigned the post of master of the Princes' Landing Stage, Liverpool, after 44 years of service with the Mersey Dock and Harbour Board.

North Wales.

Mr. J. W. Williams, Rhos, has decided, through pressure of work, to relinquish the post of local secretary of the Lancashire, Cheshire, and North Wales Enginemen and Boilermakers' Federation, which he has held for many years past. He will, however, continue to act as secretary of the North Wales Surfacemen's Union.

Maj. T. H. Parry, M.P. for Flint Boroughs (son of Mr. T. Parry, colliery proprietor, Mold), has been in hospital for some time as a result of a wound received in active service, but is now convalescent, and has re-joined his unit. Maj. Parry has been wounded twice, and has been awarded the D.S.O.

The third annual conference of the North Wales Labour Council was held on Saturday last at Llandudno, presided over by Mr. Hugh Hughes, financial secretary of the North Wales Miners' Federation. In the course of his presidential speech, Mr. Hughes said, in spite of what Mr. Lloyd George might say, the workers of the country must, and would, have a voice as to what the terms of peace are to be; and he took strong exception to the statement of the Prime Minister in the House of Commons on August 1, when he stated that "we do not propose to allow any sectional conference to decide or dictate terms of peace, which must be the responsibility of the Government, and they alone." Mr. Hughes contended this statement was a direct challenge to labour. Resolutions were passed at the conference in favour of increased wages for soldiers and increased labour representation on the local Food Control Committees.

Notts and Derbyshire.

Prosecuted by the Grassmoor Colliery Company for breaking three electric safety lamps in the pit, James E. Mitchell was fined £3, and Albert Brown and Leonard Wheeldon £3 each, at Chesterfield on Saturday last.

The Midlands.

Mr. T. A. Staley, of Earlsdon, Coventry (recently connected with the Warwickshire Coal Company Limited, Coventry), has been appointed assistant manager at the Whitfield Collieries, North Staffs, where he commenced his duties on Monday last.

Another levy for men is being made by the recruiting authorities on the Warwickshire coal field. This week each colliery is being advised of the number of miners required of it towards an aggregate of 350, which is the contribution that is just now being levied. The new arrangement is calculated to promote the smooth working of the levy. Nevertheless, the coal masters are ill-pleased with this continued withdrawal of men from the mines, and enquire how the authorities expect the coal supply to be maintained during the coming winter if it is the intention to continue these periodic drafts from the pits.

The Warwickshire coal owners are once again raising the question of improving the canal transport to London, as a means of relieving the mineral traffic by railway from the Midlands. They point out that canal transport is at present handicapped owing to the railway companies having so arranged their freights that their total charges exactly equal the bedrock minimum cost of toll and haulage on the canals, and, having the greater facilities, the railways naturally attract the traffic. If the cost of transport by water were reduced by 50 per cent—a thing not at all impossible, and which would still leave a respectable profit to the hauliers—an immediate great increase would, it is being urged, be witnessed in the water carriage, greatly to the relief of the railways, at the same time that the coal masters were benefiting. Some Warwickshire coal masters well acquainted with the details of the situation, assert that, supposing such a reduction in canal freights occurred, the Midlands—by which is intended Warwickshire, South Staffs, and Nottingham—could supply the London market with 3,000,000 tons annually by canal. There is a strong feeling throughout the Midlands that water transport has not played the part it should have done in relieving railway traffic congestion, and it is hoped that something will be done before the winter sets in to assist the coal trade in this respect. The existing waterways, notwithstanding their limited capacity, might render valuable service if they were properly utilised, and the tolls reduced. If through tolls were instituted to the London market, they would be welcomed as a great step forward. It has to be borne in mind, however, that the canal companies serving the Midland coal fields are not themselves carriers, or only in isolated instances. The fact is, that if the Government control were to make it worth the carriers' while, London could obtain a largely increased supply of house coal from the Midlands by canal this winter, without any extra burden on the railway companies. The Warwickshire collieries seriously complain of the competition of seaborne coal, it being pointed out, for example, that the coal traffic to the London market on the Grand Junction Canal is only some 15,000 tons a year; yet the total coal traffic on the same waterway in the direction of the Metropolis is 273,000 tons a year.

Kent.

The Betteshanger Coal Boring Company have informed the Sandwich Corporation that they are negotiating with another syndicate with a view to the development of the area, and the Corporation were asked to sanction the transfer to the company—or to a company which may be formed under their auspices—of the option of the lease of certain mineral rights in connection with the Corporation lands now held by the Ebbsfleet Coal Boring Syndicate. It was explained that the mineral area is being divided between the Ebbsfleet and Betteshanger companies, and the application relates only to the option concerning the area allotted to the Betteshanger Company. The Council sanctioned the transfer, subject to confirmation by the Ebbsfleet Syndicate.

The shipping of Kent coal to France is continuing satisfactorily, a fair proportion of the output going to our Allies.

Scotland.

A considerable amount of misunderstanding has arisen through the report that appeared in a section of the Scottish Press that Mr. Gilmour, the general secretary of the Lanarkshire Miners' Union, had taken a permanent appointment with the National Service Department of the Government. Mr. Gilmour has explained to the delegates of the Lanarkshire Miners' Union that he is only temporarily engaged at the offices of the National Service Department, and had refused to accept any salary for the work undertaken by him.

The question of medical service in the Cleland district of Lanarkshire has been causing some trouble lately. Only one doctor is left now to serve this very large area, all the others having had to present themselves for military service. An effort is being made by the Lanarkshire Medical Association to endeavour to obtain additional assistance.

Several of the lead mines in the neighbourhood of Newton Stewart, which were closed over 40 years ago, are now being re-opened.

Mr. Kenneth M. White, who has just passed his examination as mining engineer, has been appointed assistant engineer to the Ormiston Coal Company, Edinburgh. He held successive appointments with the Wigham Colliery Company and at Polmont, afterwards going out to Canada.

Shortage of labour on the surface at many collieries is responsible for large accounts for demurrage to the railway companies. To incur demurrage, though it is against the Defence of the Realm Act, can, under the present circumstances, hardly be avoided.

A scarcity of surveyors is very noticeable in connection with colliery work in Scotland. Those collieries having resident surveyors have little difficulty in claiming exemption, but with mining engineers' offices doing work on behalf of landlords the case is different. The staffs of these offices have been so depleted that the surveys, as a consequence, are much overdue.

Complaints are being made in many of the districts regarding the class of prop wood supplied. In collieries with no stock to work on, the wood is put underground in a green state, and this action the miners are resenting.

At numerous districts meetings of the miners were held, at which strong disapproval was expressed regarding the new recruiting Order. They were unanimous in refusing to countenance any further demands by the military upon miners until a complete "comb out" had been made of men who had entered the mines since August 1914. At Bellshill the meeting demanded equality of sacrifice from the Lithuanians, who form a considerable portion of the mine workers of Lanarkshire.

The first meeting of the Glasgow Committee on Coal Supplies has been held, at which it was reported that there was a grave shortage in the supply of labour for the distribution of coal, and that immediate steps would require to be taken to prevent a serious situation in the winter time. The committee decided to obtain full information as to the labour available in the district, so that representations could be made to the military service tribunals.

At a special meeting of the South of Scotland Chamber of Commerce, held at Hawick, the scheme for supplying coal from certain districts was discussed. It was stated that Hawick manufacturers obtained large gas steam coal from Plashetts, and that now they would have to get supplies from the Lothians. Representations were being made on the subject, and a letter was submitted which had been received from the Board of Trade Coal Mines Department, in which it was stated that they did not think it was in the national interest to depart, even in this case, from the general principle, viz., that no coal would be imported from England to Scotland by rail. It was necessary to consider the redistribution scheme as affecting the country as a whole. The meeting was of opinion that the reply was unsatisfactory, and the matter was remitted back to a sub-committee.

The work of enlarging and brick-building No. 7 shaft, Cowdenbeath Collieries, has now been completed. Rail guides have been fixed in the shaft, which is now of an elliptical form, and the cages run on. Work is now being pushed forward to the repairing of the underground roadway, and it is expected coal will be drawn at no distant date. While the work of enlarging the shaft was proceeding, several good seams of coal were unexpectedly cut through. Formerly this colliery was owned by the Cowdenbeath Coal Company, but now is in the hands of the Fife Coal Company. It is expected this shaft will provide work for a long period of years.

The coal export trade at Burntisland was well maintained during the week, the aggregate being 10,430 tons, as against 10,870 tons in the previous week; 5,563 tons went abroad, and 3,870 tons coastwise.

OBITUARY.

Lieut. F. D. Young, R.G.A., who has died from wounds received in action, was formerly a member of the staff of Messrs. Pyman, Bell and Company, Newcastle Quayside, and, more recently, was with Messrs. A. T. Watson and Company, coal exporters, Newcastle. He died on the day following that on which his employer, Maj. A. T. Watson, succumbed to his wounds.

Mr. Thos. Weighell, who has died at the age of 79 years, was secretary of the Northumberland Colliery Enginemen's and Firemen's Association for 36 years, right up to the time of his death, and had been connected with the association as an official for over 50 years. He had served as president and treasurer before taking up the secretaryship. Mr. Weighell was credited with having been instrumental in obtaining the eight-hour day for winding and underground enginemen in Northumberland as far back as 1872, and last December he had the gratification of seeing the concession extended to the firemen.

Mr. Matthew Kirton, of Newburn, who has died at the age of 62 years, was one of the partners in the lease of Walbottle Percy Pit, Lemington-on-Tyne, and, more recently, re-opened a pit shaft to the rear of Newburn Steel Works. His principal activities centred round quarrying in the Tyneside district.

The death is announced of Mr. Horatio Nance, coal exporter, at his residence in Cardiff, on August 9, aged 68. Mr. Nance was very popular on the Exchange, where he also carried on the business of timber merchant.

Mr. George Mitchell, coal exporter and ship owner, of Cardiff, has died of pneumonia, as the result of an operation at a London nursing home, at the age of 46 years.

Certifying Surgeon Appointed.—The Chief Inspector of Factories has appointed Dr. W. H. Wigham to be certifying surgeon under the Factory and Workshop Acts for the Tattenhall district of the county of Chester.

Exports and Imports of Mining Machinery.—The value of imports and exports of mining machinery during July is given below:—

	July.		Jan.-July.	
	1916.	1917.	1916.	1917.
Imports	£ 19,252	£ 23,210	£ 78,421	£ 110,725
Exports	53,214	80,253	362,159	436,873

These figures are not inclusive of prime movers or electrical machinery. The following shows the value of exports of prime movers other than electrical:

	July.		Jan.-July.	
	1916.	1917.	1916.	1917.
All prime movers (except electrical)	£ 395,621	£ 410,294	£ 2,547,143	£ 2,093,144
Rail locomotives	140,902	216,144	727,500	958,575
Pumping	39,268	26,794	369,777	271,563
Winding	453	333	6,627	5,635

LABOUR AND WAGES.

South Wales and Monmouthshire.

of the Ebbw Vale coke oven and by-product submitted on Thursday to the Committee on Sir George Gibbs being in the chair. They payment at a rate of time and a half on account of week-end work. The owners also presented their statement, showing that the claim was not justified. The employers' case was submitted by Mr. Hugh Bramwell, Mr. Percy Ward, Capt. Brown, and with them was Mr. Finlay Gibson, secretary of the Coal Owners' Association. Mr. James Winstone, with Mr. T. Richards, M.P., and Messrs E. Davies and W. Evans submitted the men's claim. It was intimated that the decision would be announced in due course.

Employees at electrical works did not agree to the reading of the award given by the Committee on Production in June, and the matter was therefore referred to the Industrial Commissioner, Sir George Askwith. Mr. McWhirtir, chairman of the National Federated Electrical Association, with Mr. Wintle, the secretary, represented South Wales; and the workmen's representatives were Mr. Shimman, of Cardiff, Mr. Woolecott, of Newport, and the trade union secretary. It was decided that the men were mistaken in their reading of the award, and that the employers' interpretation was correct.

The delegates of Blaenau district at their monthly meeting considered a report from Mr. Manning, the agent, who has been in negotiation with the managers of the North Blaenau Colliery in order to have a price fixed for the Black Vein seam. It was stated that this matter was not yet settled. With regard to the Black Vein at No. 2 South Griffin Pit, an offer had been made which was under consideration. A deputation from the Lower Deep Pit had met the management concerning coal "clog," and arrangements had been made whereby the men would receive 1d. per inch for all clog coming down. It is intended to take steps in order to secure better rates of pay for surface men at the No. 2 and No. 3 South Griffin Pits.

The Rhymney Valley district of miners held a private meeting on Saturday, and it is stated that the agent submitted a report concerning affairs at the Groestean Colliery, where there had been two strikes during the month. In the first case the pit was stopped for two days, it is alleged, because of delays in paying sums of money chiefly under the minimum wage award; but after an interview by the men's representative with the Rhymney Iron Company's general manager, this matter was adjusted, and the men resumed work. On Friday last, however, hauliers who considered that they had been deprived of their bonus turn on account of the two days lost during the strike referred to, refused to go back on Saturday. A meeting was held at the pit top, and the men upon the advice of their leaders decided to return to work on Monday morning. It was reported to the district meeting that there was probability of the men being sued for damages for breach of contract on account of both stoppages, and the meeting decided that the matter should be taken up by the whole district; that a statement of facts should be prepared for submission to the general secretary of the Federation, and afterwards, if necessary, to the Coal Controller—it being desired to prevent the issue of summonses.

The locomotive enginemmen of the Port Talbot branch met on Sunday and passed a resolution regarding the decision arrived at at the meeting with the Board of Trade. They appeal to a special meeting of delegates to consider a national strike; the resolution called upon the South Wales and Monmouthshire locomotive men to immediately withdraw their labour in support of the eight hours day in the event of the conference of delegates not agreeing to this course.

The locomotive enginemmen and firemen at a meeting in Newport on Sunday passed a resolution regretting the decision arrived at in the meetings between their executive council, the Railway Executive, and the Board of Trade on the question of an eight hours day.

The latest development in connection with the strike of workmen employed at the Elled Colliery, Pontypool, is that representatives of the men and their employers have been invited to Westminster to discuss the situation with the Coal Controller's representatives. It has been reported that the invitation has been accepted and hopes of a settlement are entertained. The men have been idle since the 1st ultimo.

North of England.

The special council meeting of the Northumberland Miners' Association, held on Saturday, took into consideration the question of the better allocation of trade in the mining industry of the county. It was urged that, as a guarantee regarding profits had been given to coal owners, a guarantee as to wages should be given to the miners. The president (Mr. Wm. Weir), corresponding secretary (Mr. Wm. Straker), financial secretary (Mr. John Cairns), Mr. Aaron Walton, Mr. T. Tully and Mr. W. Wade were appointed as a deputation to wait upon the Coal Controller to make representations as to the need for a better adjustment of colliery employment. Failing the Controller providing a remedy, it was agreed that the executive committee of the Miners' Federation should be asked to bring to bear all the pressure possible in order to secure the desired end. As to the men at collieries working short time, it was held that their wages should be guaranteed, so that they might be enabled to maintain their families in decency and comfort. It was decided to notify the other colliery associations in the county and the coal trimmers at Amble (who were stated to be working short time) as to the council's decisions and to invite them to appoint representatives on the deputation to the Coal Controller, if they endorsed the plan that had been decided upon.

Mr. John Iffe presided at a council meeting of the South Derbyshire Miners' Association on Saturday, when the question of men out of work at Medsham Colliery owing to water in the roadway was considered. It was decided that the men be paid according to rule. It was agreed to make a united effort to deal with non-unionists in the mines, and to make a vigorous demand that a non-union man should not be employed underground. It was explained that the question had been mentioned to the owners in the South Derbyshire district on several occasions, and it was concluded that "it had been in abeyance long."

Derbyshire Area.

Miners held on Monday and Tuesday at Derbyshire, Atherton and Tyldesley adopted in favour of pressing for a further advance in wages, and that the promised reduction in wages would not materialise to the extent foreshadowed.

in certain quarters. Similar resolutions are also being passed at meetings in the south-west Lancashire coal fields.

After the transaction of routine business at meetings of miners held in the Manchester district on Monday night, protests were raised against the action taken by the Labour leaders concerning the Stockholm conference.

Additional meetings of colliery surface workers in furtherance of their campaign for securing an eight hours day and a substantial increase in wages were held last week end and the beginning of this week in the Manchester, Leigh, Wigan and Bolton areas. Active propaganda work is now being carried out amongst the surface workers throughout the Lancashire and Cheshire coal field.

The Coppel branch of the Lancashire and Cheshire Miners' Federation last week adopted a resolution opposing the new recruiting scheme and threatened to cease work in the event of members of the branch being called up for service before men who had gone into the mines since August 1914.

Scotland.

At Coylton Colliery, Rankinston, Ayrshire, a section has been stopped by the management on the ground that it is too expensive to work under existing conditions. The twenty men involved have found employment in other sections of the pit.

At the Dalmellington pits in Ayrshire, friction has arisen in consequence of complaints relative to the filling of excessive dirt. As Dalmellington is one of the Ayrshire districts usually free from disputes, it is believed the difficulty will be got over by a conference between the representatives of the masters and the men.

At Clyde Colliery, Hamilton, liberty is being sought to strike work against the continued employment of two tradesmen who refuse to join the Miners' Union. The matter has been taken up by the executive committee of the Lanarkshire Miners' Union, and arrangements are being made to have the case dealt with.

At several pits in Mid and East Lothian the employers are resorting to binging, thereby not only securing more work for the miners at present, but securing a stock to meet extra requirements during the winter months.

Trouble has arisen at Leadhills Mine through the refusal of two of the men to sign contracts which they considered unfair. An application has been made by the men employed in the mine for permission to declare a strike for the abolition of such contracts. Mr. David Gilmour has promised to lay the whole subject before the Ministry of Munitions.

At Allanton Colliery, Hamilton, the manager has given notice of a reduction of sixpence per ton in the machine run in the Pyotshaw seam, on the ground that the places have now become normal.

A nice point has arisen at Bardsykes Colliery, near Blantyre. A miner there claims a day's wage for the loss of a day's work, caused by his not being able to find his "graith" at the beginning of his shift. It is asserted that a brusher had inadvertently sent the graith to the surface in a hutch of debris. Both the colliery manager and the brushing contractor repudiate liability for payment of wages.

At Hirst Colliery, Salsburgh, Lanarkshire, the men remained idle for two days on account of bad drawing roads. On the advice of the executive of the Lanarkshire Miners' Union the roads are to be jointly examined in order to ascertain the actual conditions.

At Barrachnie Colliery, Shettleston, some 70 men were employed by a contractor at a certain fixed day's wages. The company have now reverted to a tonnage rate which the miners contend to be too low. The latter, however, have agreed to give the new arrangement a fortnight's trial.

Considerable friction has arisen at Whitehill Colliery, East Lothian, over the attitude taken up by the manager in requiring the men to do oncost work underground or work on the surface at a wage considerably below what they would earn at the coal face. The subject is to be dealt with on behalf of the union by Provost Brown, Dalkeith.

Work is proceeding fairly steadily at most of the collieries in West Lothian, with the exception of one or two where the men are only getting about four days' employment each week.

The repairers at the Summerlee Company's pits at Prestongrange have made a claim for an advance in wages. The matter is in the hands of Mr. Young, assistant agent, and if not adjusted locally will be referred to the executive of the National Union.

Intimation has now been given by the general manager of Carron Company that the surface workers at the firm's pits in the Maryhill district will have their wages raised to 6s. 4d. per shift. The advance was promised some time ago, but was held back in consequence of some misunderstanding.

At Priory Colliery, Blantyre, a dispute is in progress over payment for extended drawing roads. A scale of payment for this extra work has been proposed, but the manager and men have been unable to come to terms.

The miners of Lanarkshire are seriously considering the wisdom of reverting to the five days a week working policy. Some branches of the union have already carried resolutions favourable to such a course.

The question of contracting at Dennyloanhead has been considered and a ballot of the workmen shows fully 5 to 1 in favour of the abolishment of contracting at the colliery.

The Banknock miners who had been on strike for an advance of 1s. per shift returned to work pending negotiations.

Jersey's Winter Coal.—For the purchase of coal for the use of the inhabitants during the coming winter, the Jersey States have authorised the Defence of the Island Committee to spend £40,000. A deputation will shortly proceed to London to interview the home authorities regarding freights, etc.

Spanish Coal Syndicate.—The formation of a National Coal Syndicate in Spain has been ordered by Royal Decree, to include all the fuel producers in the country, supplemented by district syndicates, which are to be formed in each large mining centre. The principal aim of the syndicate will be to increase the coal output, to which end all small concerns of a district are to group together, new coal fields are to be investigated, mechanical means are to be adopted wherever possible for the cutting and handling of coal, railways are to be built, ports to be enlarged, storage places and distribution centres to be established, additional rolling stock is to be provided on existing railway lines, and workmen's colonies and institutions are to be developed. The Government will construct the necessary mineral lines, and finance the development of the industry to the extent of £1,200,000.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Bristol and South Wales Railway Wagon Company Limited.—The usual interim dividend at the rate of 10 per cent. per annum for the past half-year is announced, and the warrants will be posted to-day (Friday).

Bristol Wagon and Carriage Works Company Limited.—The report for the year ended April 5 last states that, after adding £2,000 to depreciation account and charging £616 gifts to dependants of men serving in H.M. Forces, there remains (including the amount brought forward from last account) a balance of £10,081, and after deducting interim dividend of 2 per cent., there is left £7,881. The directors recommend a dividend of 3 per cent., making 5 per cent. for the year, on the preference and ordinary share capital, and that the balance of £4,581 be carried forward.

Consolidated Cambrian Limited.—The directors have declared an interim dividend in respect of the half-year ended June 30 last at the rate of 10 per cent. per annum, less tax, on the ordinary shares. Last year the interim dividend was at the rate of 15 per cent. per annum.

Fife Coal Company Limited.—Interim dividend on the ordinary shares at the rate of 15 per cent., free of income tax, comparing with 20 per cent., free of tax, a year ago.

Guest, Keen and Nettlefolds Limited.—Final dividends for the half-year ended June 30, 1917, are recommended as follows: On the preference shares at the rate of 5 per cent. per annum, and on the ordinary shares at the rate of 10 per cent. per annum, together with a bonus of 1s. per share, all free of income tax.

Horbury Junction Iron Company Limited.—The accounts for the year ended June 30 show a profit, including £5,773 brought forward, of £21,838. The directors recommend a dividend of 10 per cent., and propose to appropriate £3,500 for depreciation of plant, leaving £14,518 to be carried forward, subject to munitions exchequer payments and excess profits duty.

Lancashire Dynamo and Motor Company Limited.—Final dividend of 2½ per cent., free of tax, making 12½ per cent. for the past year on the ordinary shares.

Lochgelly Iron and Coal Company Limited.—The report for the year to May 31 last states that the profit on trading, after deducting all ordinary expenses, depreciation on works and plant, and making provision for excess profits duty and income tax, is £90,955, and £45,492 was brought forward, making £136,447. The directors recommend a dividend on the ordinary shares of £1 15s. per share (subject to tax), to carry to reserve £20,000, and to carry forward the sum of £46,447. Negotiations for renewal of two of the mineral leases were completed and new leases signed. The adjoining property of North Pitkinny, the mineral lease of which it was endeavoured to secure about 12 years ago, has been purchased.

Lofthouse Colliery Company Limited.—Interim dividend of 6s. per share, the same as a year ago.

New Sharlston Collieries Company Limited.—The directors have declared an interim dividend of 1¼ per cent. (5s. per share), less income tax, payable 24th inst.

North-Eastern Steel Company Limited.—The report for the year ended September 30, 1916, indicates that, after providing for estimated liabilities to the Government, profits amounted to £85,271, which, with £5,722 balance from 1915, makes £90,993. From this amount there has to be deducted interest paid on June 30 and accrued to September 30, 1916, on debenture stock and second debentures, £16,693; directors' fees, £1,000; provision for workmen's compensation insurance (in addition to amount paid, £1,875), £1,173; reserve account for redemption of second debentures, £7,500—£26,366, leaving £64,626 to be disposed of. Of this sum, the directors recommend that £20,000 be written off as depreciation of buildings, plant, and machinery, and £40,000 be applied in payment of a dividend of 10 per cent., free of income tax, leaving £4,626 to be carried forward.

Ocean Coal and Wilsons Limited.—This company has paid an interim dividend for the half-year ended June 30 last of 10 per cent., free of income tax (equal to 20 per cent. per annum). This compares with a distribution of 6 per cent. for the corresponding period of last year.

Swan, Hunter and Wigham Richardson Limited.—An interim dividend of 5 per cent., free of tax, on the ordinary shares has been declared.

Watson (John) Limited.—The directors have declared an interim dividend for the half-year to June 30, 1917, at the rate of 10 per cent. per annum, less tax, being the same as a year ago.

NEW COMPANIES.

Bather (Richard) and Company Limited.—Private company. Registered August 2. To carry on the business of coal, coke, lime, limestone, iron, ore, timber, petrol, and oil fuel merchants, etc. Capital, £20,000. Directors: R. Bather, T. Wilton, and F. Dobson.

Bellaphone Company Limited.—Private company. Registered office, 33, Goldhawk-road, London, W. Registered August 4. To establish, carry on the business of engineers, iron foundries, metal, mineral, and machinery merchants, etc. Capital, £1,000 in 20,000 1s. ordinary shares. Directors: M. Gilbey and S. R. Barnard.

Excelsior Engineering Company (Leeds) Limited.—Private company. Registered August 7. To carry on the trade or business of engineers, munitions manufacturers, founders, smiths, machinists, etc. Capital, £2,000. Directors: A. Morton, E. C. Richardson, F. Rawson, and H. B. Shepherd.

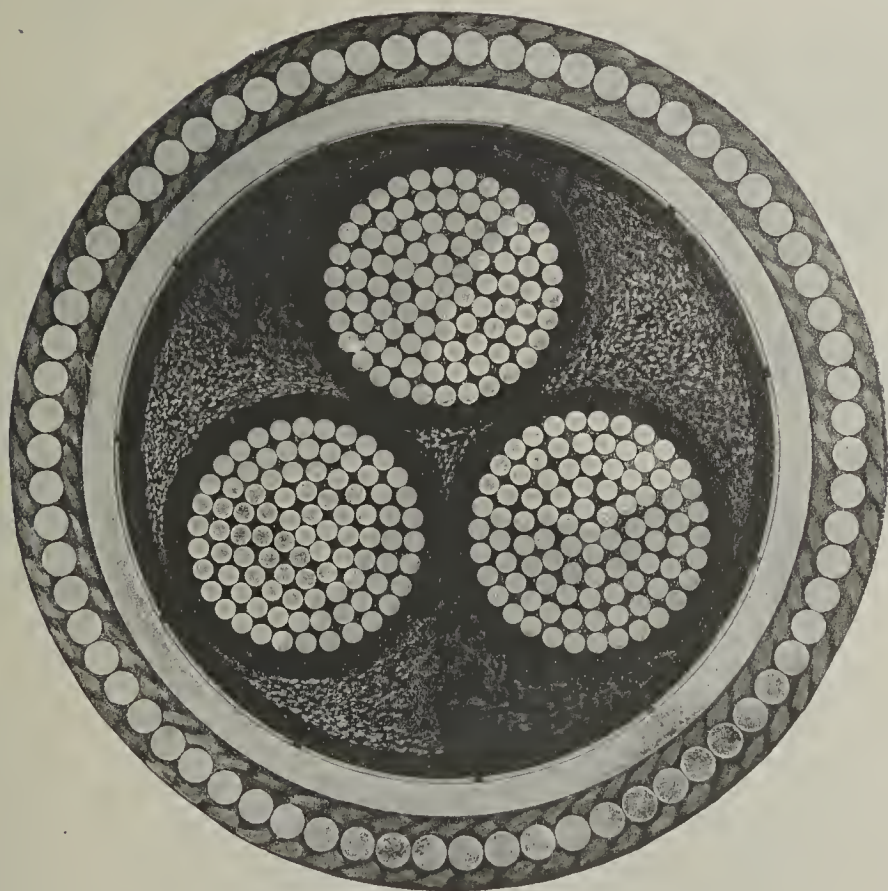
Ferguson (John) and Company Limited.—Private company. Registered August 9. To carry on the business of marine, electrical, and general engineers, etc. Capital, £1,500. Subscribers: R. T. Barton and E. C. Clark.

Holmes and Jordan Colliery Company Limited.—Private company. Registered August 3. Nature of business indicated by title. Capital, £150,000. Directors to be appointed by the subscribers. Subscribers: E. L. Mason and J. S. Wufinson.

Keeling (A. D.) Limited.—Private company. Registered office, Warstone Metal Works, Hall-street, Birmingham. To acquire and carry on the business of metal manufacturer and merchant. Capital, £50,000. Directors to be appointed by the subscribers. Subscribers: A. D. Keeling and one other.

Lancashire, Cheshire and North Wales Colliery Owners' Pitwood Association Limited.—Public company. Registered August 9. Nature of business indicated by title. Every member of the association undertakes to contribute to the assets of the association in the event of the same being wound up not exceeding a sum which shall be equivalent to 10 per cent. of the cost of the timber and pitwood supplied to him within 12 months. Directors and sub-

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30, Mosley Street, Newcastle-upon-Tyne.
247/9, Deansgate, Manchester.
91, Whitechapel, Liverpool.

165/7, Edmund Street, Birmingham.
88, Albion Street, Leeds.
56, Victoria Street, Bristol.
20, West Bute Street, Cardiff.

C. Greenwell, Poynton Colliery, Stockport, manager; H. Harwood-Bauer, Caerhowel, Mont-
director of collieries; J. F. Gillott, Moat House,
Wigan, manager of collieries; R. Landless,
Burnley, mining engineer; J. E. Rayner, 18,
Liverpool, colliery proprietor; A. J. A.
grove, Dunsiding-lane, St. Helens, mining
engineer; and five others.

Player (John) and Sons Limited.—Private company.
Registered office, Clydach-on-Tawe, Glamorgan. Regis-
tered August 9. To carry on the business of iron founders,
iron masters, metal workers, etc. Capital, £75,000.
Directors: J. W. H. and W. J. P. Player.

This list of new companies is taken from the *Daily
Register* specially compiled by Messrs. Jordan and Sons
Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late
for inclusion in this column, see LEADER and LAST
WHITE pages.

SOUTHAMPTON.—The Corporation of Southampton invite
tenders for the supply of coal to their Electricity Supply
Station. Particulars may be obtained upon application to
the borough electrical engineer. Sealed tenders, endorsed
"Tender for Coal, Electricity Works," should be sent to
the town clerk, Town Clerk's Office, Southampton. No
pledge is given to accept any tender.

Abstracts of Contracts Open.

COATBRIDGE, SEPTEMBER 4.—Coal and coke during year
commencing October 1, for the Old Monkland School
Board. Tenders to the clerk, Municipal Buildings, Coat-
bridge.

CORK, AUGUST 23.—1,200 tons of best double-screened
Whitehaven house coal for the Guardians. Tenders to the
clerk.

FRAMLINGHAM, AUGUST 24.—Coal for one term to Fram-
lingham College. Forms from the secretary.

KANTURK, AUGUST 22.—250 tons best coal for the Guar-
dians. Tenders to the Board-room.

MANCHESTER, AUGUST 20.—Coal for the Guardians.
Tenders to the Union Offices.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the
Isle of Wight County Council. Particulars from the clerk
to the Council, Newport, Isle of Wight.

PORTLAND, SEPTEMBER 4.—200 tons large Welsh steam
coal, and 300 tons anthracite nuts or beans, for the Water-
works Committee. Tenders to the engineer.

RATHMINES, AUGUST 29.—500 tons of coal for the Rath-
mines and Rathgar Urban District Council. Tenders to
the chairman.

SLEAFORD, AUGUST 25.—Coal for the Guardians. Tenders
to the Workhouse.

The date given is the latest upon which tenders can be
received.

THE FREIGHT MARKET.

Tonnage shortage has acted as a very effective negation
of business in the outward freight market this week. At
the north-east coast, chartering has been wholly confined
to coasting and near French ports, at 15s. from the Tyne
to London for the former, and the uniform rate of 45s. for
coke carriage in the latter direction. Orders in all direc-
tions with which business is nowadays transactable are very
numerous, and fancy figures are quoted; indeed, ship
owners can command practically their own terms. Thus,
Barcelona is listed at 215s., Lisbon at 85s., Oporto at from
95s. to 100s., Christiania or Gothenburg at 200 kr., and
Stockholm at 250 kr., Tyne loading in each instance. Only
the "quick turn round" appears to be favoured by ship
owners at present, however, and no fixtures for these
greater voyages are reported. As at the north-east coast,
so at South Wales business is exclusively restricted to near
ports, although the enquiry for boats for considerable dis-
tances is as active as ever, and rates in all directions are
well maintained at recent colossal levels. At the Humber,
there is a keen demand for tonnage for most directions,
and for North French ports in particular.

Homewards, the River Plate to the United Kingdom is
unvaried, from 145s. from up-river and 140s. from down-
river ports. Business therefrom is very dull. At the
United States, Virginia to the River Plate with coal is
steady, at 125s., with 20 dols. for Rio discharge. On net
form terms, Northern Range to the United Kingdom is
quoted at 200s., an advance of 20s. on the week; 220s. to
225s. to French Atlantic, an increase of from 20s. to 25s.;
and 200s. to 325s. to West Italy, a corresponding advance.
For heavy grain, neutral tonnage is in demand, at 30s. to
the United Kingdom and 32s. 6d. to France from the
Northern Range. At the Far East, Madras Coast to Mar-
seilles with kernels is very firm, and tending to advance at
500s. Saigon to Marseilles or French Atlantic with rice is
quoted at the same rate. Bombay seeks tonnage for Medi-
terranean discharge at 400s., or for United Kingdom
unloading at from 250s. to 270s. on d.w. basis. Kurrachee
to United Kingdom on scale is quoted at the easier prices
of from 225s. to 250s. Firm figures are quoted for vessels
loading at the Mediterranean ore and phosphate ports for
discharge in this country.

Tyne to Boulogne, 600, 45s., coke, six voyages; Calais or
Dunkirk, 400, 45s., coke; London, 1,350 and 1,500, 15s.;
North French Range, 800, 450, and 500, 45s., coke.

Cardiff to Cherbourg, 700, 48s., 9d., neutral; Granville,
200, 130s., sail; Havre, 1,500, 48s., 9d., neutral; North
France, 150, 120s., sail; St. Malo, 1,500, 43s., 6d., neutral.

Swansea to Caen, 1,200, 46s., 6d., neutral; 900, 48s.,
neutral; St. Servan, 600, 22s.; La Rochelle, 1,200 and
2,000, 29s.; Boulogne, 2,200, 50s., 3d., neutral; and Rouen,
2,350, 48s., 9d., neutral.

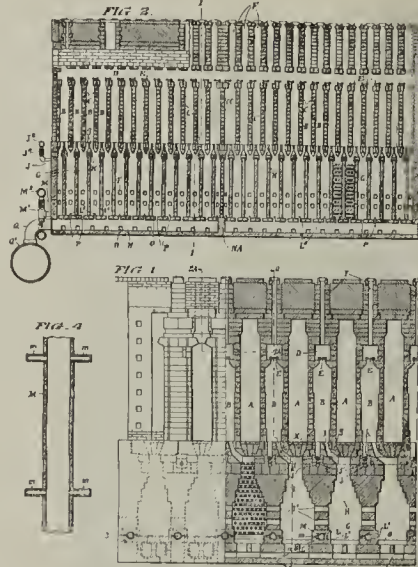
Hull to Caen, 875, 61s., 9d., neutral.

Ayr to Bilbao, 2,600, 135s.

Kharkoff Coal: Reduced Output.—In the Kharkoff dis-
trict the production of coal in May amounted to only
that of anthracite to 27,500,000
4,000 poods, whereas the average
160,000,000 poods. As compared
year, the decline in the output is
being ascribed, in the first place,
1 production per man, which has
head per month, or 28 per cent.
1916, and 12 per cent. in comparison
this year.

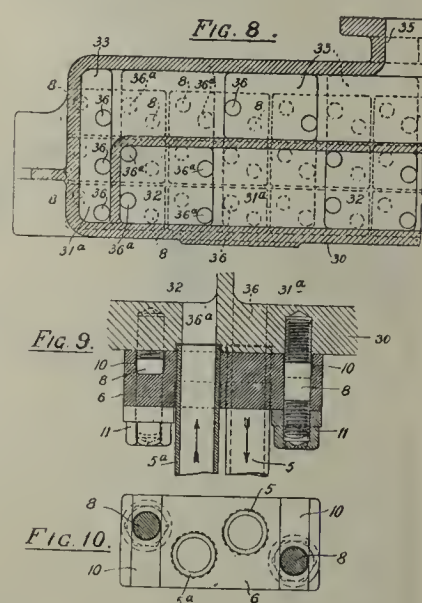
ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

106953. *Apparatus for Regulating the Distribution of
the Heating Gases of a Regenerative Coke Oven.* L.
Wilputte, Decatur-road, Sutton Manor, New Rochelle,
Westchester, State of New York, U.S.A.—The present
invention is primarily adapted for use in, and in connec-
tion with a regenerative coke oven structure of the type in
which a considerable number of the parallel heating flues
for each coking chamber, ordinarily all the heating flues
along one side of the chamber, are connected, usually at
the upper ends of the flues, to a common horizontal collect-
ing and distributing flue, which receives heating gases
through approximately half of the flues, and discharges
heating gases into each of the remaining flues, the direc-
tion of flow through the flues being reversed from time to
time. Fig. 1 is an end elevation of a portion of a coke
oven, partly in section on the line 1-1 of fig. 2; fig. 2 is a
sectional elevation, mainly in section on the line 2-2 of
fig. 1, but partly in section at the upper left hand corner
on the line 2A-2A of fig. 1; fig. 4 is a plan view of a portion
of one of the air supply pipes. A represents parallel, hori-
zontal, elongated coking chambers formed in the coke oven
structure. The walls separating the chambers A are made
hollow, as usual, to provide heating chambers which are
divided up into a series of vertical heating flues B by the
partitions C and C', and open at their upper ends into
the usual common horizontal flue D. E represents slide
dampers mounted on the tops of the partition C employed
to regulate the port area by which each flue B is con-
nected at its upper end to the common horizontal flue D.
Advantageously, as shown, the partitions C are enlarged
in cross section at their upper ends to initially restrict the
communication between the flues B and the flue D, and to
provide a better support for the slides E. Channels F
running from the flues D to the top of the oven structure
are provided as usual to permit the adjustment of the
slides E, as well as of the gas burner nozzles hereinafter
referred to. The passages F are normally closed at their
upper ends. In the lower portion of the coke oven struc-
ture are located regenerator chambers G, which run trans-
versely to the length of the heating chambers, and are
separated from one another by the transverse partition
walls H. In order to obtain the desired structural
strength, wall portions I extend across the regenerative
spaces between the division walls H and beneath the heat-
ing wall between the chambers A. Large ports or
passages J are formed in the wall portions I, however, so
that the latter do not interfere with the practical continuity
of the transversely running regenerative chambers. Each
flue B is connected at the bottom in the particular form
shown in figs 1, 2, and 4, with two regenerative chambers,
and each regenerating chamber is connected by two
passages g to two different flues for a reason hereinafter
explained. Gas burner pipes J are located in passages
formed in the oven structure beneath the flues B, and
supply gas through the ported nipples J' and burner
nozzles k into burner chambers K opening one into the
bottom of each flue B. With the arrangement of air
passages g and burner chambers K shown, the air
enters the flues at an inclination which ensures an
active combustion in the bot-
tom of the flues,
thus tending to
avoid an over-
heating of the
upper part of
the oven and the
consequent de-
struction of the
by-products and
deposits of car-
bon in the roof
of the oven
which are experi-
enced when in-
sufficient com-
bustion occurs at
the bottom of the
flues. Air supply
pipes M are
located in passages L formed in the lower portion of the
masonry structure, and, as shown, in line with the wall
portions I. These passages, as shown, each comprise a
cylindrical body portion with opposite horizontally dis-
posed radial slot-like extensions L'. In the cylindrical
body portion of each passage is located the air supply
pipe M, and the slots L' receive the laterally extending
nozzles or nipples m carried by the pipe. The passages L
open to the regenerative chambers G at one or both sides of
each passage L through ports L' in line with the nozzles m.
The air supply pipes M, as well as the burner pipes J, are
arranged in aligned pairs extending into the oven struc-
ture or battery from its opposite sides, and are preferably
removably mounted in place so that they may be withdrawn
for cleaning and to permit the nozzles or nipples connected
thereto to be adjusted or replaced. With the apparatus
shown, the distribution of the heating gases descending
through the flues B at one side or the other of the parti-
tions CC is controlled by the sizes of the corresponding
ports P at the bottom of the regenerative spaces, and by
the throttling effects of the slides or dampers E, which may
be adjusted with sole reference to their regulating effect
on the descending flow of the heating gases through the
flues below them. Since with this form of apparatus and
mode of use the dampers E serve as a supplemental means,
and not as the sole means for regulating the distribution
of the descending currents of heating gases, the parts may
be so relatively proportioned that under the conditions of
pressure and velocity at which the air and combustible
gas are supplied, the dampers E will have but a com-
paratively small effect on the distribution of the ascending
heating gases, and this modifying effect of the dampers E
on the distribution of the ascending heating gases may be
compensated for, moreover, by suitable adjustments of
the air supply nozzle m, the gas supply nipples j and the
burner nozzles k. With the apparatus disclosed, it is also
possible, and may sometimes be desirable in practice, to
adjust these dampers with sole reference to their effect on
the ascending streams of heating gases, disregarding, in
this case, the effect of the dampers E on the descending
streams of the heating gases. All of the regenerative
spaces G are employed for pre-heating air, and the com-
bustible gas supplied through the burner pipes J is not
pre-heated. This is preferable, and, indeed, necessary
when the burner combustible gas is a rich gas, such as
coke oven gas, which would be injured by pre-heating,



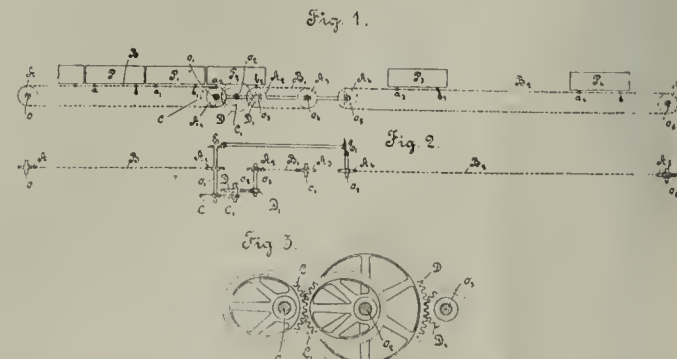
and, moreover, is small in volume in comparison with the
air with which it unites in combustion. When a less rich
combustible gas, such as producer gas, is employed, the
character and greater relative volume of the gas makes it
desirable to pre-heat the gas. It is one of the advantages
of the apparatus that it may be used without change,
except perhaps in the adjustment of the readily adjustable
flow distribution regulating devices, and in the conduit
connections external to the oven structure proper, to pre-
heat and burn producer gas. When producer gas is to be
pre-heated and burned in such an oven structure, the
external air and gas supply connections may be modified
so that alternate pipes M and consequently alternate
regenerative spaces G are supplied with air, while the
intermediate pipes M and regenerative spaces G are sup-
plied with producer gas first at one side and then at the
other side of the battery. The heating gases pass down
from the heating flues into all of the regenerative cham-
bers at the corresponding side of the battery. Combustion
then takes place at the bottom of each flue B supplied with
air and gas through the ports g opening into it. It is to
permit this method of operation that each flue B is con-
nected to two regenerative spaces, and that the nozzles m
of adjacent pipes M are staggered and open into different
regenerative spaces. (Twenty-one claims.)

107023. *Improvements in Steam Superheaters of the
Multiple Smoke or Fire Tube Type.* J. G. Robinson, Mere
Bank, Fairfield, Manchester; and the Superheater Corpora-
tion Limited, Palace-chambers, 9, Bridge-street, West-
minster, London, S.W.—Figs. 8, 9, and 10 show respec-
tively, a sectional plan of one half of a superheater header,
a front sectional elevation (on a larger scale) of the flange
block securing the ends of an element to the bottom of the
header, and a plan view of the flange block with the
element ends and screwed studs in the holes of the block.
In this construction, it will be seen that the ends of each



superheater element are secured
in holes situated
in an oblique
plane of the
flange block and
the holes in the
block through
which the screwed
studs 8 extend,
are situated in
an oppositely dis-
posed oblique
plane, so that
these two planes
intersect each
other. The header
30, figs. 8 and 9,
connected in the
usual manner
with the satur-
ated steam pipe
31 of the boiler,
is of a known
construction, com-
prising a suitable
number of trans-
versely and alter-
nately arranged steam spaces 31a and 32, the spaces 31a
being for saturated steam and 32 for superheated steam.
a longitudinal passage 33, adjacent the rear or boiler side
of the header, connecting all the saturated steam spaces
31a, and a similar longitudinal passage adjacent the front
of the header connecting all the superheated steam chambers
32, 35, being the usual tubular extension on the header
casting adapted to form communication between the satur-
ated steam pipe 31 and the saturated steam passage and
spaces in the header. Fig. 8 shows the holes, 36, 36a in
the bottom of the header, with which the saturated steam inlet
and superheated steam outlet ends, respectively 5, 5a, of the
elements register when secured, by means of the flange
blocks 6, studs 8, and nuts 11, to the bottom of the header.
the position of the two studs 8, for each flange block, fixed
in the bottom of the header, being also shown by dotted
circles. (Eight claims.)

107029. *Improvements in Conveyors.* M. Naletoff, 29,
Shirokaya, Petrograd, Russia.—The object of the invention
is to provide means by which the speeds and distances
apart of loads transported by conveyors can be varied at
certain definite points of the conveyor system, and by which
these variations can be effected smoothly, without shock,
in accordance with a predetermined law, and without
stopping any part of the conveyor system. The accom-
panying drawings show diagrammatically examples of con-
veyors according to the invention. Fig. 1 represents in
elevation, and fig. 2 in plan, a conveyor in which the loads
are transported by means of chains or ropes. The con-
veyor transports loads P, P, . . . P, by means of endless
chains along a section O, O, at a constant speed V, on a
section O, O, increases the speed V smoothly, without
shock to V, and also increases the space between the loads,
and conveys the loads on a section O, O, at a constant
speed V, with the spaces between them greater than in
the previous section O, O. The conveyor is divided into



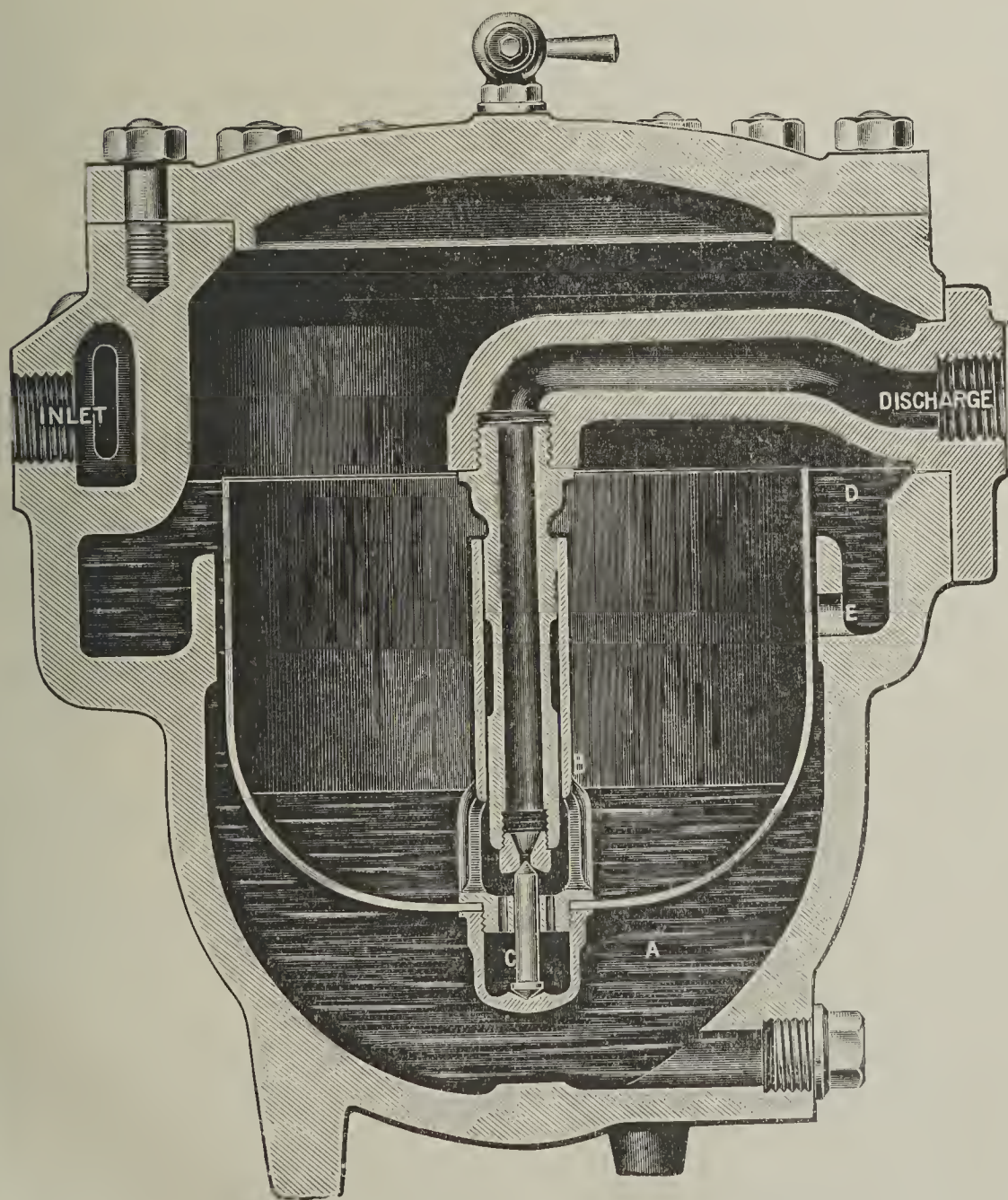
three sections, one of which O, O, is the translating sec-
tion. A chain wheel A or A, of the first section is driven
with a constant angular speed, so that an endless chain B
moves at uniform speed. The loads P, P, and P, are con-
nected with this chain by means of teeth, or other suitable
connecting elements. If a shaft O, is connected with a
shaft O, by means of transmission gear, consisting (fig. 3)
of a pair of non-circular wheels C, C, keyed on the shafts
O, and O, and a pair of circular wheels D and D, keyed
on shafts O, and O, the rotation at a constant angular
speed of the shaft O, will cause the shaft O, to rotate at a
variable angular speed; the shaft O, will rotate also with
a variable angular speed, which by means of a chain wheel
A, will actuate at a variable speed a leading chain B. This

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FOR HIGH PRESSURE AND SUPERHEATED STEAM.

R.D.S. STEAM TRAP FOR ALL PRESSURES.



HOPKINSON R.D.S. STEAM TRAP

FIGURE No. 9034.

Valve and Seat
of Hopkinson
Platnam Metal.

Cast Iron or
Cast Steel
Body & Cover.

Rapid Discharge
of Water and
Sharp Cut-off.

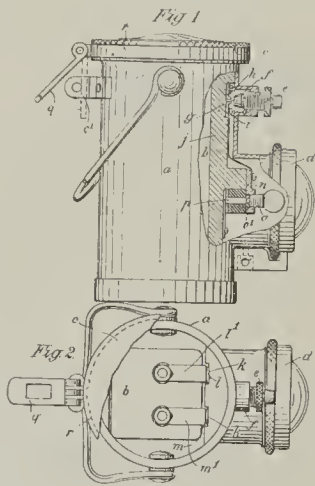
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CARDIFF - OLDHAM - BLACKPOOL - PETROGRAD

move in the general direction of movement of the chain, periodically changing its speed within the limits of the speed V_1 . If the non-circular wheels are so arranged that at the moment the load passes from the chain B_1 to the chain B_2 , the latter chain has the speed V_1 ; the loads pass smoothly from one chain to the other; it will likewise pass smoothly from chain B_1 to chain B_2 at the moment when chain B_1 has the speed V_1 , with which chain B_2 is moving. Chain B_2 is driven from shaft O_2 at constant speed by means of gearing E, E_1 . Since the loads P, P_1, P_2 pass on to the chain B_1 in succession, the spaces between them increase; and the loads separated by these increased spaces are then transported at constant speed by the chain B_2 . If the motion of the conveyor is reversed, the speed of the loads conveyed by chain B_2 is smoothly reduced by the transmission gear, the distances between the loads being diminished. In the example described, both non-circular and circular wheels are connected directly to the shafts O_1 and O_2 of the sections of the conveyor, but the transmission gear, in order to suit constructional requirements, can be connected also with elements (axles, chain wheels, etc.) of the conveyor by means of additional gear, such as circular toothed wheels, worm and chain wheels. (Seven claims.)

107074. *Improvements in Miners' Electric Safety Lamps.* O. Oldham, Denton, Manchester.—This invention relates to improvements in miners' electric safety lamps of the kind in which the electric circuit is independent of and involves no part of the lamp casing. Fig. 1 is a partial sectional elevation of a lamp constructed according to this invention; fig. 2 is a plan view with parts of the cover broken away. As shown in the drawings, and in carrying the present invention into effect, the body of the lamp preferably comprises a cylindrical casing a , into which the battery or cell b is adapted to be placed. The case a is provided with a screw-on cover c , and with a screw-on lens ring d . The switch is a simple screw stud e , which enters a flame-tight boss or chamber f on the lamp casing a , and it is so arranged that it cannot be removed from the outside of the lamp, but merely screwed in and out within predetermined limits. The screw stud e is provided with an insulated contact or tip g at its inner end, which is adapted to make and break circuit with a pair of spaced terminal pieces h, i , on a segmental ebonite or other insulating block j , secured within the lamp casing a . A pair of spaced grooves k, k' are formed in the insulating block j on its inner side, and contacts l, m are provided in said grooves, both of which grooves k and contacts l, m are adapted to co-operate with a pair of contact strips l', m' respectively on the cell b . These contacts l, m in the block j are connected to the two spaced terminal pieces h, i respectively, and in one of the connecting circuits a brass block n is interposed, and provided with a screw-threaded recess into which the lamp bulb o screws. The screw-threaded portion of the brass block o is spaced from the block j as shown, and behind it is disposed a spring supported contact member p , adapted to make contact with the central contact o' of the lamp. The hole in the reflector (not shown) is enlarged, so that the metal terminal sleeve of the lamp bulb o cannot touch it, therefore ensuring that the current flows through the lamp independently of the lamp case a . In order to seal the cover c of the lamp, a hasp q is provided and connected or hinged to a rotatable ring r mounted in a groove in the cover, as shown. Thus the cover may be sealed either with a lead rivet or by means of a padlock to a staple or lug c' on the casing. (Two claims.)



107117. *Improvements in Cranes.* Stothert and Pitt Limited, Newark Foundry, Bath; and C. M. Toplis, Walton, Frome-road, Combe Down, Bath.—This invention relates to improvements in cranes in which the path of the load is horizontal when the jib is luffed, such as are described in the specification of the Patent No. 22704/12.

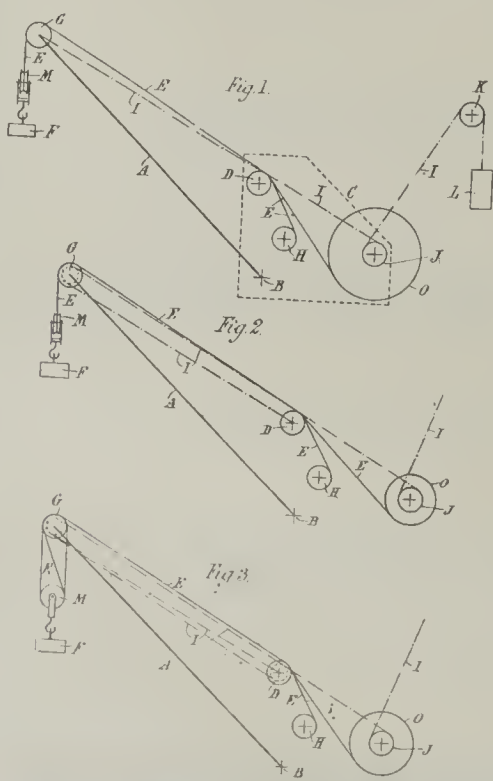
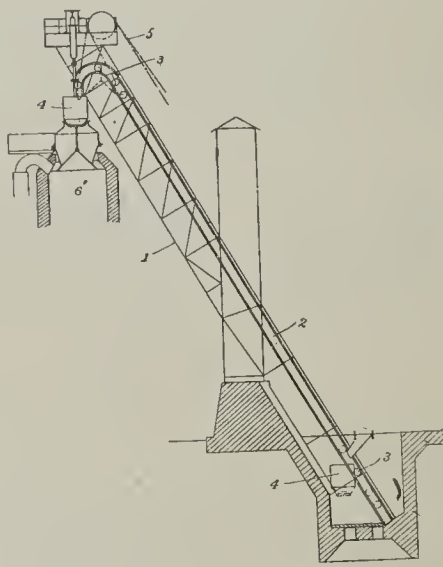


Fig. 1 shows diagrammatically a jib A pivoted at B in a structure C . D is a guide situated at a height above the jib foot approximately equal to the length of the jib. The hoist rope E passes from the sheave of the pulley D , over one of the sheaves of the pulley F , back over another sheave of the pulley D to a luffing drum J . The luffing rope I is wound round the luffing drum J , and

then led over a fixed guide pulley K , and carries a constant counter-balance weight L . The drum O is four times the diameter of the drum J , but it is obvious that the drum O might have the same diameter as the drum J , provided it is driven four times as fast. In fig. 2 the arrangement is the same as in fig. 1, except that there is a two-part luffing rope, and in this case the diameter of the drum O is twice that of the drum J . In fig. 3 again there are six falls of hoist rope between the snatch block M and the block G , and two between the block G and the block D , and there is a six-part luffing rope, and the diameter of the drum O is two and two-thirds times the diameter of the drum J . In a crane so arranged, the hoist rope passes over a minimum number of pulleys, so that it has the minimum amount of wear, and the number and size of the luffing ropes is the same as would be required in an ordinary crane in which there was no compensation. (Three claims.)

107130. *Improvements in Blast Furnace Hoists.* A. Sahlin, International Construction Company Limited, 56, Kingsway, London, W.C.—This invention relates to blast furnace hoists of the class in which charging buckets carried by trolleys are brought to the foot of a usually inclined framework or track, and there engaged respectively with a trolley frame or frames, which are guided by the framework and hoisted to the furnace top by means such as a rope or chain, the engagement being usually effected by causing the head of a bail, link, rod, or like part attached to the bucket to be caught by a hook or Y-shaped piece or like part of the hoisting trolley. According to the present invention, a safety device is provided for preventing the bucket escaping from the hook or the like part carrying it, and preferably also from swinging during its travel on the framework at desired points thereon. The drawing is a general elevation of a blast furnace hoist of the class referred to. 1 represents the inclined framework, with a double track 2, of which there are two side by side, on which travel the trolleys indicated at 3, 3, adapted to connect with and raise and lower buckets 4 by means of hoisting and lowering ropes 5, in order to discharge their contents into the furnace 6, the bucket in this case having a suspension rod provided with a button head so that the rod can be partly encircled beneath the head



by a Y-shaped piece in the form of a heavy forked or jawed block, which is part of a cross head serving as one of the axles of a trolley 3, and carrying two of its travelling wheels, such parts being substantially known. Pivoted to the cross head is a pair of tongs, one end of each arm of which carries a roller, while the other end carries a hook adapted to close in the manner of tongs in front of the bucket rod. A spring contained in a box connects the arms of the tongs near the roller end, and normally keeps the hooks close together in front of the rod. The rollers are arranged to be brought at intervals into contact with guides or cam pieces, carried by a part of the track 2 or the framework, so that the hook ends of the tong-like device will be opened when the bucket reaches the desired point, thus placing same in a condition to be released from the Y-shaped piece or fork, such, for example, as when a point is reached where an empty bucket has to be delivered or a loaded one taken. The position of the tongs with respect to the button head of the rod, and the relatively long surface of the latter partly embraced by the Y-shaped piece, prevents the bucket from swinging. (Six claims.)

107344. *Improved Fuel.* R. Illema, of 54, Scott-street, Port Dundas, Glasgow.—Relates to the manufacture of an improved fuel capable of being moulded or pressed into the form of blocks, briquettes, nuts, or the like, and composed of or contains the following ingredients, namely, bitumen or pitch (whether natural or artificial) made fluid by heat, an argilliferous substance made fluid by water, and a carbonaceous substance which may be used when in a damp or wet condition, thereby obviating the expensive and troublesome drying operations hitherto necessary in the manufacture of coal briquettes and the like. The carbonaceous substance used may be coal dust, slack, coal or wood chips, peat, or coke breeze, or sawdust, or other like readily combustible matter of mineral or vegetable origin. These ingredients are all well known as being suitable for briquette manufacture. The bitumen, or pitch, is used in a condition which may vary from that of a more or less plastic substance to that of a brittle solid at a temperature of 60 degs. Fahr. The bitumen (or pitch) is melted in a vessel. The argilliferous substance (preferably ordinary clay) is mixed with sufficient water to bring it also to a fluid condition, and then poured into the vessel containing the fluid bitumen, and the mass thoroughly stirred or agitated. Whilst this is being done, the carbonaceous substance (coal chips, or dust) is charged into the vessel, and stirring is continued until the ingredients are thoroughly mixed, the heat being maintained throughout the process. When mixed, the mass is transferred to moulds or presses, in which it is formed into blocks, etc., of the desired shape and size. The following proportions by weight are used, by way of example: 10 lb. bitumen, or pitch; 6 lb. clay; 6 lb. water; and 112 lb. coal dust. The proportion of the carbonaceous substance used would preferably vary according to its specific gravity. Experiment has shown that about 106 lb. of coke breeze to 11 lb. bitumen, 7 lb. clay, and 7 lb. water make a good briquette for firing purposes. The pressed briquettes are stacked away until the water has evaporated, and, when dry, are ready for use. (Two claims.)

GOVERNMENT PUBLICATIONS.

. Any of the following publications may be obtained on application at this office at the price named **post free**.

Alkali, etc., Works Regulations Act, 1906: 53rd Annual Report on Alkali, etc., Works, by the Chief Inspector. Proceedings during the Year 1916. Presented to the Local Government Board and to the Secretary for Scotland. Price, 1s. 6d. net.

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Ackroyd, R. E. Coal saver. (11303)
Balmford, A. B., and Bickerton, H. N. Explosion engines. (11396)
Bloxam, A. G. (Zellstoffabrik Waldhof). Roasting pyrites, ores, etc., in shelf burners. (11335)
Bradshaw, G. E. Cooling engines. (11315)
British Thomson-Houston Company (General Electric Company). Electric transforming and converting apparatus. (11392)
Cochrane, W. Internal combustion engines. (11569)
Cook, T. Recovery of benzol, toluol, and light oils from coal gas. (11434)
Court Works. Chain grates. (11571)
Cunningham, A. Fuel. (11507)
Fell, L. F. R. Means for determining horse power of engines. (11353)
Foster, H. C. Crane, etc., hooks. (11344)
Fraser, J. Dynamo electric machines. (11489)
Guinness, K. E. L. Two-stroke internal combustion engines. (11587)
Harbord, F. W. Furnaces for roasting ores. (11464)
Henery, J. Control of electric motors, applicable to cranes, hoists, etc. (11490)
Hill, W. Recovery of benzol, toluol, and light oils from coal gas. (11434)
Hjort, V. F., and Lassen, J. J. Apparatus for softening and purification of water. (11570)
Holloway, D. W. T. Internal combustion engines. (11325)
Hurd, M. Heat engines for pumping, etc. (11314)
Isko Inc. Refrigerating apparatus. (11402)
Jones, F. J. C. Manufacture of gas and coke. (11305)
Lewis, A. Power transmission gear. (11393)
Mason, G. W. Prime movers or power engines. (11378)
Nachenius, H. A. J. de B. Centrifugal pumps. (11323)
National Gas Engine Company. Explosion engines. (11396)
Parker, C. H. Chain grates. (11571)
Patchall, H. M. Differential power transmission device. (11510)
Penning, C. J. H. Internal combustion engines. (11362)
Rayner, G. H. T. and P. Percussive rock drills, etc. (11479)
Romanet, E. E. Steam generators. (11518, 11519)
Sahlin, A. Heating pit furnaces. (11445)
Sahlin, A. Apparatus for removing or replacing covers or tops of ingot or slab pit furnaces, etc. (11563)
Saunders, R. Means for preventing accidents resulting from breaking of winding rope, etc. (11426)
Smith, C. M. Two-stroke internal combustion engines. (11587)
Soc. Française Radio-Electrique. Alternating current generator and group converter. (11360)
Thornton, A. A. (Carnot Development Corporation). Rotary devices for pumping fluids. (11517)
Tinker, F. Distillation of coal, shale, etc. (11338)
Whittaker, G. R., and Yates, J. Automatic mechanical joint for boiler flues. (11422)

Complete Specifications Accepted.

(To be published on August 30.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
9186. Dehn, F. B. (Synthetic Hydrocarbon Company). Apparatus and method for the conversion of hydrocarbons. (108333)
10240. Fernandez, A. M. Steam boilers. (108338)
10263. MacLaurin, R. Separating low temperature tars into components without distillation. (108339)
10726. Lamplough, F., and Oil Extractors Limited. Low-temperature distillation of coal. (108343)
11203. Aarts, J. G. Carbonising furnaces or furnaces for reducing ores. (101215)
11972. Sterling Telephone and Electric Company, Pell, F. G., and Davey, W. C. Mine signalling keys. (108373)
12114. Marks, E. C. R. (Deutsche Babcock-und-Wilcox-Dampfkessel-Werke Akt.-Ges.). Water tube boilers. (108375)
13817. Boot, G. H. Rotary pumps. (108394)
13954. Samson, J. Signalling appliances for collieries and the like. (108397)
14320. Wiesengrund, B. Geared turbine installations. (108398)
15007. Ellison, G., and Anderson, J. Electric motor controllers and like apparatus. (108403)
16399. Thompson, W. P. (Bossard, A.). Process for the manufacture of converter bottoms, furnace hearths, and the like for metallurgical purposes. (108412)
1917.
1754. British Thomson-Houston Company, and Hastings, H. C. Electric motor control, and apparatus therefor. (108430)
5174. Hovland, H. B. Treating ores and other materials. (105571)
8603. MacLaurin, R. Separating low temperature tars into components without distillation. (108448)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
54. Oltmans, J. Processes and apparatus for obtaining lower from higher carburets of hydrogen. (108454)
10975. Heinrich, H. Rotary engines. (108488)

PUBLICATIONS RECEIVED.

"The Journal of the Institute of Metals" (Vol. 17, No. 1), 1917, edited by G. Shaw Scott, M.Sc., secretary (London: published by the Institute of Metals, 36, Victoria-street, Westminster, S.W. 1), price 21s. net.; "Proceedings of the Engineers' Society of Western Pennsylvania" (Vol. 33, No. 6), July 1917, price 50c. a number; "Journal of the Western Society of Engineers" (Vol. 22, No. 3), March 1917; "University of Illinois Bulletin" (Vol. 14, No. 46), July 16, 1917; "The Economical Purchase and Use of Coal for Heating Homes, with Special Reference to Conditions in Illinois."

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Development of Deep Coal Areas in Bengal.*

By G. GEORGE.

A remarkable change has taken place in 10 years in the view with which the sinking of deep shafts in Bengal is regarded. Excluding the Giridih coal field, where special conditions prevailed 10 years ago, the deepest shaft sunk or in contemplation was 650 ft., and a 1,000 ft. shaft was regarded largely as beyond practical politics. Now there are three collieries with shafts 1,000 ft. deep, one colliery where 1,200 ft. shafts are being sunk, one where 1,500 ft. shafts are being sunk, and one where 1,800 ft. shafts are contemplated.

The economics of deep mining in Bengal is a question which appeals directly to all holding shares in coal companies, and resolves itself into the following heads:—

(a) What is the maximum depth at which the various classes of coal can be worked at a profit with costs and selling prices prevailing at present or likely to prevail in the coming 10 years?

(b) What is the least area necessary for sinking shafts of various depths to various seams, or, to give an example, is a taking of 1,000 bighas a large enough area for sinking shafts 1,000 ft. deep to a coal likely to give a profit of Rs. 2 per ton.

Before considering these two heads in detail, there are certain considerations which must be settled, viz.: A classification of coals on their probable market value and selling price; the capital cost of sinking to various depths; the working cost at various depths, including amortisation of capital; and the profit per ton on the various classes of coal.

Classification of Coals.

This is a thorny question, if a classification by ash content or calorific value is attempted. Analysis unaccompanied by a correct method of sampling can only lead to fallacious results; but for the purpose in view this thorny question can be avoided, as we are concerned in the value the market places on the coal, i.e., the price it is likely to pay for it. As regards selling prices in the next 10 years, it may be safely assumed that they will go up, as materials are advancing rapidly in price, are not likely to return to their pre-war figures; and as the enhanced prices will affect all in the coal trade, it is reasonable to assume that the coal trade will succeed in passing on the greater part of the increase to the consumer.

It is assumed for the purposes of this paper that prices in the next 10 years will run 8 annas per ton higher on all classes of coals than present prices. Thus, viewing coals from the selling price aspect, they may be classified as follow:—

(a) First-class Ranigunge coal field coals, i.e., Disergarh, Sanctoria, and Ponati seams: Present average selling price, Rs. 4-8-0 per ton; probable average selling price for future, Rs. 5-0-0 per ton. These coals market under 11 per cent. ash.

(b) First-class Jherria seams, such as 13, 14, 14A, 15, 17 seams, when running less than 12 per cent. ash as marketed: Present price, Rs. 3-8-0; future price assumed, Rs. 4-0-0.

(c) Second-class seams in Ranigunge and Jherria fields, marketing over 12 and under 16 per cent. ash: Present selling price, Rs. 2-12-0; probable future price, Rs. 3-4-0. Seams over 16 per cent. ash can be left out of consideration.

Cost of Sinking to Various Depths.

Deep sinkings in India will not present extraordinary difficulties. The strata are good, and walling will only be required in the first 100 ft. in the majority of cases. While fairly heavy water may be expected in Jherria sinkings, the quantities will probably be such as can be dealt with by electric pumps, and special processes of sinking are not likely to be required. The price of machinery and materials has risen rapidly in the last two years, and will probably remain high for some years.

One note of warning is requisite. A very different equipment is necessary to sink and develop shafts 1,500 ft. deep to that for shafts 500 ft., and the most expensive way to sink and develop shafts is to under-equip them.

The cost of sinking shafts and developing collieries to a self-supporting basis at various depths may be taken as follows:—

	Two shafts.	Cost.	Time sinking.	Time developing.	Total time.
	Ft. deep.	Lakhs.	Years.	Years.	Years.
(1)	500	7	1½	1	2½
(2)	1,000	11	2½	1	3½
(3)	1,500	18	3½	1	4½
(4)	2,000	23½	4½	1½	6
(5)	2,500	28	5½	1½	7

* Transactions of the Mining and Geological Institute of India.

The conditions assumed are good ground, not necessitating special walling, and water not exceeding 20,000 gals. per hour in each shaft. If the water is likely to exceed these quantities considerably, 10 per cent. to the total cost should be added. The expenditure and time are taken to the period when the sale of the output meets the running charges. If little water is met, 10 per cent. can be deducted. Also coal companies already possessing collieries, with staff and plant, could save 10 per cent. in the cases (4) and (5), and possibly 20 per cent. in cases (1), (2), and (3). The cases, however, it is proposed to consider would be fresh undertakings.

The present working cost of a colliery 500 ft. deep may be taken as:—Colliery cost, Rs. 1-12-0; depreciation on plant and machinery, Rs. 0-1-6 (this merely provides for renewal of plant such as pipes, tubs, and machinery such as haulage); royalty, Rs. 0-4-0; Calcutta and sale charges, Rs. 0-4-6—a total of Rs. 2-6-0. The depreciation charge is got by taking the perishable plant in the original equipment and calculating on renewing it every 20 years. Electric plant and tubs will deteriorate more rapidly, winding engines, boilers, and rails more slowly. This charge does not allow for amortisation of the property. Allowing 2 annas per ton for the increase in cost of materials, the cost for shafts 500 ft. deep in the next 10 years may be taken as Rs. 2-8-0 per ton.

Cost in a Shaft 1,000 ft. Deep.—In a well-equipped pit the working cost is not likely to show any decided or sudden increase on that for shallower shafts. Possibly when pillar cutting is undertaken, timber costs may be heavier. Plant and machinery depreciation charges will be heavier owing to the greater value.

The cost may be taken as:—Colliery cost, Rs. 1-13-0; depreciation on plant and machinery, Rs. 0-2-0; royalty, Rs. 0-4-0; Calcutta and sale charges, Rs. 0-4-6—a total of Rs. 2-7-6. Allowing 2 annas per ton for increase in cost of materials, etc., the cost becomes Rs. 2-9-6, or, say, Rs. 2-10-0 per ton.

Cost in Shafts 1,500 ft. Deep.—Colliery cost, Rs. 1-14-0; depreciation on plant and machinery, Rs. 0-3-0; royalty, Rs. 0-4-0; Calcutta and sale charges, Rs. 0-4-6—a total of Rs. 2-9-6. Adding 2 annas per ton for increase in cost of materials, etc., Rs. 2-11-6, or, say, Rs. 2-12-0 per ton.

Cost in Shafts 2,000 ft. Deep.—Colliery cost, Rs. 2-0-0; depreciation on plant and machinery, Rs. 0-3-6; royalty, Rs. 0-4-0; Calcutta and sale charges, Rs. 0-4-6—a total of Rs. 2-12-0. Adding 2 annas per ton for increased cost of materials, the cost becomes Rs. 2-14-0.

Cost in Shafts 2,500 ft. Deep.—Colliery cost, Rs. 2-3-0; depreciation on plant and machinery, Rs. 0-4-0; royalty, Rs. 0-4-0; Calcutta and sale charges, Rs. 0-4-6—a total of Rs. 2-15-6. Adding 2 annas for increased cost of materials, etc., Rs. 3-1-6, say, Rs. 3-2-0 per ton.

Cost of Acquiring Properties.

The salami or lump sum payable to the owner of the minerals must be kept within modest limits for deep coal, Rs. 20 per bigha being a fair figure. The area necessary for various depths will be from 2,000 to 2,500 bighas; and salami, flotation, and other expenses should not involve the colliery in a capital charge of more than one lakh of rupees.

Output and Labour.

Labour is, of course, a vital matter, as it is not the least use sinking and equipping pits of the type suggested above unless labour and an adequate output can be got.

It has been asserted for many years as an argument against deep sinkings that labour would refuse to go down deep pits. This is undoubtedly a fallacy, as in a case for which the author can vouch, pits recently sunk to a depth of 1,000 ft. are amongst the most popular in the district; and no fears need be felt on this point alone. The native does not appreciate the difference between a shaft 500 ft. and 1,500 ft.

That outputs approaching English figures will be obtained is probably out of the question. The Indian miner cuts one-third as much coal per year, and consequently per day, as the English miner. Consequently three times the number of working places have to be provided, and three times as many Indian miners as would be required in the case of English miners. So it is not considered that the proposed deep collieries will raise 1,500 tons per day, or half a million tons per year; but 200,000 to 250,000 tons per year will be capable of attainment, although in each case some time will be necessary to build up the requisite labour force. It may be assumed, in all cases, that an output of 200,000 tons per year will be attained in one or two

years after sinking and development have been completed, during which period the colliery will be paying its way, but not making profits available for dividends.

Basing outputs on 200,000 tons per year in all cases, and on the costs and selling prices given above, the total profits would be:—

	Depth of shafts.				
	500 ft.	1,000 ft.	1,500 ft.	2,000 ft.	2,500 ft.
	Rs.	Rs.	Rs.	Rs.	Rs.
A grade coal...	5,00,000	4,75,000	4,50,000	4,25,000	3,75,000
B grade coal...	3,00,000	2,75,000	2,50,000	2,25,000	1,75,000
C grade coal...	1,50,000	1,25,000	1,00,000	75,000	25,000

This refers to separate undertakings. Large companies, already having electric power stations, technical staff, and workshops, can probably save up to 20 per cent. on the capital costs given above, and probably make 10 to 15 per cent. more profit.

Minimum Return on Capital.

Capital invested in mining enterprises deserves a high return owing to the relative uncertainty of mining operations, and in metal mining 12 to 15 per cent. is considered the minimum. In coal mining, the uncertainty of results is not so great, and 10 per cent. may be taken as a fair minimum return from the date of investment of capital, after providing for amortisation of capital. In the case of the deep shafts requiring large capital, a large proportion of the capital will be in the form of preference shares, say, 7 per cent. cumulative preference shares. The life of the colliery can be taken at 80 years, and amortisation of capital provided for on that basis.

An examination of all the conditions reveals that, with shafts 2,500 ft. deep, even established companies sinking in the neighbourhood of their existing collieries would not make the highest grade coal profitable, and therefore such shafts are not "practical politics" at present.

Shafts 2,000 ft. deep to B grade coals are out of the question, for the same reason, and even for A grade coals the profit would be too close to the necessary minimum profit to be pleasant, though for companies sinking adjacent to their existing collieries it is a fair mining proposition to sink 2,000 ft. to A grade coals.

Shafts 1,500 ft. deep are a fair mining proposition for separate undertakings likely to give a return of 10 to 15 per cent. to ordinary shareholders, and they will be more profitable in the cases of companies sinking them adjacent to their existing properties.

Shafts 1,000 ft. deep to B grade coals are a reasonable proposition, and in the case of A grade coals the matter is beyond doubt; whilst shafts 500 ft. deep, working A and B grade coals, are unquestionably profitable, and for the first time C grade coal becomes possible.

The summary of the conclusions is:—

(a) That shafts 2,500 ft. deep are not likely to be profitable ventures to any Indian seam at the prices and costs likely to obtain in the next 10 years.

(b) That shafts 2,000 ft. deep are inadvisable to Jherria seams, and to Disergarh and Ponati seams in the case of separate undertakings, though they may possibly be profitable to companies sinking them adjacent to existing collieries of theirs.

(c) That shafts 1,500 ft. deep are likely to be profitable to the Disergarh and Ponati seams, but not to Jherria seams.

(d) Shafts 1,000 ft. deep should undoubtedly be profitable to Disergarh and Ponati seams and also to first-class Jherria coals.

(e) Shafts 500 ft. may be profitable even for second-class Jherria coals.

Minimum Areas.

A further interesting point is the least area to which pits of various depths can be sunk to seams of various thickness.

Taking Indian coal as 81 lb. per cu. ft., and a net recovery of 75 per cent., allowing for losses in working, faults, shaft pillars, etc., the yield is 400 tons per ft. thickness of the seam per bigha.

In the cases considered above, a life of 80 years and a sale of 200,000 tons per year have been assumed. Allowing for coal consumed in boilers and dust sold, the amount raised annually would be 225,000 tons. This life in a 9 ft. seam would require 5,000 bighas; in a 12 ft. seam, 3,750 b.; in a 15 ft. seam, 3,000 b.; in an 18 ft. seam, 2,500 b.; and in a 21 ft. seam, 2,100 bighas.

When the necessary allowances for redemption are taken into calculation, the areas work out as follow:—

Shafts 2,000 ft. Deep.—Minimum life for A grade coals, 60 years. Minimum area: With a 9 ft. seam, 3,750 bighas; 12 ft., 2,800; 15 ft., 2,250; 18 ft., 1,600 bighas.

Shafts 1,500 ft. Deep.—Minimum life for A grade coals, 30 years. Minimum area: With a 9 ft. seam, 1,875 bighas; 12 ft., 1,400; 15 ft., 1,125; 18 ft., 940; and 21 ft., 800 bighas.

Shafts 1,000 ft. Deep.—Minimum life for A grade coals, 15 years. Minimum area: With a 9 ft. seam, 940; 12 ft., 700; 15 ft., 560; 18 ft., 470; and 21 ft., 400 bighas.

100 ft. high; 12 ft., 700; 15 ft., 560; 18 ft., 470; and 20 ft., 400 ft. high.

100 ft. high. Minimum life for B grade 100 ft. high. Minimum area: With a 9 ft. seam, 12 ft., 1,400; 15 ft., 1,125; 18 ft., 940; 20 ft., 800 ft. high.

Small areas would, however, be rendered available by limiting the shareholders' profits to 10 per cent., and they only represent what may be possible, and by no means what is desirable.

ESTIMATION OF FIREDAMP BY THE LIMITS OF INFLAMMABILITY.*

By M. BRUN.

The principles of the Le Chatelier method are:— (1) Any combustible gas forms which, with the air mixtures, will or will not be explosive according to the proportions taken; the proportional limits of these mixtures are invariable, assuming the external conditions to be constant. (2) When several combustible gases are mixed with air, each gas behaves in the mixture as if it were alone, and preserves its own limit of inflammability. The result is, therefore, that a given mixture of several combustible gases will act, in admixture with air, like a simple gas, and will have a well-defined limit of inflammability.

A given mixture of a total volume V , and in proportions corresponding to the limits of inflammability, contains quantities $a, a', a'' \dots$ of different combustible gases with the respective limits of inflammability $N, N', N'' \dots$ per cent.† If this volume be divided into as many parts as there are gases, each part forming a limit mixture, the volume of one of these mixtures will be:—

$$v = \frac{100 a'}{N'}$$

and the total volume will be

$$V = \Sigma v = 100 \frac{a}{N} + 100 \frac{a'}{N'} + 100 \frac{a''}{N''} + \dots$$

$$\text{whence } \frac{V}{100} = \frac{a}{N} + \frac{a'}{N'} + \frac{a''}{N''} + \dots \quad (1)$$

In practice, one of the gases will be firedamp, the other gases together constituting the reactive gas, which will be either simple or mixed.

The formula (1) is reducible to

$$\frac{V}{100} = \frac{a}{N} + \frac{a_1}{N_1} \quad (2)$$

a referring to the firedamp and a_1 to the reactive gas.

By this formula (2) the value a , and consequently the percentage x of firedamp in a sample of mine air can be calculated as follows:—

$$x = \frac{100 a}{V - a_1};$$

but, according to (2):

$$a = N \left(\frac{V}{100} - \frac{a_1}{N_1} \right),$$

$$\text{whence } x = \frac{100 N}{V - a_1} \left(\frac{V}{100} - \frac{a_1}{N_1} \right) \quad (3)$$

The Le Chatelier burette holds 200 cubic centimetres ($V = 200$) and enables the volume of gas introduced to be measured in cubic centimetres.

For the second trial, a volume V of air containing the percentage x —that is, $\frac{Vx}{100}$, of firedamp is introduced into the burette, and to this is added the volume a_2 of reactive gas, the inflammability limit of which is:

$$N_1 = \frac{100 a_1}{V + a_1}$$

The quantity $\frac{Vx}{100}$ of firedamp, in the form of a limit mixture will furnish a volume equal to:

$$\frac{100 Vx}{N - 100} = \frac{Vx}{N}$$

The reactive gas will give a volume of limit mixture equal to:

$$\frac{100 a_2}{N_1} = a_2 \frac{V + a_1}{a_1}$$

The total volume of these mixtures is $V + a_2$; therefore:

$$V + a_2 = \frac{Vx}{N} + a_2 \frac{V + a_1}{a_1}$$

$$\text{which gives: } x = N \frac{a_1 - a_2}{a_1} \quad (5)$$

Construction of the Diagram.—Take any two axes OX, OY.

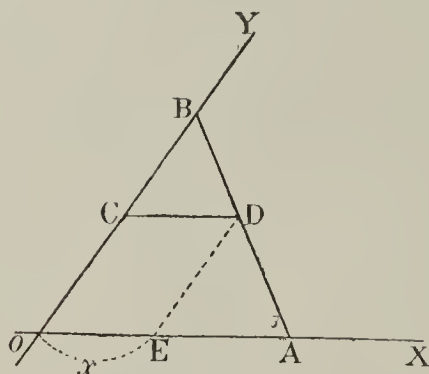


FIG. 1.

On OX mark off OA = N.

On OY mark off OB = a_1 and OC = a_2 .

On joining AB and drawing CD parallel to OX, the similar triangles BCD and BOA give:

$$\frac{CD}{OA} = \frac{CB}{OB};$$

$$\frac{CD}{N} = \frac{a_1 - a_2}{a_1};$$

that is to say:

$$\text{therefore } CD = N \frac{a_1 - a_2}{a_1} = x$$

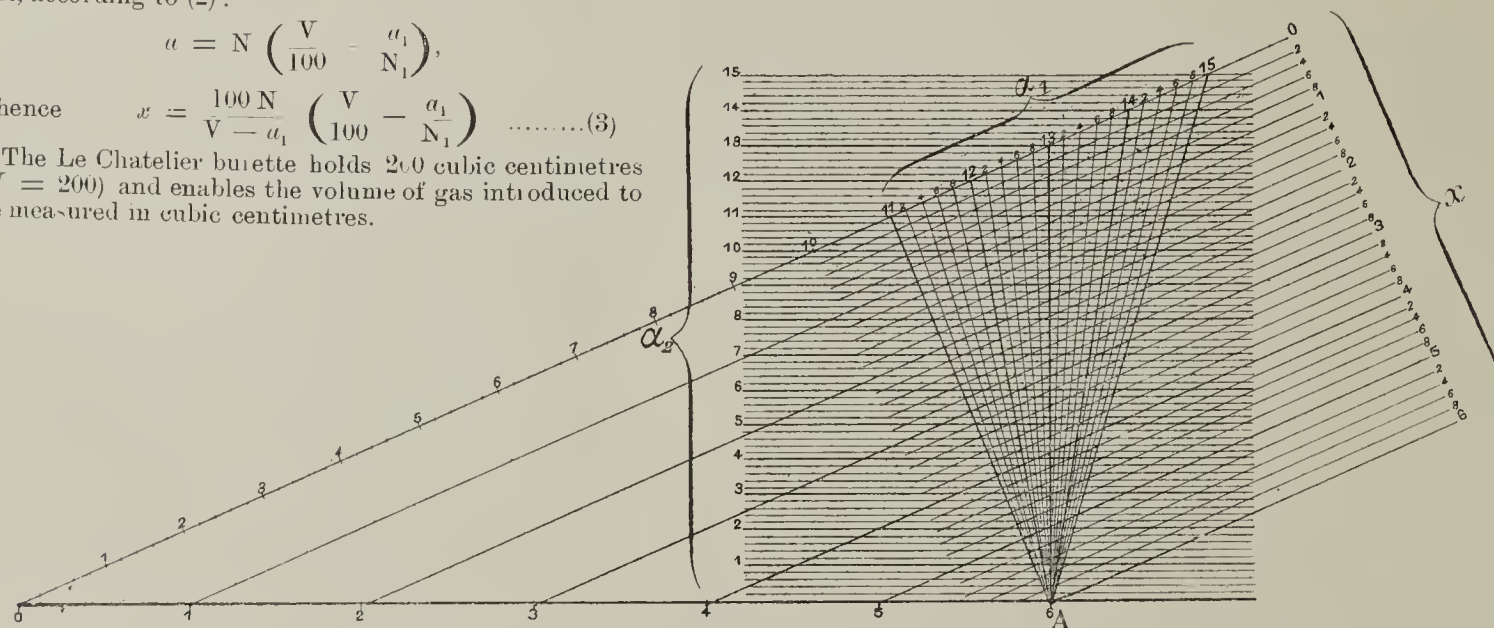


FIG. 2.

In a preliminary series of tests tentative experiments are made to determine the quantity a of reactive gas to put in so as to obtain the inflammability limit with pure air. It is found that

$$N_1 = \frac{100 a}{V} = \frac{100 a}{200} = \frac{a}{2}$$

In the same way, working with the air of a mine the value a_1 is obtained. By substituting the value of V, N, N_1 in the formula (3) (it being known that $N = 6$) we obtain finally:

$$x = \frac{1,200(a - a_1)}{a(200 - a_1)} \quad (4)$$

Note.—Attempts have been made to dispense with the calculations entailed by this formula, such calculations being a possible source of errors. This object has been achieved by several forms of apparatus, which are described by Haton de la Goupillière, in his work on mining. The following is a new modification of the Le Chatelier method, by which calculations are replaced by a simple diagram demonstrating the whole in a clear and definite matter.

The New Method.

Instead of introducing a certain volume of reactive gas into the total volume V of the burette in order to obtain limit mixtures, the volumes a_1, a_2 of the reactive gases necessary for this purpose are added to the volume V of pure or mine air.

The first trial with pure air (proceeding by tentative

$$= \frac{100 a_1}{V + a_1}$$

des Rendus Mensuels de la Société
livraison de 1916), pp. 301-8.
has maximum and minimum
symbolise the lower limit.

To obtain the complete diagram, all that is necessary is to draw the series of straight lines AB, CD, DE, which correspond to the different values expressed by a_1 and a_2 . The returning lines DE will not, as a rule, coincide with those of the diagram, but will fall between two adjacent lines. The division of the scale may always be continued far enough to obtain x with all the exactitude of experiments.

However, the limits of variation of the values a_1 and a_2 must be known. But it may be remarked that a_2 will always be between 0 and a_1 ; thus only the limits of variation of a_1 will have to be determined, and for this the exact conditions must be ascertained by experiment.

The scales of a and x are independent of one another, and the angle XOY may be anything. One can therefore select these factors so that the readings will present the maximum of ease and exactitude. One useful point in constructing the diagram is to arrange matters in such a way that the angle CDB will be as nearly as possible 90 degs.; that is, that the mean position of AB will be perpendicular to OX. A model of the diagram scale is illustrated in fig. 2.

The Apparatus (fig. 3).

The Le Chatelier burette is not suitable in the application of this process, but two other means are available:—

(1) Two burettes A and B can be used, A having a slightly larger capacity than B, with only one graduation mark V_1 , and B graduated to measure a_1, a_2 . A is first filled with pure air or firedamp, and then the quantities of reactive necessary to obtain the inflammability limit are introduced by means of B.

(2) A single burette consists of two members of large diameter and connected by a graduated tube. The volume V terminates at the zero mark on the scale. The member F, which forms the explosion chamber,

must be of greater capacity than CD, so that it may contain $V + a_1$ + an excess of water.

With this burette the volume V terminating in a narrow space is exactly defined, and, moreover, any transfusion of the reactive gas is prevented.

For convenience in handling this burette, V is of smaller dimensions than that of Le Chatelier.

Formula (5) gives x independently of V ; a_1 and a_2 operate only through their mutual ratio. Therefore the volume V may be indefinite and unknown; the graduation for reading a_1, a_2 may represent arbitrary and unknown volumes, and is merely required to be regular. Nevertheless, it is useful to know these volumes, at least approximately, in drawing a diagram, since for this purpose, the mean value of a_1 must be known, and for each reactive this value is a function of the ratio between V and the volume of a division on the scale.

V could be taken as 100 c.c., in which case, if it be desired to preserve the same comparative accuracy in the Le Chatelier burette, the graduated scale must be marked on a tube of lesser diameter than that of Le Chatelier, to give a_1 or a_2 in $\frac{1}{2}$ c.c.

The diagram shown in fig. 2 was constructed on the basis of a 100 c.c. burette, the reactive gas being assumed to be methane prepared in the laboratory. The inflammability limit for this gas (commercial products being used in its preparation) is about 6.5, and the mean value of a_1 will be about 13. In fact, it will always lie between 11 and 15.

The diagram is on too small a scale to give sufficiently exact readings, but in practice it can easily be enlarged to suitable size. To simplify the figure, only the series of lines in the vicinity of A, a_1 need be drawn, the readings being inserted at the ends of each series.

MINERALS OF CHINA.

The mineral resources of China are dealt with in a recent issue of the *North China Daily News*, and while admitting that, judged in the light of modern information and modern standards, these resources having nothing like the importance ascribed to them in the past, there is no reason to doubt that China possesses a reasonable share of the world's mineral wealth.

Of the various minerals, coal is no doubt the most important. The writer ventures to estimate the resources at a minimum of 100,000 million tons. The most important deposits occur in Shansi, Chihli, Shantung, and Honan. So far as is known, Inner Mongolia and Manchuria are fairly

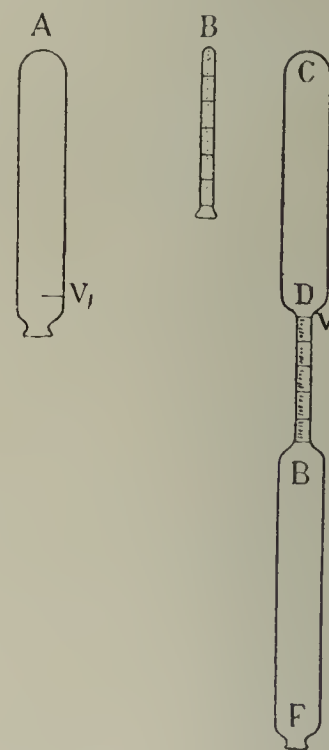


FIG. 3.

well supplied. Kansu and Turkestan contain a number of considerable coal fields. In the centre, South Hunan and Kiangsi are the most important. There are numerous occurrences in Szechuan, Yunnan, and Kueichow, though individually they are not of any very great importance. Both bituminous and anthracite coal abound.

The chief mines and their latest annual output are as follow:—

Name of mine.	Locality.	Tons produced.
Kailan Mining Administration.	Kaiping and Lanchow, Chihli.	2,971,792
Fushun Colliery	Fushun, Mukden	2,034,856
Pingshiang Colliery	Pingshiang, Kiangsi	927,463
Peking Syndicate	Chaotso, Honan	480,875
Pengshihu Coal Mining Co.	Pengshihu, Mukden	275,777
Lincheng Coal Mining Administration.	Lincheng, Chihli	259,703
Chungshing Coal Mining Co.	Yishien, Shantung	244,825
Tsingching Mining Administration.	Tsingching, Chihli	179,154
Paoching Company	Yangchuan, Shansi	131,396
Liuhokou Coal Mining Co.	Liuhokou, Honan	9,822
Tungshing Company	Mentoukeu, Chihli	80,000

Iron deposits, both igneous and sedimentary, exist in China. Of the igneous deposits, the Tayeh mines are the best known. Besides these, there are the following:—Aochung, in Hupeh; Chengmenshan, in Kiangsi; Taiping and Fangchang, in Anhui; Sing Ling Chin, in Shantung; Anchi, in Fukien; and a recent discovery near Nanking. The best-known of the sedimentary deposits are those near Pengshihu and Lanchow, in Manchuria. A large amount of the sedimentary deposits cannot be exploited under modern conditions, and the reserves of workable ore are put at about 150,000,000 tons.

Germany promises to supply Holland with a certain quantity of coal if Dutch workmen are sent to Germany to fetch it from the mines.

THE FUTURE OF FORESTRY.

At the annual general meeting of members of the Land Owners' Co-operative Forestry Society Limited, held recently at 31, Queen-street, Edinburgh,

Sir JOHN STIRLING MAXWELL, in moving the adoption of the report, said the demand for home-grown timber had steadily increased during the last two years. The Prime Minister had placed forestry in the forefront of industries of national importance. Thanks to the arrangements made by their president, Lord Lovat, who was acting as Director of Forestry in France, the drain of timber from this country to the Western Front had been reduced, but British mines and railways were still dependent on home supplies, as well as the Navy and Army in the United Kingdom. They had to face the fact that their woods might be brought so near the point of exhaustion as to entail heavy loss on their owners, even at the present prices. Owing to scarcity of tonnage and heavy demand, the price of imported timber was unlikely to fall for some time after the end of the war. This was no argument for holding up timber, but it was an argument for distributing fellings fairly over the country, and for utilising poor and under-stocked woods in preference to flourishing plantations entering the period of most rapid increment. If a sound timber industry was to be built up in Scotland, woods of this character would be needed to carry it over the period of reconstruction. This was a matter which affected the timber merchant no less than the grower, since the whole industry would be in danger of collapsing in districts denuded of timber. Certain loose and contradictory statements had appeared in the Press that owners were holding up their timber for ransom prices, and that they were recklessly cutting young woods for pitwood. Such statements, unsupported by evidence, scarcely required contradiction, but, speaking for their society, which now included a large proportion of the timber growers in Scotland, he said that such statements were, with a single exception, untrue. Now that the uncertainty with regard to the calling up of skilled labour had been removed, the output should be further increased. True that many immature woods had been cut. These, so far as he knew, had been woods damaged by squirrels or disease, under-stocked, or for some other reason better cleared away. The felling of immature, flourishing plantations entailed a heavy loss on the owner as well as on the nation. Should it become necessary, as it might, the blame must rest on the neglect of forestry shown by successive Governments, which had left the country dependent on imported timber. The crisis through which their woods were passing compelled them to look ahead, and he reminded members of the need for keeping their nurseries in order, even at the expense of destroying plants which they might have no labour to plant. It also called for attention on the part of the Government. He hoped they realised that the conditions after the war were likely to be unfavourable for planting, and that few proprietors would be in a position to plant at a loss. In many cases the difference between profit and loss would depend on the market for thinnings, and this again would depend on facilities for transport. Before the war it cost less to bring pitwood to Bo'ness from Norway than from Inverness. That society would be ready to co-operate in any arrangements which were made for the development of the timber industry in Scotland. The demand for birch twigs by steel works warranted him in making a special appeal to members to send any supplies they could muster, even though the quantities from individual estates might be small and the trouble considerable. The steel works had agreed to increase the price to 65s. per ton in order to obtain supplies, which are urgently needed.

The report by the SECRETARY (Mr. R. B. Fraser) stated that an Order had now been issued by the Timber Controller fixing prices for certain classes of sawn timber, i.e., deals, battens, boards, planking, and sleepers. These prices appeared to be good, but were apparently fixed on the assumption that the timber would be cut at sawmills close to the standing timber. Sawmills which in the past used only foreign timber, and with their centres far away from home-grown timber, might find that the cost of taking the timber in the round from the wood to their sawmills and sending it out again as sawn timber would not pay them at the prices fixed. This point should receive the attention of the Timber Controller. The selling of standing timber, especially during the past six months, had shown a large improvement. In the southern counties, where it was difficult to sell timber in the past, it was now readily saleable. In the Centre and North of Scotland timber selling was easier in the past. The tractors appear to have been the salvation of outlying lots. It was reported that the Government proposed to apportion certain districts in Scotland for the supply of certain colliery districts in Scotland and England. The Government were warned that this might lead to serious difficulties, for the counties proposed to be apportioned to the North of England would probably not be able to supply the quantities required, and this would tend to put up prices in England, and might lead to a serious crisis. There appeared to be a more serious shortage of pitwood in England than in Scotland, and it would be extremely unfortunate if pitwood in the North of Scotland ready for delivery in England could not be sent owing to Government restrictions. While fully realising the importance of railway transport, the Government should hear the views of proprietors and merchants.

The Reconstruction Committee of the Cabinet were dealing with questions relating to afforestation. Along with other parties, the society were invited to express their views as to how various problems should be met and dealt with. The society, looking at the problems chiefly from a commercial point of view, prepared a memorandum which was submitted to the Committee referred to. In this memorandum the society drew

attention to certain defects in the management of woodlands which they had found prevalent in Scotland, viz.:—(1) The absence of any settled policy in the management of woods; (2) failure to put in force any consistent working plans; (3) absence of any system of classification, which is essential where timber varies so much in quality as it does in many of our woods; (4) lack of organisation and uniformity in the methods of selling timber; (5) the practice of advertising lots of timber for sale without the lots having been valued, and without the contents having been approximately estimated; (6) absence of records of annual production of timber, and where records are kept of timber sold, there is often no record of the quantity or value of timbers used for estate purposes.

The society further suggested that serious attention should be given to: (a) Suitable education for various classes of foresters; (b) prejudice against home-grown timber; and advised (among other points) that when areas are being re-planted, there should be kept in view the requirements of the local markets, both as regards size and species of timber. Thus, Scots fir is required in Aberdeenshire for box boarding, barrel headings, etc. Pitwood might be grown in the districts nearest to the coal pits, or in those districts where the transport to the coal fields would not be excessive. It might be advisable to have short rotation crops for pitwood in those districts; and unless home prices are to be kept up to something near their present standard, it is probable that home pitwood will be again ousted from the market. This might be remedied by cheaper railway rates for home pitwood. Maximum rates have been fixed for the duration of the war, but some permanent arrangement will be necessary if the home grower is not to be unduly handicapped in competition with the foreign producer. Failing a suitable adjustment of railway rates, a moderate tariff on foreign pitwood might answer the purpose.

COAL MINING IN ALBERTA IN 1916.

The annual report of the Department of Public Works of the Province of Alberta states that the province has now been divided into 34 separate districts instead of four, as a number of new districts have been opened up in recent years. Several small mines have been opened in the Peace River district, and although these mines are operated on a small scale at present, it is probable that with the increased settlement that is taking place in the district north of Edmonton, these mines should be fairly large producers in the near future.

The output of coal for 1916 exceeded that for 1915 by 1,213,713 tons, thus establishing a record output for the province. Notwithstanding the increase, however, 2,910,576 tons of coal were imported into the territory between Port Arthur and the western boundary of Alberta.

During the year a number of samples of mine air were analysed in the Federal Government laboratory at Ottawa, and the result of these analyses has been the means of assisting the Mines Branch to form an opinion as to what should be done to ensure greater safety in gaseous mines. The mine operators co-operated with the inspectors in this connection, with the result that the conditions of these mines, as far as safety is concerned, have been greatly improved.

During the year, instruction in mining, chiefly by correspondence, was commenced at the Institute of Technology, Calgary, under the supervision of Mr. W. A. Davidson, formerly manager of the International Coal and Coke Company Limited, Coleman. This instruction is having good results, and a large number of candidates for certificates under the Mines Act are availing themselves of the opportunity offered.

Wages paid to mine employees were practically the same on December 31, 1916, as at the end of the year 1915, except that a war bonus was put into effect on August 16, 1916.

Considerable progress has been made in connection with training in mine rescue and first-aid work during the year. Mine rescue cars have been installed in districts where there are a number of mines in close proximity to each other, such as the Crow's Nest Pass, Canmore, and Drumheller. Where there is only one mine to be taken care of, such as Lethbridge, Coalhurst, Commerce, Brazeau, and Jasper Park, stations were installed. The cars, which are each provided with sleeping accommodation for 12 men, visit all the mines in the district each month, and are kept in constant readiness to proceed immediately to the scene of a catastrophe. Each car and station is under the care and supervision of a qualified superintendent, who devotes his whole time to training men and keeping the apparatus in order, so that it can be put into immediate use at any time. Two teams composed of five men each are maintained at each mine, so that their services can be obtained should occasion arise. While engaged in training, the men are paid at the rate of 50c. per hour, each man being required to undergo eight trainings of three hours each, after which he is required to take one training each month, so as to keep him in a state of efficiency. The Government has also arranged that any person meeting with an injury while doing mine rescue work will be compensated in the same manner as provided for by the Workmen's Compensation Act. It is intended, when consistent with efficiency, that only returned soldiers will be appointed in future as superintendents of mine rescue stations and cars. Two returned soldiers have already been appointed to these positions. Over 500 men have been fully trained in the use of the apparatus, and this number is continually being added to.

There are 5,395 safety lamps in use in the province. Of these, 3,749 are of the Wolf type, 204 of the Koehler type, 287 of the Clanny type, 505 of the Edison type, 600 of the Wico type, and 50 of the Ceag type. The Edison and Wico types are electric cap lamps, and the Ceag type electric hand lamps. The Edison electric cap lamps have been provided in a number of cases for

men engaged in transportation and for mine workers in the extraction of pillars.

Readings of the relative humidity of the air in the mines are being taken periodically by the inspectors, the results showing that the percentage of humidity ranges from 86 to 100 per cent. In order to protect as far as possible the propagation of explosions, inert dust barriers have been installed in several bituminous coal mines. These barriers extend from 175 to 200 ft. in length, and consist of shelves 18 to 24 in. wide, with spaces of 24 in. between them. These shelves are loaded with incombustible dust taken from the combustion chambers of steam boilers, the analysis of this dust showing that it is very satisfactory for this purpose.

Arrangements are being made in the Taber field with a view to changing the present method of mining from room-and-pillar to the longwall advancing method. It is expected that by doing this a larger percentage of lump coal will be obtained.

The principal development in the province during the last year has been in the Drumheller district, where a considerable amount of underground development has been done, and a number of new plants erected. There were 282 mines in operation during the year. Of these, two were operating copper ore, one shale, and 279 coal. The shale mine produced shale from which 200,000 bricks were manufactured.

On October 1, 1916, an Order in Council was passed regulating the operation of mining coal under road allowances in the province. Although these regulations have only been in effect a short time, they are proving of considerable benefit in allowing the workings of a mine to cross under a road allowance from one property to another when desired. This permission is only granted, however, where the surface would not be damaged by operations.

The total output of coal was 4,648,604 tons (of 2,000 lb.), as compared with 3,434,891 tons in 1915, of which 2,172,801 tons (1,682,922 tons) were lignite; 2,335,259 tons (1,626,237 tons) bituminous; and 140,544 tons (125,732 tons) anthracite; 67,105 tons (38,878 tons) of coal were used in coke production, 41,950 tons (23,826 tons) of coke being produced. The production of briquettes was 107,959 tons (83,180 tons).

The chief producing districts, with their outputs, were:—Crow's Nest Pass (bituminous), 1,402,636 tons (916,051 tons); Lethbridge (lignite), 740,022 tons (613,293 tons); Taber (lignite), 139,318 tons (89,698 tons); Canmore (bituminous), 281,387 tons (208,875 tons); Banff (anthracite), 140,544 tons (125,732 tons); Drumheller (lignite), 377,618 tons (247,805 tons); Brazeau (bituminous), 289,768 tons (232,728 tons); Hanna (lignite), 25,048 tons (28,556 tons); Lacombe (lignite), 18,803 tons (27,498 tons); Camrose (lignite), 52,588 tons (56,731 tons); Tofield (lignite), 67,063 tons (54,320 tons); Clover Bar (lignite), 204,546 tons (155,613 tons); Edmonton (lignite), 111,907 tons (100,981 tons); Cardiff (lignite), 236,433 tons (177,617 tons); Pembina (lignite), 72,746 tons (32,888 tons); Jasper Park (bituminous), 152,504 tons (86,496 tons); Yellowhead Pass (bituminous), 69,426 tons (83,414 tons); and Mountain Park (bituminous), 139,538 tons (83,585 tons).

The total number of men employed in the mines was 7,570 (5,536 underground), and the tons of coal mined per man was 614 (839 tons per man employed underground). The quantity of explosives used for blasting rock in coal mines was 70,946 lb., 4,555 lb. being Monobel, 48,965 lb. Polar Permitite, 1,815 lb. Black Powder, 11,611 lb. dynamite, and 4,000 lb. Samsonite.

Electricity was used at 41 mines, seven being in the Crow's Nest Pass district, four in the Lethbridge district, three in the Taber district, eight in the Drumheller district, three each in the Clover Bar and Yellowhead Pass districts, two each in the Edmonton, Cardiff, Canmore, and Jasper Park districts, and one each in the Mountain Park, Pembina, Banff, Brazeau, and Three Hills districts. The number of tons of coal raised per electrical horse-power was, in the Crow's Nest Pass district, 520 tons; in the Lethbridge district, 874 tons; in the Taber district, 377 tons; in the Canmore district, 592 tons; in the Banff district, 611 tons; in the Drumheller district, 983 tons; in the Brazeau district, 419 tons; in the Three Hills district, 1,512 tons; in the Clover Bar district, 4,060 tons; in the Edmonton district, 2,238 tons; in the Cardiff district, 1,153 tons; in the Pembina district, 207 tons; in the Jasper Park district, 794 tons; in the Yellowhead Pass district, 925 tons; and in the Mountain Park district, 581 tons. No accidents were reported in connection with the use of electricity during the year.

The number of coal-cutting machines in operation was 168, eight being driven by electricity and 160 by compressed air (including 87 in the Lethbridge district, 43 in the Taber district, nine in the Edmonton district, four each in the Drumheller and Clover Bar districts, three each in the Medicine Hat, Canmore, Three Hills, and Yellowhead Pass districts, and one in the Trochu district). By electrical cutters, 200,597 tons of coal were mined, and 889,129 tons by compressed air machines.

Export of Coke to France.—The Hull Export Committee has received information from the High Commissioner that the Bureau Nationale des Charbons (France) will not refuse to grant authorisations which might be asked for by importers of coke from the Yorkshire district, provided it is within the limit of the tonnage of coke allowed to France by the British authorities. It now remains for French importers to apply to the Bureau des Charbons for authorisations to import.

Timber Supplies.—The Controller of Timber Supplies has secured the active co-operation of Sir John Stirling Maxwell, Bart., as Assistant Controller of Timber for Scotland. He is hon. secretary of the Royal Arboricultural Society, chairman of the Land and Forestry Sub-Committee of the Reconstruction Committee. He will have the assistance of Mr. S. P. Scott, who retains the position of executive officer, and to whom communications should continue to be addressed at 1, Queen-street, Edinburgh.

INFLAMMABILITY OF MIXTURES OF GASES WITH AIR.*

G. A. BURRELL and A. W. GAUGER.

Others have carried out a number of experiments in the limits of complete inflammability of mixtures of mine gases and of industrial gases with air, and have arranged the most important results of these tests in the drawing. The data are important in relation to the occurrence of inflammable gases in mines and to the industrial use of such gases. The gases investigated were gasoline vapour, ethane, methane, natural gas, acetylene, artificial illuminating gas, hydrogen, carbon monoxide, and blast furnace gas. Vast quantities of gasoline vapour, natural gas, acetylene, artificial illuminating gas, blast furnace gas, and hydrogen are being utilised for industrial purposes; methane, hydrogen, and carbon monoxide are found in mines; and methane and ethane are constituents of natural gas.

Flame Propagation in Gaseous Mixtures.

Flame is said to be self-propagated through a mixture of combustible gas and air, or of combustible gas and oxygen, when enough of the combustible gas is present to permit combustion to spread through the mixture from any given point of ignition. Then propagation of flame takes place from layer to layer of the mixture without the continued presence of the source of heat that started the inflammation.

The conditions of experiment affect to some degree the limits of complete propagation. For instance, with mixtures of gasoline vapour and air, the low limit was 1.5 per cent. when a mixture of vapour and air was ignited from the bottom upward, and 2.0 per cent. when ignition was made from the top downward. With methane, the limit was 5.50 per cent. for horizontal propagation of flame, and about 5 per cent. when ignition was made from the bottom upward. In coal mines, where methane is found, the limits for horizontal propagation are the most important. In general, the limits are slightly lower when ignition occurs from the bottom upward than when it occurs from the top downward.

Apparatus and Conditions of Experiments.

In some of the experiments a glass vessel having a capacity of 2,800 c.c. was used as the container for the gases tested. Two copper wires entered through the sides and met at the centre of the vessel. A current of 5 amperes at 15 volts was passed through the wires. Ignition of the gaseous mixtures was brought about by drawing the two wires apart while the electric current was flowing, thereby producing an electric flash.

In all the experiments the explosion chamber was large enough so that its cold walls exerted no appreciable effect on the results. In spite of the slightly different results one can obtain under different conditions of experimenting, it is believed that the values for explosive limits given herein are close enough to be of decided commercial importance.

The results were obtained with gas mixtures kept at atmospheric pressure. It was found that with mixtures of methane and air and of gasoline vapour and air, raising the initial pressure to six atmospheres had no appreciable effect in changing the limits of complete inflammation, although the explosion, when it came, was of greater violence. As regards the effect of temperatures, raising the initial temperature from ordinary room temperature to as high as 200 degs. Cent. only shifts the low limit for methane from 5.5 to about 5.05 per cent. Presumably increases of temperature and pressure affect to about the same degree the other gases mentioned in this report.

Tests with Acetylene-Air Mixtures.

With a mixture of air and acetylene containing 2.81 per cent. of acetylene, inflammation did not spread completely through the mixture. The flame travelled for 1 or 2 in. above the terminals, but did not spread throughout the mixture. With 3.07 per cent. of acetylene the flame spread entirely through the mixture.

Tests with Hydrogen-Air Mixtures.

With mixtures of hydrogen and air no propagation of flame could be noticed by the eye in mixtures containing 7 per cent. of hydrogen when ignition was brought about by means of an electric spark from an induction coil driven by four small dry cells. But when the mixture was analysed after sparking, it was found that there had been a slight burning, undoubtedly only in the immediate neighbourhood of the spark. As further experiments were tried with increasing percentages of hydrogen, the amount of hydrogen that burned increased until, with 10 per cent. of hydrogen, it was completely burned.

Tests with Methane-Air Mixtures.

With mixtures of methane and air, the limits for complete propagation of flame were found to be between 5.5 and 14.5 per cent. With 5.5 per cent. of methane the explosion was not violent. The flame could easily be followed by the eye. With larger percentages of methane—or any other inflammable gas—the explosion was very violent. At the lower limits the explosion was very slowly compared with its progress at higher limits.

The limits of propagation of mixtures of air and of combustible gas are given in the following table in proportions below the low limit of inflammability of mixtures of air and blast

testing for methane in mine air. When a safety lamp is placed in air containing about 1.5 or 2 per cent. of methane, a small cap is usually seen on the flame when the latter is turned low. Careful and experienced men may detect as little as 1 per cent. of methane with a modern safety lamp. As the percentage of methane increases, the cap grows higher.

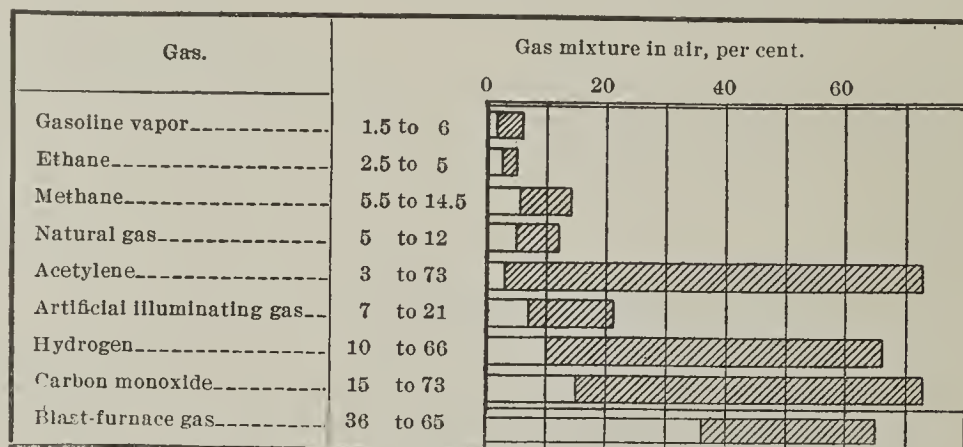
Incomplete Burning of Gaseous Mixtures.

Incomplete burning also takes place in mixtures of air and of combustible gases in proportions above the upper limit. The upper limit for complete propagation of flame in mixtures of methane and air is 14.5 per cent. But even with a proportion of methane as high as 20 per cent., an electric flash about $\frac{1}{2}$ in. long caused a slight burning, the flame extending about 3 in. above the electric flash. The explosion chamber used was 6 in. wide and 12 in. high. The igniter was placed in the centre.

Importance of Oxygen in Gaseous Mixtures.

At present oxygen is used in increasing quantities for industrial purposes, hence the limits of inflammability of mixtures of combustible gases with oxygen are of immediate interest.

As regards methane-oxygen mixtures, it was found that the low limit was raised about 0.25 per cent. when pure oxygen was used instead of air. The high limit was, however, extended from 14.5 to 45 per cent. methane, the explanation being as follows:—In a methane-air mixture containing 9.47 per cent. of methane and 90.53 per cent. of air there is enough oxygen for complete combustion of the methane to carbon dioxide and water vapour. But if more methane is present, carbon monoxide and hydrogen, products of incomplete combustion, result. This reaction takes oxygen that would otherwise form carbon dioxide and water vapour. Some heat is produced, but much more heat is produced in the formation of carbon dioxide and water. As the percentage of methane is increased above 9.47 per cent., more and more carbon monoxide and hydrogen are formed from combustion, until so much is formed that not enough heat is produced by ignition of the gas molecules adjacent to the igniter to cause the mixture to propagate flame. As air is only about one-fifth oxygen, substituting oxygen for an equal volume of air greatly increases the proportion of oxygen available for burning the combustible gas, the gas burns to water vapour and carbon dioxide, the heat of combustion is greater,



LIMITS OF COMPLETE INFLAMMABILITY OF MIXTURES OF COMBUSTIBLE GASES AND AIR.

and the upper limit of propagation becomes higher. Presumably the upper limits for other gases would also be extended if oxygen were used instead of air. However, the low limits are the important ones as regards danger of accidental explosions, and these are seemingly not much affected.

The values for explosive limits given above refer to mixtures of the combustible gases with nearly pure air having a normal oxygen content. However, the oxygen content has to fall considerably before the limits of complete inflammability are appreciably changed. For instance, for mixtures of methane and air, the low limit is given as 5.5 per cent. of methane, which is the limit when the oxygen content varies between 17 and 21 per cent. With 17 per cent. of oxygen in the mixture, the limit is raised to 5.7 per cent. of methane. The oxygen content has to fall below 14 per cent. to prevent all explosions in mixtures of methane and air. Replacing the nitrogen of the air with 20 per cent. carbon dioxide raises the limit to 6.4 per cent. methane. Raising the pressure of a gas mixture above atmospheric has no appreciable effect in changing the explosive range.

The authors compressed mixtures of hydrogen and oxygen in a steel bomb to 100 atmospheres before ignition, and found that the explosive range was only a trifle different than the range at atmospheric pressure. The low limit was raised about 1 per cent.

Mixtures of Blast Furnace Gas and Air.

Explosions have occurred at blast furnaces owing to the leakage of air into gas conduits and the subsequent ignition of the resulting mixture. The results of experiments to determine the explosive limits of mixtures of blast furnace gas and air are presented below.

In the experiments a glass vessel $8\frac{1}{2}$ in. long and with a capacity of 900 c.c. was used. A little above the centre two copper electrodes were so arranged that they could be separated by the operator to produce an arc. The top was capped with heavy waxed paper. All experiments were made with the mixtures saturated with water vapour at room temperature and atmospheric pressure.

The blast furnace gas used had the following composition: Carbon dioxide, 10 per cent.; oxygen, 0.5 per cent.; hydrogen, 2.7 per cent.; carbon monoxide, 27.5 per cent.; methane, 0.3 per cent.; nitrogen, 59 per cent.

The proportions of blast furnace gas that mark the limits of inflammability of mixtures of air and blast

furnace gas of the composition given are 44.9 to 45.7 for the low limit gas, and 64.5 to 65 per cent. for the high limit. Thus, in order to have an explosion of blast furnace gas, not less than 35 cu. ft. nor more than 55 cu. ft. of air must be present in 100 cu. ft. of a mixture of such gas with air.

The composition of iron blast furnace gas varies considerably in practice, but Stoughton gives the average composition for iron blast furnace gas as about 61 per cent. nitrogen, 10 to 17 per cent. carbon dioxide, and 22 to 27 per cent. carbon monoxide. The maximum variations in composition are apparently in the percentages of carbon dioxide and carbon monoxide. If 45.5 per cent. of gas be taken as the lower limit of the gas, then the limit mixture contained 12.5 per cent. carbon monoxide, 1.2 per cent. hydrogen, and 11.6 per cent. oxygen. Should the carbon monoxide content drop to 22 per cent. and the carbon dioxide content increase to 17 per cent., the hydrogen and nitrogen contents remaining approximately the same as before, then 56.8 per cent. gas will be required before 12.5 per cent. carbon monoxide will be present.

If the percentage of carbon monoxide should increase, then the lower limit of such a gas would be lower than 45.5 per cent. The maximum per cent. of carbon monoxide found is 34.4 per cent. Of this gas 36.3 per cent. would furnish 12.5 per cent. carbon monoxide.

The upper limit, however, would not be changed appreciably, as it depends on the percentage of oxygen present, which in turn depends on the percentage of air. For pure carbon monoxide, the high limit is only 73 per cent.; for pure hydrogen, 66 per cent.

The lower limit for blast furnace gas in general, therefore, varies with the amount of combustibles present in the gas from 36 to 57 per cent. gas. The upper limit will, however, be approximately 65 per cent. gas for all gases.

SAFE AIR COMPRESSOR OPERATION.

By M. A. SALLER.

In connection with the installation and operation of air compressing equipment, there are many factors and considerations that may be overlooked or neglected, and thereby result in extreme hazard to the operators, to say nothing of unsatisfactory operation and poor economy.

Probably the first and most important consideration is the compressor itself. The capacity of the equipment should be adequate to meet the requirements for air at the proper pressure and at normal operating speeds. Extreme overloading results in too high piston speeds, and dangerous velocities through the air valves cause inefficient results, and present a source of positive danger. A piston travel of 500 ft. per minute, while maintaining full capacity and pressure, should not be exceeded.

Excessive piston speed is often caused by leaky valves and pipe connections, which throw an excessive and unnecessary burden on the compressor. A leak in an air line is just as worthy of attention as a leak in a steam line; therefore, frequent inspections should be made to see that they are tight.

The question of flywheel speed should also be given consideration. This is even more important than in ordinary engine work, because of the tremendous strain and high overloads to which compressor flywheels are subjected, owing to frequent and sudden load changes. With a cast iron one-piece flywheel, a peripheral speed of 5,000 ft. per minute should never be exceeded. If the flywheel is of light construction, a speed of 3,000 ft. per minute should be the maximum. If the flywheel is made up of flanged sections bolted together, the speed limit should be reduced even further according to the known or calculated strength of the joint construction. In figuring these speeds, the determining factor is the maximum speed of the flywheel when acting under the impulse of the most sudden change of load.

Because of fluctuating and sudden changing of load imposed on a compressor, setting up severe shocks and jars, care should be exercised in locating and building the foundation, which should be of concrete wherever possible in order to minimise the strains on the equipment itself, and to prevent, as much as possible, the transmission of jar and vibration to the building.

Another source of considerable trouble and loss of efficiency is in connection with the condition of the air supplied to the compressors. The air intake should be located where dust and grit are not prevalent. Consideration should also be given to the temperature of the air available, since the cooler the air the less heat will be generated in the compressor. Where dust in the air intake cannot be avoided, arrangements should be made to filter the air through a muslin screen before it is delivered to the compressor intake, or else air washing apparatus should be installed.

All air pipes in connection with compressing units should be designed with as much care and intelligence as are high-pressure steam lines, both as to capacity and the elimination of avoidable sharp turns. This is to prevent any excessive drop in pressure because of undue resistance in the pipe line, and also to minimise as much as possible vibration or pulsation. Air piping should also be arranged and drained to avoid pockets in which water can accumulate.

Air Line Temperature.

The range of temperature in air lines is frequently very considerable because of varying pressures and compression conditions. The piping should be arranged with provision for the free expansion of all parts, otherwise excessive strains, possibly resulting in rupture, may be placed on different fittings or on the compressor itself.

In steam-driven compressors the rush of live steam into the steam cylinder in response to the sudden changes in load is sometimes dangerous, because of the liability of pulling over slugs of water. It is desirable to place a steam separator on the steam line to

every unit, both from the standpoint of safety and to assist in securing the best lubrication at the minimum expense for oil, as the elimination of the water in the steam prevents washing the oil from the cylinder walls.

It is desirable to insulate or cover exposed steam or hot air piping — the former from an economical standpoint to prevent extreme radiation losses, and the latter to protect the burning of operators who may come in contact with the exposed pipes.

Of utmost importance in connection with continuously operating or heavy duty compressors is that of securing a reliable and generous source of cooling water. Failure of the cooling water supply in the case of a compressor doing heavy duty will cause overheating and the consequent closing down of the apparatus. In order to know that the cooling water is being supplied, it is advisable to instal a flow indicator in the cooling water line, else arrange the overflow from the jacket so that it discharges into an open funnel where the flow is easily seen.

Cooling Water.

The quality of the cooling water is also of importance, because water containing considerable quantities of lime will cause the deposition of scale on the jacket walls, which seriously interferes with the heat exchange and presents a source of expense and trouble when it accumulates to such an extent that it must be removed. Cooling water obviously should not contain acids or other active agents that may cause the corrosion of the jacket lining.

Every air tank, however small, should be fitted with a reliable safety valve set to release at a pressure well within the limits of the strength of the tank, and of sufficient size to release all excess air delivered to it, so that there will be no accumulation above the maximum pressure. On large tanks it is advisable to instal at least two valves. A drain for drawing off such oil and water as may accumulate should also be provided in the bottom of the tank. It should be opened at regular intervals, from three to five times daily, according to the local conditions.

Explosions due to the spontaneous combustion of explosive gases within the compressor cylinder, pipe line, or receiver tank present one of the greatest hazards in compressor operation. The responsibility for these explosions can be traced largely to the use of unsuitable lubricating oil, coupled with unsatisfactory operation.

The intense heat encountered in the compressor cylinder affects lubricating oil differently from the heat encountered in the steam engine cylinder, where moisture is usually present. The dry condition of the air cylinder results in the burning of the oil into powder-like particles, which deposit on the cylinder walls, discharge valves, and in the pipe line. This soot, when properly mixed with air, has great explosive tendencies when brought in contact with intense heat, and hence its accumulation is highly undesirable, as the temperature of the compressor cylinder and parts may suddenly be increased, owing to the failure of the cooling water, the clogging of the valve passages because of the soot itself, or the extreme overloading of the compressor.

This accumulation of carbon or soot is either the result of feeding excessive quantities of oil or of the use of a poor quality oil. The oil used in lubricating air compressor cylinders should be of mineral derivation, and should be free of all foreign matter, such as tar, which may tend toward the production of excessive carbon deposits. The oil should also be one with a high flashpoint; that is, one that will not ignite below 500 degs. The ordinary cylinder oil used in steam engines is not suitable for lubricating air cylinders, and a special grade of oil compounded for the service should be used.

Danger from Oil.

As there is a positive danger from feeding too much oil to an air compressor, pains should be taken to see that oil is fed at a uniform rate in just sufficient quantities to give the necessary lubrication. A drop or two of oil every five or seven minutes should be ample for the average machine. A record should be kept of the total amount of oil fed to the compressor each week, so that the feeding of any excess can be checked up.

It is advisable to inspect the cylinder, valves, and piping whenever possible—and this should not be at longer intervals than two weeks—and any deposit of carbon and soot should be removed by mechanical means; that is, by scraping or cutting away, or by the application of soapy water or a solution of caustic soda and water. Kerosene or gasoline should never be used for removing carbon.

In connection with inspection work, it should be remembered that whenever an air compressor head is being removed, care should be exercised in avoiding contact of the escaping gases with a flame, caused by the mixture of the air and vaporised oil, because a flare-up or explosion is liable to occur if the gas happens to be very dense. In all cases where repairs are being made or inspections carried out, the compressor should be allowed to stand for a while to ensure thorough cooling of all parts before the work is undertaken.

An after-cooler is used in the air discharge line for cooling the air after compression, so that any moisture or oil contained therein will be condensed and separated from the air instead of being carried to the pipe line.

Frequently a fusible plug, containing a mixture that will melt at a certain predetermined temperature, is placed in the discharge valves. When the temperature rises above the predetermined point, the fusible metal is melted, and the air is discharged with a whistling noise, which sounds the alarm that the temperature is rising, and hence the valves or cooling water need attention. Recording thermometers installed in the air discharge line also serve to give notice of undue rise in temperature in that they will indicate when there is a gradual increase in the temperature of the discharged air.

As pointed out, there are many factors in air compressor operation that require great and constant care and attention in order to secure efficient results and to prevent dangerous accidents, and the subject should therefore be considered in all its phases wherever apparatus of this kind is installed and placed in service.—*Power.*

PETROLEUM PRODUCTION BILL.

The text of the Bill to make provision with respect to the searching and boring for and the getting of petroleum in the United Kingdom, and for purposes connected therewith, was issued on Saturday. It consists of 10 clauses, and provides that the Crown shall have the exclusive right of searching and boring for and getting petroleum within the United Kingdom, and if any person, other than a person acting on behalf of his Majesty, or holding a licence under this Act for the purpose, gets petroleum in the United Kingdom, he shall forfeit to his Majesty a sum equal to three times the value of any petroleum gotten by him. There shall be paid into a special fund, called Petroleum Royalties Fund, (a) in respect of petroleum gotten on behalf of his Majesty, out of moneys provided by Parliament; and (b) in respect of petroleum gotten by a person holding a licence under this Act, by the licensee—a sum equal to 9d. for every ton of petroleum so gotten. Subject to payment of such expenses as are payable thereout under this Act, the sums paid into the said fund in respect of petroleum gotten in any area defined in a scheme made in manner herein-after provided, shall be distributed amongst the persons interested in the land in that area in such proportions, at such times, in such instalments, and generally in such manner as may be prescribed by the scheme, and where operations for the getting of petroleum are commenced in any district, the Board of Trade shall, on the application of any person who appears to them to be interested, prepare a scheme defining the area the persons interested in the land in which are entitled to receive payments out of the Petroleum Royalties Fund, and regulating the distribution amongst such persons of the sums available for distribution.

If the land in respect of which any payment is made or to be made out of the Petroleum Royalties Fund is settled land, the payment shall be treated as if it were rent paid under a mining lease. Every person holding a licence under this Act shall furnish to the Board of Trade such information with respect to the operations carried on by him as the Board may require for the purpose of framing schemes under this Act, and shall make to the Board such returns as to the quantities of petroleum gotten by him at such intervals and verified in such manner as the Board may direct. If any person fails to furnish any information or make any return, or furnishes false information, obstructs or impedes an officer of the Board in the exercise of his duties, or refuses to answer or gives a false answer to any question, or refuses to produce any books or documents required for obtaining the information to be furnished, he shall be liable to imprisonment for a term not exceeding three months, or to a fine not exceeding £50, or to both such imprisonment and fine, and if the person in default is a company every director and officer of the company shall be liable to the like penalties, unless he proves that the default was committed without his knowledge or consent. The Railway and Canal Commission are appointed to decide as to who are entitled to payment out of the Royalties Fund, and as to how those payments should be made. The Board of Trade may search and bore for and get petroleum, and may grant licences to search and bore for and get petroleum to such persons for such consideration (whether by way of royalty, share of profits, or otherwise) and upon such terms and conditions as the Board think fit.

All expenses incurred by the Board of Trade under the Act other than expenses in respect of searching and boring for and getting petroleum, and all expenses of the Railway and Canal Commission, shall be paid out of the Petroleum Royalties Fund. The expression "petroleum" means all petroleum and natural gas and their relative hydrocarbons (excluding coals and bituminous shales) existing in their natural condition, and the expression "land" includes mines and minerals lying under the surface. The sum payable into the Petroleum Royalties Fund in respect of natural gas shall be a sum equal to 1d. for every 10,000 cu. ft. of the gas computed on the basis of volume at the barometric pressure of 30 in. of mercury and a temperature of 60 degs. Fahr.

Canadian Coal Supply.—The Canadian Fuel Controller recently paid a visit to New York, where he made arrangements for Canada's normal supply of fuel from the United States. He has appointed an expert on coal and transportation, who will direct all supplies from the mines to the Canadian border. The Canadian Railway Commission will be responsible for handling the coal from the border to points of distribution.

Miners and Recruiting.—The districts affiliated to the Miners' Federation have been invited to consider and answer the following questions regarding the recruiting scheme:—Are you in favour of miners' organisations taking any part in recruiting for the Army? Are you in favour of the present scheme as amended? What modifications, if any, to the present scheme do you propose? The replies will be submitted to a special national conference. Amendments must be sent in by to-morrow (Saturday).

Coal Miners' Families in France.—The French Government, through the Military Commission on Mines, is organising measures for the re-union of native and refugee miners (exempt from military service) with their families, such families having been broken up and scattered by the German invasion. In districts to which families could not be removed, the miners are granted an exchange permit to some more convenient mining locality, this concession being on the understanding that operations thereby do not suffer from shortage of labour. The miners are allowed free railway passes.

THE HANDLING OF COAL BY HYDRAULIC MEANS.

By GEORGE FREDERICK ZIMMER, A.M.I.M.E.C.E.

Little has appeared as yet in the technical Press concerning the handling of coal by hydraulic means. In fact, only a few such installations are in existence, the most important being that of the American Zinc Smelting Company; and in this country, so far as the writer is aware, the only plant is that installed a few years ago at the Hammersmith Electricity Works.

There is no apparent reason why coal should not be handled successfully, as the fundamental principle of the hydraulic system would not be unlike the pneumatic one; and the latter system of conveying, particularly for grain, is such an unqualified success that installations for handling 250 tons per hour are in use. It is so universally employed that its more general application to heavier substances is not likely to be much longer delayed. Coal with a specific gravity between 1.2 and 1.5 is not so favourable as grain for conveying by pneumatic means; it is therefore obviously but a step further to substitute a denser medium than air in which the substance should be made to float—viz., water. With a specific gravity of 1.2 to 1.5, the tendency of coal to sink in water—by deducting the weight of the water displaced—is only 0.2 to 0.5. We should here bear in mind that the material to be conveyed must float in the conveying medium, but since the objects to be handled are always heavier than the medium, the former must be held in suspension and made to float within the latter by creating a current, which must be quicker or stronger the greater the specific gravity of the material to be handled—otherwise the material will separate and block up the pipes.

Coal has been handled by pneumatic means from the stock heap to the boiler house, and installations which have come under the writer's notice with capacities varying from 7 to 15 tons per hour, are in use on the Continent, the power consumption in such plants being 38 horse-power. In the United States, much larger installations are in use, a typical one being that of the Pierce Arrow Company, which consumes annually 28,000 tons of coal under its boilers, all of which is handled by pneumatic means.

We have already seen that water has been used, especially for conveying coal in a horizontal or slightly inclined direction. The writer is, however, not aware that the conveying by hydraulic means, chiefly in a vertical direction, has been reported in our technical Press. An installation has been erected on the Continent in which the dirt from the coal face has been raised and conveyed for distances of 1,000 m. in closed pipes by the use of the Hannibal pump. Before the installation of this plant, the colliery owners experimented with pneumatic machinery in order to pack the seams after the coal had been removed, and although the plant worked successfully it raised such clouds of dust that it had to be abandoned, and the hydraulic system substituted, which did the work satisfactorily. The encouraging results of such early experiments have led to attempts being made to raise coal from the workings of a colliery to the bank by hydraulic means. The proposition to pump the coal from the face to the bank is one which promises the possibility of success, and several experimenters are at work on it. For such installations it is necessary to introduce the coal into the lower end of the circulating system through a form of water lock. In one of the methods, that of Honigmann, the water in the pipes is made to circulate by means of a stream of compressed air blown into the lower end of the pipe, somewhat like that of an injector, the return water pipe being larger, and arranged concentrically round the rising main, so that the communication between the two mains takes place through a number of orifices between them and just at the point where the air jet enters. The introduction of the coal is accomplished by a funnel-shaped receptacle, closed at the lower end by a valve, and from this, by the opening of the valve, into another receptacle also closed by a valve at the lower end. This second receptacle is filled with water, and the opening of the valve establishes communication with the main hydraulic conveying pipe. The feeding of the coal into this second receptacle forces the displaced water into an overflow tank, from which it is forced back into the main pipes. The valve of the first receptacle is now closed, and that of the second one opened, so that the coal enters the hydraulic system, and is raised with the water without any water escaping out of the first receptacle. While the valve is open, water will re-enter the second receptacle, to again take the place of the coal, and be ready for receiving the next charge. At the top end of the pipe the coal is delivered on to a screen of inclined bars, while the water collects in a settling tank, and is eventually led back down the pit. The upcast and downcast pipes are arranged concentrically, as mentioned, the rising main being inside, and the return water main outside.

The pioneer work done in this direction is still very much in the experimental stage, and we are a long way yet from being able to raise the output of a colliery from the coal face to the bank by hydraulic means; but we must not lose sight of the advantages which would be gained by the perfecting of such a process, and must, therefore, welcome the further progress in this direction. A few of the principal advantages of the system would be the dispensing with the air-lift engine, except for men and material, the elimination of a great deal of dust, and a more uniform continuous delivery of the coal at bank. A further advantage might be found in collieries which have a pump constantly to keep the water out of their workings, since this water from the pumps might be used for conveying the coal, and there need then be no return main. This, however, is only an idea of the writer's, given for whatever it may be worth.

MINING EMPLOYMENT STATISTICS.

Board of Trade *Labour Gazette* reports that employment in coal mining during July was very good in all districts: there was some slackness in a few districts in Scotland. There was a decrease of 1,701 (or 0.3 per cent.) in the number of workpeople employed at collieries making returns compared with the previous month, and an increase of 19,586 (or 3.7 per cent.) on a year ago.

Of the 542,934 workpeople included in the returns for July, 218,658 (or 40.3 per cent.) were employed at pits working 12 days during the fortnight to which the returns relate, while a further 151,394 (or 27.9 per cent.) were employed at pits working 11, but less than 12 days.

Districts.	Work-people employed in July 1917.*	Average No. of days worked per week by the collieries in fortnight ended					Inc. (+) or dec. (-) in July 1917, on a	
		July 1917.			Month ago.		Year ago.	
		July 21, 1917.	June 23, 1917.	July 22, 1916.	Month ago.	Year ago.		
		Days.	Days.	Days.	Days.	Days.		
<i>England & Wales.</i>								
Northumberland ...	38,304	4.05	5.08	5.49	-1.03	-1.44		
Durham	91,672	4.95	5.03	5.50	-0.08	-0.55		
Cumberland	7,913	5.63	5.97	5.85	-0.34	-0.22		
South Yorkshire ..	61,288	5.90	5.89	5.81	+0.01	+0.09		
West Yorkshire ..	26,049	5.86	5.85	5.77	+0.01	+0.09		
Lancs. & Cheshire...	52,068	5.62	5.89	5.72	-0.27	-0.10		
Derbyshire	35,080	5.75	5.77	5.87	-0.02	-0.12		
Notts and Leicester	32,949	5.69	5.67	5.71	+0.02	-0.02		
Staffordshire	27,319	5.63	5.91	5.87	-0.28	-0.24		
Warwick, Worcester and Salop	8,274	5.88	5.85	5.82	+0.03	+0.06		
Glo'ster & Somerset	5,723	5.16	5.94	5.82	-0.78	-0.66		
North Wales	9,402	5.92	6.00	5.96	-0.08	-0.04		
South Wales & Mon.	99,061	5.43	5.71	5.99	-0.28	-0.56		
Total	495,102	5.40	5.61	5.76	-0.21	-0.36		
<i>Scotland.</i>								
West Scotland	20,228	3.60	4.91	5.44	-1.31	-1.84		
The Lothians	2,348	3.85	5.31	5.45	-1.46	-1.60		
Fife	25,256	2.57	4.42	5.50	-1.85	-2.93		
Total	47,832	3.07†	4.67	5.48	-1.60	-2.41		
Total, U.K.	542,934	5.20†	5.53	5.73	-0.33	-0.53		

* At the collieries included in the table.
† Time was lost on account of holidays.

The following table shows the numbers employed and the average number of days worked, distributed according to the principal kind of coal raised at pits at which the workpeople were engaged.

Description of coal.	Work-people employed in July 1917.*	Average No. of days worked per week by the pits in fortnight ended					Inc. (+) or dec. (-) in July 1917, on a	
		July 1917.			Month ago.		Year ago.	
		July 21, 1917.	June 23, 1917.	July 22, 1916.	Month ago.	Year ago.		
		Days.	Days.	Days.	Days.	Days.		
Anthracite ..	5,465	5.53	4.76	5.99	+0.77	-0.56		
Coking ..	28,190	5.34	5.54	5.60	-0.20	-0.26		
Gas ..	35,072	4.76	5.00	5.61	-0.24	-0.85		
House ..	51,866	5.49	5.69	5.72	-0.20	-0.23		
Steam ..	182,303	5.27	5.65	5.83	-0.38	-0.56		
Mixed ..	240,038	5.11	5.31	5.68	-0.40	-0.57		
All descriptions ..	542,934	5.20	5.53	5.73	-0.33	-0.53		

* At the collieries included in the table.
† Time was lost on account of holidays.

Iron Mining.—Except where affected by holidays, employment continued very good at iron, shale, and lead mines, and good at tin mines. In quarries employment was good on the whole, except in slate quarries. Returns received for each of the three periods named below, relating to the same mines and open works in each case show that 15,013 workpeople were employed at the mines included in these returns in July 1917, an increase of 145 (or 1.0 per cent.) compared with June, and of 1,467 (or 10.8 per cent.) compared with a year ago.

Districts.	Work-people employed in July 1917.*	Average No. of days worked per week by mines in fortnight ended					Inc. (+) or dec. (-) in July 1917, on a	
		July 1917.			Month ago.		Year ago.	
		July 21, 1917.	June 23, 1917.	July 22, 1916.	Month ago.	Year ago.		
		Days.	Days.	Days.	Days.	Days.		
Cleveland ..	6,405	6.02	5.95	5.84	+0.07	+0.18		
Cumberland and Lancashire ..	4,852	5.94	5.50	5.93	+0.44	+0.01		
Scotland ..	685	3.90	5.55	5.97	-1.65	-2.07		
Other districts ..	3,071	5.79	5.87	5.95	-0.08	-0.16		
Total ..	15,013	5.85	5.77	5.90	+0.08	-0.05		

* At mines included in the returns.
† Time was lost on account of holidays.

Pig Iron Industry.—Employment continued good. Shortages of labour and of materials were again reported.

District.	No. of furnaces, included in the returns, in blast at end of			Inc. (+) or dec. (-) in July 1917 on a	
	July 1917.	June 1917.	July 1916.	Month ago.	Year ago.
	July 1917.	June 1917.	July 1916.	Month ago.	Year ago.
<i>England & Wales:</i>					
Cleveland ..	77	78	70	— 1	+ 7
Cumberland & Lancs.	34	34	33	—	+ 1
S. and S. W. Yorks	13	13	11	—	+ 2
Derby & Nottingham	32	32	26	—	+ 6
Leicester, Lincoln and Northampton	29	27	28	+ 2	+ 1
Staffs and Worcester	30	30	30	—	—
S. Wales ..	12	12	11	—	+ 1
W. Wales ..	5	5	5	—	—
	232	231	214	+ 1	+ 13
	61	66	62	- 5	- 1
	293	297	276	- 4	+ 17

Forks.—Employment at iron and steel continued very good, and showed little change from the previous month in England and

Wales, but there was a decline in Scotland; the decline, however, was largely due to time lost on account of holidays. It was better than a year ago. Shortage of labour continued to be reported from every district. According to returns relating to 115,020 workpeople, the number of shifts worked during the week ended July 21, 1917, was 60,245, showing a decrease of 12,085 (or 1.8 per cent.) as compared with the previous month, and an increase of 30,959 (or 4.9 per cent.) on a year ago.

Engineering Trades.—These trades continued to be extremely busy during July, and a great amount of overtime was worked. Trade unions with 292,150 members (mostly in skilled occupations) reported 0.2 per cent. unemployed at the end of July, compared with 0.1 per cent. in each of the previous five months, and with 0.2 per cent. a year ago.

Tin-Plate.—The number of mills working at the end of July showed an increase of 22 compared with June 1917, but a decrease of 142 compared with a year ago. Difficulties of transport were reported.

Steel and Galvanised Sheets.—The number of mills working at the end of July showed an increase of 2 compared with the previous month, but a decrease of 15 on a year ago. Short time, owing to shortage of steel, was reported.

Nuts, Bolts, Nails, etc.—Employment with nut and bolt makers was good at Birmingham, Smethwick, and Darlaston, and very good at Blackheath and Halesowen. Shoe rivet and wire nail makers were still very busy at Birmingham.

Tubes.—Employment was good at Birmingham, Wednesbury, Landore, and Newport, Mon.

Chains, Anchors, etc.—At Cradley Heath employment was good with cable chain and anchor and shackle makers, and very good with block makers. It was fairly good with anvil and vice makers at Dudley, and good with axle and spring makers at Wednesbury.

Sheet and Metal Workers.—Employment continued good generally, and much overtime was worked.

Wire.—Employment was fairly good, but was still hindered in some districts by a shortage of materials.

Changes in Wages.—No change took place in miners' wages in Northumberland and Durham as the result of the ascertained selling price of coal for the second quarter of 1917. The selling price averaged 15s. 7½d., an increase of ¾d. on the previous audit, and of 3½d. a year ago.

Pig Iron.—The ascertained selling price of No. 3 Cleveland pig iron for April, May, and June resulted in an increase of 6 per cent. in the wages of blast furnacemen, making wages 78 per cent. above the standard.

Manufactured Iron.—In the North of England and in the Midlands the wages of puddlers and millmen remained unchanged, whilst in the West of Scotland puddlers' wages were increased by 3d. per ton and millmen's wages by 2½ per cent.

Disputes.—Thirteen new disputes in coal mining occurred, affecting 20,234 persons directly and 3,159 indirectly.

Fatal Accidents.—The total number of fatal accidents at mines was 117, a decrease of 3 on a month ago, and an increase of 3 on a year ago.

COLLIERY ASSESSMENTS AND PUBLIC WORKS.

At a recent meeting of the Newport Trades Council, Mr. Mardy Jones, one of the organisers of the Miners' Federation, dealing with the question of rating reform, contended that the colliery companies throughout the South Wales coal field were under-assessed on their properties, as compared with dwelling-houses. He stated that the labour organisations had formed an association of the 400 representatives who were now on public bodies in this district, in order that the interests of the wage earners should be safeguarded, and some of their members were on the assessment committees. He urged that colliery properties were "notoriously under-rated," and if such a state of things existed, then it must be patent that other properties were over-assessed in order to provide the money for carrying on. In the county of Monmouth and for the larger half of Glamorgan a very inadequate method prevailed of rating on the long or royalty ton. The long ton was one-ninth more than the imperial ton; and, in effect, they were escaping exactly one-ninth of the rates they ought to pay. In one case, a colliery had been worked for a whole 12 months without being rated because the overseers had neglected to assess on the output. Last year, in one union, two companies escaped paying £1,700. Coal consumed in coke ovens providing very valuable products escaped paying in some instances 10 to 15 per cent. As to private agreement between colliery companies and assessment committees, it had been ruled that there was no power in law to make an agreement with any body of ratepayers or coal owners or anyone else binding the ratepayers beyond the year in which the assessment committee was in office. In some cases, where coal was being worked in two unions owing to the workings running into them, there were different tonnage rates. The Newport Union, which brought into their area so large a section of the coal field at Abercarn, Bedwas, etc., was well ahead of Bedwellty in this respect, because 2d. a ton was paid more at Abercarn than in the adjacent union as tonnage rate for the same coal from the same colliery. There was an instance in another union, where it came out in an appeal case that one company should have been rated at double what they were, namely, £55,000 instead of £27,000. Taking the average rates throughout South Wales, he asserted that, instead of paying 3d. a ton on the coal sent to market, it should be 6d. a ton; and that the colliery proprietors were escaping from one-third to half a million sterling every year, whilst other properties had to make up that sum.

All classes of wage earners are moving in this matter, and its special importance is due to the great schemes of council outlay that are foreshadowed in the immediate future. The effect of these schemes upon colliery returns will be considerable, because a very large proportion of the rates has to be raised from the collieries.

The fact that public companies have no representation on local councils gives peculiar importance to present-day circumstances in South Wales. The fundamental principle of the professed democrat is that there should be no taxation without representation; but the application of this principle to the proprietors of limited liability under-

takings is barred, no provision existing in our municipal legislation whereby their interests in respect of local taxation can be safeguarded. There is, indeed, a contrary influence, frequently voiced by complaints in trade union lodges, when office employees of the companies independently secure election to the local councils. Huge expenditure, affecting the rate levy over a long series of years, is not only in contemplation, but is also certain, because it is a necessity. Put in a nutshell, the issue is whether the largest ratepayers in a locality should have any representation at all upon the local spending authority; for, in most cases—practically the whole—the colliery company is by far the largest ratepayer. Yet the shareholders, notwithstanding their heavy financial interest, have not a single vote in choosing the men who decide upon local expenditure.

At present, schemes are being drawn up all over South Wales for expenditure after the war—upon housing, sewerage, water supply, etc.—which will entail enormous cost; and these schemes, in the main, are assured of Departmental approval, because they will afford employment for men demobilised from the Army. The Local Government Board and the Treasury, as well as the Education Department, have under review many projects submitted to them from South Wales. Even a relatively small area like Abersychan has its scheme for 400 houses; whilst the adjoining town of Pontypool has a town-planning and housing scheme as to which they have sought expert advice. The Blaenavon Council has purchased land whereon new houses can be built; and the Llanfrechfa Council are also dealing with the question. Aberdare has drafted a large scheme of housing, which entails expenditure of £40,000 to £50,000, and in some parts of the borough the land has been taken. Merthyr's project includes several hundreds of houses, in addition to £70,000 for a new sewer and heavy outlay on new schools, road widenings, etc. In the Llynfi, Garw, and Ogmore area, housing and sewerage schemes, with new main roads and bridges, are debated; and for the Neath and Port Talbot area town-planning schemes have been drafted, whilst the Neath Rural Council has in hand the construction of new main roads in the Dulais Valley. At the other end, in the Margam area, the new main road for Avon Valley is to be completed, the Council having decided to employ miners temporarily idle owing to depression in the coal trade. Works outlined for the future include a new water reservoir in the Duffryn Valley. The adjoining Aberavon Council will have to provide a new cemetery, lay out a recreation ground, etc.; and the Glyncoerrwg Council, at the top of the Avon Valley, have a housing project which will cover Blaengwynfi and Cymmer, as well as Glyncoerrwg itself.

Pontypridd Council—largely, of course, owing to the fact that their area has hitherto been well supplied—is not anticipating an expenditure of more than about £25,000 in public works, part of this being for new school buildings.

Bedwellty Council, within whose area the Powell Duffryn and the Rhymney Iron Company are working their large new collieries, find the housing question of so much importance that a scheme has been submitted for erecting many hundreds of houses at a cost of probably as much as a quarter of a million sterling; and in the same Rhymney Valley area, works of sewerage, entailing an outlay of probably as much as another quarter of a million, will have to be undertaken. This district, solely on account of colliery development, is increasing in population very rapidly; and all the essential requirements of new communities, such as those already mentioned, with water supply, schools, new roads, etc., have to be carried out as promptly as possible. Taking Rhymney Valley as a whole, in its course from the town of Rhymney to Caerphilly and Bedwas, considerably over half a million sterling is the expenditure already in sight.

Even in the Rhondda Valley, where it might have been supposed public work had by this time been completed, there are heavy demands still to be met, so much so that it is estimated the new undertakings will afford employment for hundreds of men. One of the main sewers requires re-construction, because of later developments in the Trehafod area, and the work would have been carried out before now but for official prohibition on account of the war. In this district, also, housing schemes are in contemplation, and there will be new schools and extensions required, the Board of Education sanction having been already granted. Recreation grounds, cemetery enlargement, with tramway extension, are also projected.

This is only a very brief indication of a vast amount of highly expensive public work foreshadowed in the colliery area, the greater part of the cost falling upon the colliery proprietors.

IMPROVEMENT IN TWIST BORING DRILLS.

A novel form of hand boring drill has recently been introduced into some of the Fife mines, in which "bits" formed by ordinary horseshoe cogs are used on the cutting edge. The usual cutting edge is cut off by the blacksmith, and the end of the drill formed as shown in sketch. Through the part thus formed, a square hole is made, and into this the cog having a square shank is inserted. The cogs are made of much better material than the drills, and through not having to be heated their temper is better. When these cog drills are being used, about three times more work can be got without re-sharpening than is the case with ordinary drills. When the cogs do get blunt, they are in cases replaced by new ones, and even at that the workers state that they are cheaper than getting their drills sharpened in the ordinary way. The drills not having to be brought to the surface, much loss and inconvenience are thereby prevented. In cases where the workers buy their own drills, the colliery management are altering them free of charge.



New Men in the Mines.—Mr. Robert Smillic, president of the Miners' Federation of Great Britain, according to an official report of the recent miners' recruiting conference, now issued, estimates that from 160,000 to 170,000 persons had entered the mines during the last three years to fill the places of men who had gone on active service.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Compensation Increase: 50 instead of 25 per cent. called for — "Smalls" to be Re-classified — Mr. Seymour Berry's Gift to Merthyr.

In the development of their scheme to establish first-class technical, mining, and engineering education at Swansea, the Corporation of that town have presented a petition praying for grant of a charter of incorporation, their design being to establish the "University College of Swansea and West Wales."

At the Glanhowy Colliery level on Thursday of last week, whilst Mr. Jenkins, one of the proprietors, was going around, a fall suddenly occurred in the main roadway—part of the rubbish pinning his legs—and he had a very narrow escape from being buried. Five men were entombed. Mr. Jenkins succeeded in releasing himself, and, together with his father and brother and other helpers, made effort to reach the men. They were aided by Mr. Mitchard, under-manager of the Graham Navigation Colliery, and others, and fortunately were able to maintain ventilation. After more than nine hours' work, the rescue party got through the fall, and were able to release the men, who fortunately proved to be none the worse for their experience.

The miners' executive met at Cardiff and considered a circular from the secretary of the Miners' Federation of Great Britain asking whether they favoured the idea that miners' organisations should take any part in recruiting for the Army; were they in favour of the present scheme; or what modification did they propose? The present scheme was for "combing out" unmarried Class A men between 18 and 25 years of age, with certain exceptions. A resolution was passed disapproving of the miners' organisations taking part in recruiting work; and the matter will be brought up at a special conference. Meanwhile, ballot of the South Wales miners on the question will be deferred.

With regard to Mr. W. Brace's Bill concerning increase of compensation, the miners' executive of South Wales passed a resolution that, in their opinion, 25 per cent. increase of compensation was totally inadequate to meet the increased cost of living, and they urged upon the Miners' Federation of Great Britain to approach the Government and press upon them that the increase should be by at least 50 per cent.

At Mountain Ash, the county court judge had before him on Tuesday a claim for compensation brought against the Ocean Coal Company by a labourer who had sustained a compound fracture of the leg in Australia in 1900. Returning to Wales at the end of 1913, he sustained another fracture of the same leg whilst at work in the company's colliery at Ynysybwl, and received compensation for this. He resumed work in May 1914, but this year was away from work for two months because the injured leg was inflamed. He received sickness pay in respect of this incapacity, his doctor having told him that he could not connect it with the accident. The Ocean Coal Company called evidence to prove that the incapacity was attributable to the original accident in Australia. Judgment was reserved.

The old difficulty as to what period should be taken for deciding the amount of wages due, arose in a case at the Tredegar County Court last week. A collier claimed from the Markham Colliery Company £1 1s. 11d., the difference between the amount of his pay ticket and what he considered himself to be entitled to under the price list. He had worked five full turns in a week, and was paid £2 16s. 6d., out of which he had to pay a boy £1; and he stated that under the minimum wage rule he would be entitled to £2 18s. 5d. During the preceding week he had worked 20 tons of coal—his own wages being 14s. 10d. a day after paying the boy; but during the week in question he ripped 3 yds. of top, and was only able to work eight tons of coal—his average per day, after paying the boy, being 7s. 4d. In the following week, when there was no top to rip, he brought down 37 tons of coal, and his earnings were £1 0s. 5d. a day. Evidence was given on his behalf that the top was abnormally hard; and argument took place between the legal representatives of the two sides as to whether the company were justified in averaging the earnings of a man during the period of three weeks in order to ascertain whether he earned the minimum wage. The judge decided that the place was abnormal, and that there was no rule for averaging a man's wage. He gave judgment for the plaintiff for the amount claimed.

A second case against the same employers was brought by another collier. A man had been paid £5 8s. 7d. on one shift, whereas another man in the same place on the next shift was paid only £2 13s., and it was stated that when the company was asked to make up the wages of the latter, a suggestion was made that the men should pool their wages and divide equally; but this the men refused to do. The employers, through their counsel, expressed the opinion that the only way to obtain a decision would be to go to the High Court for a declaration—a course which had been always followed in the coal field in settling such a point. The case was adjourned.

A matter of special interest to coal shippers is contained in the announcement that the Instone Transport and Trading Company Limited, of Cardiff, have effected a deal which involves the purchase of steamers to the value of a million and a quarter sterling. The capital has been subscribed in France, and the vessels that are to be acquired are to be engaged exclusively in the French coal trade, and will be managed by Messrs. Instone and Company, of Baltic House, Cardiff.

The workmen employed at the Tirpentwys and Eastern Valley collieries, near Pontypool, are agitating for railway facilities to convey them to and from the collieries. At present the colliery proprietors are doing their best to oblige the workmen by allowing them to ride in special empty coal trains, but they are unable to make adequate provision for all the men. The Tirpentwys Colliery employs some 1,400 men, and as the undertaking is situated between hills, far from the populous district where the workmen reside, it is contended that the railway company might run a special workmen's train profitably to themselves, whilst the men would be greatly comforted. The officers of the Eastern Valley district of miners are in communication with the Board of Trade on the matter.

Charles P. Wells, a collier, of Pontnewynydd, was fined 40s. at Pontypool on Saturday last for stealing a bicycle belonging to a fellow workman, named Thomas Henry Price, from the store-room at the Tirpentwys Colliery. The presiding magistrate (Mr. T. H. Deakin) commented severely upon the mean practice of taking from a store-room (set apart by the colliery companies for the use of workmen) bicycles which men utilised for the purpose of covering the long journeys to and from their work.

What was described as the most important of the annual timber sales, took place at the King's Head Hotel, Newport, Mon., on Saturday last, when large quantities of mixed coppice, oak, and pitwood larch trees on the estate of Lord Tredegar were disposed of. The sale realised £13,602 10s. Amongst the principal purchasers were the United National Collieries Limited, Mr. E. James (Ystrad Mynach), Mr. W. Morgan (Caerphilly), and Messrs. Pask, Newport.

The Classification Committee has undertaken, at the request of the Coal Controller, to deal further with the schedule relating to small coals—grievances having been occasioned by the fact that the range of fixed prices from 18s. to 23s. has created difficulties on account of inequality. Mr. Calthrop having had put to him a proposal that "smalls" should be re-graded, the range of prices remaining the same, he has accepted the proposal conditionally upon the merchants and colliery proprietors reaching an agreement; and it is to this end the Classification Committee is at work.

This arrangement is in keeping with the procedure that has developed during the war, and it is to be noted that competition is now practically extinguished. The new circumstances are rather unfortunate for merchants, as colliery proprietors more and more tend to deal directly with customers. Forward speculation is, of course, extinguished, and the opinion prevails that after the experience of war conditions, there will be a permanence in concentration that will effect material changes in modes of business. This is the case not only in respect of producing and selling coal, but also in the growing practice of merchants, and colliery proprietors as well, becoming the owners or at least securing an interest in steamships. Present circumstances, of course, do not permit of large profits, whatever may have been the case in the earlier months of the war; and the experience of a colliery working with fixed prices, greatly increased wages, as well as of other standing charges, coupled with inability to work full time, do not suggest a very hopeful prospect for the future, when the Coal Controller's guarantee of dividend shall have ceased. What that guarantee is to be is still the subject of keen speculation.

A schoolboy, summoned at Pontypool on Saturday last, was alleged to have damaged an insulator, the property of the South Wales Electric Power Company Limited, to such an extent as to cause a local colliery to be laid idle for several hours. The boy struck the insulator with a stone. He was cautioned, and his parents were ordered to pay the costs (6s. 6d.). A representative of the company said it would cost £1 13s. to replace the insulator by a new one.

The gift which has been made to Merthyr by Mr. H. Seymour Berry—£10,000 for erection of a technical and engineering school—was considered at a meeting summoned by the Merthyr Trades and Labour Council. Mr. Seymour Berry, who is a director of Messrs. D. Davis and Sons, of the Imperial Navigation Company, chairman of the Cynon Colliery Company, and also of the Celtic Collieries, designs the institution to be a memorial to his father, the late Ald. J. M. Berry, of Merthyr. It was pointed out in the meeting that a sum of between £30,000 and £40,000 would be required to fully establish the school, there being needed, in addition to Mr. Berry's gift, £10,000 to £15,000 for an endowment fund, with further maintenance charges of £2,000 to £3,000 per annum. The local Trades Council propose to raise £10,000 for endowment of scholarships; and those present at the meeting, which represented different industrial organisations in the borough, pledged themselves to heartily support the scheme.

In a case where a collier was summoned for marking another man's tram with his own number, intending to defraud, the Bridgend magistrates on Saturday last dismissed the charge, which defendant had denied. It was suggested on his behalf that someone with a grudge against him had made the mark in order to bring him into discredit, there being bad feeling on the part of some of the workmen because he was "such a glutton for work," and had been nick-named "the American devil" and "the steam navy."

Mr. Zachariah Andrews, Talywain, who has succeeded Mr. Harris (miners' organiser) as political agent to the North Monmouthshire Labour Party, is president of the Eastern Valleys district of the South Wales Miners' Federation, and chairman of the Varteg lodge. He takes a very active part in public life; and was one of those who attended before the executive of the British Steel Smelters' Association when Mr. T. Griffiths, its South Wales organiser, was authorised to accept an invitation to contest the Parliamentary representation of North Monmouth, as against Mr. R. McKenna, M.P.

Mr. E. R. Moxey, managing director of Messrs. Moxey, Savon and Company, coal exporters, of London and Cardiff, has four sons on active service, and one of them, a lieutenant in the Flying Corps, has been mentioned in connection with good work in Mesopotamia. Another son of Mr. E. R. Moxey, also a lieutenant, was seriously wounded in 1914.

The new Order increasing the allowance of steel for tin-plate manufacture has been received with much satisfaction, although it relates only to special orders. The restriction has operated very adversely to the industry, not one-half of the works being now in regular production, and the earnings of the men who remain being seriously affected. The export trade has not entirely ceased; but it at present approximates only one-half of what it was in the corresponding period of last year—which showed great reduction. The great problem facing makers and merchants is how best, after the war, to recover the business connection which the limitation of exports has so gravely and detrimentally affected, hugely to the advantage of American makers, who have captured the trade previously held by South Wales.

Mr. David Griffiths, colliery manager, Tylorstown, has received intelligence of the death of his youngest son, Lieut. Arthur Griffiths, who was killed in action in France on August 3. So recently as four weeks ago he was home on leave from the front. Before the war broke out he acted as secretary to the Tylorstown Explosion Trust Fund.

Mr. James Winstone, acting-president of the South Wales Miners' Federation, has been chosen to represent the Trades Union Congress as one of their delegates for the Canadian Congress, which will be held during September.

The secretary of a train committee of miners employed in the Dulais Valley publishes a statement as to hardship imposed upon them owing to train alterations. Amongst the trains which have been stopped is one which brought home the night workers at six o'clock in the morning. Further, at present only weekly tickets are issued, for which 2s. 6d. is charged; and that if the colliery works only a day in a week (which he says has been the case frequently) the men cannot get any rebate, nor can they get a daily return ticket at an equivalent rate. Daily

tickets would be issued if the men would pay 2s. a week for the privilege. Then, again, the one of the trains should stop at a particular point to save the miners a walk of a mile. There is a halt at night, but not in the morning. The one appears to be one in which both colliery workers and others make representations to the Railway Executive, but there is no indication that this step has been taken.

Mr. C. M. Roberts, who until recently was agent for the Lewis Merthyr Collieries, has been presented by the officials and workmen with a gold watch and chain, a dressing case, and an illuminated address, in testimony of the esteem in which he is held. Mr. Roberts has been engaged in various positions at the collieries for the past 27 years.

At an esteddffod at Crumlin, Monmouthshire, the novel competition of essay-writing on the subject, "The Advantages and Disadvantages of Electric and Oil Safety Lamps (Mining)," was adjudicated upon. The prize-winners were (1) J. R. Baker, Newbridge; (2) J. D. Herbert, Resolven, Glam.; (3) S. West, Crumlin. Mr. V. V. Phillips, Crumlin, was the adjudicator.

Northumberland and Durham.

Northumberland Miners' Association Quarterly Statement—Ashington and Hirst Memorial—Short Weight Prosecution—District Pitwood Committee.

The financial statement of the Northumberland Miners' Association for the quarter ended June 30, shows a membership of 25,886 full members and 4,670 half-members. The capital funds amount to £36,840. The bank account shows a credit balance of £5,068. The political fund has a balance to credit of £403.

The federated groups of trades unions in Ashington and Hirst have decided to erect, after the war, a fountain in Hirst Park in memory of the 13 men who lost their lives in the Woodhorn Colliery on August 13 last year. It is estimated that the memorial will cost £950. Speaking at a memorial meeting, Mr. Wm. Straker said the accident emphasised the necessity for the enforcement of the Miners' Federation's recommendation as to the need for more inspectors and sub-inspectors being appointed from the ranks of the working miners, and for firemen, examiners, and deputies to be appointed by the workmen and paid by the State. It was not sufficient for the safety of a mine that the inspector should visit it once a year. The only safe inspection, especially when there was gas, was day by day and hour by hour whilst the pit was working. They all knew how a changed atmosphere would create a dangerous condition, and must be immediately attended to on the spot.

Mr. Andrew Smith, retired miner, who died at Ashington on April 6 last, left estate valued at £1,891 3s. 3d. gross, with net personalty £27 9s. 2d.

Geo. Cutter, deputy overman at Wearmouth Colliery, when charged at Sunderland with having taken a lucifer match into the mine, pleaded that he did not know that he had the match. It was found in the lining of an outer pocket of his jacket, having apparently fallen through a hole in the pocket. Mr. Bell, prosecuting, said the colliery company had no reason to doubt defendant's statement, as he was an old and respected servant. The company had no option but to bring the case to court, however. A fine of 30s. was imposed.

The Tyne Local Committee for the Export of Coal to Italy has requested shippers who have contracts with Italy which have not expired by lapse of time to send in all particulars of such business to the committee. Full details are required, but particulars are asked for only in cases where merchants have not only sold to Italy, but have covered the sale by purchase from a colliery.

It is now precisely 50 years since the first shipment of coal from Cambois took place at North Blyth.

Sabotage in the mine or elsewhere is usually righteously reprobated, but there will be few in this country who will not confess to sympathy with Pte. Patrick Hobin, of the 8th Durhams, in his recital of how, during his imprisonment in Germany for a period of two years and four months, he caused a little accident at a coal mine at which he was compelled to work. Hobin, who was a putter at Witton pit prior to the war, was captured by the Germans in April 1915. He made several attempts to escape, and, on July 28, at last succeeded in making his way into Holland. During his first attempt, a mate and he crossed the Lippe River by means of an overhead wire system used for the conveyance of coals across the stream. They were recaptured, however, and, in order that they might not renew their attempt to escape, were sent down a coal mine to work. It took six men to carry each Englishman down below, for they were not particularly keen about descending. They kicked right and left, and the result was that one of Hobin's fingers was broken. In spite of this, he was forced to work, and part of it was afterwards cut off with scissors. Later, the same finger was again damaged. They did not forget to give the Germans some trouble when underground. By an occurrence in the shaft, for which Hobin was responsible, the pit was laid idle for three days. When brought before the authorities, and asked to give an explanation, he said he did not understand the work!

Whilst Foster Hartis, 63, wasteman at Lumley Sixth pit, was engaged in the Main coal seam taking a tub to the coal staple, he put the tub in the wrong side of the staple, and was pulled down with it, falling a distance of 10 fms., and sustaining injuries from which he died a few minutes later.

The Estate and Property Committee of the Newcastle Corporation has had under consideration an application by the Walker Coal Company Limited for the opening of the Henry pit at Walker Gate, which is owned by the Corporation. The consideration of the application has been adjourned, pending the provision of certain information by the colliery company.

The controversy between the pacifist minority amongst the miners of Northumberland and Durham and their more war-like brethren has reached the point at which, especially in Northumberland, demands for the resignations of anti-war officials—Messrs. Straker and Weir being most generally specified—are numerous being made by the branches. Probably no one would be more grieved than the members of these branches themselves if the criticised officials threw up their jobs, for it is safe to say that such resolutions are very largely "Pickwickian," and simply symptomatic of momentary irritation. As a matter of fact, the resolutions have been very impartial in the controversy, for Burt Hall has been very impartial in the controversy, for Mr. Hogg, the treasurer of the Northumberland Miners' Association, was a speaker at the pro-war conference. Citizens' and Services' Committee in Newcastle, and Mr. John Cairns, financial secretary, has supported the war in recent speeches; whilst on the other hand, Messrs. Weir and Straker support the peace by negotiation. The two latter are both members for having attended a recent conference of the Soldiers' and Workmen's Council, but it is only fair to state that the executive committee of the Miners' Association

puted that their representatives at that con-
not commit the association to anything that
ne.

land magistrates fined Claud Runchman Ray,
on Coal Landsale, £5 for having sold and
of short weight. It was stated that a ton
which was being sent by defendant for re-sale by
a small retailer, was found, when tested by the Corpora-
tion weighbridge, to be 30 lb. short. For the defendant,
it was contended that the Corporation machines were
frequently wrong, there having been discrepancies in the
weight as indicated by the various machines in the borough
of 22 lb. in one instance, 42 lb. in another, and 88 lb. in
another. Defendant stated he had frequently given excess
weight so as to make doubly sure.

Joseph Gorton, 20, putter, was fined 40s. by the Castle
Eden magistrates for having hewed coal off the wallside at
Deaf Hill Colliery. Edward Kay, 19, putter at the same
pit, was fined 40s. for having been in a part of the mine
in which he had no right to be.

A District Pitwood Committee, with an area extending
to Kirkcudbrightshire in the north-west and Cleveland in
the south-east, has been appointed by the Coal Controller
to develop the local resources of mining timber. The allo-
cation of the timber is expected to be conducted on co-operative
principles. The local chairman is Mr. J. R. R. Wilson, H.M. inspector of mines, assisted by Mr. R. S. Anderson, of 26, Mosley-street, Newcastle, as technical
assistant, and Mr. T. Edlington, of Westgate-road, New-
castle, as transport officer.

Lieut. E. W. Williams, of the Durham Light Infantry,
the first miner to gain a commission among those employed
at Gordon House Colliery, Cockfield, has been presented
with a sword of honour, subscribed for by the colliery
workmen.

Cumberland.

At a largely-attended meeting of the Buckhill Colliery
lodge of the Cumberland Miners' Association, held at
Broughton last week, the recruiting of miners was con-
sidered, and, after a lengthy discussion, the following
resolution was carried unanimously:—"Now that recruit-
ing from miners has been suspended until September 8, we
are of opinion that the whole question of recruiting should
be re-considered by every member of our association. We
consider that public opinion has considerably changed
towards conscription and the prolongation of the war, and
the sacrifice of human life are questions that the whole of
the workers should decide."

After standing idle for about 12 years, a new start has
been made at the Askam Iron Works of the Millom and
Askam Hematite Iron Company Limited. At Askam there
are four furnaces, one of which has now been re-lighted.
Other furnaces are being rebuilt.

Mr. John Barr, of Barrow, has been appointed a special
director of the firm of Messrs. Vickers Limited, in suc-
cession to Mr. A. Miller, who recently resigned owing to ill-
health. Mr. Barr will take over the whole of Mr. Miller's
duties as commercial director and secretary.

Mr. F. D. Harper, the manager of the Allerdale Coal
Company's by-product coke oven works at Great Clifton,
has patented a gas burner for heating all kinds of boilers,
superheaters, glass furnaces, blast furnace stoves with coke
oven, producer, or blast furnace gas, and a local company,
called the Harper Patent Burner Company Limited, has
been formed to put the burner on the market. It is
already in use at the coke ovens at Great Clifton and at
blast furnace stoves in West Cumberland, and is yielding
exceedingly satisfactory results. The burner is said to be
capable of raising steam very quickly.

Yorkshire.

*Important Housing Schemes — Unskilled Labour in the
Mines—Winter Coal for Doncaster and Sheffield.*

The Doncaster Coal Supply Committee are taking steps
to ensure that the poor people shall not be without fuel
this winter. They have decided to ask the Controller of
Coal Mines for permission to purchase and store 500 tons
of coal for the use of the poor in case of emergency. Various
places in the borough have been selected as depots for the
purpose of storing the coal, which is to be purchased as
soon as possible from collieries in the neighbourhood of
Doncaster. It will be issued to the poor people in small
quantities, and at market prices. Meanwhile, most of the
inhabitants of the town are being circularised, and advised
to get in sufficient quantity of coal to last them till April
next, in all cases where they have storage accommodation.

Everywhere in the South Yorkshire district the call just
now is for houses; the builders will, indeed, be busy after
the war. But in some cases it is impossible to wait till
the conclusion of hostilities, such is the demand. The new
colliery at Hatfield, near Doncaster, furnishes a case in
point. At last week's meeting of the Thorne Rural Dis-
trict Council, application was made that the Council would
support the colliery company in an appeal to the Ministry
of Munitions for permission to erect 51 houses for workmen
and four for officials, in order that the colliery may con-
tinue its development. The application certainly had the
sympathy of the Council, who are fully cognisant of the
shortage of houses in the district, and the long distances
which pit employees have to go in order to obtain accom-
modation. Both shafts at Hatfield are now down to coal,
and it is imperative the company should be able to offer
something in the nature of housing accommodation, pend-
ing that happy day when the great model village at Stain-
forth materialises. The Thorne Council at once consented
to support the colliery company's application.

Nearly all the councils invited by the Wath-upon-Dearne
Urban Council to a housing conference have accepted the
invitation to be present, and the assembly promises to be
one thoroughly representative of South Yorkshire. The
object of the conference, which should have considerable
weight, is to ascertain the requirements of the whole of
the area in the matter of housing, then to present a joint
application to the Local Government Board for financial
assistance. There will also be a proposal to form a Dearne
Valley Federation of Urban Councils. Wombwell is pro-
posing a housing scheme embracing 528 new houses.

The subject of unskilled labour is being debated by the
Dalton Main miners, and at a largely-attended meeting
recently held two officials of the local branch of the York-
shire Miners' Association were appointed to inspect the
signing-on book at the colliery (this privilege being offered
by the manager), and to report all doubtful men to the
military authorities. Investigation as to their ante-
cedents expressed the view that they
importing unskilled labour into
a dangerous one; and that in no case
able-bodied Irishman filling the
are now fighting.

Coal have been allocated by the
the Sheffield Committee on Coal
the poor in the event of ordinary coal
The coal is not to be drawn upon without

the consent of the Department, which will only be given
on the receipt of an intimation from the Sheffield Com-
mittee that the local merchants are no longer able to cope
with the demands. The town clerk was requested to ascer-
tain whether the 3,000 tons was supplemental to the quan-
tity of house coal allocated to the city through the coal
merchants, or would be deducted from such quantity. The
Committee gave instructions that if the quantity was
supplemental, the offer should be accepted; if not, another
meeting of the Committee to be called to consider the
matter further. Messrs. G. H. Turner, W. Hall Wood,
C. White, and Brooks were appointed by the Committee
as the representatives on the committee of the Sheffield
Coal Merchants' Association.

Lancashire and Cheshire.

*Wigan and Salford Winter Coal Supplies—Colliery Exten-
sions and Improvements — Astley Model Colliery
Village.*

At a recent meeting of the Salford Town Council, the
Gas Committee was authorised to purchase an additional
supply of coal, to be available for sale during the winter
to persons who have no storage accommodation. The coal
will be stored on land in Liverpool-street, and a motor
vehicle will be bought to transport it to householders. The
Government are to be asked to pass temporary legislation to
authorise local authorities to store and sell coal during
periods of shortage.

Mr. Horace Rowson, of Little Hulton, is succeeding Mr.
Josiah Twigg (retired) as under-manager at Lord Elles-
mere's Ashton Field and Ellesmere Collieries, Walkden.

Working men in the Walkden and Little Hulton dis-
tricts are having electric batteries fitted up in connection
with the coal sheds, with the object of warning off would-be
coal lifters during the coming winter months.

One of our correspondents was assured the other day by
representatives of the Lancashire and Cheshire Coal
Owners' Association that the projects for building wash-
houses at many collieries in the Manchester, Bolton, Leigh,
and Wigan districts have not been lost sight of, but are
simply held up for the time being—until labour and other
matters become more normal. The necessary plans have
been prepared, and will be presented in due course to the
local authorities, where necessary.

Apud of the letter just forwarded to various local
authorities in Lancashire and Cheshire by the Canal Con-
trol Committee, in which it urges the use by manufactur-
ers of the inland waterways of the country for the con-
veyance of all kinds of traffic, with a view to relieving
railway congestion, it may be of interest to state that the
Bolton and Bury Canal (Lancashire and Yorkshire Railway
Company), Bridgewater Canal (Manchester Ship Canal
Company), and the Leeds and Liverpool Canal, are now
being largely used for the carriage of coal from collieries
in various parts of the South Lancashire coal fields.

At meetings of local miners held during the last few
days in the Walkden and Little Hulton districts, it was
decided to ask the Worsley and Little Hulton district
councils to appoint more working class representatives on
the local Food Control Committees.

The Coal Supplies Committee of the County Borough of
Wigan has accepted an offer of the Corporation Gas Com-
mittee to stack 1,000 tons of coal for distribution to poor
people in the borough during the coming winter, and has
decided to ask the retail coal merchants to furnish the
committee with information showing the actual quantity of
coal supplied for domestic use last winter, and the mini-
mum quantity such merchants are in a position to deliver
during the coming winter. The attention of the committee
has been drawn to the decisions of the local tribunal with
respect to men of military age engaged in the retail coal
trade, it having been pointed out that there were a few men
of military age left in this class of business, and that if
these men were taken it would mean that such businesses
would have to be sold, and the customers of such persons
would have to go without supplies of coal. The Coal
Supplies Committee has decided to request the local
tribunal to give serious consideration to any application
from men engaged in the retail coal trade.

Even if the threatened coal famine materialises during
the coming winter, the Fine Cotton Spinners' Association,
the largest textile combination, with large mills in Man-
chester, Bolton, Tyldesley, and elsewhere, will be ensured
of a full supply of coal for its factories, as it runs its own
colliery, in Bradford, Manchester.

The New Moss Colliery Company is opening out the
Roger mine and other seams, besides effecting other
improvements at its collieries in Audenshaw, near Man-
chester.

The leading collieries in the Wigan, Leigh, and Bolton
localities are making preparations for putting down by-pro-
ducts plants at their pits as soon as the war is over—earlier
if possible.

Lord Ellesmere has had improvements carried out at his
by-product works at his Brackley Collieries, Middle Hulton.
The Coal Controller has allocated 1,500 tons of emergency
coal to Bolton, and arrangements for stocking the same
having been made, the District Supply Committee, of
which Sir Thos. R. Ratcliffe-Ellis is chairman, will decide
from which collieries the coal will be received. No
communication on that point had come to hand as
yet. The emergency coal cannot be touched except
by permission of the Controller, and then only in
case of absolute necessity. It is understood that
the 1,500 tons is only a tentative allotment, the local com-
mittee holding the opinion that 4,000 to 6,000 tons of emer-
gency coal is needed to meet the town's requirements. The
District Committee are to be approached, with a view to
Bolton obtaining at least 4,000 tons.

The completion of the building of a model colliery village,
comprising 400 houses of the semi-detached type, at Astley,
near Manchester, where new coal fields are being opened
out, will be proceeded with as soon as the war is over.
Already 100 houses have been built, but the need for more
housing accommodation for local colliery workers is grow-
ing more and more acute.

North Wales.

At a meeting of delegates of the Sailors, Firemen,
Stewards, Dockers, and Carters' Unions, Liverpool, held
this week, it was decided to secede from membership of
the Liverpool Trades Council on account of the pacifist
tendencies of the latter. A new body is to be formed, and
called the Trades Union Representative Council.

Mr. Wm. Corbett (Nant) has been awarded a first-class
colliery manager's certificate as the result of an exami-
nation held at Wigan centre in May last.

An adjourned inquest was held at Chirk on Monday, on
the body of Emmanuel Jones, who died from injuries
received on July 5 last in an explosion of gas at Ifton
Colliery, when 10 other men were also injured. The
inquest was attended by Mr. A. D. Nicholson (H.M.
inspector of mines) and Mr. Mathews (deputy inspector).
The evidence showed that owing to the presence of gas

work was suspended, but subsequently resumed. On a shot
being fired, there was an explosion. After considering the
evidence, a verdict was returned to the effect that deceased
had died as a result of the explosion which had occurred,
and expressed an opinion that extra precaution should be
exercised when shot-firing was about to take place.

At a meeting of Chester Port Sanitary Authority, held
at Rhyl on Wednesday, it was stated that the number of
coastwise vessels which entered the port during the quarter
was 295, with a tonnage of 23,957 tons. There were no
vessels from foreign ports. The inspector of the Board
said that the state of the River Dee and its shipping was
gradually getting worse, and there was no prospect of
improvement until the navigation of the river was
thoroughly adequate. An extensive scheme was under con-
sideration immediately before the war, which was esti-
mated to cost about £75,000, but when hostilities broke
out, the scheme was held up until better times.

Notts and Derbyshire.

In the Nottinghamshire and Derbyshire coal field a
third rescue station has just been completed by the North
Midland Coal Owners' Rescue Station Company Limited.
It is situated at Ilkeston, the other two stations being at
Mansfield and Chesterfield. The new station is in a very
pleasant situation, overlooking Victoria Park, and within
about 300 yds. of Manners Colliery. The work was com-
menced before the outbreak of war, which had materially
interfered with its completion. The buildings, which have
a total frontage of about 270 ft., comprise the main block
forming the training station, and on either side a block
of two dwelling-houses for four married men. A 30 horse-
power Leylands rescue and ambulance car is always in
readiness, and is constructed to carry 11 sets of "Meco" or
liquid air apparatus, and the necessary electric hand
lamps, oxygen revivers, etc. The plant includes a fire
engine capable of pumping 400 to 500 gals. per minute.
Two types of self-contained breathing apparatus will be in
use to ensure that the immediate demands of any colliery
will be effectively complied with. A permanent rescue
corps of eight men will be the complement, consisting of
four married and four single men.

At a meeting of the Notts Miners' council held on
Saturday last, Mr. W. Carter, assistant secretary, pre-
sented a report on the recent labour conference. After
full discussion, it was decided not to vote in favour of
Stockholm, but to urge an adjournment of the special
labour conference for three weeks, to enable a ballot to be
taken on the whole question.

The Derbyshire Miners' council met at Chesterfield on
Saturday, when a resolution was passed expressing the
opinion that the retention of worked coal in the workings
was a positive danger and a loss of national wealth, and
that it should be sent to the surface. The council, there-
fore, called upon the Miners' Federation executive to take
up the question of the removal of forks, screens, and riddles
used for the filling of the coal, and arrange for the work to
be done with shovels. It was decided to organise mass
meetings in various centres in Derbyshire to protest against
the high price of foodstuffs. A grant of £25 was made to
the Burston school strikers. The delegates were deputed to
lay before their respective lodges the question of making a
grant to the Mill Close lead miners who have been on
strike at Darley Dale, and who have not been members of
the association sufficiently long to justify financial assist-
ance according to the rules. The men have now resumed
work, pending a settlement by arbitration or agreement.
The lodges are to be circularised in regard to an appeal to
continue their levies towards the ambulance convoys pro-
vided by the owners and miners of Derbyshire and Notts,
the money now being required for maintenance.

Judge Alan Macpherson, at Chesterfield on Friday of
last week, heard an interpleader action concerning the
Mickley (Dronfield) Colliery Company, in liquidation. On
behalf of execution creditors, objection was raised to the
county court judge dealing with the motion; it was sub-
mitted that, certain writs being issued by the High Court,
the matter should be decided there. The ex-Sheriff and
trustee in bankruptcy claimed that his Honour had juris-
diction; but counsel for execution creditors said he was not
prepared for the trial that day, as a number of witnesses
must be procured. It was very difficult to decide who was
the debtor, and he was instructed that it would not be
necessary to obtain as witness a person now in prison. His
Honour decided that the court had jurisdiction, but
adjourned the hearing to October, offering, however, to
sit specially in September if an earlier date could be fixed.

Nottingham will be allotted 2,000 tons of house coal for
distribution amongst the poor if supplies run short. The
coal is to be drawn from local collieries and stored.

A verdict of "Accidental death" was returned at an
inquest at Burton-on-Trent on Monday, on Thomas Draper,
a stallman, of Newhall, who was buried by a fall of roof
on Saturday at Cadley Hill Colliery. On going to work
in the Main coal deceased noticed that two bars were
crushed at the ends, and was in the act of "lining" them
when a "bump" occurred, followed by a fall. He was
conveyed to Burton Infirmary, but died five minutes after
arrival, from shock due to a fracture of the skull. The
workmen's delegate's report was that all precautions had
been taken, and that the affair was a simple accident.

The Midlands.

The new Government scheme for the distribution of home
supplies of pit timber is occupying much attention at
collieries, and district pitwood committees are already at
work organising the local supplies in some of the dis-
tricts. Co-operative purchase and distribution has been
commenced by some colliery associations.

In some of the districts bordering upon the Warwick-
shire coal fields the pit prop merchants are ready to un-
dertake to give a 12 months' supply as far as is practicable,
but they claim that in such a case they should be fortified
with a Government Order limiting the price at which the
timber can be obtained by them to a figure commensurate
with their contract price. Warwickshire coal owners
themselves do not take the view that the scheme implies
co-terminous areas of supply and consumption. It is
possible that the proprietors of collieries will form a com-
pany for the purchase and distribution of pit timber, as
has been done in Yorkshire and South Wales. Their
action in the matter is contingent, however, upon the fixing
of a price by the Controller, with the sole right of pur-
chase in the defined area. An enquiry on these points
has elicited no reply as yet. In any case, the coal owners
would hardly contemplate moving independently of the
timber merchants, whose aid is essential to the realisation
of the objects. The matter is one of urgency, as our over-
seas supplies of pit timber are steadily diminishing month
by month, and incidentally, of course, there is a corre-
sponding appreciation of prices.

Cannock Chase coal masters anxious about the allocation
of the new distribution of coal supplies should note that
the allocation of new sources of supply to consumers who

have hitherto imported coal into the South Staffordshire district from beyond the zone defined by the Controller in his re-organisation will be made in the coming week. Mr. Frank Impy is the chairman of the committee which has the matter in hand, but coal owners' communications should be addressed to the secretary, Maj. Selby Gardner, of Cannock.

Scotland.

Improvement in Shipments—Serious Damage at Rosie and Lochhead Collieries — Points of Local Interest in Petroleum Production Bill.

Mr. R. W. Drou, mining engineer, Glasgow, in a letter to the local Press, points out that the proposals outlined in the Production of Petroleum Bill raise some points which are of considerable economic interest to the West of Scotland. He explains that the series of strata containing the productive oil shales of Midlothian extends westwards underneath the coal fields of the Clyde Valley at a depth which is well within the limits for oil-bearing operations. Bores to test the oil-bearing capacities of these shales would be quite a legitimate speculation under the conditions of the Petroleum Bill. There are reasonable grounds for believing that crude oil might be found here in payable quantity. It is not uncommon, he further explains, to find crude oil exuding from the pavement of the lower seams in Lanarkshire, and in some cases sufficient has been recovered to make it worth while to collect it for colliery purposes. Such bores would pass through the unproven coal seams of the carboniferous limestone series, and would thus yield immensely valuable information regarding the coal seams in that series.

In the Hamilton Sheriff Court, Daniel Timmins, miner, Baillie's-causeway, Hamilton, was fined 30s., with the alternative of 10 days' imprisonment, for failing to adequately and systematically prop and support the roof of his working place in North Motherwell Colliery, Motherwell.

The Auchinleck branch of the Ayrshire Miners' Union have decided to give an increase of ½d. in the flat rate paid to the local doctors for medical attendance on miners and their families.

The delegates attending the monthly meeting of the Ayrshire Miners' Union have decided not to hold a county demonstration and a general idle day to protest against the excessive food prices. The delegates have indicated a preference for a national holiday, and have forwarded a resolution to the general secretary of the National Mine Workers' Union to that effect.

A mines prosecution of interest to colliery engine keepers was heard in Hamilton Sheriff Court on Thursday of last week. A winding engineman pleaded guilty to a charge of having lowered a pit cage down the shaft without having previously received the signal of two bells. Sheriff Shennan dismissed the accused with an admonition.

Mr. John Millar, Motherwell, has been appointed assistant colliery manager under his brother, Mr. Matthew Millar, to the New Irish Mining Coal Company at their pits at Wolfhill, Queen's County, Ireland. For the past six years Mr. John Millar has been employed at Parkhead and Shields Colliery, Motherwell, belonging to the Glasgow Iron and Steel Company.

Mr. James Cook, manager at Neilson Colliery, Hamilton, belonging to Messrs. John Watson Limited, has been temporarily transferred to the firm's new pits at Robroyston, on the outskirts of Glasgow. Mr. James Houston, under-manager, has taken over Mr. Cook's duties at the Hamilton Colliery.

A serious loss has been sustained by a fire in the coal bins at the Rosie and Lochhead collieries, Firth of Forth, which lasted several weeks. The outbreak has now been subdued.

The company working the coal field in the Camelon district have two mines going at present, and their intention is to sink a third at the west portion of the field. Boring operations are being carried out.

For contravention of the Explosives in Coal Mines Order, two miners from a Fife colliery were at Kinross Sheriff Court each fined the sum of £5.

The shipment of coal from Burntisland for the past week was 6,640 tons, all of which went coastwise. Last year the week's shipment was 16,530 tons.

At Easter Jaw a good number of men are employed, but no developments can be looked for until the lower seams are tapped.

Working time at the Fife collieries continues fairly steady. The shipments of coal from the Fife ports are now considerably higher than they were in the spring and early months, which largely explains the improved conditions.

THE BY-PRODUCTS TRADE.

Tar Products.—London and provincial markets remain quiet, but firm. There are some very fair enquiries for pitch on Continental account; and some shipments are being continued during the summer months. Solvent naphtha has a slightly harder tendency. The average quotations for gas works products are as follow:—Coal tar, 23s. 3d. to 28s. Pitch, east coast, 16s. to 17s. per ton; west coast, Manchester, 15s. to 16s.; Liverpool, 16s. 6d. to 17s. 6d.; Clyde, 19s. to 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 1s. 11d. to 2s. Heavy naphtha, north, 1s. 1d. to 1s. 2d. Heavy oils, in bulk, north, 3¾d. to 4¼d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—Home trade is still taking current supplies on the basis of official prices, and there are many enquiries for delivery next spring.

THE TIN-PLATE TRADE.

Liverpool.

Pending the issue of the full schedule of prices to be charged, most makers decline to book any new business at all; consequently, only a very small trade has been done on the week, and all, of course, at 30s. basis net f.o.r. at works, subject to revision when the list is officially published. Unrestricted sizes, the stock of which is rapidly being reduced, are commanding 47s. basis and upwards; some holders are asking 50s.

Two thousand steam coal workmen at the Treharris pits of the Ocean Colliery Company went out on strike yesterday (Thursday), but returned to work in the evening; an alleged insufficient supply of timber was the main cause of the trouble.

CURRENT SCIENCE AND TECHNOLOGY.

Complete Carbonisation of Coal.

A process for the carbonisation of coal without leaving any residue but incombustible ash or clinker, whilst affording considerable latitude in the by-products and kind of gas produced, and giving a high yield of ammonia, has been described by Dr. A. Naumann in the *Chemiker Zeitung*. The carboniser is a vertical retort, heated internally by gas, and the descending charge gives off in succession water, ammonia, volatile oils and rich gas, tar, methane, hydrogen, and carbon dioxide. The coke drops into a generator below, where it reacts with steam, the resulting water-gas being used to drive off the volatile matter from the coal in the upper zone of the retort. Air is blown intermittently through the coke, followed by steam, to raise the temperature and generate the water gas, which distils the volatile constituents of the coal, passing off with the latter to the hydraulic main. Part of the water-gas may be burned, by admitting air between the generator and retort, in order to increase the temperature in the latter if required. Steam may also be introduced at the same level, to increase the yield of ammonia. This "tri-gas" process furnishes a gas containing about 41 to 50 per cent. of hydrogen (according to the coal used), 5½ to 10 per cent. of methane, 26 to 30 per cent. of carbon monoxide, 0.4 to 1 per cent. of heavy hydrocarbons, 5 to 9 per cent. of nitrogen, and 4 to 18 per cent. of carbon dioxide, and with a calorific value of 260 to 370 British thermal units per cu. ft. The yield of ammonia is stated to approximate to the theoretical maximum.

Carbonisation of Dust and Soot.

Heer Alting, of the Amsterdam Eastern Gas Works, has described in *Het Gas* (abstracted in *Gas World*) experiments with dust and soot as gas producing materials. As in these critical times every grain of fuel has its value for gas making purposes, the author had the idea of using refuse which might in ordinary times be regarded as valueless for the production of gas. The removal of the dust from the dust catcher of the water-gas plant and the soot from the boiler house flues is generally a problem, as nobody cares much to take them.

The aim was to mix the material with a sufficient quantity of coal tar, and to carbonise the resultant product in retorts temporarily out of action. The first trial was made with 50 kilogs. of water-gas dust mixed with 15 kilogs. of raw tar. The mixture was carbonised for three hours at 1,000 degs. Celsius. The coke was valueless; being very soft, and easily reduced to powder. When the amount of tar was increased to 20 kilogs., there was obtained a coke of better quality, though still lacking in hardness. This was usable under steam boilers. With 30 kilogs. of tar, the coke was hard and light grey in colour, being quite suitable for use as an ordinary fuel. When consumed in an open fire, it was found to last longer than ordinary gas coke, and to give more heat; nothing but ashes being left in the grate. Further experiments with dust from other sources clearly showed that the amount of tar necessary to afford adequate binding, and resistance in the resultant coke, was at least 60 per cent. of the weight of the dust.

As the intention was to remove as much valueless material as possible, the following experiments were made with the pitchy material from the hydraulic mains and the tar separators. A mixture of 50 parts of water-gas dust and 30 parts of pitchy tar, carbonised for 3½ hours, produced 50 parts of small coke and 12½ parts of breeze. The coke was hard, light grey in colour, and was found to burn well. Not so hard, but otherwise of good quality, was the coke produced from a mixture of 25 parts of water-gas dust and the same amount of dust from the coal gas plant. In this case, there were produced 47 parts of small coke and 18½ parts of breeze. In the same manner, there were treated dust from the roof of the water-gas plant, from the roof of the workshop, and from the flues of the boiler house. This produced a coke which was very hard and dark grey in colour.

The result, therefore, is to show that mixtures of dust from various parts of a gas works with 60 per cent. of their weight of thick tar carbonised for 3 to 3½ hours at about 1,000 degs. Celsius gives coke that is usable as household fuel, and has the advantage of leaving only ash in the grate. The amount of ash, calculated as dry matter, of the different types of coke varied between 13 and 23 per cent., the average being 15 per cent. The point is whether this treatment of gas works refuse is remunerative. A trial with about 10 metric tons of the mixture demonstrated that, when all charges had been taken into account, the cost price of the coke per ton was 8s. 11d.; the breeze being regarded as of no value. Thus, the proposal seems to be a practical method of utilising the gas works refuse referred to.

Cerium-Iron Alloys.

Experimenting with a cerium of 95.6 per cent. which contained lanthanum and traces of iron, but seemed to be free from neodymium and praseodymium, and also ferro-cerium containing from 15 to 75 per cent. of iron, R. Vogel (*Zeits. für angewandte Chemie*—abstracted in *Engineering*) has prepared high-grade alloys. Cerium and iron, he finds, are miscible in all proportions, and they form two compounds, first CeFe₂, which is changed at 773 degs. into Ce₂Fe₃, which decomposes at 1,085 degs. into a liquid and a solid solution rich in iron; the solution contains 15 per cent. of Ce, and becomes poorer in Ce on cooling. The compound CeFe₂ is magnetic, but loses its magnetism at 116 degs. Whether the second compound is magnetic is not certain. But there is another magnetic transformation point near 795 degs. for alloys containing 25 per cent. of Ce; that transformation temperature is lowered to 750 and 675 degs. as the Ce percentage rises to 60 and 65, and then drops suddenly to 116 degs. as the Ce percentage is further raised. The point is fairly con-

stant, hence, for the range 15 to 55 per cent. of Ce. As regards the pyrophoric character of the alloys generally, some alloys must be vigorously filed before they spark, others need only be scratched; the CeFe alloys of 70 per cent. of Ce are the most pyrophoric of the series. It is not merely a question of friction and oxidation; cerium itself is much more oxidisable than CeMg, but less pyrophoric than this compound. Vogel considers that the peculiarity depends upon two factors. First, the presence of at least one Ce compound in the shape of crystallites. All these compounds are hard, brittle, pyrophoric, and do not oxidise at ordinary temperature; that holds for alloys of cerium with tin, aluminium, silicon, bismuth, antimony, copper, lead, etc., all known in definite compounds. Secondly, there must be present a softer material, more readily oxidised than the compound. That material is cerium itself in the case of MgCe, which when pure is little pyrophoric, but improves in that respect when it contains free cerium. The same applies to ferro-cerium. Iron with 50 or 60 per cent. of cerium does not make a good igniter; but when it further contains free cerium it gives powerful sparks. When the first mentioned crystallites are firmly interwoven, the rubbing or filing of the surface does not expose fresh oxidisable material; but when the crystallites enclose the softer cerium, friction will expose the latter, which is much more oxidisable, and the particles from the brittle crystallites catch fire.

The Nichrome-Constantan Thermocouple.

Messrs. R. W. Woodward and T. R. Harrison (*Electrical Review*) have tested a thermocouple made of No. 18 nichrome and No. 12 constantan, the wires having a single asbestos wrapping, and being further protected by covering with a thick mixture of kaolin and sodium silicate, winding with asbestos cord, and again smearing with a thinner mixture of kaolin and sodium silicate.

A life test of this combination of thermo elements was made, together with others of nichrome-constantan and iron-constantan. The couples of nichrome-constantan maintained a very nearly constant calibration—to within 10 degs. Cent.—during their life, and could be relied upon to 10 degs. Cent. as long as there was a metallic electrical circuit, whereas the iron-constantan couple had a practically uniformly diminishing E.M.F. In all cases it was the constantan wire that failed, by oxidation and becoming so brittle that it readily broke; the nichrome wire never became brittle, and showed no considerable oxidation.

The couple nichrome-constantan showed a remarkably high E.M.F.; the calibration curve was very nearly linear, and showed no departure from a smooth curve. The same calibration was found to hold good to within 1 up to 1,000 degs. Cent. for other couples made of wire from the same lot, but it would probably be different for wires from other lots or other wires from this lot.

Couples were constructed of this combination for use in the investigation referred to, and to date had been found to give very good service.

For use in the air, therefore, to 1,000 degs. Cent., even when only incompletely protected, these data and subsequent experience showed that the thermocouple nichrome-constantan would maintain its constancy to within 10 degs. Cent. (18 degs. Fahr.) until nearly completely oxidised. The E.M.F. of this couple was high, 63.8 mv. at 1,000 degs. Cent., as compared with iron-constantan, 57.5 mv. at 1,000 degs. Cent.; nickel-constantan, 27.2 mv. at 1,000 degs. Cent.; nickel-nichrome, 28 mv. at 1,000 degs. Cent.; and cobalt-constantan, 39.5 mv. at 1,000 degs. Cent.

CALIBRATION OF NICHROME-CONSTANTAN.

Temperature. Degr. Cent.	E.M.F. Millivolts.	Temperature. Degr. Cent.	E.M.F. Millivolts.
108 ...	4.92 ...	632 ...	37.4
204 ...	9.90 ...	842 ...	52.2
292 ...	14.90 ...	1,033 ...	66.3
434 ...	23.80		

Ankylostomiasis in the Madras Presidency.

As the result of an enquiry carried out at the Negapatam Emigration Depot, Dr. K. S. Mhaskar (*Indian Journal of Medical Research*, April 1917) reports that of the coolies in the Negapatam Emigration Depot, 98.6 per cent. were found to harbour hookworms, and a similar rate of incidence, 98.7 per cent., was also found in two typical villages of the Tanjore district. Negapatam town had a slightly lower infestation rate, viz., 91 per cent., but of 67 samples obtained from Negapatam schools, ankylostome ova were found in all but one. Ankylostome infection is much more prevalent in the Madras Presidency than hospital and dispensary returns indicate. Infection occurs irrespective of caste, age, sex, occupation, and social status. The disease is endemic in India. Hookworm infection is equally prevalent among coolies who have never left India as it is among coolies emigrating for the second or third time. The physical condition of coolies, who are more or less selected, in the depot, demonstrates that hookworm infection is not incompatible with apparent good health. On the other hand, the examination of the school children in Negapatam town and two villages indicated that hookworms are responsible for deterioration of physique, anæmia, and much ill-health. The coolies found infected were drawn from rural areas in 13 districts and four states in the Madras Presidency area. For most of these districts the figures are small, but it can be asserted that hookworm infestation is universally prevalent in the areas of the Trichinopoly, Tanjore, Malabar, Madurai, and South Arcot districts, and of the Pondicherry State.

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CONTENTS.

ARTICLES:—	PAGE
... and the Stockholm Conference.....	355
... Petroleum in the United Kingdom	355
... of Deep Coal Areas in Bengal.....	345
... of Firedamp by the Limits of Inflam-	346
Minerals of China	346
The Future of Forestry	347
Coal Mining in Alberta in 1916	347
Inflammability of Mixtures of Gases with Air	348
Safe Air Compressor Operation.....	348
Petroleum Production Bill.....	349
The Handling of Coal by Hydraulic Means	349
Mining Employment Statistics.....	350
Colliery Assessments and Public Works	350
Improvement in Twist Boring Drills	350
Miners' Wages.....	356
South Wales Mining Timber Trade	359
The German Coal and Iron Trades	360
The American Coal Trade	360
Labour and Wages.....	361
Coastwise Shipments in July	362
Open Contracts	362
Obituary	362
The Freight Market	366
Publications Received	366
Abstracts of Patent Specifications Recently	366
Accepted.....	366
New Patents Connected with the Coal and Iron	368
Trades	368
THE COAL AND IRON TRADES	353-359
The By-Products Trade	353
The Tin-plate Trade	353
The London Coal Trade	356
NOTES FROM THE COAL FIELDS	351
CURRENT SCIENCE AND TECHNOLOGY.....	353
LAW INTELLIGENCE	360
INDIAN AND COLONIAL NOTES	360
PARLIAMENTARY INTELLIGENCE	361
MONTHLY LIST OF RECENT COAL LITERATURE	364
COAL, IRON AND ENGINEERING COMPANIES	362
MISCELLANEA:—	
Export of Coke to France—Timber Supplies	347
Canadian Coal Supply—Miners and Recruiting—	
Coal Miners' Families in France	349
New Men in the Mines	350
Coal Cards for Paris	356
Certifying Surgeons Appointed—Cargo Ship	
Owners' Demands	360
Registration and Publication of Directors' Names	362
America Fixes Coal Prices	366
Italy's Imports of American Coal—Fostering	
Empire Trade—Mining Rights in County Leitrim	368

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LONDON, FRIDAY, AUGUST 24, 1917.

The London market has been better supplied during the week both with railborne and seaborne coal, but the supply is still below the demand. Depots are busy, but merchants report orders in hand for above two months' supply. Empties are running better, and the railway companies are bringing loaded wagons through promptly. The Coal Controller's scheme is the main topic of conversation. A special request has been formulated asking for an extension of at least one month to get old orders executed, and to put a fortnight's supply on the ground as provided for in the new regulations.

Northumberland and Durham markets report that every quality of coal is offering plentifully at minimum prices. Tonnage shortage is acute, and is felt more severely by Northumberland collieries, whose output is mainly for export, than by the Durham pits, which have a considerable amount of home custom.

Yorkshire and Lancashire areas still report considerable pressure for all kinds of fuel, and collieries find it almost impossible to work off arrears.

Humber ports show no change, and a fair business continues to be done, chiefly on French and Italian account.

In the Midlands all classes of households are in greater demand than ever, and railway sidings are blocked with empty wagons waiting to be filled;

traffic for London and district is getting into confusion.

There is a distinct improvement in the tone of the South Wales markets, and collieries on the whole have been working better time. Tonnage clearances fall below market requirements. Anthracite and steam sorts are in good demand, with moderate supplies.

No fresh feature is to be noted in Scotland; demands are limited, and employment at the mines is somewhat irregular.

The feature of the Irish trade is the large demand for household coal at Belfast, and the insufficient supplies of best English coals to meet it, although Scotch coals are fairly plentiful. There is practically no change at Dublin.

The freight market remains dull, all coal shipping centres being starved for want of tonnage. On the north-east coast fixtures have been mainly for carriage of coke to near French ports. At all Welsh ports fixing has been limited to French Atlantic ports and other near destinations.

The Minister of Munitions is issuing an Order applying Regulation 30A of the Defence of the Realm Regulations to tin-plates and terne-plates, and fixing maximum prices and conditions of sale for these materials.

The Miners and the Stockholm Conference.

THE Miners' Federation of Great Britain have been much in the limelight during the last few days, and their action, or rather the decision of their delegates, promises to play an important part in connection with the proposed Stockholm Conference. By a narrow majority—376 votes to 354—the miners' delegates decided on Monday last against the participation of the British Labour movement in the attempt now being made to revive the International. This was a reversal of their decision on August 10, when they supported the proposal under a misapprehension brought about by the imperfect manner in which the case had been presented to them. It is not necessary to attempt to unravel the contradictions and mutual recriminations in which this matter is shrouded. We are quite ready to believe that the muddle which has characterised this affair has resulted from a general misunderstanding all round, in the tangle of which Mr. HENDERSON found himself involved. There is not the slightest use in attempting to get at the bottom of this strange confusion, which seems to have had its prime origin in the intrigues of the Socialistic element. We have from the outset of these proceedings, which date from the days of the late Mr. KEIR HARDIE's activities some years back, endeavoured to show that the Miners' Federation was ill-advised in toying with Socialism. Now that the promise of a new era, after the war, in the status and influence of the trade unions is rapidly developing, it is satisfactory to see signs of a more independent attitude on the part of the miners, whose change of view with regard to the Stockholm Conference is believed to have been based upon the conviction that their representation at that meeting would have led to a complete misrepresentation of their views regarding the war. Every indication goes to show that the Socialist wing of the Labour Party, apart from its numerical insignificance, has not the smallest claim to speak for British Labour. Participation in the Conference has been declined by the Belgian Labour Party, the American Federation of Labour, and the Japanese Socialists. The French and Italian Socialists seem to be in favour of it; but even that fact does not indicate the true feeling of French and Italian Labour. As for the Russian working men, the situation in that country is so chaotic that it is almost impossible to determine what is their real attitude. That in itself is enough to prove the unwisdom of the Stockholm meeting at the present time. The situation is not ripe for any such Conference, even if it could be justified on other grounds. Mr. BARNES made that point perfectly clear when he showed that such a meeting could only result in relative disadvantage to the cause of the Allies. Does any sane person believe that Herr SCHEIDEMANN is acting otherwise than as a tool of the German Government? Apart, therefore, from the natural repugnance which every right thinking person must feel to even a semblance of fraternising with the enemy in his present mood, it would certainly

be a feeble move to play deliberately into his hands in the manner aimed at by the promoters of the Stockholm plot. There can be no revival of the International under the existing régime in Germany. Such a step would be neither more nor less than an alliance with the pan-German idea. Neither is there any sense in trying to fight German militarism with Socialistic phrases. Mr. BARNES said some very hard things about the efficacy of that kind of clap-trap—the shibboleths of Socialism—when used as arguments for a premature peace. It is cheering to feel that the bulk of the Labour Party, in this and Allied countries, takes a saner and more practical view of the situation. As *The Times* very pertinently remarks, there is something supremely ludicrous in the spectacle of the Socialists, the most disputatious class of men in every country, setting out to lead the warring nations into amity and concord. These doctrinaires do not even know what they want. Hopelessly divided amongst themselves, split into sections steeped in mutual distrust, honest for the most part according to their lights, but always at loggerheads with one another, these victims of impracticable ideals seek to pose as the sole exponents of sociological conceptions, which, old as they are, have never yet found favour in the evolution of the history of the world.

Neither does it seem likely that the Miners' Federation will be permitted to be dragged at the tail of the Socialist Party, and in adopting that attitude they are doing good service to themselves and to the nation.

Next week there is to be a conference of allied Labour and Socialist delegates. It will be interesting to see whether any effective action will then be taken to clear up the hopeless muddle in which the Labour movement has got involved over the question of the Stockholm conference. At present the prevailing opinion seems to be that there will be no conference at all. That would indeed be the best solution of the question, and would amount to a diplomatic victory over the deep-laid schemes of the Germans, aided by their too-confiding dupes in many lands.

Search for Petroleum in the United Kingdom.

THE end of the Parliamentary Session has been marked by the introduction of more than one Bill of outstanding importance. Last week we referred to Mr. FISHER's Education Bill, and now we propose to direct attention to Mr. LONG's Bill to make provision with respect to the searching and boring for petroleum in the United Kingdom. As is known, a committee has lately been engaged in discussing the question of our oil supplies, in connection with which Lord NORTHCLIFFE went to the United States, and Sir FREDERICK BLACK has been since appointed to represent British interests in that country. Apart from the problem of obtaining petroleum from other countries, the committee has come to the conclusion that it is quite probable that oil exists in this country, and the Government has decided that the decision of this important question should not be left entirely to private enterprise, which has been found abroad to result too often in scrambling competition, with much bad work and wasteful expenditure.

Before proceeding to examine the details of the Bill to be laid before Parliament, which would enable the Government to take this matter in hand, we may point out that this question has a twofold interest for those engaged in the coal industry. In the first place petroleum supplies have a direct bearing upon the position of coal as a source of energy. The relation between oil and coal is not, however, antagonistic. Each has its own special sphere of use in industry, and the discovery and exploitation of oil fields will not necessarily lead to any diminution in the demand for coal, although it may influence to a considerable extent the manner in which coal is utilised. In the second place, it is important to bear in mind that systematic deep boring for petroleum in this country cannot fail also to throw light upon many problems connected with the extent of concealed coal fields and the geological structure of the deeper portions of the earth's crust. It may be safely predicted that whether oil fields are discovered or not, these borings will add to our knowledge of our coal resources.

The question of the probability of the discovery of petroleum in the United Kingdom is one which cannot be settled without trial. As Mr. LONG observed, petroleum, being a liquid, is liable to

and is, therefore, not easy to locate. In the course of this year an important paper on this subject was read by Mr. W. FORBES-LESLIE before the meeting of Petroleum Technologists. It has, however, long been known that the oil shales of the Lower Carboniferous are not by any means the only petroliferous strata in Great Britain. The bituminous shales of the Kimmeridge beds have long been regarded as a possible source of mineral oil of commercial value. It is not, however, the development of oil shale mining that is now in contemplation, but the discovery of the oil itself which has been expressed from its parent rock, and may be expected to have accumulated in suitable subterranean reservoirs where the necessary conditions for its retention exist. Experience has shown that anticlinal domes are the most promising situation for such accumulations. One of the problems involved, therefore, in this investigation will be the location of concealed domes of this kind. Mr. FORBES-LESLIE, in the paper referred to above, shows that there are certain areas where such domes may be expected to occur. A considerable number of oil escapes have been detected in various parts of the country, one of the most important being that discovered 70 years ago in the Riddings Colliery, Alferton, in Derbyshire, from which Dr. JAMES YOUNG, the founder of the Scotch shale industry, obtained from seven to 10 barrels of oil per week for a year or more. From the Kelham boring also, oil was obtained at a depth of 2,452 ft., under sufficient pressure to force it to the surface. Without enumerating the many oil escapes which have been recorded in various parts of the country, and described in Mr. FORBES-LESLIE's paper, it may be stated that there are good reasons for believing that these may be definitely related to the structure of the underlying rocks, and to the axes of the folds into which they have been thrown. Many of these folds can be inferred with a fair degree of probability, and these will probably form the basis for the location of the first experimental borings. Amongst them perhaps the most promising is that known as the Ashover-Sherwood anticline, with which the oil escapes both of the Riddings Colliery and the Kelham boring are possibly connected. Perhaps the most hopeful feature of the question is that this problem has never been investigated. No borings of sufficient depth have yet been made, even in the most likely areas, and it is with the greatest satisfaction that we learn that the Government has at length determined to put this matter to the test.

The Government has decided to bring in a Bill, although during the war it will be possible to proceed under the Defence of the Realm Act. The Bill places in the hands of the Government all rights to get petroleum, and authorises the leasing and definition of oil field areas, whereby both waste and loss of time will be prevented. Under its powers petroliferous zones can be marked out, and payments will be made by fixed royalties for all oil that may be won. At the same time, schemes will be drawn up by the Board of Trade whereby oil fields may be worked by private persons or by companies upon fixed terms and conditions. There will be no question of the abrogation of rights of surface owners.

The exploration of oil fields by the Government, if judiciously carried out, will prevent waste of money in speculative boring. The possibility of the existence of oil deposits in Britain has already attracted attention, and enough excitement has been aroused to stimulate private enterprise at a time when the maintenance of our oil supplies has become of national importance. The success of the exploration will depend largely upon an accurate knowledge of the tectonics of the underlying rocks of this country. Both in America and on the Continent, and indeed in almost every important oil-bearing area, the existence of workable oil deposits can be shown to depend upon certain well-known geological conditions. There is good reason for the belief that these conditions exist in the eastern portion of England, which will probably be one of the first areas to be thoroughly explored. At the same time, the location of a deep-seated anticline and the penetration of its axis by no means an easy matter, and the considerable amount of per-
centage of the Government boreholes tap an oil

like a premature division of the skin of the bear, no one will withhold a cordial approval of the spirit of enterprise which it shows, and a sincere hope for the success of the endeavour. The future of the project appears to rest largely upon the value of the theory that such petroleum indications as have been observed in this country, including the supplies in the shales, are but the manifestations of larger concentrations at greater depths.

MINERS' WAGES.

[FROM OUR MINING CORRESPONDENT.]

Mr. Guy Calthrop, Coal Controller, has arranged to meet the executive of the Miners' Federation of Great Britain on Tuesday afternoon next, to consider the application agreed to by the Glasgow conference in July for a 25 per cent. increase of the wages of all the men and boys employed in and about the coal mines of Great Britain. The application is based upon the increase in the cost of living, and, as was the case in the war bonus application of 1915, not upon the economic position of the trade or the selling price of coal. In the award then given, Mr. Asquith admitted the principle of a war bonus to meet the rise in food prices, as apart from the selling price of coal, and the awards made in the different districts by the chairman of the Wages Board were given on this basis.

THE LONDON COAL TRADE.

THURSDAY, AUGUST 23.

The London coal trade continues brisk, and orders from the general public are still coming in, far beyond the power of the merchants to deal with them. Happily, the tonnage coming forward continues fairly satisfactory, and the railway companies are despatching the loaded wagons with great regularity and promptitude. At all the various depots strenuous efforts are being made to cope with the orders on hand, but the loaders and carmen now dealing with the coal trucks are not so well able to throw their energies into the work as in former years, on account of so many of the younger and stronger members having been called up. The prominent feature of the week's work has been the special effort to get a bit of stock on the ground, but as the wagons are cleared by old unexecuted orders on hand as fast as they come in, there has been but little opportunity for putting any on the ground. Steam coals are particularly scarce and difficult to obtain. Colliery representatives are constantly refusing any further orders, and confining themselves to the monthly contract quantities. Empties are working much better. The seaborne market continues to be fairly well supplied; 44 contract cargoes were entered as arriving in the River Thames for Monday's market, and 11 for Wednesday. The pressure for this coal is as great as ever, although gas companies are undoubtedly better supplied than heretofore. Freights are firmly held, but the Humber ports show that a better supply of coal is coming forward, if only the number of vessels could be increased. All prices remain stationary. A very important meeting was held at the Cannon Street Hotel during the week to consider the proposals of the Coal Controller as it affects the London coal trade generally. Nearly all the merchants were present, and the discussion of the various points gave rise to a good deal of excitement at times. Very little was done, however, except to pass a resolution urging the Controller to stay the proceedings for a further month, in order that something like a fair stock of coal might be put upon the ground, in addition to the clearing up of the mass of orders on hand. The meeting was perfectly unanimous that the end of September would be too short a time in which to get the orders fulfilled, and especially to enable them to put a bit into stock. The majority of the pits report a fairly good number of empties on hand, and in some cases the collieries have a good stock of coal on the ground; but still the cry is for more coal for London. The Price of Coal (Limitation) Act undoubtedly at one time diverted large quantities of coal into the shipping areas, where better prices were easily obtainable; but this is the one great point which it is hoped the Controller will grasp, in his efforts to secure a better tonnage for London. The Government have naturally had first claim for all the local munition works, and as the coal has to pass so many of these special centres, it is not at all surprising that the quantity available for London is so small. The North London depots are comfortably off for coal, but there are many of the South London depots who are still exceedingly short of supplies. In many cases merchants have been obliged to close their books from entering any more orders from the public, and it is a frequent occurrence for them to state that they have sufficient orders in hand to last for the next two months.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, AUGUST 17.—The enquiry for seaborne house coal still continues good, but the supplies coming forward are far short of the demand, no sales being reported to-day. Cargoes, 13.

MONDAY, AUGUST 20.—There was a good demand for seaborne house coal to-day, and though a large arrival of colliers, no spare cargoes were available. Cargoes, 44.

WEDNESDAY, AUGUST 22.—The seaborne house coal market was rather quiet to-day, although the enquiry for supplies continues good. No sales, however, were reported. Cargoes, 11.

The Controller of Coal Mines had a conference with the London Coal Merchants Committee on Tuesday. While the coal merchants are still of opinion that the London Coal Distribution Order is unnecessary, they have reiterated their desire to assist the Controller in every possible way. The Coal Controller has acceded to the wishes of the merchants by extending the time for the completion of outstanding orders to October 15, and the merchants' committee, on their part, will help him in obtaining the services of supervisors, representing the trade, to assist in carrying out his scheme.

Coal Cards for Paris.—Coal cards will be distributed in Paris at the end of this week. The price of household coal has been fixed at 110 fr. (£4 8s.) a ton, but there is no guarantee whatever that coal will be available.

THE COAL AND IRON TRADES.

THURSDAY, AUGUST 23.

Scotland.—Western District.

COAL.

The coal trade in Scotland is still without fresh feature. The industrial demand is comparatively healthy, and a fairly good household turnover is being done. The export department, however, continues extremely quiet. In the west of Scotland district collieries are finding difficulty in disposing of their outputs, and employment is somewhat irregular. The shipping returns are remarkably good under the circumstances, but are mostly coastwise or to the Allies. Prices remain on last week's basis. Shipments for the week were 131,968 tons, against 119,835 in the preceding week and 128,334 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	22/-26/
Ell	26/6-28/	26/6-28/	24/-25/
Splint.....	28/-30/	28/-30/	30/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The position in the Scotch iron trade continues to be one of great activity. All branches are sharing in the call for war material, the demand for which increases week by week. In spite of large additions and alterations to plants the output, though undoubtedly showing expansion, is still below requirements. In pig iron the chief demand centres in haematite for the local steel works. Stocks of foundry and forge qualities are now very low, and supplies are difficult to arrange, and, in fact, are not always obtainable. Exports are confined to the necessities of war. Prices are firm and unchanged. Monkland and Carnbroe are quoted f.o.b. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Malleable iron makers are exceptionally busy, chiefly on war work. Supplies of iron for ordinary disposal are very restricted, the majority of the mills producing steel at present. The ordinary qualities of iron bars are practically unobtainable, and shell discard material is being substituted in a number of cases. Black sheets are also scarce, while galvanised goods are off the market apart from Government orders.

Scotland.—Eastern District.

COAL.

Conditions in the Lothians coal trade are not improving, and prospects are not encouraging. Demands generally are limited, and the workers are not getting anything like full employment. Shipments amounted to 20,571 tons, against 19,822 in the preceding week and 29,053 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	35/
Secondary qualities.....	25/6	25/6	34/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

The situation in Fifeshire is similar to the Lothians, though perhaps even more discouraging. Local requirements are not heavy, and business from other sources is small. Shipments were 18,126 tons, against 30,245 in the preceding week and 54,314 in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	40/-45/
Unscreened do.....	24/-25/	24/-25/	39/-41/
First-class steam coal.....	28/	28/	39/
Third-class do.	24/	24/	29/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 170,665 tons, compared with 169,902 in the preceding week and 211,701 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

Throughout the week under review arrivals of collier tonnage have been exceedingly small, and the activities of the market have been proportionately checked. The only silver lining to the cloud has been the fact that Scandinavian buyers, particularly those in Norway, have made fairly large purchases of coal and have sent their own tonnage to remove these cargoes. To that extent the collieries have been afforded a little more employment than would have fallen to their lot had they had to depend upon transport facilities granted by such free tonnage as has been chartered locally. As usual, the Northumberland collieries, the great volume of the output of which is for export, have suffered to a greater degree than the pits in the neighbouring county of Durham, which have a very considerable amount of home custom. The tonnage shortage is, however, affecting practically all the producers in both counties. Many pits have been thrown idle, and employment of a good many others has been very irregular. Every quality of coal is offering plentifully at the scheduled minimum prices. Bunkers, in particular, are in excessive supply. The output of coke is fully equal to the demand, but late selling values are maintained without difficulty.

...Boring Bill, with its arrange-
...and compensations, reads much

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	35/ -47/6
Do. Tynes (Bowers, &c.)	29/6	29/6	35/ -45/
Secondary, Blyths	25/6	25/6	30/ -35/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/ -40/
Unscreened	23/6-25/	23/6-25/	27/6-35/
Small, Blyths	20/	20/	24/ -25/
Do. Tynes	18/6	18/6	22/6
Do. specials	20/6	20/6	25/ -27/6
Other sorts:—			
Smithies	25/ -30/	25/ -30/	25/ -30/
Best gas coals (New Pelton or Holmside)	25/	25/	35/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	28/ -30/
Special gas coals	26/6-30/	26/6-30/	37/6
Unscreened bunkers; Durhams	24/ -25/	24/ -25/	22/ -26/
Do. do.			
Northumbrians	24/ -25/	24/ -25/	27/6-32/6
Coking coals	24/ -25/	24/ -25/	25/ -30/
Do. smalls	24/ -25/	24/ -25/	24/ -25/
House coals	28/6-30/	28/6-30/	40/ -45/
Coke, foundry	42/6	42/6	40/ -45/
Do. blast-furnace	42/6	42/6	37/6-40/
Do. gas	29/ -30/	29/ -30/	33/ -35/

Sunderland.

COAL.

Business in the coal market continues in the same dull and depressing condition which has characterised it all the month. There is no sign of improvement, unless it is that Government requisitioning of supplies is inclined to increase, while a few orders for cargoes continue to be picked up from neutrals. Neither, however, are sufficient to ensure full work for the pits—some are reduced to idleness while others have to work short time. Steam coals are more particularly affected by the shortage of tonnage, supplies of every grade being abundant, but best and Wear gas coals are firm on their scarcity. Smallers are weakly and so are bunkers, but coking and manufacturing coals as well as coke are all steady. Prices remain at schedule figures.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	37/6
Secondary do.	23/6-25/	23/6-25/	30/
House coals:—			
Best house coals	30/	30/	38/
Ordinary do.	28/	28/	30/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	37/6
South Hetton do.	28/6-30/	28/6-30/	37/6
Lambton unscreened ...	24/	24/	30/
South Hetton do.	24/	24/	30/
Do. treble nuts	20/	20/	—
Coking coals unscreened	25/	25/	26/
Do. smalls	25/	25/	25/
Smithies	25/	25/	25/
Peas and nuts	24/6-26/	24/6-26/	26/6
Best bunkers	25/	25/	26/
Ordinary bunkers	24/	24/	25/
Coke:—			
Foundry coke	42/6	42/6	42/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke	31/	31/	32/6-35/

Middlesbrough-on-Teess.

COAL.

The fuel market is practically unaltered. There is little business passing in coal. Fairly active enquiry from neutral sources is reported, and occasional contracts are entered into, but, as a rule, lines are by no means extensive. There are continued complaints of inconvenience to collieries through tonnage irregularities, and prospects of any marked change in this respect are not at all encouraging. Heavy home requirements for several sorts of manufacturing fuel, however, keep some Durham collieries well placed, and official absorption promises to become fuller. Generally, collieries are seeking orders at the fixed minimum rates. Best Durham gas coals are 25s., and seconds 23s. 6d., whilst Wear specials are 26s. 6d. Best steams are 30s., and steam smalls 20s. to 20s. 6d. for primes, and 18s. 6d. for ordinaries; unscreened Durham bunkers are 24s. to 25s. Household coals are quiet. Coking coals continue to be fairly well taken up at unaltered rates. Demand for coke for export is good, and the home market is almost overburdened with business. An ample supply meets the heavy requirements. Beehive and foundry qualities are 42s. 6d. f.o.b., and gashouse is fairly active at 28s. 6d. to 30s. Average blastfurnace kinds are 28s. at the ovens, and low phosphorus qualities 30s. 6d. at the ovens.

IRON.

Local demand for pig iron is very quiet, as the consuming works are closed this week in accordance with Tees-side Race holiday custom, but deliveries to other home districts are proceeding steadily, the supplies of Cleveland pig to Scotland being very heavy. All descriptions of Cleveland pig are plentiful, and as there is some improvement in the tonnage situation, hope is expressed that expansion of foreign trade will be experienced. For home consumption No. 3 Cleveland, No. 4 foundry, and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Conditions continue very stringent in the east coast hematite branch, and indeed they are likely to become even more acute with the acceleration of the shipbuilding programme. Supply is such that very careful distribution is necessary to satisfy legitimate home needs, and leave some little surplus for sale abroad. Moderate home contracts are entered into from time to time, but obstacles to new foreign business are very difficult to overcome. Exports to our Allies, against contracts made some time ago, are proceeding as satisfactorily as can be expected, every effort being made to facilitate despatch. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France, and 142s. 6d. for export to Italy. The strike in Spain has to some extent interfered with arrivals of foreign ore, but the interruption is not such as to handicap working of the blastfurnaces. There is a steady business passing in other ores. Manufactured iron and steel prices strong. The works are closed this week.

Cumberland.

Maryport.

COAL.

Business in the Cumberland coal trade is rather quieter than usual this week, and for the first time for months the supply, so far as local needs are concerned, is almost equal to the demand. Production has been restored to its former level, and for the present at any rate a big part of the output is being absorbed, but how long this will continue remains to be seen. The demand for coal for home use is weaker, the export trade is not quite so firm, and a big diminution on local manufacturing account may be expected unless there is a speedy change for the better in the condition of the local iron and steel trades. Of course, it is possible that all branches may soon pick up again, but at the moment the prospects are not very bright. The collieries have still sufficient on hand to keep them fairly busy, but very little new business is being offered, and local manufacturing requirements are now probably lower than they have been for months. Landsale is a livelier account, and in some rural districts consumers have already commenced to put in stocks for the winter. Locomotive fuels are firm, and gas coal for both outside and home consumption is in steady request. One of the pits was idle on Monday owing to a dispute, but the remainder are all working full time. The cross-Channel trade is still fairly active, but owing to the harvest operations in Ireland the demand on export account is scarcely so keen as it was. Industrial fuel for export is in firm request, but landsale is quiet. The shipments, however, from all the Cumberland ports are higher than they were some time ago, and Irish consumers are still taking all the coal that is available for shipment. The shipments for the week amounted to 3,410 tons, compared with 3,110 tons at the corresponding period of last year, or an increase of 1,000 tons compared with the previous week. The largest cargoes have been consigned to Belfast, Coleraine, Carrickfergus, Cork and Londonderry. Coke makers are busily employed, and all the output from the Cumberland by-product ovens is being absorbed by the local smelters. There has been no change in either local or export quotations.

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal „ ...	22/6	22/6	22/6
Do. double-serned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts „	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) ..	25/	25/	25/
Do. (for foreign-going steamers)	30/	30/	30/
Bunkers (mixed nuts and steam coal) (coastwise) ..	21/6	21/6	21/6
Do. (foreign)	25/	25/	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

There is no improvement to report in the condition of the hematite pig iron trade in Cumberland and North Lancashire. The dispute in the iron ore industry is still unsettled, and the situation throughout the district is full of uncertainty. It is reported, however, that negotiations, with a view to a settlement, have been entered into, but at the time of writing no decision had been reached, and the iron ore mines were still idle. Under the circumstances, therefore, smelters are unable to maintain all their furnaces in full blast, and the production of hematite pig iron is very much lower than it has been for some months. There are now only about 22 furnaces in full operation between Workington and Carnforth, and unless an agreement is reached before the week-end, it is feared that more furnaces will have to be put off blast or damped down until such time as iron ore is more plentiful. The furnaces that are still blowing are mainly using imported material or ore that has been on stock. The market for hematite pig iron is firmer than ever, and the demand for both special and ordinary iron is undiminished. Makers are inundated with orders, but little or no business is being transacted. Practically all the output of the special and ordinary iron is reserved for approved users on work of national importance, and therefore makers are not in a position to accept much of the outside business which is being offered. All the metal that is being smelted is going into prompt use. The entire make of low phosphorus iron is being consigned to users engaged exclusively on Government work in Scotland, the Midlands and other consuming areas, and practically all the output of ordinary Bessemer iron is going into consumption at the steel works in the district. There has been no alteration in prices, and Bessemer mixed numbers are still quoted at 127s. 6d. per ton, f.o.t., with special iron at 140s. per ton, and semi-special iron at 135s. per ton, f.o.t. Warrants at cash are idle at 115s. per ton. The position of ferro-manganese is unchanged. The steel industry at Barrow and Workington is as busy as ever, all the mills are working at high pressure, and a big output of steel will be maintained so long as sufficient iron is available. All the work is for the Government, and very little ordinary commercial business is being dealt with. Engineers are very busy, and some of the shops in this district are working overtime.

South-West Lancashire.

COAL.

The inland demand for household coal continues as brisk as ever, and now that the enquiries from corporations and urban councils for considerable tonnages of emergency coal are coming upon the market, there is real difficulty in making provision for them, and, at the same time, leaving some quantity for the merchant to stock on his own account. With regard to shipping, requirements for ordinary bunkering purposes are much as they have been of late, and there is an increasing enquiry for export. On the other hand, owing partly to the holidays and partly to heavier inland

demand and Government requirement, supplies are not so plentiful as they were, being at the moment on the whole rather short, notwithstanding that slack and small fuel are on the market in considerable quantities, there does not seem to be any surplus in this district. The first phase of the new contract is coming to a close, the allocations made by the committee having already been posted to the collieries and factors concerned.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/ -22/	21/ -22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/ -20/	19/ -20/	19/ -20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds.
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—	—	23/ -24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6 upwds.

* As per official list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. Practically little business was done, the members being mostly occupied in discussing the probable effects of the coal control and redistribution of sources of supply to different areas. House coal is very strong, the demand greatly exceeding the supply. There is no change in furnace coal. Owing to holidays in various towns, slack is more plentiful. Shipping coal is in steady call on contract account. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/ -23/	22/ -23/	22/ -23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/ -18/6	18/ -18/6	18/ -18/6
Furnace coal	17/6-18/	17/6-18/	17/ -18/
Bunker (f.o.b. Partington)	—	—	25/ -26/
Best slack	16/ upwds.	16/ upwds.	16/ upwds.
Common slack	14/6 upwds.	14/6 upwds.	14/6 upwds.

* As per official list.

Yorkshire and Derbyshire.

Leeds.

COAL.

There was again a large and representative attendance on the Coal Exchange on Tuesday, not including as many as there sometimes are of Humber shippers, but London factors and merchants were well represented, as well as local merchants, and there were a few traders from the Cumberland area, whose supplies of Yorkshire coal have already been partially disturbed under the distribution scheme. With regard to the latter, the feeling of the market becomes more settled as the details of the scheme become better considered and known. Generally speaking, the collieries have resumed normal working after the holidays, and the output has improved since last week. A plentiful supply of empty wagons is on hand; in fact, the pits are better situated in this respect than they have been for a long time, and there is an unexceptional absence of complaints of delays on the railways, even on long journeys. As an illustration of the improved conditions on the railways, the instance may be mentioned of a considerable number of wagons averaging three and a-third journeys between West Yorkshire pits and London during July. So far as demand generally is concerned, the urgency of the call for house coal, and hardly in less degree for gas coal, is still the feature of the market. But all descriptions of screened fuel, from best household qualities downwards, are scarcer than they have been probably for some years, except on the occasion of general stoppage of the pits. The increased requirements of the Government is a considerable factor contributing to this exceptional firmness. The pressure for house coal for London is not one whit abated. The tonnage already sent from West Yorkshire this year is appreciably in advance of last year, but merchants report heavy arrears of orders and practically no stocks at the depots. Attempts to augment supplies by purchases in the open market meet with little or no success, as the collieries generally are fully sold, and are not in a position to accept further orders. The coastwise trade is inactive, owing to the difficulty of securing boats except at very high freights.

Current pit prices

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	20/ -21/	20/ -21/	20/ -21/
Wallend & London best	19/ -20/	19/ -20/	19/ -20/
Silkstone best	19/ -20/	19/ -20/	19/ -20/
Do. house	17/ -18/	17/ -18/	17/ -18/
House nuts	16/ -17/	16/ -17/	16/ -17/
Prices f.o.b. Hull:—			
Haigh Moor best	23/ -24/	23/ -24/	23/ -24/
Silkstone best	22/ -23/	22/ -23/	22/ -23/
Do. house	20/ -21/	20/ -21/	20/ -21/
Other qualities	19/ -20/	19/ -20/	19/ -20/
Gas coal:—			
Prices at pit:			
Screened gas coal	16/ -17/	16/ -17/	16/ -17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/ -16/	15/ -16/	15/ -16/
Other sorts:—			
Prices at pit:			
Washed nuts	17/ -18/	17/ -18/	17/ -18/
Large double-screened engine nuts	16/ -17/	16/ -17/	16/ -17/
Small nuts	15/ -16/	15/ -16/	15/ -16/
Rough unscreened engine coal	15/ -16/	15/ -16/	15/ -16/
Best rough slacks	14/ -15/	14/ -15/	14/ -15/
Small do.	12/ -13/	12/ -13/	12/ -13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

West Riding towns merchants are well employed in the coal trade, the public demand increasing as the summer approaches, but the supplies coming through from the collieries are barely sufficient, best qualities being relatively scarce. The position in regard to house coal shows a similar state. Most collieries are more or less in arrears for deliveries, and stocks at the works, although improving and fairly satisfactory under the circumstances are not yet sufficiently large to enable gas engineers to view the coming winter without uneasiness. A fair quantity of gas coal, as well as of Hartleys, is being shipped to France from the Humber ports at limitation prices. As to manufacturing fuel, washed nuts and all the specialised qualities are exceedingly scarce. The pressure for other sorts of engine fuel is perhaps not quite so keen at the moment owing to the holiday effects, and ordinary steam slacks are relatively plentiful. This latter condition is expected to be only temporary, and likely to be altered as the longer nights approach and the Daylight Saving Bill ceases to operate. Coking slacks continue to be scarce, but washed furnace coke is rather more easily procurable.

Barnsley.**COAL.**

In this immediate district holidays have affected the work of the collieries, but a restart was generally made on Wednesday. It is fairly recognised that the workers are entitled to the respite, for they have kept faith with their promise to ignore the general holidays. The pressure for all kinds of fuel, however, is very heavy, and collieries find it to be impossible to keep the arrears at a low level with the prospect of further heavy demands coming upon them. The business in regard to steam coal shows but little alteration. The export trade appears to be rather more active, though there is not a great deal doing in this direction apart from the Allied countries. The bulk of the tonnage, however, is being taken for Admiralty and home industrial purposes. The difficulty of procuring an adequate supply of steam nuts is ever present, but this fuel cannot be spared for purposes other than for the use of munition works and engineering concerns. A strong enquiry for all classes of small manufacturing fuel is again felt, and for the moment the scarcity is much evident, whilst nut slacks used for special purposes are more sought for, but there is little to be obtained other than on contract supply account. Gas coal collieries find it difficult to maintain the contract supplies, and still less supply the extra tonnage which is being pressed for by concerns who have increasing calls upon them owing to the greater demand for gas for cooking and heating purposes. The need for a fuller supply of coke slacks is again great if the heavy demand for furnace coke is to be met. The tremendous tonnage of house coal going to London continues, with the result that other areas who are on short supply are more pressing for their requirements.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	17/-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.**COAL.**

Conditions of the Humber coal trade are not changed, and a fair business continues to be done, chiefly on French account. Italian shipments are light, and exporters who have not been able to get contracts away to time are invited to apply for an extension, provided that both coal and ships have been arranged for. Neutral business is, however, on restricted lines, and in view of the big demands on Yorkshire output for Admiralty, industrial and Allied purposes, there is very little indeed to spare, even of large steam coal, which is now being absorbed in considerable quantities for manufacturing purposes. Gas and house coals are in increasing request, merchants and others laying in stocks as far as practicable to meet winter requirements. Values all round are well sustained at the level of the scheduled minima for neutrals. The High Commissioner has intimated that the Bureau Nationale des Charbons (France) will not refuse to grant authorisation to import coke from the Yorkshire district. There has been a little more activity in the freight market, recent fixtures including a neutral steamer of 800 tons Hull to Dieppe at 52s. 6d. and an 8,000-ton steamer Hull to Alexandria at 165s.

Chesterfield.**COAL.**

The demand for every class of coal is as strong as ever, and supplies are on the same limited scale. Orders for house coal come to hand in increasing numbers, but delay in their execution is inevitable. Fuel for munition works is urgently wanted and collieries are being pressed to their utmost capacity. Cobbles and nuts suitable for gas-producers are particularly difficult to find. Slack is in steady requirement, but consumers are not so clamorous for supplies as they have been of late. The demand for locomotive coal is good, and fairly substantial deliveries are made from day to day. There is no change to report in respect of the export trade, which remains practically lifeless so far as Derbyshire coal is concerned. The coke trade is in an active condition, and all qualities continue in strong demand.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
.....	16/	16/	16/
.....	15/	15/	15/
.....	12/6	12/6	12/6

IRON.

Things is apparent on every hand. Full operation, and every branch of the orders.

Nottingham.**COAL.**

Steps are being taken in this district for the storing of emergency coal for distribution to the poor during the coming winter. The Coal Mines Department of the Board of Trade has informed the City Council that it has been decided as a tentative measure to allot to Nottingham 2,000 tons of house coal to be stocked in the event of the ordinary supplies falling short. It is not, however, anticipated that there will be the same shortage in the ensuing winter as was the case a year ago, owing to so many householders having already got in supplies. There is no particular pressure on merchants at present, but a good steady trade is passing, and the output of all kinds of domestic fuel can be readily disposed of at the collieries to merchants who are anxious to obtain stocks for the coming winter. For steam coal there is a strong demand. Railway companies are taking large supplies and a considerable tonnage is required by firms engaged on war work. Then with the obligations in regard to contracts, collieries have little opportunity of making outside sales. Nearly all kinds of slacks are in good request.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/-16/6
Best hard coals	16/9-17/6	16/9-17/6	17/-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

Leicestershire.**COAL.**

There are increasing signs on all hands of the ever-growing intensity of the strain placed on colliery administration. Every change which is brought into being is accompanied by a substantial demand for fresh statistics and returns week by week and day by day. This is bad enough, but when accompanied by further calling up of members of skilled clerical staffs the position becomes intolerable. At many collieries the pressure thrown upon the management threatens to bring about a general collapse through exhaustion and worry. Managers, who are at a loss which way to turn, are called away to attend appeals for exemption, which seem to have no finality about them, and thus many days are absolutely thrown away by attendance at centres many miles away from the pits. The scheme of preference in deliveries is fully maintained, and returns have to be sent in showing not only the daily deliveries but also the classes of coal, with the corresponding figures for last year. The traffic for London and district is getting into confusion, and there are no signs of any improvement. All classes of household are in greater demand than ever, and the sidings are blocked with empty wagons waiting to be filled. Deep and main cobbles and nuts command a very free sale, and there are heavy deliveries of bakers' nuts and small nuts for mechanical stokers. Country coal merchants are in a very tight place, and they cannot get anything like the tonnage required to meet urgent orders. There are very small reserves of coal at country stations, and none whatever at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	17/-19/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-17/
Deep screened cobbles ..	16/-17/	16/-17/	16/6-17/6
Deep large nuts	16/-16/6	16/-16/6	16/-17/
Bakers' nuts	15/-15/6	15/-15/6	15/-16/
Small nuts	14/6-15/	14/6-15/	14/6-15/6
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/	6/-7/	6/-7/
Main nuts for London			
kitcheners	13/6-14/	13/6-14/	13/6-14/6
Steams, best hand picked	14/-14/6	14/-14/6	14/-15/
Steams, seconds	13/-13/6	13/-13/6	13/-14/6
Main cobbles for kitcheners	13/6-14/	13/6-14/	13/6-14/6
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.**Birmingham.****COAL.**

Although the collieries are again working full time, with beneficial results by reason of the holiday, the situation is in no way relieved. Demand is at the maximum of tonnage again, merchants are short of stocks, with two to three months, orders on their books, and search for odd lots is an almost hopeless undertaking. The local Coal Supply Committee, formed by the Lord Mayor of the city with a view of regulating supplies for small consumers during the winter, has got to work, and has asked ordinary consumers to reduce their requirements by 25 per cent., not to order more coal than they require, and to deal with one merchant only. In the matter of industrial fuel, the trade finds its hands full in endeavouring to meet the extensive demand for all grades. The scarcity of double screened nuts is keenly felt, and supplies are promptly cleared. Slacks are reported a shade easier, but all the better qualities are quickly absorbed. Prices are steady and unchanged. Prices at pit:—

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder ..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

Conditions in the local iron and steel industries continue extremely busy, and there is hardly any alleviation in the stringency which has prevailed for some time under the weight of war work. For some classes of foundry pig iron demand may be a shade easier, but for all the pig iron available ready markets are open. South Staffordshire foundry iron is in as steady request as forge. There are also good openings for cast scrap, light qualities commanding 92s. 6d. and heavy sorts 105s. Wrought iron scrap is somewhat in abeyance, as the official prices do not make for much anxiety to sell. Pressure of demand for bar iron has in no sense slackened. Best qualities are asked for at an active rate by the Government and rolling stock makers, and in common bar iron a heavy business is offered by all classes of consumers. No business is done below the official limits. Small sizes of iron are increasingly difficult to obtain, makers being so fully committed, and although licences are now required for export, enquiry is well sustained. Quotations on the basis of three-eighths sizes are given at £16 10s. to £16 15s., but prices depend largely on ability to give delivery, consumers being willing to pay substantial premiums, especially for the smaller sizes, which many makers are reluctant to touch, if some assurance is forthcoming on that point. The sheet branches are an exception to the prevailing activity. Some firms have temporarily suspended their galvanising branches. Demand is small, spelter and sheet bars are difficult to obtain. Production of black sheets is continued, and it is estimated that demand is sufficient to keep about one-fifth of the capacity employed. The price quoted for these is £19 10s. Gas strip commands about £15 10s. and steel strip £17 15s. to £18. The scarcity of steel is very pronounced, and there is no sign of relief in the shape of supplies of American semis. Fair quantities of wire rods are coming forward, but no billets.

Forest of Dean.**COAL.****Lydney.**

A very firm tone continues to prevail in the house coal trade of this district, there being a strong market for all the qualities produced. Numerous orders are held by the collieries, which will take, in many cases, a few weeks yet to work off. Owing to the heavy requirements for war work, the extraordinary pressure on the steam coal branch is fully maintained, and all the collieries have more orders on hand than they can immediately attend to.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	13/6	13/6	13/
Steam coal:—			
Large ..	20/-21/	20/-21/	18/-19/
Small ...	16/-17/	16/-17/	16/

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE WELSH COAL AND IRON TRADES.

THURSDAY, AUGUST 23.

North Wales.**COAL.****Wrexham.**

The general state of the coal trade of this area has been unchanged during the past week. All the collieries have worked full time, and every effort has been made by coal-owners and men to make the output as much as possible. As regards house coal, merchants are exercising all the pressure they can with a view to getting a little stock, but owing to the keen demand for other markets the supplies available for this department are very limited. Householders are beginning to be disturbed at the prospects for the coming winter. Rationing may be, and no doubt is, an advisable course to pursue, but if the necessary tonnage of fuel is not on the market to meet the allotted requirements, the position remains much the same so far as the consumer is concerned. Last winter things were pretty bad, especially in some of the large centres; and if any combing of miners for the Army is done, the output is sure to be adversely affected, and will amount to a material reduction of last winter's tonnage. The housing question has recently come prominently to the front in the local mining villages, and anyone who pays a visit to such places as Rhos, Brymbo, Cefn and other villages in this coal field will readily agree that it is high time active measures were taken for the provision of better dwellings for our miners and their families. At present many men have to reside in Wrexham, a considerable distance from their work. Gas companies, whose contracts at present are held by local collieries, are pressing for all that they can get, and everything possible is done to meet their requirements, but as the end of the month approaches this demand is increasing. Practically the whole of the output of steam coal is required for railway contracts and works under Government control, with the exception of a certain tonnage which is allotted to the shipping trade at the Mersey ports. Much concern is felt at the action of the Liverpool boilermakers, who, following an application for an increase in wages, have passed a resolution that all members in the Mersey Boilermakers' Society shall strike until such time as the Government has given a re-hearing of the April award. They also ask the executive to call out all members of the

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit f.o.r.:—			
Best house coal	21/-23/	21/-23/	—
Secondary do.	20/-22/	20/-22/	—
Steam coal	19/-22/	20/-22/	—
Gas coal	19/-21/	19/-22/	—
Bunkers	19/-22/	19/-22/	—
Nuts	18/-20/	18/-20/	—
Slack	12/-14/6	12/-14/6	—
Gas coke (at works)	21/8-23/4	21/8-23/4	—
Prices landsale:—			
Best house coal	27/6-30/	27/6-30/	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

sizes was excellent, and these were difficult to sell. The market continued slow, with stocks excessive. There was a fair to good demand for steam coals, with supplies ample. Bituminous coals for home consumption were bought in small quantities.

THURSDAY, AUGUST 23.

Business is still active generally, and there has been no further advance in prices at this port. Current quotations are: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 41s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount. Coke, 45s. per ton; Scotch steam coal, 41s. Irish coals at Castlecomer Collieries, co. Kilkenny, are: Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d.—all at the pithead. Coals from the Wolfhill Collieries, Queen's County, are: Malt-ing coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton all f.o.r. Athy, the nearest railway connection with the mines. Last week about 300 labourers engaged under the National Service in the construction of the railway from Wolfhill mines to Athy struck work. The men's demand is 8d. per hour, or permanent wage. The construction of the bridge that will cross the River Barrow at Athy, so as to connect with Athy Station, is well under way. It would appear that at present Dublin is fairly well stocked with coal, as compared with other cities of the United Kingdom, but grave fears are entertained for the winter supply. At the last monthly meeting of the Chamber of Commerce, further correspondence was considered from the Controller of Coal Mines on the subject of the diversion of Lancashire coal from Dublin, and the council directed that the Director of Coal Mines be communicated with, urging the necessity of an adequate supply of coal being reserved for Dublin. It is considered unlikely that the coal rationing Order introduced in London will be extended to Ireland.

The chief features in the port are the large demand for household coal and inadequate supplies of best English coal to meet it, although Scotch coals are fairly plentiful. Scarcity of tonnage also affects the supply. Prices of house coals are as follow: Best Arley, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Cheapest Scotch steam coal is 29s. per ton, and best qualities up to 35s. and 37s. 6d. per ton. The price of gas coke ranges from 37s. 6d. to 40s. per ton; foundry coke, from 60s. to 65s. per ton.

Foreign Imports Good.

The imports of foreign mining timber into South Wales and Monmouthshire for the week ending August 17 were satisfactory, a total of 16,921 loads being received, of which 6,840 loads were taken by the Committee for the Supply of Pitwood to the Admiralty collieries, while the balance was allocated amongst pitwood merchants in proportion to their pre-war imports. The whole of the imports practically were received from the French ports, only one cargo coming from Portugal. The actual imports were as follow :—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Aug. 13	A. Bromage and Company.....	2,340
" 13	Lysberg Limited	1 920
" 13	Lysberg Limited	1,620
" 14	Budd and Company	378
" 14	Lysberg Limited	3,120
" 14	Morgan and Cadogan	1,800
" 14	Morgan and Cadogan	1,660
" 15	Franklin Thomas	160
" 15	E. Marcesche	250
" 15	E. Marcesche	96
" 15	E. Marcesche	600
" 16	Grant Hayward	114
" 16	Budd and Company.....	480
" 16	Lysberg Limited	180
" 17	A. Bromage	1,200
" 17	Franklin Thomas.....	65

Total.....15,983

<i>Swansea</i> :—		
Aug. 13	Unenumerated	537
" 16	"	401

Total..... 938

There were no imports at either Newport or Port Talbot.

Market quotations showed little change, and round about 58s. to 60s. per ton ex ship Cardiff represents the range of values—prices much under those ruling a month or so ago, having been held in check by tonnage shortage and difficulty in procuring wagons. These prices leave but little profit for pitwood importers, and whilst collieries benefit there is the tendency when values fall and profits are bare for merchants to stop importing. So far, however, this has not been shown, and last month the Pitwood Importers' Association imported the full amount allowed them under the import restrictions. At a meeting of the allocation committee of the Pitwood Importers' Association last week the machinery for the purpose of equitably allocating the total monthly quantity of mining timber allowed to be imported was recognised, provision being made for those firms who imported in excess of their allocation. This has taken the form of a penalty of 1s. per ton on every ton imported beyond each individual allocation, the sum to be pooled and divided monthly amongst those who are "short."

Home-Grown Timber.

Imports of home-grown wood—from Ireland, Cornwall, etc.—were good, and found a ready market. The Controller of Mines, in his latest regulations with respect to home-grown timber supplies has endeavoured to prevent the uneconomic transport of pitwood. The country being unmaped out into areas of supply, each area being under the jurisdiction of a district pitwood committee, will now ensure each district of supplies being as near as possible to its area. One of the most important factors in the regulations issued is that a heavy demand in one district removed district, and the zest to supply by other districts, prices, will be rendered impossible. For some time a large amount of pitwood grown in the South Wales district has been despatched to the Midlands owing to the higher prices offered. This competition has been obviated at the expense of the collieries and the State. The South Wales and

COAL.

The market has been very much disturbed of late by various causes. Scarcely had the holidays passed and stocks of coal began to be replenished, than the fear of the locomotive men's strike appeared on the horizon. Beside this there was a strike of coal tipplers at Barry Dock, which began on Monday last, and which necessitated the diversion of a good deal of traffic to other places. Beyond these circumstances there is the fact that less and less coal is coming on to the free markets all the time. There is more control in various directions, which virtually means that the output is being more commandeered than ever. Prices, therefore, are necessarily nominal, with slight variations here and there from the official quotations. There is still a good deal of broken time at some of the collieries. Almost all classes of house coal remain very firm. There did not appear to be enough on the market to meet the demand.

Later.—The Barry Dock coal shippers have resumed work pending arbitration for new terms.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	30/	30/	41/6 -42/6
Western-valleys, ordin'y	29/	29/	41/ -41/6
Best Eastern-valleys ...	29/	29/	37/6 -39/
Secondary do. ...	28/	28/	34/ -36/
Best small coals	21/6	21/6	27/6 28/
Secondary do.	20/	20/	24/ -25/
Inferior do.	18/	18/	20/ -21/
Screenings	23/	23/	27/6 -28/
Through coals	27/	27/	25/6 -27/6
Best washed nuts.....	30/	30/	29/ -31/
Other sorts:—			
Best house coal, at pit..	33/	33/	24/ -26/6
Secondary do. do. ...	30/9	30/9	22/ -24/
Patent fuel	32/6	32/6	47/6 -50/
Furnace coke	47/6	47/6	52/6 -55/
Foundry coke	47/6	47/6	62/6 -65/

IRON.

There is little new to be said about the conditions in the local iron and steel trades. They are being maintained at the highest possible tension, and there has been a very satisfactory output of all classes of goods on Government account. The supply of iron ore has caused some anxiety owing to disturbances in Spain and other causes. Raw materials for the tin-plate trade continue to be scarce. There has been a fair arrival of pitwood, which tends slightly to decline in price, the ruling quotation being 58s. to 60s.

Cardiff.

COAL.

The most important feature this week has been a strike of tippers at Barry Dock, which has had the effect of disorganising traffic, and may result in the temporary stoppage of collieries. The men demanded a pre-war wage in addition to the 15s. bonus which they have already received, and this request not being acceded to they ceased work on Sunday, thus rendering all the tips idle. Fortunately the dispute was confined to Barry, so that shipments were not held up either at Cardiff or Penarth. Vessels awaiting cargoes were diverted to the neighbouring ports, some even going to Newport, but the effects were disturbing, and the dislocation of traffic has been such as to create an accumulation of stocks which it may take some days to work off. The men resumed work on Wednesday morning, and in the meantime the dispute has been submitted to arbitration by the Board of Trade. Reports to hand show that all the collieries are working well, although

Prices f.o.b. Cardiff (except where otherwise stated).

Steam coals :—	Current prices.	1 st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—
Seconds	30/9	30/9	39/ -41/
Ordinary	30/	30/	37/ -38/
Best bunker smalls	23/	23/	29/ -30/
Best ordinaries.....	21/6	21/6	28/ -29/
Cargo qualities.....	20/	20/	20/ -24/
Inferior smalls	18/	18/	19/ -20/
Best dry coals	30/	30/	39/ -40/
Ordinary drys	28/6	28/6	33/ -35/
Best washed nuts	30/	30/	33/ -35/
Seconds	28/6	28/6	31/ -33/
Best washed peas.....	27/6	27/6	30/ -32/
Seconds	26/6	26/6	28/ -30/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	40/ -41/
Western-valleys	29/	29/	39/ -41/
Eastern-valleys	29/	29/	38/ -40/
Inferior do.	28/	28/	36/ -38/
Bituminous coals :—			
Best house coals (at pit)	33/	33/	25/ -26/6
Second qualities (at pit)	30/9	30/9	23/6 -24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	38/ -40/
Through-and-through	—	—	34/ -35/
Small	26/	26/	32/ -33/
No. 2 Rhondda—			
Large	27/	27/	33/ -35/
Through-and-through	25/	25/	28/ -29/
Small	20/	20/	23/ -24/
Best patent fuel	32/6	32/6	47/6 -50/
Seconds	30/	30/	45/ -47/6
Special foundry coke	47/6	47/6	62/6 -65/
Ordinary do.	47/6	47/6	60/ -62/6
Furnace coke	47/6	47/6	50/ -52/6
Pitwood (ex-ship)	58/ -60/	60/ -62/6	45/ -46/

* Nominal.

IRON.

There is no abatement in the demand for all descriptions of steel, and the various works are hard pressed to meet the requirements which are necessary for war purposes. The extra supply of bars to the tin-plate mills has had a beneficial effect, and it is reported that some 20 mills are now in operation, more than were working prior to the holidays. For standard sizes there is a strong demand at the limitation price of 30s., but for the unrestricted sizes as much as 45s. is being paid, consumers realising that after the end of this month no plates at all will be obtainable except under Class A or B certificates. Shipments last week amounted to 9,142 boxes against 12,313 boxes received from works, thus leaving 47,993 boxes in stock in the docks warehouses and vans, compared with 44,822 boxes the preceding week and 105,227 boxes for the corresponding week of last year. There is no change to report in the galvanised sheet trade, and makers are still busy in the production of plates for war purposes. Prices continue nominal. Spelter remains at £54 per ton, and outputs are heavy. Extensions are being made to the blastfurnace plants of several works, and outputs are expected to be greatly increased in the near future. At present the whole of the production is controlled, and there is nothing available except on certificated orders. Iron ore imports continue satisfactory, and the market is regulated in accordance with the fixed schedule. There is an active demand for scrap at maximum rates, and the supplies are insufficient to meet the requirements of the market.

Llanelli.

COAL.

There is a distinct improvement in the tone of the market, and collieries, on the whole, have been working better time. Tonnage clearances are, however, not up to market requirements. In the anthracite section large qualities are a better market, with best kinds in particular moving freely. Red Vein sorts are also more brisk. The machine-made kinds are very firm, and nuts and beans in particular are well enquired for. Duff and culm are, however, easy. The steam coal section has also an improved tone, and large kinds of the better grades well in demand. Throughs and smalls are also firmer and stocks much reduced. There is a strong demand for large kinds suitable for traction engine purposes. Manufacturing coals are in strong demand, and house coals are also very active.

Prices f.o.b.

	Current prices.	1 st week's prices.	Last year's prices.
Best malting anthracite....	30/	30/	30/ -32/
Seconds	29/	29/	27/ -29/
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	25/6 -27/6
Machine-made cobbles.....	42/6	42/6	38/ -39/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/ -32/
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/ -23/
Rubbly culm	13/	13/	15/3-15/6
Red Vein culm	11/	11/	—
Breakers duff	8/	10/	—
Billy duff	6/6	6/6	5/ - 5/6
Steam :—			
Best large steam	30/	30/	36/6-38/6
Seconds	27/	27/	—
Cargo through	23/6	—	—
Seconds	22/	—	—
Bunkers through	23/6	25/	27/6-31/6
Smalls	19/	19/	20/ -22/
Second smalls	17/	—	—
Bituminous :—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	—
Gas through	23/6	—	—
Gas smalls	21/	—	—
Coke-oven coke.....	—	47/6	26/6-28/6

Swansea.

GOAL.

There was no material alteration to report in the conditions prevailing on the anthracite coal market, nearly all qualities being firm. The demand for machine-made

the area consumes a larger amount of mining than any other district, and it is therefore pleasing to the Coal Controller has recognised this by the area of supply, and one which is prolific in Somersetshire, Dorsetshire, Wiltshire, and Cornwall are counties from which large quantities of coal can readily be assembled. It is imperative that the delivery of home-grown timber should be considerably increased in the next few months, for during September and October the quantity of foreign timber allowed to be imported will fall by 10,000 tons each month. October is the correct month for the commencement of wood cutting, and the authorities hope that when that month is reached the deliveries to the collieries will be sufficient to neutralise the curtailment of the foreign imports.

THE GERMAN COAL AND IRON TRADES.

We give below further extracts from foreign periodicals that have reached us, showing the course of the coal and iron trades in Germany:—

State Coal Mining in Bavaria.

The Bavarian State is about to become possessed of the Friedrich Heinrich Coal Mining Company, Lintfort. The French shares in the concern will be liquidated, and the State will, it is stated, acquire not only the 20,000,000 mk. foreign share capital, but also the balance of some 2,000,000 mk. in German possession. There has been some difficulty in extending the pits of the mine in question, but matters have mended the last few years. The coal is of the very best quality. This is the second important mining concern which has passed into the possession of the Bavarian Crown.

Utilisation of Peat and Brown Coal.

Now that it is possible to convert inferior fuels (such as peat and brown coal), with a relatively high degree of efficiency, into gas by generators, and to make practical use of them as sources of power, the interest in them is increasing. In Northern Germany, where water power is not easily available, the high and low bogs are, it is said, "destined to furnish the fuel needed for the generation of electricity." The experiences of the overland power plant in the Auricher Wiesmoor have conclusively proved that with a peat consumption of 2 kilogs. (4.4 lb.) per kilowatt-hour the peat bogs are "an economically useful source of power of great extent and duration."

THE AMERICAN COAL TRADE.

Offices shipping bituminous coal are flooded with enquiries, and what spot business is being done is undoubtedly close to the Government maximum, but (says *Coal Age*) operators are concentrating shipments on contracts, the prices on which range at a higher level, or an export business, which has not yet been subjected to regulation. Car supply is short, and railroads have been so hard pressed for locomotive fuel that they have occasionally been compelled to confiscate shipping *en route*. The labour situation is growing constantly more acute; not only have considerable numbers of the men in the mines joined the Colours, but the operators have for some time been feeling the loss of new increments which have been joining the Army instead of entering the mines. There is so little encouraging in the existing situation, with stocks constantly disappearing faster than supplies arrive, that a consumer feels that he can make no mistake by taking up any free coal that offers. The Pocahontas and New River situation shows little change. Government requisitions are large, and expected to be larger. Coastwise consignments were relatively small the past week, and there are many who are most apprehensive over the future. There is a distinct feeling among the Hampton Roads agencies that the Pennsylvania operators should be called upon to furnish their full share of the tonnage needed by the Army and Navy.

At Philadelphia, shipping offices are flooded with enquiries from all sources, particularly from the heavy consumers. The price of 3 dols. for mine-run and 3.50 dols. for lump coal, per net ton, is generally maintained, and usually with the 25c. brokerage added. As it now stands, the prevailing price is usually 3.25 dols., for there is very little lump coal being screened, and most houses are adding the extra 25c. for brokerage. With the idea of getting coal at this figure, consumers are now making strong efforts to stock as heavily as possible in addition to current needs. There are still persistent rumours that some coal continues to be sold at prices in excess of the agreed upon figures, but the amount is not sufficient to affect the market. It is known that heavy shipments have been made to Canada lately, where the manufacturers especially are trying to fortify themselves against the usual interruptions to rail movement in the winter season. This coal is not covered by the Government agreement, and the prices received for it are much higher than the rate prevailing here. This movement naturally has a tendency to divert much fuel from the domestic market.

The Government figures are ruling generally at Baltimore, and will undoubtedly hold in this section until after the Government legislation regarding fuel prices and distribution is sifted down. That does not mean that there is any considerable amount of this cheap coal in evidence here. Practically the entire movement at the moment, which is restricted under a poor car supply at the mines, is devoted to contract fuel and to coals for bunker use. Some little spot coal is finding its way through, and is being distributed as usual to customers here. Coastwise movement through the pooling system is proceeding smoothly. There have been some angles to straighten out. Some operators have complained that they are forced to load the coal they get off a barge onto a truck. Most of these are users of bituminous coals, who object to any other

fuel than that from some particular mine. These complaints are not serious, however.

As regards anthracite, the persistent buying on the part of the public is evidence of their growing conviction that there will be a pronounced shortage of coal next winter. In the meantime, the uncertainty is being greatly accentuated by the difficulty dealers are finding in explaining to their customers the apparent discrepancy between the extraordinary record-breaking shipments and the great shortage that prevails; if, as is generally stated, these shipments are being diverted to outlying points, the receipts in those sections are failing to show any results from this, and the Washington authorities could greatly relieve the existing tension by explaining away this puzzling situation. Certainly, the trade will be slow to accept the promises now being made of increased shipments later, under existing conditions. Premiums are freely offered for coal, but as a good many agencies are getting notices from Washington enquiring about excessive prices they are charging, they are very careful about considering any high-priced business. Pea does not improve, and is the one size over which the dealer has cause to be alarmed. August 1 found every Philadelphia retailer with more unfilled pea coal orders on his books than he had coal on hand of all sizes. This, too, at a time when he is usually accustomed to receiving more of this size than he could store. The prices per gross ton f.o.b. cars at mines are as follow: Broken, 5 dols.; egg, 4.25 dols.; stove, 4.50 dols.; nut, 4.60 dols.; pea, 3.20 dols.; buck, 2.90 dols.; rice, 2.40 dols.; boiler, 2.20 dols.; barley, 1.90 dols.

The freight market is practically the same as a week ago, and it is becoming extremely difficult to secure steamers for export coal, owing to the great scarcity of tonnage. There are, however, a number of steamers available for coals to Brazil and the West Indies. Freight rates on coal by steamer to Europe are as follow: Marseilles, about 100 dols.; Spain (Atlantic), about 42 dols.; Spain (Mediterranean), about 44.40 dols.

LAW INTELLIGENCE.

NEWPORT COUNTY COURT.—August 16.

Before Judge HILL KELLY.

Colliers and Unloading Timber.

J. Hopkins v. Newport-Abercarn Colliery Company.—An important judgment was delivered by Judge Hill Kelly. The plaintiff, an experienced collier, of Newbridge, sued the Newport-Abercarn Colliery Company for 11s. 1d., being the amount of a day's pay, which he was prevented from earning on January 30 last, when he refused to work on the surface, and went home as a protest against the request of the management to assist in discharging timber from trucks. Plaintiff was supported in his action by the officials of the South Wales Miners' Federation, whose local counsel conducted his case. The South Wales Coal Owners' Association took up the defence, one of their solicitors appearing to resist the demand.

The main facts were scarcely in dispute. Hopkins, the plaintiff, had worked in the same mine on and off for a long time, but on the last occasion when he was taken on, though he was a skilled collier, he was regarded as a "hobblor," that is, one who had then no regular place of his own, and might be called upon to work in places with various other men. The contention put forward on his behalf was that, being a skilled collier, there was no obligation binding upon him to do such unskilled work as unloading timber on the surface (which he regarded as common labourer's work), and when he was asked to do it he refused. There being on that day no other work that the management assigned to him, he went home and spent the day in idleness.

For the colliery company, the contention was that a "hobblor" was the first man to be called upon in an emergency for unloading timber, and not only had there never been a refusal on the part of a "hobblor" to do such work, but there had never been a refusal on the part of other skilled colliers in regular work, the hours of labour and rates of pay being made the same as if they were below cutting coal.

His Honour, in giving judgment, said there was no express provision in the agreement of service that a skilled collier might be called upon to do unskilled work, and what he had to determine was whether there was an implied provision to that effect. Though a servant was only required to do the work he was engaged for, men often did work outside their ordinary employment. Those, however, were matters of mutual consent and accommodation. When the matter went into a court of law it was different, and the strict legal rights and obligations had to be looked into. One of the questions which he had to ask himself in this case was: What were the limits of the work that a man in the plaintiff's position could be called upon to do? Was unloading timber on the surface within those limits? He thought it was not, and therefore that the plaintiff was entitled to succeed in his action. But at the same time, he did not think the plaintiff's attitude was a very creditable one, especially in view of the grave emergency which existed in the matter of labour at the collieries. But that was not quite the question at issue. It was: What was the legal contract and not the plaintiff's obligation. It had been stated in the course of the case that many colliers did the work of unloading timber. He hoped that they would continue to do so, and thus assist in the safe working of the mines. But the contract of service was to work as a collier, and he would require very strong evidence indeed that a man who was engaged to work underground could be compelled to work on the surface, although it had been a common practice for many of them to do so without demur. He came to the conclusion that there was neither an express nor an implied term in the contract to do such work, and he awarded the plaintiff the day's pay, the amount of which, with bonus, was not in dispute, viz., 11s. 1d.

Leave to appeal was subsequently granted.

Certifying Surgeons Appointed.—The Chief Inspector of Factories has made the following appointments as certifying surgeons: Dr. A. H. R. Duncan, for the Omagh district of the county of Tyrone; and Dr. E. H. Cooke, for the Hendon district of the county of Middlesex. A vacancy is announced at Radcliffe, in the county of Nottingham.

INDIAN AND COLONIAL NOTES.

Africa.

Owing to the few working days in April, the output of coal in the Union of South Africa showed a material decline when compared with the previous month. For the whole of the Union the coal sold only reached 814,001 tons, as compared with 866,918 tons for March, whilst the average price at the pit tops fell from 6s. 5d. to 6s. 2d. per ton. The 30 producing collieries in the Transvaal sold 519,873 tons, of which the Middelburg area was credited with 395,109 tons, the Springs area 49,222 tons, and the nine collieries scattered over the rest of the Transvaal 18,849 tons. The average pit top selling price was 4s. 8d. per ton, both the Springs and Middelburg areas showing a slight decline, but the collieries in the outside districts increased their average selling price from 4s. 3d. to 4s. 4d. per ton. The Transvaal collieries maintain their reputation for low average pit top selling prices, being less than one-half that of Natal collieries, and only a third of the average price obtained for the inferior quality of coal produced in the Cape coal fields near Stormberg. Even the Orange Free State collieries obtain an average pit top selling price of 5d. better than that of the Transvaal. Nevertheless, if the volume of business transacted is taken into consideration, the Transvaal coal trade is in a more flourishing condition than at any previous period of its history, whilst the average pit top selling price is higher than for any period during the last five years. In Natal, the saleable coal produced declined from 259,239 tons for March, to 225,021 tons, and the average pit top price from 10s. 2d. to 9s. 10d. per ton. This is a higher pit top price for Natal coal than has prevailed for many years, although immediately after the Anglo-Boer war standard Natal coal fetched for some time £1 per ton at the collieries. The Vryheid Company still hold the position of premier coal producer in Natal, with a monthly output of 40,039 tons, compared with 38,382 tons for the Dundee Coal Company, and 32,659 tons for the Natal Navigation Collieries Company. Durban Navigation for the same month produced 27,116 tons, but Glencoe fell to 14,974 tons. Ballengeich Colliery was credited with an output of 14,114 tons, and the Natal Cambrian with 13,854 tons. Wallsend, Tendega, Utrecht, and Natal Steam all exceeded 10,000 tons, whilst 10 other collieries were credited with a lesser output. During the month of April, 137,966 tons were bunkered, 9,750 tons exported, and 3,119 tons shipped to other ports of the Union of South Africa. The five collieries in the Orange Free State did comparatively well in April, and increased their sales from 67,390 tons in March to 68,351 tons in April. They also maintained their average pit top selling price at 5s. 1d. per ton. The number of producing collieries in the Cape Province has now been reduced to four, their output for April being only 756 tons, but the average price was no less than 14s. 5d. per ton at the pit's mouth.

Australia.

The State Colliery.—There is considerable activity on the State's coal mine, Mott's Gully. Good progress has been made with the sinking of the upcast shaft. Many difficulties have had to be faced, such as the inflow of water, which is estimated to be equal to 5,000 gals. per hour, and the "running" of the rubble of alluvial wash from the sides of the shaft as depth is being made. Softer strata had been passed through, but rock spurs or bands (according to recent advices) were making their appearance, which necessitates blasting, some of which has been carried out. It is thought that the true rock is close at hand, in which case sinking is expected to be prosecuted more rapidly. When the main rock is struck, and the top face evened up, the shaft will be continued in round form, instead of square, and the opening will be 19 ft. in diameter. The corners of the square opening, for the whole depth of 40 ft., will then be filled in with concrete, and the whole shaft, which it is estimated will reach a depth of 260 ft. to the working coal seam, will be circular, and 19 ft. across from top to bottom. The winding and other gear will then be placed in position for hauling up the coal. The purpose of the big body of concrete referred to is for the forming of a firm foundation for carrying the permanent headgear, which will be much more massive and higher than the poppet-heads used for sinking purposes. Close by the shaft now being sunk, which will be used as the hauling shaft until the main shaft has been sunk and the big hoisting engine is in operation, is an excavation which, when filled with concrete, will form the bed of the powerful winding engine already on the ground; the present engine, used for sinking only, will then be discarded. Everything is now nearly ready for a start with the downcast shaft, which will require exactly the same process as that adopted in the present workings. The mullock taken from the shaft is lifted to the surface in large iron buckets, which are placed on a specially made truck, taken out on a little tramline, and tipped into a creek. On every side are piles of timber, bricks, ironwork, etc., all of which go to indicate that much labour and capital will yet be expended before the mine is developed. One pleasant feature of the operations is the fact that the officers and men work in perfect harmony.

Illawarra Developments.—The syndicate which has been boring for the Illawarra western coal extension (near Robertson) got the seam at a depth of 942 ft. The quality of the coal is described as "fair average" (14 per cent. ash). The depth of the seam was 7 ft. 3 in. The coking quality is described as "excellent." The syndicate, who holds 5,000 acres of leasehold, are in hopes of the construction of a railway from Robertson to Moss Vale, which would give them a good position for the southern trade.

Cargo Ship Owners' Demands.—At a meeting of owners of cargo steamships engaged in the coal trade, on Tuesday afternoon at Cardiff, a resolution was passed demanding "just and fair treatment with the right to earn an equitable amount for depreciation on the cargo steamers or replacement values." They also require "a reasonable hearing by the Shipping Controller of owners' complaints, and restitution for losses incurred, and relief from the condition of companies unable to trade save at a heavy loss." The resolution stated further that, unless conditions are ameliorated, "a large number of cargo steamers will have to be laid up on account of the inability of owners to meet the heavy financial losses and liabilities incurred by continuing to trade." It is argued that, inasmuch as so large a proportion of the mercantile marine is under Government control, their earnings are nothing like what Mr. Bonar Law described in the House of Commons. In view of the further difficulties which would be created for the coal trade if the ship owners were to lay up vessels, the suggested action in that direction is a serious matter.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—August 17.

Coal Distribution.

Replying to Col. COLLINS, who asked the President of the Board of Trade if he had received representations regarding the new coal regulations for the burgh of Greenock, whether he was aware that these regulations will increase the transport difficulties, and if he would take steps to modify the scheme, Mr. G. ROBERTS said that representations had not been specifically made regarding the burgh of Greenock. The transport of coal as it would be affected by the coal transport reorganisation scheme had been discussed with representatives of the railway companies in Scotland, and the opinion had been expressed that the difficulties of transport would be lessened rather than increased.

August 20.

Peat Fuel Factory (France).

Mr. ROWLANDS asked the Under-Secretary of State for War whether the steps taken by the War Department in connection with the peat fuel factory to be erected in France had been such as to ensure that the best and most economical method of treating peat with a view to its dehydration had been selected; whether the general knowledge available as to the workability or failure to work particular processes had been given due consideration, especially the official literature on this point published by the Canadian Bureau of Mines, the Bureau of Mines of the United States, the Records of the Swedish Government, and other analogous data had been given due weight, and, if departed from, would he state the reasons; whether the reports of the Admiralty on peat proposition had been taken into consideration and acted upon by the War Department; whether reliable assurances had been forthcoming that peat fuel will be produced during this winter from the factory intended to be erected for supply to the trenches; and, if not, the earliest date on which such supply would be given.

Mr. MACPHERSON replied that the War Department had consulted the Ministry of Munitions, and received a satisfactory report. No reports had been received from the Admiralty on the matter. The date of delivery of supply depended upon many factors, such as the supply of machinery, material, and labour, which under present conditions it was impossible to estimate with any certainty. Every endeavour was being made to obtain a supply at the earliest possible date, but it was very doubtful whether the factory could be in operation during the coming winter; there were, however, good grounds for anticipating a beginning within the next 12 months.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The Committee of Pro-union have issued an award in the advance of wages sought by the Bristol Channel engineers, and these will be at the rate of 3s. for men and 1s. 6d. for boys as from August 1. An erroneous statement has been in circulation that the award was 5s. and 2s. 6d., but the foregoing is the present position.

The South Wales Freighters' Association and the Bristol Channel Pitwood Importers' Association have had before them an application from the Dockers' Union for a further increase of 25 per cent. in the war bonus paid to pitwood workers. An offer of 15 per cent. made by the employers had been refused; but it is probable that a compromise will be arrived at on the basis of 20 per cent.

The Lewis Merthyr Hafod Colliery workmen have sent a deputation to Mr. Brace, Under-Secretary of the Home Office, to whom they made representations concerning the condition of the roads underground.

A deputation from the Gurnos Colliery has waited upon the miners' executive asking permission to tender notices because there were a number of disputes they had been unable to get settlement of. The executive therefore ordered an investigation.

Applications for out-of-work pay which came from the Cape Colliery, from the Avon Valley district and from the British Rhondda Lodge, were deferred, and it was decided in regard to stoppages at Cwmillynfell that the men should receive three weeks' lock-out pay. It was also resolved to grant payment to men who had been idle at Groeswen Colliery, and further that Tirbach men who had been idle in consequence of stop trucks should receive payment as well as men at Machen Colliery.

The claim of the workmen at the by-product plant, Ebbw Vale, for extra payment on account of week-end work has been decided by the Committee of Production with the assent of the federation. The rates of men concerned have been reduced by 5 per cent. on the advance previously awarded—this being a condition of the grant of payment for week-end work. The Committee of Production, therefore, award that week-end work shall be paid for at the rate of time and a-half, and that the finding comes into operation on the first full pay day following.

Cilely Colliery workmen of Tonyrefail have submitted to a representative of the Industrial Commissioner a statement as to their case in a wages dispute wherein they claim payment for change of working from naked lights to electric lamps. The workmen's deputation was introduced by Mr. T. Richards, M.P., and Mr. James Winstone. They had given notices terminating agreement, but had withdrawn them in order that the Department might decide the issue. The facts stated will be submitted to the Commissioner, who will issue his decision in due course.

Mr. J. Winstone, with Mr. C. Edwards and a deputation of workmen, attended before the Controller of Mines, in London, to furnish particulars as to the dispute at the Elled Colliery, where between 200 and 300 men have been on strike for some weeks—the Conciliation Board having failed to bring about a settlement in respect of a price list. Mr. G. Fisher was present on behalf of the colliery company. The matter has now been referred to Mr. Bramwell and Mr. Hartshorn so that they may make further investigation, and then, in conjunction with two other members of the Conciliation Board, will make an effort to effect a settlement.

An important wages question is engaging the attention of the Eastern Valley District of Miners, Monmouthshire, so far as surface craftsmen, who happen to be members of the South Wales Miners' Federation, are concerned. It appears that the advances due to them in accordance with the decision of the Wages Board have been held back, while surface craftsmen who are members of the Surface Craftsmen's Association are receiving the increased new rate of pay. It is felt in the ranks of the miners' organisation that the former ought to receive the advances, and they contem-

plato making a demand for retrospective payment. They appear to be determined to carry this into effect whatever may be the consequences.

North of England.

The executive committee of the Northumberland Miners' Association has declined to assist the manager of a local lead mine to secure workmen, the wages and conditions not being, in the executive's opinion, such as any member of the association would accept.

At Saturday's council meeting of the Durham Miners' Association, it was decided that the executive committee should meet the county coalowners with a view to inducing them to allow the widows or other dependants of association members who have fallen in the service of their country to retain their tenancy of colliery houses or to be paid house-rent and to be supplied with coal for the period of the war.

At a meeting held under the auspices of the Tanfield Lea lodge of the Durham Miners' Association a resolution was carried strongly protesting against the limit of income for income tax purposes being altered from £160 to £130, thereby causing unjust burdens to be borne by those who are already heavily taxed through the very high cost of living, and calling upon the Chancellor of the Exchequer, before he introduces his next Finance Bill, to consider seriously the advisability of raising the limit of income to its former standard.

Durham coal owners and miners' representatives met in conference in Newcastle on Thursday of last week on the question of the interpretation of the phrase "satisfactory wages" in the absenteeism rules formulated by the Miners' Federation of Great Britain. It was stated that it had been found, in the operation of these rules, that the owners at some collieries had been paying the minimum wage as "satisfactory" wages when the men had been brought from their own cavils to work other vacant places. The men contended that the "satisfactory" wage was the wage that had obtained in the county for nearly 40 years, viz., the county average. It was decided that the miners should make application for a meeting at an early date for the purpose of adjusting the county percentage to apply to the different minimum wages, in order to bring them as nearly as possible to the prevailing county average paid to the different classes of workers.

A conference of delegates from Durham miners' lodges was held in South Shields last Saturday, convened by the St. Hilda lodge, which submitted the following motion for the approval of the meeting:—"That, failing a satisfactory reply from the Coal Owners' Association to the miners' request for a substantial increase of wages generally, a ballot of the Miners' Federation be taken at once with a view to enforcing our request with a general down-tools policy." In the circular convening the conference, the St. Hilda lodge officials stated that they would, no doubt, be twitted with the usual parrot-cry of "German gold," or, "Are you going to stop the pits, and therefore endanger the lives of our men at the front?" "The profiteers are taking advantage of the patriotism of the workers, and have made use of such phrases to keep the workers quiet, but, in seeking an advance of wages somewhat in proportion to the increased cost of living, the miners are neither being bribed by Germans nor yet have any desire to increase the sufferings of their own kith and kin at the front. They are animated by a desire to minimise the sufferings of the fathers, mothers, brothers and sisters of the lads who are fighting for us. The long-suffering and patriotic spirit of the workers has about broken down, not because they are not willing to make sacrifices to bring the war to a successful conclusion, but because they feel sure that it is not necessary for them to have to live below a standard of healthy animality, especially when it is common knowledge that the captains of industry are making huge profits out of the present circumstances." The officials affirm that there are thousands of miners at present whose wages are about 6s. 6d. per day, which means that, if the pits are working six days a week, these men with large families are only earning £2 a week. Furthermore, the pits are working short time. Over 60 lodges were represented at the conference. Mr. John Edmondson, secretary of the St. Hilda lodge, in proposing the resolution, said that from St. Hilda Colliery alone 720 men had joined the Forces, and over 4,000 had gone from the South Shields collieries. It could not be urged that the lodge was showing an unpatriotic spirit. Mr. J. Edmondson, of Marsden, moved as an amendment:—"That we ask for a special Council meeting, and instruct our agents to at once seek a meeting with the coal owners to request a 50 per cent. advance; also, at the rising of the Council, to immediately issue ballot papers to the county on the question of tendering 14 days' notice, failing a satisfactory reply from the owners." He said that the amendment was more revolutionary than the resolution, but he was determined to press it. If the resolution was adopted, a considerable time would elapse before anything could be accomplished, and one of the objects of the amendment was to obviate that waste of time. A second amendment, calling for a reduction in the price of food-stuffs, to the extent of at least 25 per cent., was moved, but was ruled out of order. The St. Hilda motion was carried with only four or five dissentients. It was decided to ask each lodge to request the executive committee of the Durham Miners' Council to summon a special council meeting to discuss the proposal.

At a special council meeting of the Durham Miners' Association, on Saturday, resolutions were adopted to seek to have the basis wage of surfacemen and shifters raised: to obtain a seven-hours' shift for fillers after mechanical coalcutters; to get all horsekeepers throughout the county to go to the mine not more than once a day for their shift; to have rent and fire allowance for all married surface workers; and to make it compulsory that a Government inspector, when visiting a colliery, should be accompanied by one of the local mine inspectors.

Mr. C. C. Hodgson presided as neutral chairman over the Cumberland Brick Trade Conciliation Board at St. Helens Colliery Offices, Workington, last week, the meeting being called to hear a claim from the workmen for advances of 5s. wages—a shilling per day on all standard rates under 5s. per day, and sixpence per day on the present standards for all youths and women workers. Mr. T. Cape presented the case of the workers, and Mr. L. Wilson that of the employers. The neutral chairman reserved his decision. The award is expected in a few days.

The St. Helens No. 2 Lodge of the Cumberland Miners' Association has passed a resolution recommending the executive to approach the Miners' Federation on the question of soldiers' leave. The resolution states that they understood there had to be equal sacrifice for all, but this cannot be the case, as officers get leave much more frequently than N.C.O.'s and men. They urge that the matter be pressed before the Government.

Several attempts have been made to adjust the wages of the iron ore miners in West Cumberland, but up to the present time the men and the Ministry of Munitions have not been able to agree as to terms. Another meeting, however, has been arranged to be held shortly, and it is earnestly hoped that a satisfactory settlement will be reached.

Federated Area.

The question of the employment of non-unionists in collieries came up for discussion at a meeting of the Coal Conciliation Board held in Manchester, on the 14th inst. Mr. Lionel Pilkington presided, with Mr. Thomas Greenall, president of the Lancashire and Cheshire Miners' Federation, in the vice-chair. A scheme was formulated and eventually agreed upon whereby all men (except officials) working underground must belong to the Lancashire and Cheshire Miners' Federation. It was reported that the dispute at Burnley regarding payment for colliers doing datal work was still unsettled, and representatives of the employers and men's leaders were appointed to visit Burnley to deal with the question.

A meeting of the executive council of the National Federation of Colliery Enginemen and Boilermen was held last week at the Exchange Hotel, Manchester, when the executive considered the attitude of the Labour Conference towards the Stockholm Conference. It was agreed that the Federation be represented at the forthcoming Labour Conference in London, and it was urged that a referendum of trade unions ought to be taken, on the ground that the vote of the 10th inst. was not representative.

At branch meetings of miners held during last week end in Manchester and Bolton districts, special consideration was given to a letter from Mr. Thomas Ashton, secretary of the Miners' Federation of Great Britain, relating to the new scheme for the recruitment of miners. In this letter the executive committee of the Federation ask for a delay of one month in order to give time for further consideration of the matter by the miners in the various coal fields. Application, it was stated at the meetings, had already been made to the Coal Controller for delay.

At meetings of miners held in the Leigh, Atherton and Bolton districts on Monday night, it was stated that the continued employment of young Irishmen in South Lancashire coal mines was becoming a grave scandal, especially in view of the further coming-out of Englishmen of certain ages. The attention of the executive council of the Lancashire and Cheshire Miners' Federation is to be drawn to the grievance.

Failing concessions as to wages, payment for holidays and other matters, the Leicestershire and South Derbyshire members of the National Association of Colliery Deputies, Examiners and Shot-firers decided to hand in notices. This decision is the result of the ballot recently taken on the matter. The men's demands are:— (1) A uniform rate of wages for all firemen, examiners, deputies, and shot-firers. (2) That 60s., plus 10 per cent. per week, be the minimum basis rate of wages, 13½ per cent., plus 18 per cent. war bonus, to be added, and varied as per the miners' wages. (3) Eight hours to constitute a shift. (4) That all overtime, Sunday work, and work during the usual holidays, such as Easter, Whitsuntide, Christmas, and feast time, be paid for as overtime, at rates and conditions as per Nos. 2 and 3. (5) That a week's holiday be allowed each year with wages as stated in No. 2. (6) Fourteen days' casual holidays be allowed each year, which are to be balanced against the number of days' overtime worked, and the difference to be paid *pro rata* as a bonus quarterly—that is to say, if a man works a year without taking any casual holidays, he be paid the above said 14 days, in addition to the overtime he works. (7) During sickness and accident full wages to be paid for a period of three months, less State insurance or compensation. (8) That a ton of best coal be allowed every four weeks free.

Trouble has arisen among a number of miners engaged in certain Midland collieries, and according to a telegram sent by the Coal Controller to Mr. John Richards and Mr. H. Whitehouse, president and secretary respectively of the South Staffordshire and East Worcestershire Amalgamated Miners' Association, which is a branch of the Miners' Federation of Great Britain, men in various pits have given notices to cease work for a 25 per cent. increase in wages. As the matter is in the hands of the Miners' Federation, who are shortly to meet him, he asks that the men should withdraw notices at once. In a printed announcement issued from the Miners' Hall, Great Bridge, the president and secretary of the Miners' Association for the area express the hope that the men concerned will act on this advice, and await the decision of the Controller, after the case has been put to him by the Federation executive. Some of the notices are due to expire this week end, and the notice, it is hoped, will tend to avert a crisis.

Scotland.

At Parkhead Collieries, Bellshill, an examination was made of a section of places with a view to fixing a new tonnage rate. The inspectors have suggested a rate which the manager has declined to accept, and there the matter stands meanwhile.

The trouble at Coyllon Colliery, Rankinston, Ayrshire, has been satisfactorily adjusted. The places which were in dispute are to be worked for a period at the ordinary tonnage rate of 3s. 8d. and 3s. 10d. Wages are to be brought up to the standard rate if the output does not come up to expectations. At the end of a month the tonnage rate is to be based on the amount of coal produced.

At Fortisset Collieries in the Shotts district complaints are being heard from the workmen about the unsatisfactory condition of the drawing roads. Application has been made to the Lanarkshire Miners' Union for authority to strike work as a means towards effecting improvement.

There has been idle time at Dewshill Colliery, Salsburgh, over an unfortunate dispute with the Harthill and the Miners' Union. The executive committee of the Lanarkshire Miners' Union are to hold an early meeting, with interested parties and are hopeful of arranging matters.

At Cowie Colliery, Bannockburn, there has lately been friction over the alleged dismissal of a fireman. The miners threatened a strike but, happily, loss of work has been avoided by the reinstatement of the fireman.

Complaint is being made that since the resumption of work after the strike at Bedlay Colliery, Lanarkshire, the manager has increased the hours of the women employed on the surface. The change is keenly resented, and the executive of the Lanarkshire Miners' Union has been approached to take the matter in hand.

Arbitration has been resorted to in the settling of the question of rates at Dennyloanhead.

The miners employed at Garriofell Colliery seek liberty

work with the object of getting a number of remedied.

Meeting of the Fife Miners' Board, reports were being the non-payment of adequate wages to men in deficient places. To a large extent the cause of the trouble was that no proper ton rate was fixed, the men being that men were unable to earn the standard wage, and were dependent at the end of the day on the manager as to what their wages should be. The executive agreed that steps should be taken to insist upon proper rates being observed.

COASTWISE SHIPMENTS IN JULY.

According to the returns issued by the Commissioners of H.M. Customs and Excise the following quantities of coal were shipped coastwise from the United Kingdom during July:—

From	Total cargo.		Total bunker.	
	1916.	1917.	1916.	1917.
	Tons.	Tons.	Tons.	Tons.
Bristol Channel ports	116,116	125,877	10,218	10,397
North-western ports	235,442	168,561	47,074	38,631
North-eastern ports	532,083	549,553	27,958	20,737
Humber ports	65,606	41,428	7,627	3,897
Other ports on east coast	3,377	740	8,516	4,916
Other English ports	3,710	6,137	1,825	1,949
Total from England and Wales	956,334	892,296	103,218	80,527
Ports on east coast of Scotland	46,696	64,612	7,591	6,613
Ports on west coast of Scotland	140,071	177,146	20,845	16,333
Total from Scotland	186,767	241,758	28,436	22,946
Irish ports	—	—	1,218	1,874
Total from United Kingdom	1,143,101	1,134,054	132,872	105,347

The destination of cargo shipments was as follows:—

To ports in	July 1916.	July 1917.
	Tons.	Tons.
England and Wales	705,051	735,205
Scotland	51,685	26,027
Ireland	386,365	372,822

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ARMY CONTRACTS (YORK), AUGUST 29.—Coal for a period from September 10, 1917, to June 30, 1918. Forms from Officer Commanding, Army Service Corps, East Yorkshire District, 92, The Mount, York.

BECKHAM (NORFOLK), SEPTEMBER 3.—Coal for the Guardians of the Erpingham Union; also coke. Tenders to the Workhouse.

BLETCHINGLEY, SEPTEMBER 4.—Coal for the Guardians of Godstone Union; also coke. Tenders to the clerk, at the Institution.

BROMLEY (KENT), SEPTEMBER 5.—Coal and coke for the Bromley and Beckenham Joint Hospital Board. Tenders to the clerk.

BUNTINGFORD, AUGUST 30.—Coal for the Guardians. Tenders to the Workhouse.

CLITHEROE, SEPTEMBER 5.—Coal for the Guardians. Tenders to the chairman, under cover to the clerk.

COATBRIDGE, SEPTEMBER 4.—Coal and coke during year commencing October 1 for the Old Monkland School Board. Tenders to the clerk, Municipal Buildings.

DEVIZES, AUGUST 31.—Coal for the Guardians. Tenders to the Board-room, Workhouse.

FALMOUTH, AUGUST 29.—Coal for the Guardians. Tenders to the Clerk's Office, 43, Church-street.

LONDON, E.C., SEPTEMBER 5.—Coal and coke for the Guardians of the Holborn Union. Tenders to the Clerk's Office, 53, Clerkenwell-road, E.C. 1.

MANCHESTER, SEPTEMBER 3.—Burgie coal for six or 12 months, commencing September 17, 1917, for the Baths and Washhouses Committee. Approximate quantities, 5,250 and 10,750 tons respectively. Tenders to the chairman of the Baths and Washhouses Committee.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport.

PORTLAND, SEPTEMBER 4.—200 tons large Welsh steam coal and 300 tons anthracite nuts or beans for the Waterworks Committee. Tenders to the engineer.

RATHMINES, AUGUST 29.—500 tons of coal for the Rathmines and Rathgar Urban District Council. Tenders to the chairman.

SEVENOAKS, SEPTEMBER 4.—Coal for the Guardians for six months. Forms from the clerk, Bank-chambers, High-street.

TADCASTER, SEPTEMBER 1.—Coal for the Tadcaster Rural District Council. Tenders to the Clerk's Office.

UPPINGHAM.—Coal to the Uppingham Auxiliary Hospital—20 tons a month household coal, seven tons a month steam coal—delivered at Uppingham Station. Replies to Commandant, Auxiliary Hospital.

WINDSOR, SEPTEMBER 10.—Coal and coke for the Guardians. Tenders to the Clerk's Office, 3, Sheet-street.

The date given is the latest upon which tenders can be received.

The Foreign Trade Department has issued a list of firms to the Statutory List of firms for enemy association with whom trade in the United Kingdom are forbidden to trade. The list can be obtained at a trifling cost from the Publications, H.M. Stationery Office, Kingsway, W.C.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Cargo Fleet Iron Company Limited.—The report of this company includes the figures for 1915 and 1916 to September 30 of each year, the publication of the accounts having been delayed on account of the war. The balance of profit at September 30, 1915, was £149,198; dividends were paid on the ordinary shares of 3 per cent. on December 31, 1915, and 2 per cent. on May 31, 1916. £50,000 being written off for depreciation, leaving a balance to be brought forward of £49,198. Profits for the year ended September 30, 1916, amounted to £171,410. This leaves a disposable balance of £176,097, after providing for the ordinary charges for debenture interest. The directors propose a final dividend for 12 months ended September 30, 1916, of 2 per cent. (less income tax), paid on March 10, 1917, putting to depreciation £75,000, and carrying forward £51,097. During the year 4½ per cent. first debentures to the value of £16,500 have been cancelled, in accordance with the provisions of the trust deed, thereby completing the annual redemption for 1917, and anticipating to the extent of £6,600 the annual redemption for 1918.

Crossley Brothers Limited.—Interim dividends of 5 per cent. per annum on both the preference and the ordinary shares for the half-year ended June have been declared—the same as last year.

Guest, Keen and Nettlefolds Limited.—The report for the year ended June 30 last states that, after making provision for liabilities under the Finance Acts, the accounts show a profit of £433,453, which, added to £377,029 brought forward, gives an available balance of £810,482. Deducting from this the amount of the debenture interest and interim dividend on the preference and ordinary shares, there remains a sum of £645,212. The directors recommend a dividend on the ordinary shares at the rate of 10 per cent. per annum, free of income tax, for the six months ended June 30 (making 10 per cent. for the year), also a bonus on the ordinary shares of 1s. per share, free of income tax; to place to reserve £100,000; and to carry forward £405,712.

Scott (Walter) Limited.—The report for the year ended June 30 last states that the profits of the steel works, collieries, etc., after providing for the estimated liability under the Munitions of War Act, 1915, and the Finance Acts, amount to £127,903, to which must be added the balance of profit brought forward from last account, £10,557. The directors recommend a dividend of 10 per cent. on the ordinary shares for the half-year to June 30, 1917, making with the interim dividend 15 per cent. for the year, carrying forward to next year's account the balance of £17,179. The make of iron and the output of steel compares favourably with that of the previous period, the works having been fully employed the whole year.

South Durham Steel and Iron Company Limited.—The report for the year ended September 30 last states that the profit amounts to £279,821, which with the balance brought forward from the previous year makes a total of £309,406. After paying interest on debenture stock, dividend on 6 per cent. cumulative preference shares, an interim dividend of 1s. per share on the ordinary shares (paid April 30, 1916), and allowing £75,000 for depreciation, there is a balance of £129,141. The directors recommend a dividend of 1s. per share to September 30, 1916, on ordinary shares (paid November 29, 1916), making 10 per cent. for the year, allowing £75,000 for depreciation, and leaving to be carried forward £32,141.

Stewarts and Lloyds Limited.—The directors have declared an interim dividend for the half-year ended June 30 at the rate of 10 per cent. on the preferred ordinary shares.

Summerlee Iron Company Limited.—Dividend of 20s. per share on the ordinary shares, free of income tax.

Swan, Hunter and Wigham Richardson Limited.—In their report to December 31 last, the directors state that, after providing for depreciation on buildings, plant, and machinery, and for income tax, munitions levy, etc., there remains a net profit on the year's trading of £313,753, and £43,576 was brought forward. Out of this sum it is necessary to provide: Interest on 4½ per cent. first mortgage debenture stock for the year, and £1,000 instalment for sinking fund account, leaving a balance of £341,016, which it is proposed to deal with as follows: Interim dividend at 2½ per cent. on cumulative shares, paid August 31, 1916; interim dividend at 2½ per cent. on ordinary shares, paid August 31, 1916; further dividend at 2½ per cent. on cumulative preference shares, paid March 1, 1917, making 5 per cent. for the year; further dividend at 10 per cent. on ordinary shares, paid March 1, 1917, free of tax, making 12½ per cent. for the year; £100,000 to reserve account; £50,000 to reserve for special depreciation; leaving a balance to be carried forward of £47,082.

Witbank Colliery Company Limited.—The directors announce a dividend (No. 25) of 12½ per cent. (2s. 6d. per share) for the six months ending 31st inst., payable to holders registered on that date.

Workington Iron and Steel Company Limited.—The report shows a profit on the year's working of £309,255, which, with £23,351 brought forward, gives a total of £332,607. £100,000 is placed to depreciation, £30,001 to reserve, and £32,895 is carried forward. The actual liability for war taxation for the previous year, for which £220,000 was set aside, has not yet been ascertained, but

estimates have been made for ample provision for all contingencies. A valuable addition has been secured to iron ore property by the purchase of shares of the Biggryg Mining Company. A final dividend for the year ended June 30 on the ordinary shares of 7 per cent. has been declared, making 10 per cent. for the year—the same as for 1916.

NEW COMPANIES.

Chase (A.) and Company Limited.—Private company. Registered office, 97, High-street, Teddington. Registered August 14. To carry on business as electrical and general engineers. Capital, £3,000. Directors: A. M. Cole, A. R. Cole, and T. B. Hill.

Chemical Engineering and Wilton's Patent Furnace Company Limited.—Private company. Registered office, Hendon, N.W. 4. Registered August 13. Nature of business indicated by title. Capital, £20,000. Directors: N. and T. O. Wilton.

Chemical Engineering Corporation Limited.—Private company. Registered August 14. To carry on the business of chemical, mechanical, and general engineers, etc. Capital, £5,000. Directors to be appointed by the subscribers. Subscribers: C. Reynolds and M. Benson, junr.

Girdwood (E. and E.) Limited.—Private company. Registered office, 5, Frederick's-place, Old Jewry, E.C. Registered August 11. To carry on the business of general engineers, etc. Capital, £500. Directors: D. Anderson and R. Taylor.

High-Speed Machinery Company Limited.—Private company. Registered August 10. To carry on the businesses of mechanical, electrical, hydraulic, gas, and water engineers, etc. Capital, £2,500. Directors: J. P. Annacker, K. J. Almfelt, F. B. Spéar, B. Strachan, and H. H. Whitworth.

Machan Coal Company Limited.—Private company. Registered office, West Regent-street, Glasgow. To acquire and carry on the business of coal masters carried on at Machan Colliery, Larkhall. Capital, £6,000. Subscribers: R. Allan and J. M. Cairncross.

Meerloo Engineering Company Limited.—Private company. Registered office, 1A, Forest-lane, Stratford, E. Registered August 16. To carry on business of general engineers, etc. Capital, £3,000. Directors: R. E. Care, H. C. Davis, J. Meerloo, senr., and J. Meerloo, junr.

North London Engineering Company Limited.—Private company. Registered office, 209, Cobbold-road, Willesden, N.W. Registered August 15. To carry on the business of motor engine manufacturers, mechanical engineers, etc. Capital, £5,000. Directors: S. Ward, C. F. Goodwin, and G. Gall.

Provincial Metal Company Limited.—Private company. Registered office, 14, New-street, Birmingham. Registered August 14. To carry on the business of manufacturers, casters, founders, refiners in aluminium, brass, bronze, copper alloy, metal, lead, etc. Capital, £3,000. Subscribers: E. Dean and H. G. Willmott.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

OBITUARY.

Mr. John Edmunds, who died at Bargoed on Saturday last, in his 84th year, was an outstanding figure in the coal trade of the Rhymney Valley. He commenced work in the mine at nine years of age, and worked his way forward until he became colliery manager at Llanhilleth and other pits in that area, subsequently entering upon colliery enterprise on his own account. He took an active part in public life as member of different local councils; and in the days before the Education Act he helped to establish schools and libraries in the district.

Mr. T. J. Daley, of the Irish Guards, who was killed in France on July 31, had been engaged in the shipping office of the Powell Duffryn Company before enlisting. He was the son of Mr. A. R. Daley, the London agent of the Powell Duffryn Company, and leaves a widow and two children.—Another death of local interest is announced, that of Capt. Beresford Vyvyan, who was well known in coal trade and shipping circles at Cardiff.

Second-Lieut. Sydney Walker, of the Durham Light Infantry, who has been killed in action, at the age of 25, was well known in mining circles in North-East Durham, having been assistant under-manager of Easington Colliery for five years.

Mr. Francis Evan Moss, gas coal contractor, died on August 21 at Kilhey Court, near Wigan, in his 52nd year. Funeral service at Orrell Congregational Church to-morrow (Saturday), at 2 p.m.

Registration and Publication of Directors' Names.—The Companies (Particulars as to Directors) Act, 1917, which lately received the Royal Assent, is an important measure applying the principle of the Registration of Business Names Act to all companies. In normal times, the Bill would have encountered strenuous opposition, but owing to the pre-occupation of Parliament its passage through both Houses has been easy and expeditious, and it has largely escaped public attention. The principal provisions of the Act are as follow:—The annual list and summary entered in the register of members and the register of directors, and the copies thereof filed with the Registrar of Companies, must now set out the following particulars concerning the directors: (a) The present Christian name or names and surname of every director; (b) any former Christian name or names or surname of every director; (c) the nationality of every director; (d) the nationality of origin (if other than the present nationality) of every director; (e) the usual residence of every director; (f) the other business occupation (if any) of every director. Companies registered since November 22, 1916 (and, therefore, under suspicion, seeing that the object of formation may have been to evade the provisions of the Business Names Act, which was then passing through Parliament, and became law a month later) are not permitted to wait until the next annual return or copy register of directors is due, but must enter such particulars on a separate form, and cause it to be filed not later than September 2. They must also, on and after November 3, set out in all "trade catalogues, trade circulars, show-cards, and business letters," the names of the directors and any former names by which they were known, and the nationality of any who are not British, or the former nationality where a change has at any time been effected. The expression "director" is given a wider meaning with the object of bringing to light the man "behind the scenes," and it now includes "any person who occupies the position of a director, and any person in accordance with whose directions or instructions the directors of a company are accustomed to act."

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References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

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THE COLLIERY GUARDIAN

MONTHLY LIST OF RECENT COAL LITERATURE

I.—General.

Efficiency of Coal Production. C. B. Officer. "Coal Age," July 7, p. 9.
Valuation for Coal Land Assessments. E. B. Wilson. "Coal Age," July 14, p. 50.
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Cotton Rope for Power Transmission. J. M. Alison. "Proc. Eng. Soc. W. Penn.," June, p. 271; 15 fig.
Coal Resources of the United Kingdom. A. Lupton. "Ind. and Eastn. Engin.," July 17, p. 23.
Coal Economy. "Colliery Guard.," Aug. 3, p. 211.
Industrial Unrest in Wales and Monmouthshire. "Colliery Guard.," Aug. 3, p. 203. (From report of Comm. of Enquiry into Industrial Unrest.)
Industrial Unrest and South Wales Miners: Criticism of the Commissioners' Proposals. "Colliery Guard.," Aug. 10, p. 255.

III.—Geology.

The Economic Geology of the Central Coal Field of Scotland: Area VIII., East Kilbride and Quarter. R. G. Carruthers and C. H. Dinham. "Mem. Geol. Survey Scotld.," 1917. 3s.
Forests of the Coal Age. Dr. D. H. Scott. "Colliery Guard.," Aug. 10, p. 251. (From paper read before Midd. Inst. Min. Civ. and Mech. Engin.)

VI.—Working of Minerals.

Longwall Mining in Northern Illinois. E. T. Bent. "Coal Age," July 7, p. 19; 2 fig.
Mining Machinery as a Factor in the War. "Coal Age," July 21, p. 94; 5 fig.
The Natal Coal Fields: Phases of Development. W. T. Heslop. "Jl. Chem. Met. and Min. Soc. S. Africa," May, p. 182.
Development of Deep Coal Areas in Bengal. G. George. "Trans. Min. Geol. Inst. Ind.," May, p. 77.
Intensive Mining in Thin Seams. G. Gibb. "Colliery Guard.," Aug. 17, p. 304. (From paper read before Min. Inst. Scotld.)

VII.—Boring, Shaft Sinking, and Tunnelling.

Speed-Reducing Attachment for Air Drills. H. F. Pannepacker. "Compr. Air Mag.," July, p. 8427; 2 fig.
New Thin Seam Mounting for Jackhamers. H. L. Hicks. "Coal Age," July 21, p. 100; 7 fig.
Electrically-Operated Rock Drill. E. M. Mackie. "Coal Age," July 21, p. 110; 2 fig.
Comparative Tests of Hammer Drill Bits. C. R. Forbes and J. C. Barton. "Bull. Amer. Inst. Min. Engin.," Aug., p. 1079; 9 fig.

VIII.—Explosives, Blasting.

Pocket Blasting Machines. A. La Motte. "Lehigh Empl. Mag.," June, p. 90; 2 fig.

IX.—Timbering, Packing, etc.

Practical Wood Preservation. W. E. Hoyt. "Coal Age," July 7, p. 11; 3 fig.
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Reinforced Concrete: Its Application to Pit Props. "Iron Coal Tr. Rev.," Aug. 10, p. 144. (From paper read by Mr. W. A. Machin before Natl. Assocn. Coll. Mgrs., Midd. brch.)
Pitwood Supplies. "Colliery Guard.," Aug. 17, p. 301. (Coal Controller's arrangements.)

X.—Surface Arrangements.

Modern Coal Mining Plant at Arista, W. Va. J. F. Morris. "Coal Age," July 14, p. 46; 3 fig.
Rebuilding a Tipple. M. Raymond. "Coal Age," July 28, p. 156; 14 fig.

XI.—Winding and Haulage.

An Atmospheric Colliery Winding Engine. "Engin.," Aug. 3, p. 94; 9 fig. (Old plant at Madeley Wood Colliery.)
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Door at Sayre Colliery. "Lehigh Empl. Mag.," June, p. 98; 2 fig.

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To Eliminate Major Mine Accidents. F. Haas. "Coal Tr. Bull.," July 2, p. 47. (Paper read before W. Virginia Coal Min. Inst.)

XVIII.—Mine Fires.

The Sugar Creek (Ohio) Mine Fire. "Coal Age," July 14, p. 56; 1 fig.
Packer No. 5 Colliery has Stubborn Mine Fire. "Lehigh Empl. Mag.," June, p. 95; 4 fig.

XIX.—Rescue and Ambulance.

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XX.—Drainage, Pumping, etc.

Handling Mine Water. H. E. Cole. "Coal Age," July 21, p. 115; 3 fig.
Endurance-Efficiency Pump Tests. L. A. Quayle. "Power," June 19, p. 820; 6 fig.
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Notes on Coal Washing Experiments. J. Pascal. "Colliery Guard.," Aug. 10, p. 252; 11 fig. (From "Bull. Soc. Ind. Min.")

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Recent Briquette Installations. G. J. Mashek. "Coal Age," July 7, p. 4; 6 fig.
The Manufacture of Breeze Briquettes. G. F. Zimmer. "Gas Wld.," Aug. 11, p. 91.
Coal Concreted from Dusts or Ashes. R. G. Lovell. "Colliery Guard.," July 27, p. 158; Aug. 3, p. 216. (From paper read before Soc. Architects.)

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XXX.—Mining Laws, Royalties.

Excess Mineral Rights Duty: Relief under the New Act. J. Burns. "Colliery Guard.," Aug. 17, p. 304.

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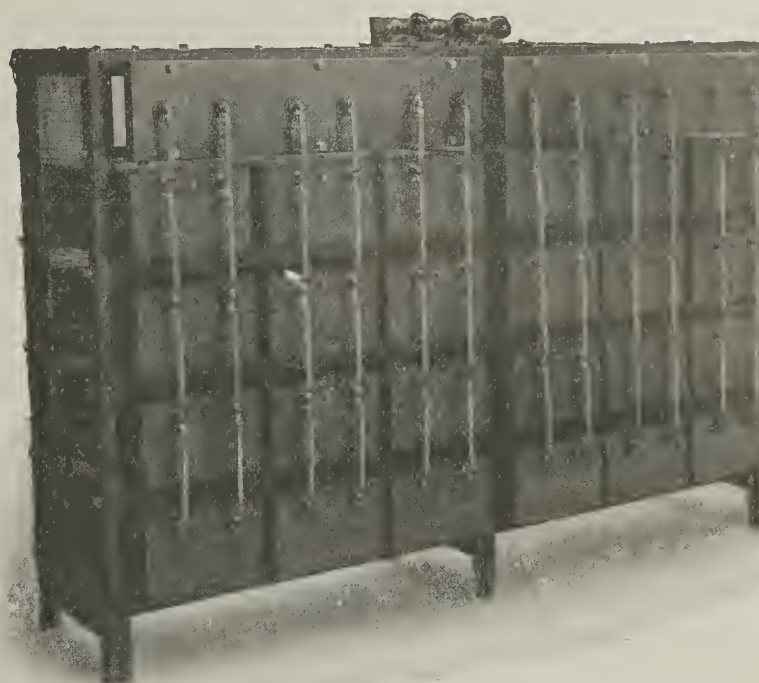
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THE FREIGHT MARKET.

the outward freight market continues to be dimensions, all coal shipping centres being out of a sufficiency of tonnage. On the north-features have been almost wholly confined to carriage of coke to near French ports, at rates. Coasting business has been done on the Tyne to London. The unscheduled French port of Isigny has been fixed for at 60s. for a 400-ton vessel. A part-cargo to Port Said has been done at the record rate of 200s. To Stockholm, a 1,500-ton vessel has been taken up at 207½ kr. There is a keen request for vessels, and very high rates are on offer. Thus, for any Norwegian port, 200 kr. would cheerfully be paid. For Portugal, rates are based on about 100s. to Oporto, and for the Spanish Mediterranean on about 220s. to Barcelona. At the Humber, an 8,000-ton steamer for Alexandria has been taken up at 165s. At South Wales, chartering has been brisker from Swansea than from Cardiff. At all Welsh ports, fixing has been limited to French Atlantic ports and other near destinations. The only long-distance charter entered into is for a 6,000-ton steamer for Port Said from Cardiff at 160s., November loading. As on the north-east coast, very high rates are being unavailingly offered for vessels for neutral ports.

Homewards, the River Plate market is slow, but steady, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. At the United States, coal freights from Virginia to Buenos Ayres continue to be quoted at 125s., with 30 dols. for Rio discharge. On net form, Northern Range to the United Kingdom is steady, at last week's advanced rate of 200s., and 220s. for French ports, with up to 360s. offered for West Italian discharge, which latter is a very considerable increase on the week. On heavy grain basis, 30s. is quoted for United Kingdom discharge, and 32s. 6d. for France, from the Northern Range. At the Far East, tonnage on rice basis is in good demand. Saigon to French Atlantic is very firm, at 500s. For Burmah loading for the United Kingdom, 480s. is offered. Madras Coast to Marseilles with kernels is steady, at 500s. From Kurrachee or Bombay to the United Kingdom the rate is about 250s., with 400s. offering for the voyage from Bombay to West Italy. Tonnage at the Mediterranean ore and phosphate ports offers very sparingly, and high rates are quoted.

Tyne to Dunkirk, 500, 45s.; coke; Dieppe, 850, 46s.; coke; Havre, 850, 46s.; coke; Isigny, 400, 60s.; London, 1,500, 15s.; North French Range, 850 and 400, 45s.; coke; Port Said, 6,000-7,000, 200s., part cargo; and Stockholm, 1,500, 207½ kr.

Cardiff to Boulogne, 1,500, 46s. 6d., neutral; Caen, 1,000, 72s. 3d., coke, neutral; 800 and 600, 48s., neutral; Port Said, 6,000, 160s. Nov. 1-30; Rouen, 1,200, 1,300, 2,000, 2,100, and 2,200, 48s. 9d., neutral; St. Nazaire, 1,800 and 2,600, 29s.; and 3,700, 61s. 6d., neutral.

Swansea to Rouen, 2,300, 48s. 9d., neutral; 850 and 800, 50s. 3d., neutral; Tonmoy Charente, 800, 31s. 9d., patent fuel; 950, 29s. 9d.; Morlaix, 175, 160 fr., sail; Havre, 2,000, 45s. 9d., neutral; Caen, 900, 48s., neutral; Chantenay, 2,600, 61s. 6d., neutral; Boulogne, 2,200, 50s. 3d., neutral; Belfast, 700, 17s. 6d.; 630, 17s.; and Guernsey, 800, 40s.

Port Talbot to Rouen, 2,000, 49s. 6d., patent fuel, neutral.

Hull to Dieppe, 800, 52s. 6d., neutral; and Alexandria, 8,000, 165s.

Tees to North France, 520, 50s., pig iron.

Troon to Bilbao, 2,600, 130s.

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PUBLICATIONS RECEIVED.

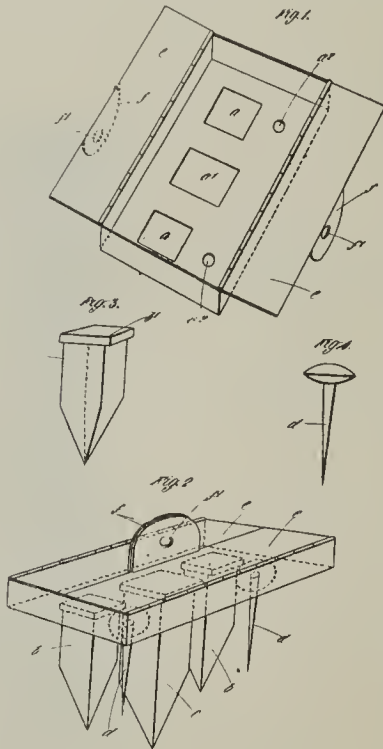
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America Fix Coal Prices.—President Wilson has fixed the price of coal for every mine in the United States at 4s. a ton, which is 4s. a ton lower than the price at the recent conference of coal owners and the National Defence. Proprietors met in Washington and formed a committee with officials, especially during

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

107139. *Improvements in Devices for Holding the Tools of Miners or Colliers.* H. C. Stokes, 20, Waen Vavr-terrace, Cross Keys, Monmouthshire.—The device is of sheet metal of somewhat shallow box form, in the bottom of which box there are apertures *a, a', a''*, to receive point downwards two smaller wedges *b, b'*, one large wedge *c*, and two spikes *d, d'*. The said bottom therefore constitutes the aforesaid apertured plate. One of the smaller wedges *b* is shown in fig. 3, and one of the spikes *d* is shown in fig. 4. The said apertures are of such size and shape that the wedges and spikes have a working fit therein, the apertures *a, a'* receiving the wedges *b, b'*; the aperture *a''*, the wedge *c*, and the apertures *a', a''* receiving the two spikes *d, d'*. The device has two half lids *e, e'* hinged to the longitudinal top side edges, and each half lid has an ear *f* projecting at right angles from its upper side at the free edge thereof. A hole *f'* is provided in each ear *f*, so disposed that when the half lids *e, e'* are closed down the said holes *f', f'* are coincident as illustrated in fig. 2. The spikes *d, d'* are prevented from passing completely through the apertures *a', a''* by their heads, and the wedges *b, b'* are provided with heads slightly larger laterally than the bodies of the wedges, as illustrated at *b'*, fig. 3, to prevent the said wedges passing completely through their apertures. The depth of the device is such that when the half lids *e, e'* are closed down, the tools held by the device cannot rise in the device sufficiently to become free from the apertures in which they are disposed, although when the said half lids are raised or opened, the tools may readily be removed. The half lids *e, e'* are locked in their closed position, and the tools consequently locked in the device by the ordi-

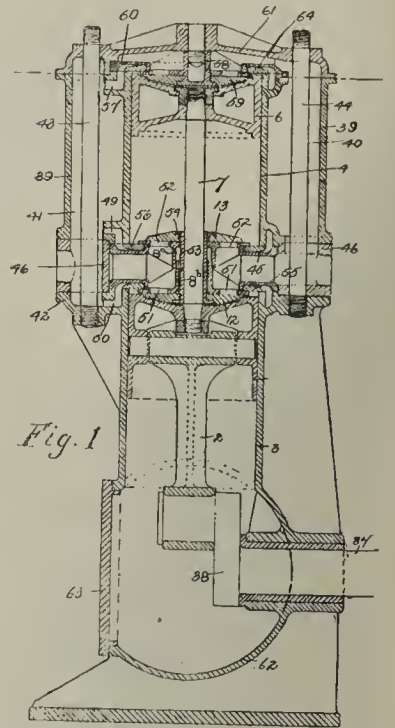


nary miners' tool bar being passed through the coincident holes *f', f'*. At the same time, the other tools, such as picks and shovels, can be placed on the tool bar as usual, and locked thereon. All the miners' tools, therefore, including wedges and spikes, can, with the minimum of trouble and time, be safely put away at the end of a shift, and their unauthorised use by the other workers in the two subsequent shifts prevented. A suitable size for the form of the device illustrated for general use would be approximately 7 in. in length, 3½ or 4½ in. in width, and 1 in. or so in depth. This size would accommodate wedges and spikes of the usual size. (Four claims.)

107178. *Improvements in Regenerative Coke Ovens.* E. Huez, Petit Couronne, near Grand Couronne, Seine Inférieure, France.—This invention relates to an improved construction of the upright flues of a regenerative coke oven, with horizontal regenerative chambers working in alternate directions, in which each contiguous pair of flues is traversed simultaneously, the one by the gas in active combustion, the other by the burned gases, limiting thus to the minimum the heating zones of more or less intensity created by the reversing, which has for its object to invert the direction of the gaseous currents in the respective pair of flues. Fig. 1 shows a vertical transverse section of the coke oven flues and the regenerators; fig. 2 shows a vertical longitudinal section of the coke oven flues, the gas inlets, and the regenerators. The operation of the furnace is as follows:—The gas is introduced at *c* and *d* (this latter channel serving as compensating channel). A series of inlets distributes the gas into alternate flues during the first period. Nozzles *k* supply the requisite gas to each flue. The air coming from the regenerator (in the drawing supposed to be coming from the right) is controlled at the base of each flue by the little damper *r*. The nozzles *k* and the dampers *r* are accessible from the upper part of the furnace by means of the movable plugs *t*. The combustion gases rise in the flues *e, e', e''*, and descend burned into the adjacent flues *f, f', f''*, and then pass to the corresponding regenerator. In the next following period (about half an hour after the first), the flues *f, f', f''* receive the combustion gas, and the flues *e, e', e''* discharge it. The partitions *b*, which separate adjacent flues, are constructed of hollow or channelled bricks, which enclose an insulating layer of air, preventing the transmission of heat from the one to the other side of partition, so that the heat evolved in the flues during the period of intense combustion serves primarily for heating the walls of the coking chamber, and not the heating of the adjacent flues, which carry off the burned gases to the regenerator. (One claim.)

107273. *Improvements in Pumps and Compressors.* J. Zwicky, of 66, Chester-road, South Tottenham, Middlesex.—Relates to double cylinder pumps and compressors of the kind having two pistons between which the valves and working chambers are located, as described in Patent 3707/14. The drawing is a longitudinal section of a compressor provided with three working spaces and driven through the medium of the crank shaft 37 and crank 38, which drives on to the connecting rod 2. The upper cylinder 4 is formed so that there is a working space on

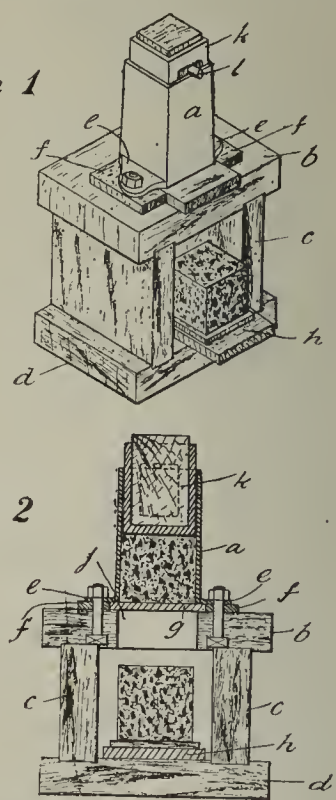
both sides of the piston 6, and is made with a kind of outer jacket 39, which is divided to form an inlet space 40 and a delivery space 41. The upper cylinder, with its outer casting, is secured to a flange 42 upon the lower cylinder 3 by means of a pair of long studs 43, 44. The valve casting 45 being interposed between. The inlet and outlet passages are completed by means of a ring 46. The studs 43, 44 pass through this ring, which is formed to the left with a wall, which shuts off the outlet space 41 from the inside of the valve casting 45. At the other side is an opening which admits of direct communication between the inlet space 40 and the interior of 45. The upper cylinder 4 and the flange 42 on the lower cylinder 3 are formed with outlet passages 49 and 50, which connect the space 41 with annular flap valves serving as outlet valves for the upper cylinder 4 and the lower cylinder 3. The inlet valves 12 and 13 have seatings of brass secured upon the valve casting 45. These are bosses 8a, 8b, one screwed into the other from opposite sides of the valve casting 45, each being formed around their upper surfaces with parts 51, 52, with which the flap valves 12, 13 co-act. Finally, the valves 12, 13 are supported by a brass sleeve 53, which surrounds the piston rod 7, and has a flange at the lower end and a collar 54 screwed on above. The outlet valves consist of rings 55, 56, each sprung over the valve casting 45, and finally held in position by a projecting lip on the bosses 8a or 8b, and co-act with the ends of cylinder castings 3 and 4 as seatings. The valves for the working space above the piston 6 are very similar to one-half of the valves between the cylinders 3 and 4. In the top of the cylinder casting 4 there is an outlet passage 57 similar to the passages 49 and 50. The brass boss 58 corresponds to either the boss 8a or 8b, and carries the disc inlet valve 59. There is a ring 60 inserted corresponding to one-half of the valve casting 45, held in position by the cylinder cap 61. The annular outlet valve is sprung over the ring 60, and retained in position by a lip on the boss 58. The cylinder casting 3 is formed in one with a light crank case 62 fitted with an inspection door 63 at the front. (Five claims.)



107310. *An Improved Apparatus for Making Briquettes.* A. E. Douglass, of St. Chads, Bracebridge-road, Four Oaks, Sutton Coldfield, Warwickshire.—Comprises an apparatus for making briquettes, particularly to enable slack, broken coal, cinders, or coke to be mixed with water and tar, or with Portland cement, or other binder, and moulded. Fig. 1 is a perspective view; and fig. 2 a central vertical section. The apparatus comprises a moulding box *a* mounted on a platform *b* on uprights or supports *c* from a bed *d*. This mould *a* may be cylindrical, rectangular, or any other shape, and may have lugs *e* or an outwardly turned flange at the bottom, by which it is secured to projections or strips *f* secured to the platform *b* aforesaid, or it may be secured thereto in any suitable way. Provision is made for a space below the mould, in which a slide *g* is arranged to work so as to close the bottom of the mould or open it as desired. On the upper surface of the bed *d* is a slidable receiver pad or plate *h*, so that as the material is moulded and the briquette discharged through a hole *j* in the platform, corresponding with the bottom of the mould *a*, it falls on to the pad or receiver. Felt or other suitable material is used on the face of the receiver plate *h*, so that the still soft briquette is not broken in discharging. A plug or plunger *k* (preferably a sliding fit in the mould) is employed, and may be hammered or rammed down to ram and compress the mixture in the mould, the slide *g* being then in a position to close the bottom of the mould. The plug may have projections *l*, which may serve for handles, and also form stops to limit its movement into the mould. The slide *g* is drawn out after the moulding operation and the briquette is forced out of the mould on to the receiver plate *h* and removed for drying in the open air, or in any other way. (Four claims.)

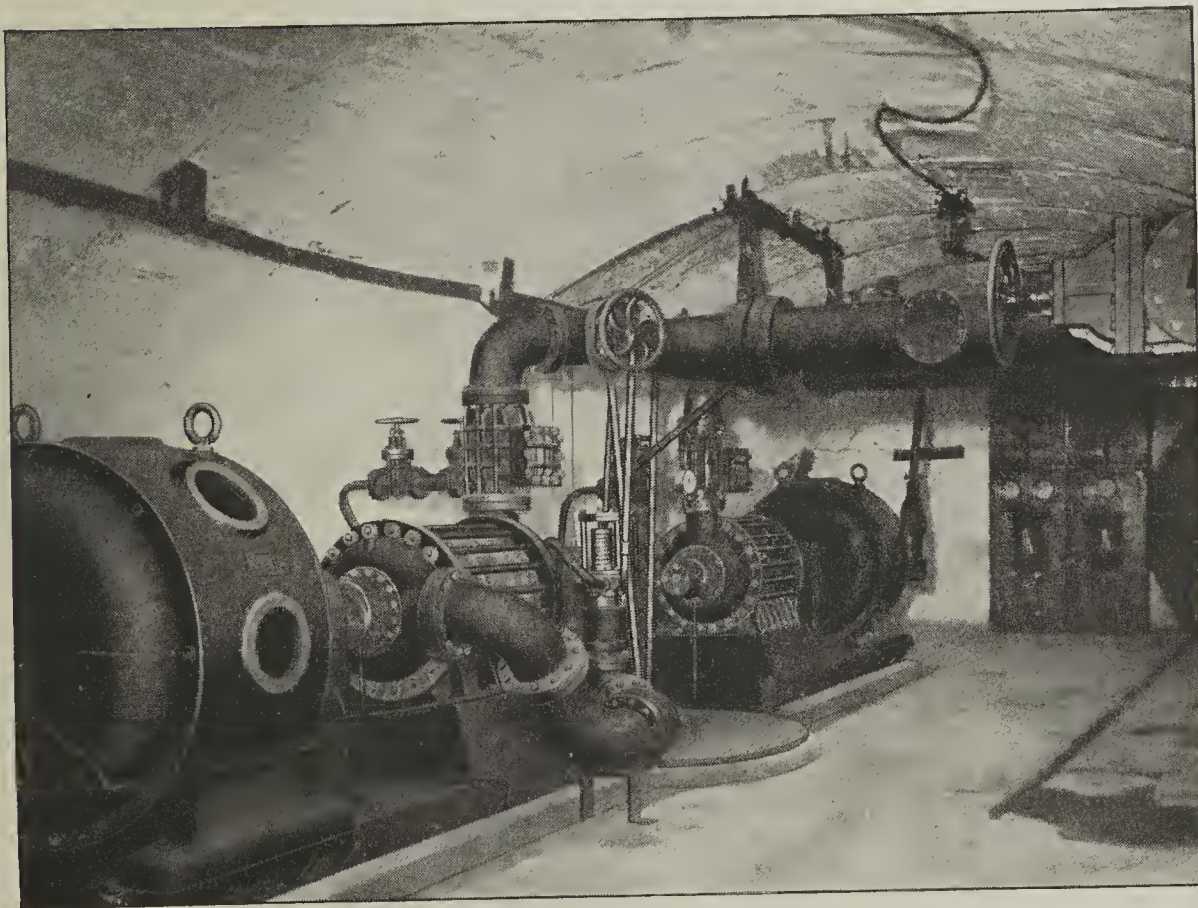
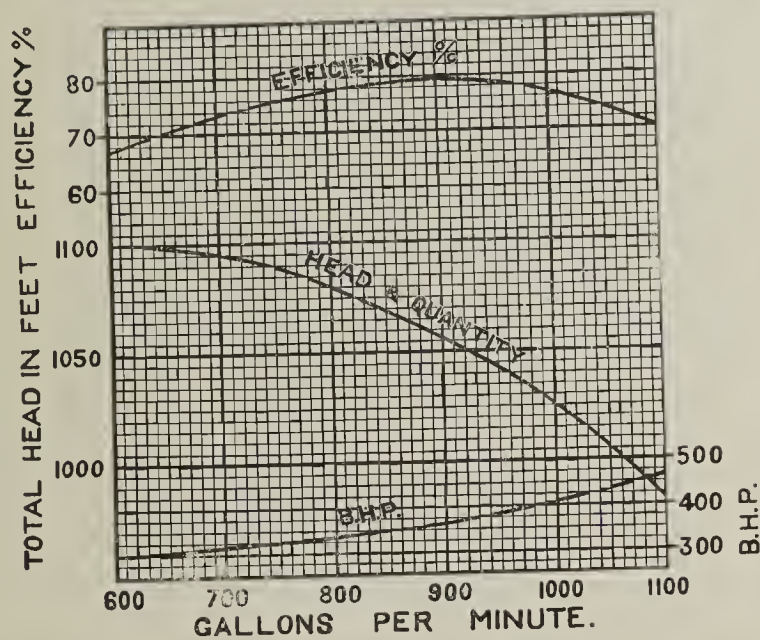
Fig. 1

Fig. 2



107317. *Improvements in Belt Conveyors.* H. C. Jenkins and E. Ellacott, both of Meco Works, Moorfields, Sheffield.—Relates to endless belt conveyors, and particularly to those used in connection with coal mines for conveying the coal at the faces of the seam or in other places where dust is prevalent. The drawing is an elevation, partly in longitudinal mid-section, showing the driven end of a belt conveyor drum and the side frame. 1 indicates the end frame of the conveyor, to which is fixed a cast iron ring 2 of channel-like section. The inner face 2a of the groove being preferably inclined to assist retention of the grease in the groove. 3 is the conveyor drum, and 4 is a steel ring fixed on the end of same and cut with internal teeth 5

It speaks for itself.



Pumping Plant in a Colliery Pumproom 1,050 feet below surface.
 Three units each delivering 50,000 gallons per hour to the surface.
 Efficiency of Pumps, 79 per cent. Speed, 1,485 revs. per minute.
 Motors work at 5,500 volts.

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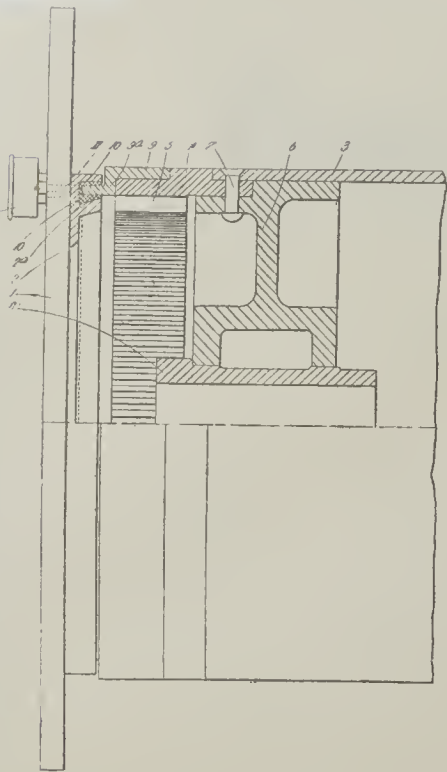
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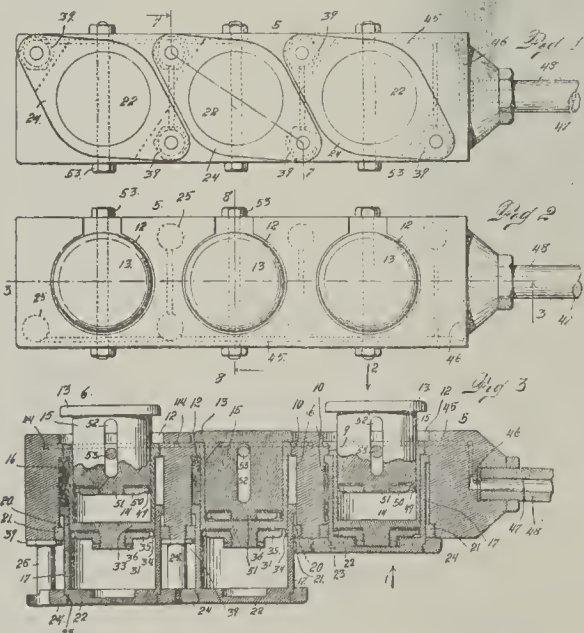
Nine Elms Iron Works,
 READING.

internally toothed wheel, the drum 3 and ring 4 are joined together and to a circular end casting 6 of the shaft 7 at suitable intervals round the drum. The ring 6 is fixed on hub 8 for the axle of the drum. The shaft 7 passes through the hub of a circular casting at the end of the drum and is supported in any suitably arranged bearings. The end of the ring 4 is fixed a ring 9 of Z sec-



tion, the inner flange 9f of which is engaged in the groove or channel of the ring 2, this groove being situated near the internal toothed wheel, and being somewhat wider than the flange 9a. The groove is packed with grease 10, kept replenished through a passage 11 in the frame 1 by a Stauffer lubricator 12 on the latter. The drive is imparted to the internal toothed wheel 4, 5 by means of a spur wheel (not shown) projecting into the interior of same, and meshing with the teeth 5. (Four claims.)

107429. *Improvements in Hydraulic Appliances for Breaking Down Coal in Mines and for like Purposes.* D. V. Sickman, of 968, Downing-street, Denver, Colorado, U.S.A.—Relates to improvements in hydraulic appliances of the type in which a number of telescoping pistons are utilised for the purpose of increasing the possible range of movement for the purpose of breaking down coal or other materials. Fig. 1 is an underneath view; fig. 2 a top plan view; and fig. 3 a sectional side elevation showing certain pistons partly ejected. The numeral 5 designates a bar, which is chambered to receive the collapsible pistons 6 and 7, spaced by a wall 8, which is secured within the bar so as to make it substantially integral. This spacing wall 8 is provided at one extremity with an exteriorly threaded collar 9, adapted to co-operate with an interiorly threaded zone 10 of the bar, the portion of the latter above this threaded zone being bored, as shown at 12, to make room for the enlarged exterior portion 13 of the piston 6 when the pistons are in the collapsed position. The wall 8 is suspended within a cavity of the bar, and surrounds a chamber 14 adapted to receive the body portion 15 of the piston 6. Furthermore, this wall is surrounded by an annular space 16, adapted to receive the cylindrical vertical wall portion 17 of the piston 7, the upper edge of this wall portion being surrounded by a reinforced collar mem-



ber 18, forming a shoulder 19 adapted to engage the co-operating surface 20 of a stop ring 21 screwed into an annular space formed in the lower part of the bar surrounding the piston cavity, whereby the outward movement of the piston 7 is limited. The lower part of the piston 7 is closed by a head 22, which is exteriorly threaded, as shown at 23, to receive a ring 24, having interior co-operating threads, the said ring extending upwardly above the threaded portions of the connected parts, and being adapted to abut the stop ring 21 from below when the pistons are in the collapsed position. This ring 24 is equipped, at opposite diagonal corners of a rectangular area of the bar, with upwardly projecting columns 25, perforated as shown at 26, to receive the water, etc., actuating the pistons. These passages 26 are in communication by way of passages 27 and 28 formed in the ring 24, and the head 22 of the piston 7, and also with ports 29 and 30 communicating respectively with the chamber 31 of the piston 7 and with the chamber 32 of the piston 6, the said port 30 being communicating with the chamber 31 of the piston 7 and with the chamber 32 of the piston 6. The columns 25, when in motion, travel downwardly in chambers

37, the upper extremities of the columns having shoulders 38 adapted to engage stops 39 threaded into spaces 40 surrounding the lower extremities of the chambers 37, and closely engaging the said columns during the movement of the latter. In order to form fluid-tight joints around the upper extremities of the columns, these extremities are equipped with cup leathers or gaskets, engaging the outer walls of the chambers 37, and held in place by washers secured in position by tubes threaded into the upper extremities of the columns. The water enters the chambers 27 directly and through lateral ports 44 formed in the upper part of the bar and in communication with a common passage 45 extending approximately the entire length of the bar, and in communication at the fluid inlet extremity of the bar with an angular passage 46, which communicates with a passage 47 of the conduit 48, which delivers the fluid to the structure. The gasket 34 of the wall 8 forms a fluid-tight joint between the wall and the inner surface of the piston 7. The piston 6 is provided with a gasket 49 exposed at the outer surface of the member, and engaging the inner surface of the wall 8 to form a fluid-tight joint between this piston and the wall. This gasket 49 is held in place by a nut 50 applied to the short exteriorly threaded projection 51 of this piston. (Eight claims.)

107443. *An Improved Method for Utilisation of the Waste Heat of Gas Engines, Incandescent Slag, Coke, and the like.* C. Semmler, of 1, Schützenstrasse, Wiesbaden, Germany.—Relates to a mode of working, which starts with waste heat at the highest available temperature in order to obtain a correspondingly high thermal efficiency, and at the same time to obviate all the aforesaid defects in a very simple manner. To this end, instead of superheated water under pressure, there is employed a non-volatile cooling medium, that is to say, a medium which at atmospheric pressure boils at a temperature above 100 degs. Cent. Suitable media for the purpose in question are, amongst others, glycerine, oil of turpentine, aniline, liquid paraffin, solutions of calcium chloride, and certain readily fusible metallic alloys, such as those known as wood metal (an alloy consisting of 8 parts of lead, 15 parts of bismuth, 4 parts of tin, and 3 parts of cadmium), and rose metal (consisting of 1 part each of lead and tin and 2 parts of bismuth), and other fusible alloys of a similar character, the fusing point of all of which is situated between 60 and about 360 degs. Cent. One or other of these cooling media is heated in the jackets of gas engines or in the cooling devices to a temperature which is somewhat below that at which it boils. For instance, there is no risk whatever in heating glycerine to about 250 degs., as its boiling point at atmospheric pressure is 290 degs. The glycerine, after it has absorbed the heat, is caused to pass, without evaporating, in a closed circuit through a heat exchanging device, which, for instance, may be arranged within a steam boiler, in which it gives up heat until its temperature has fallen to about 190 degs. Cent., with the result that steam at a pressure of, say, 10 atmospheres is produced in the boiler. Such a pressure can obviously be utilised to carry out advantageously various operations requiring high-pressure steam. The waste heat may also be utilised in a similar manner for the heating of hot air. In ironworks, where large amounts of hot air are always required for carrying out blast furnace and other smelting processes, there is nothing to prevent the insertion of heat exchanging apparatus in substitution for or combination with the Cowper stoves in the pressure supply system of the blast, and the passing through such apparatus of the compressed blast air which is therein heated by means of the hot cooling medium having a temperature of about 300 degs. Cent., it may be in a counter-current, until finally a temperature of about 250 degs. is reached. Moreover, it is also possible to produce, for instance, by means of a compressor operating as nearly as possible under isothermal compression, compressed air of 10 atmospheres at a temperature of about 50 degs. Cent. When now such compressed air is heated under constant pressure to 250 degs. Cent. on the hot walls of the heat exchanging apparatus, it can be caused to perform work, for example, in a turbine. It is also possible under a suitably high pressure to combine with the heat exchanging apparatus other apparatus for heating air by the introduction and combustion of fuel. (Three claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Akt.-Ges. Brown, Boveri et Cie. Preventing pumping in centrifugal compressors. (11786)
 Alexander, R. M. Means of applying coal gas for driving internal combustion engines. (11609)
 Babcock and Wilcox. Steam boiler installations. (11828)
 Binche, G. Two-stroke explosion motors. (11629)
 Black, G. J. F. Haulage gear. (11649)
 Bonehill, C. G. Internal combustion engines. (11600)
 Bottle, F. Internal combustion engines. (11721)
 Centrum Syndicate. Internal combustion engines. (11858)
 Clarke, J. B. Internal combustion engines. (11872)
 Dupuis, C. Two-stroke explosion motors. (11629)
 Ellacott, R. E. Chucks or drill caps for rock drills of hammer type, etc. (11655)
 Enrietti, C. Internal combustion engines. (11725)
 Gilligan, A. R. Means for transmitting power. (11598)
 Goodwin, W. E. Rotary engines or motors, pumps, compressors, etc. (11760)
 Hall, H. E., and Hamblet, J. Production of hydrocarbon gas for power uses. (11870)
 Harvey, L. C. Crucible melting furnaces. (11856)
 Husson, M. Internal combustion engines. (11808)
 James, T. C. Synthesis of ammonia. (11619)
 Kennal, J. Steam boiler installations. (11828)
 Lake, W. B. Electric furnaces. (11862)
 Lamplough, F. Hydraulic transmission apparatus. (11664)
 Layton, G. Starting apparatus for electric motors. (11677)
 Morgan Crucible Company. Crucible melting furnaces. (11856)
 Mower, G. A. Feed water regulators. (11841)
 Plates, A. P. Pleitz. Internal combustion engines. (11606)
 Prignol, H. Two-stroke explosion motors. (11629)
 Rateau, A. Arrangement for increasing power of internal combustion engines. (11673)
 Richard, J. B., Sloane Syndicate, and Stoneham, H. S. Treatment of peat. (11847)

- Rowlands, P. O. Apparatus for separating dust or powder from gases or air. (11593)
 Smith, S. Internal combustion motors. (11662)
 Spencer, H. W. Feed water regulators. (11841)
 Stott, O. Electricity generating plant. (11806)
 Tacci, P. G. Internal combustion engines. (11858)
 Theisen, H. E. Centrifugal machines for purifying, cooling, and mixing gases. (11766)
 (Ulberg, J. A.). Rotary engines. (11797)
 Wilford, S. J. Water circulating devices for steam boilers, etc. (11611)
 Wrightson, W. P. Ventilating pipes for collieries, etc. (11678)

Complete Specifications Accepted.

(To be published on September 6.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.

3251. Deakin, F. B. (Venturino, M. E.). Process and apparatus for transforming dense crude petroleum into petroleum of less density. (108496)
 6404. Kettering, C. F. Electrical regulators. (101014)
 6405. Kettering, C. F., and Chryst, W. A. Systems of electrical generation. (101960)
 8871. Lundberg, E. K. H. Smelting furnaces. (108498)
 10976. Hinchley, J. W. Apparatus for expressing liquid from peat. (108503)
 11030. Clarkson, T. Feed water supply apparatus for steam generators. (108507)
 11033. Anderson, W., and Meikle, J. Apparatus for the production of toluol, benzol, and other light hydrocarbons from heavy oils. (108508)
 11034. Anderson, W., and Meikle, J. Process of and apparatus for the carbonisation of coal and other carbonaceous matter. (108509)
 11087. Anthony, A. H. Automatic feed regulators for boilers and the like. (108513)
 11152. Anthony, A. H. Float-controlled feed regulators for steam boilers and like devices. (108517)
 11326. Schroeder, G. Dynamo electric machines. (108529)
 11382. Berry, A. F. Electric transformers. (108532)
 11809. Pavlides, P. Construction and arrangement of turbine machinery. (108548)
 12255. Harvey, J., Hulme, F. H., and Chemical and Mechanical Processes Company. Concentration, evaporation, or distillation of liquids. (108555)
 13174. Southwick, P. Furnaces. (108566)
 14093. Swindin, N. Apparatus for vaporising oils for enriching coal and other gases. (108579)
 14199. Morris, H., and Shelly, J. Jib cranes. (108580)
 14335. British Thomson-Houston Company (General Electric Company). Centrifugal compressors. (108582)
 14684. Vaught, J. C. H. Pneumatic drills. (101969)
 15592. Sumner, R. Rotary furnaces. (108596)
 16831. Grocott, F. J. Furnaces of the kind used for heating crucibles. (108615)
 17157. Cromwell, O. Control apparatus for telemotors. (108617)
 17304. Barrett, M. Manufacture of porous mineral product for use in chemical and electric operations, as refractory material, and for other purposes. (108619)
 17451. Gill, H. A. (United States Light and Heat Corporation). Dynamo electric machines. (108620)
 18273. Chenard, E. A. Apparatus for continuous distillation. (102966)

1917.

276. Svenska Turbinfabriks Aktiebolaget Ljungström. Turbines of the oppositely running rotor type. (103297)
 2392. Kaempfe, H. Anschutz. Boring tools. (104341)
 5964. Leadbetter, T. A. N., Gilchrist, A. L. K., and Tate, W. H. Internal combustion engines. (108656)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.

1457. Boerner, A. Internal combustion engines, gas turbines, or like prime movers. (108664)
 7731. Junggren, O. Elastic fluid turbines. (108667)
 8230. Gosselin, B. J. X. Surveying and other reflecting instruments for measurement of angles. (108668)
 10681. Mascart, C. Transporting and elevating apparatus. (108674)
 1518, 11519. Romanet, E. E. Steam generators. (108681, 108682)

Italy's Imports of American Coal.—The imports of American coal into Italy totalled 269,747 tons during the first four months of the current year, against 703,532 tons in the corresponding period of 1916, and 470,995 tons in that of 1915.

Fostering Empire Trade.—The Civil Service Commissioners announce their intention to appoint a number of gentlemen to serve as Trade Commissioners in various parts of the Empire. Candidates should be under 50 years of age, and must possess a good knowledge of import and export trade and commercial experience at home and abroad. No applications from gentlemen unable to show these qualifications can receive consideration. Applications should be addressed in the first instance to the secretary of the Civil Service Commission, London, W. 1, and will be considered for submission to the Selection Committee, by which recommendations for appointment will be made to the President of the Board of Trade after interviews held in London.

Mining Rights in County Leitrim.—In the Chancery Division of the Dublin Law Courts recently, application was made for an order for committal to prison of Patrick McFerran, residing at Tullycorka, co. Leitrim, for contempt of court in disobeying an injunction granted in an action in June last restraining him, his servants, and agents, from opening coal pits and from digging or mining for coal upon the land of Tullycorka. The plaintiff, Mrs. Mary Elizabeth Townsend, owned property in Roscommon and Leitrim, and the other plaintiffs were lessees of the mines and minerals on portion of the lands. The defendant had originally been a tenant, and had bought out, and in his purchase agreement he obtained the right of grazing of a certain mountain, in which there were coal seams, which were in the possession of the other plaintiffs as lessees. The defendant had worked the mines, not having the right to do so. In addition to traversing the allegation of fact, the defendant also claimed a declaration that he was entitled to work the mines, but his claim was dismissed. The Lord Chief Justice made the order sought.

THE COLLIERY GUARDIAN

AND

JOURNAL OF THE COAL AND IRON TRADES.

Vol. CXIV.

FRIDAY, AUGUST 31, 1917.

No. 2957.

The Suppression of Rock Dust in Mines.*

By A. C. WHITTOME and J. H. VEASEY.

The authors consider that (in the metalliferous mines to which the experiments given in the paper relate) the allaying of dust and gases, and the improvement of ventilation—both as regards quantity and temperature of air—should be treated as one subject.

The use of water has proved to be the best means of allaying dust and some of the deleterious gases. The cooling of air can be accomplished best by the use of water. The use of water in mine workings reduces natural ventilation, and the more efficient the water system for allaying dust and gases and cooling the air, the greater the retarding effect on the natural ventilating current. It naturally follows that some auxiliary means must be adopted to increase the rate of motion of the ventilating current. This may consist of a mechanical device—such as a fan—or the appliances used for allaying dust and gases may be designed to assist the ventilating current to an extent equal to, or in excess of, the retardation caused by the cooling effect of the water used.

The obvious means, other than fans, for accelerating the ventilating current, is to have the water discharged in the direction in which the air is flowing, and, if the water is atomised by compressed air, the accelerating effect of the jet of air and water is very considerable. The discharge of the atomised water in the same direction as the flow of the ventilating current has one ill-effect, however, it being the inferior direction for the purpose of allaying dust, which is best attained by the atoms of water meeting the particles of dust. The principle of having the atomised water stream flowing in the same direction as the air current can be carried too far, and at the points where the greatest amount of dust is formed all such streams should be opposed to the ventilation; as there would be only a portion, possibly from one-fifth to one-third, of the jets acting in this direction, the net result would be, either entirely or to a considerable extent, to counteract the retarding effect due to cooling.

Compressed Air Atomising.

The water used for allaying dust and gases, and for cooling the air, can best be atomised by the use of compressed air, since by this means the size of the atoms and the direction of flow can be much more easily controlled.

The size of water atom or drop is a very important factor in the allaying of dust and gases. Large drops are of little—comparative—value, as they fall out of the air too rapidly. On the other hand, the water can be too finely divided, creating a "dry fog," which floats in the air for indefinite periods. The mean between the two is the most desirable, and there is little doubt that the correct condition is obtained when, with the ventilating current and water atoms flowing at equal velocity, the water atoms can be seen gradually falling; in any case only a small portion of the water should reach the foot-wall within 30 ft. of the atomiser. Without the use of compressed air, the issuing water is very imperfectly atomised, and the stream of atomised water cannot be directed in the exact direction required. A very heavy shower of mixed sizes of drops of water, varying from perhaps $\frac{1}{8}$ in. diameter down to dry fog, can be created, and a jet can be led somewhat in the desired direction, but only a very small portion of the water used is efficiently atomised, the balance falls to the foot-wall within a short distance from the atomiser, and, as it flows away to the pump sump, carries quantities of sludge and grit with it, which collect in the sump and cause trouble with the pumps.

The same defect occurs with numbers of water blasts using compressed air, far too much water being used and no attempt being made to prevent the formation of large-sized drops. The excess use of water is frequently made apparent in winzes, numerous cases in which these have been filled with water from the water blasts being on record. The same excess quantity is used in all other development ends, but, as the water can flow away to the sumps, it is not so apparent.

The fact that the size of water atom has a considerable influence on the effectiveness of the dust allaying was proved by the tests carried out by the Phthisis Prevention Committee in the Apex section of the New Kleinfontein. Two sets of tests were conducted. First, experiments with different proportions of water to air—determined by using different sized apertures on the water connection—in order to ascertain the quantity of water put into suspension in the air, at a distance of 30 ft. from the water blast or atomiser, by the different sized apertures, the water used varying, of course, with the size of aperture. Second, experiments to ascertain the dust-laying powers of the atomised water with the different proportions of water to air.

The "Apex" water blast (figs. 1 and 2) was the atomiser used, in which, by means of replaceable diaphragms or nozzles, the quantity of air and water used are regulated independently of the whim of the

person operating the appliance. In this series of tests a standard $\frac{1}{8}$ in. diameter air nozzle was employed, the air pressure being about 70 lb. gauge; therefore the rate of air consumption was approximately 80 cu. ft. of free air per minute. Three different sized water apertures, $\frac{1}{8}$ in., $\frac{1}{32}$ in., and $\frac{1}{64}$ in. diameter, were employed.

The dust-laying tests were conducted in a main air-way in which the air was travelling at about 260 ft. per minute. The air was tested for dust (a) just before it reached the water blast, and (b) 100 ft. beyond the blast; thus a period of about 23 seconds was given for allaying the dust. Two Waugh drills, drilling up-holes dry, were used to create the dust, and were set

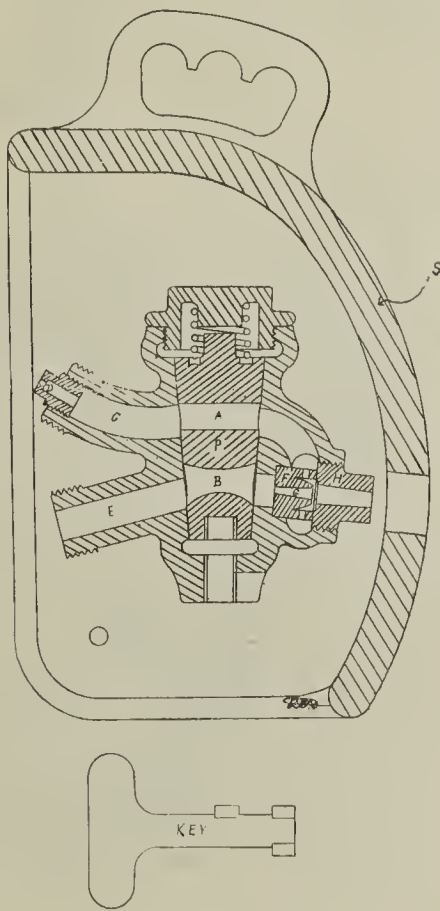


FIG. 1.

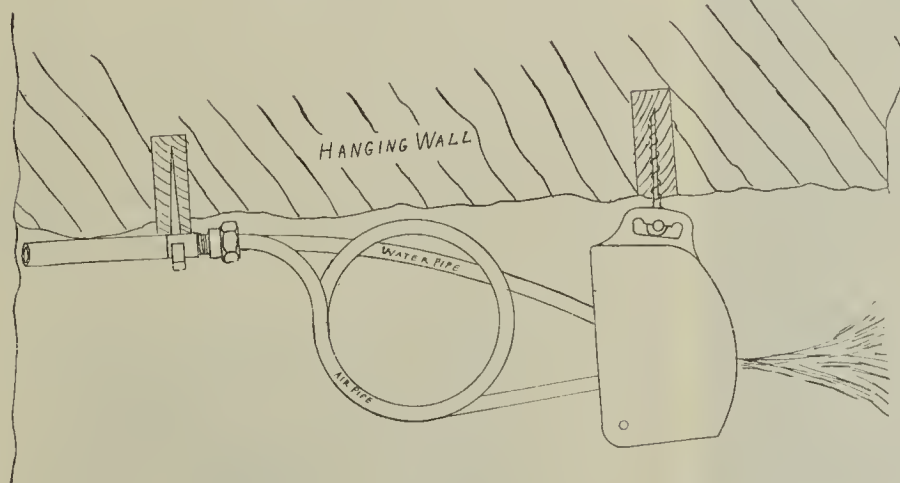


FIG. 2.

up 65 ft. to windward of the dust sampling tube. The visible particles of dust had all settled before the first sampling tube was reached, there being no dust observable by the naked eye at that point during the whole of the tests, though quantities of impalpable dust settled during the test on the outside of the sampling pump, etc.

The spray was turned on and allowed to run for two minutes before the drills commenced working, so that no dry dust was allowed to get into the test length of the tunnel. The tubes were held horizontally 4 ft. from the floor, to prevent falling particles from exerting any disturbing influence. The water used was the same as employed in the mine for sprays and atomisers, and contained: Dust under 5 mikrons,* 2 mgms. per litre; dust between 5 and 50 mikrons, 2 mgms. per litre; total dust under 50 mikrons, 4 mgms. per litre; percentage weight of particles under 5 mikrons, 50 per cent.

The first experiment was made with the $\frac{1}{8}$ in. nozzle. This produced fairly large drops, perhaps 200 mikrons in diameter, and at the test distance of 30 ft. from the nozzle suspended 2.96 grms. of water per cu. m. of air. The effect of the quantity of water consisting of particles of the size produced by the $\frac{1}{8}$ in. nozzle was to

allay 95.26 per cent. of the very fine dust. The effect was practically proportional to the sizes of the particles, for there was only an increase of 3.15 per cent. on the quantity of dust (very fine) after the dust cloud had passed the spray. This spray is very wetting at 100 ft. distant.

The second experiment was made with a $\frac{1}{32}$ in. nozzle, which produced particles of water decidedly smaller than the $\frac{1}{8}$ in. nozzle, and also some particles so small as to be classed as fog. There was no fog apparent with the larger nozzle. Although there was a considerable quantity of water apparent in the air, the spray was not nearly so wetting as with the $\frac{1}{8}$ in. nozzle. The amount of water suspended by this $\frac{1}{32}$ in. nozzle averaged 4.38 grms. per cu. m. of air.

With the water cloud produced by this nozzle, although 77.5 per cent. of the very fine dust was allayed, yet the increase in percentage of fine dust in the total unallayed dust was 25.4 per cent., showing that a spray giving drops of this size has a tendency to leave a larger percentage of the very fine dust suspended in the air, although allaying the dust efficiently.

The third experiment was made with a $\frac{1}{64}$ in. nozzle, which produced a very thick fog. At the test distance of 30 ft. it was not possible to see an acetylene lamp flame, and at 98 ft. from the jet the fog was very thick after the jet had been running for 30 minutes. The mist thoroughly saturated the atmosphere, and had not evaporated 40 minutes after the jet was stopped. It did not appear to be very wetting, although there was a large quantity of moisture suspended in the air. The amount of moisture suspended by this $\frac{1}{64}$ in. nozzle at a distance of 30 ft. from the jet averaged 4.76 grms. per cu. m. of air.

Although this very fine spray suspended a greater amount of water in the air than the others, it was not efficient in allaying the very fine dust; 54 per cent. of the very fine dust was allayed, and the usual tendency for the percentage of very fine dust unallayed to increase was shown again by the rise of from 23.2 per cent. before the spray to 38.2 per cent. after the spray.

From these results it was concluded that the nozzle with the $\frac{1}{8}$ in. orifice is the most efficient dust allayer for very fine dust. The $\frac{1}{64}$ in. nozzle produced an extremely thick fog, but the particles were too small to settle readily, so did not allay the very fine dust well.

It was clearly established by the tests that all but 4.29 per cent. of the total dust (or 4.74 per cent. of the very fine) was settled in 23 seconds; therefore such a stream of atomised water playing into a dead end would settle the whole of the dust, no matter how dense it was, in a very few minutes.

A distinctive feature of the system of finely atomising water by means of compressed air is that the whole drive is filled with fine particles of water. With the

finest atomising a dense fog is created, which is sufficient to mask the light from a group of acetylene lamps at a distance of 20 or 30 ft. This fog is too finely divided to give the best results, as is seen from the test results. On the other hand, this very dense fog is probably the best means for preparing the dust for final allaying, and the authors think that the combination of two atomisers—one creating a dense fog at a point 50 to 100 ft. in advance of the other—would provide the ideal system for allaying dust in a development end. As the whole drive is filled with atomised water, every portion of hanging and side walls is wetted, even the back of projecting rock, thus providing the most suitable means of preventing any dry dust accumulating at any part of the working place.

The ordinary water blast vets the projecting face opposite to the blast, but not the backs of projecting pieces, and it is the side away from the blast which needs wetting, as the air current, carrying dust, strikes that side.

The great proportion of the water used with the ordinary water blast is worse than useless; the large drop not only rapidly falls to the ground, but it carries numbers of useful small atoms of water with it, and removes a proportion of the water which would have done good work. It is equally certain that too much water is used in the majority of water blasts, and the quantity used is detrimental rather than useful. The tests above referred to show that a $\frac{1}{8}$ in. aperture will pass sufficient water to allay large quantities of dust very rapidly. The ordinary water blast usually has a water connection varying from $\frac{1}{2}$ in. to 3 in. in diameter, though sometimes 1 in. diameter is employed. Therefore, the maximum quantity of water used varies between 16 and 36 up to 64 times that used with the $\frac{1}{8}$ in. diameter aperture, and less efficient work is done. It naturally follows that if the smaller quantity is required the use of a better quality of water becomes permissible.

* Journal of the South African Institution of Engineers.

* 1 mikron = 1/25,000th of an inch.

The "Apex" Water Blast.

In the design of the "Apex" water blast, the whole of the considerations—except the sampling of the water—have been kept in view.

The diagram gives a sectional view of the water blast and shows the arrangement for fixing to the hanging wall. The water blast is made of cast iron, the balance of the body being of gunmetal. In the plug P are two passages A and B, the former for water and the latter for compressed air. The partial rotation of the plug turns on both air and water. In the water passage C is a removable diaphragm D, the aperture in which regulates the quantity of water delivered to the mixing chamber between the cones F and H. The compressed air supply is led through E and the passage B to the air-regulating cone F, the size of the aperture G in this cone determining the quantity of air used by the appliance. The water is atomised in the mixing chamber, and issues from the hole in the front cone H in a stream, the velocity imparted to which is determined by the size of the hole in the cone. Variations in the size of this hole permit a greater or smaller diameter of water atom being produced, and also allow the stream of atoms to be projected to a considerable distance before it expands to the dimensions of the drive, or allow it to "mushroom" just in front of the shield and immediately spread over the whole area of the drive. Thus, variation of the sizes of the three apertures D, F, and H provide for any desired condition of atomised water stream; these variations can be readily made by substitution of standard interchangeable parts.

The valve shell and plug have T-shaped slots provided to accommodate the removable key, which is shown separated from the apparatus. This key is stamped with the same distinctive mark as the water blast, and can only be removed from the shell when the air and water are turned full on. After turning on the water blast, the miner removes the key, which he hands in at the shift bosses' office on reaching the surface. The keys are hung on a board in the office, each key having its allotted place. As soon as the whole shift is out of the mine, an inspection of the board will at once show whether any water blast has not been put in operation.

At the expiration of a predetermined period after blasting, the air and water supplies can be cut off from the mine, with the full knowledge that the whole of the working places have been thoroughly watered and the air renewed. At a second definite time, prior to the lashing gang going on shift, the air and water can again be turned on and the mine again filled with atomised water. On the trammers reaching the various working places, the individual water blasts are turned off, they taking the keys with them for that purpose.

The great advantage of the key system is that the air and water supplies cannot be turned off without the key being inserted, and, once they are turned off, the key cannot be removed until they are turned on again.

The miners like the system, as it does away with all disputes as to whether the water blasts were put into operation or not.

Reference to fig. 2 will show that it is impossible for water to get into the air mains, no matter what the respective air and water pressures may be. The atomiser will lift water up to the ordinary suction heads; therefore the water in the passage from the diaphragm D to the cone F is always under a partial vacuum when the water blast is working, no matter what the pressure on the water mains, provided there is any pressure in the air mains. Should the air pressure fail entirely whilst the water pressure remains at the normal, the water would flow out of the cone H, there being no possibility of it getting into the air pipes, as it would have to rise through a head of 8 or 10 in. through the connecting hose.

The only remaining novel features in this water blast are the type of shield and method of fixing. The shield is of cast iron, its face being curved in all directions so as to prevent flying rocks giving it a direct blow. It is suspended from an eye-bolt in the hanging wall, so that it can swing under the impact of rock or the force of explosions. By changing the point of shield suspension, the jet can be given any forward direction required, either upwards, downwards, or horizontal. The shield also guards the pipes and hoses from injury. These water blasts have been fixed within 17 ft. of the working faces in drives, winzes, and raises, but neither shields, water blasts, pipes, nor hoses have (within nine months) received any injury from flying rocks more serious than when a lug was broken off, due to "slipping" rock off one wall of a single track drive immediately opposite to the water blast; in this case it was not convenient to change the shield for a week or so, and it continued to direct the atomised water in the correct direction hanging from one lug.

Placing the air and water pipes on the hanging wall removes them from all possibility of damage. The saving in pipes and repairs alone represents a considerable amount. There has not been a single case of hoses being blasted, on 10 water blasts, in nine months.

Anarchy in the Donetz Coal Basin.—The *Novoye Vremya* states that complete anarchy reigns in the Donetz coal basin. The workmen are arbitrarily dismissing members of the staffs, and putting new ones in their places; managers are being arrested, and investigations and interference are taking place in the conduct of the business. The workmen demand 20 per cent. addition to their wages. In some cases, groups of workmen have obliged the managers of the mines to sign an agreement adding over 10 per cent. to the wages. The workmen cannot carry on their work, and the result of these conditions has been a decline in the production of coal in the basin, which amounts to 35 to 40 per cent. of the normal output.

MINING IN BRITISH COLUMBIA.

The annual report on the mining industry of British Columbia for the year 1916 states that the total amount of coal produced to the end of 1916 was 44,894,609 tons (of 2,240 lb.), worth 145,440,340 dols. Of this there was produced in 1916 2,084,093 tons, valued at 7,294,325 dols., an increase of 472,964 tons in quantity and of 1,655,373 dols. in value compared with the preceding year. In these figures of coal production the coal used in making coke is not included, as such coal is accounted for in the figures of output of coke. The amount of coal used in making coke in 1916 was 401,487 tons, from which was made 267,725 tons of coke, having a value of 1,606,350 dols., an increase in amount over the preceding year of 21,854 tons, or about 8.9 per cent., with an increase in value of 131,124 dols. The total value of the output of the collieries of the province in 1916 was 8,900,675 dols. The average selling prices, taken this year in the calculation of value of product, are the same as those used last year; that for coal being 3.50 dols. and for coke being 6 dols. a ton of 2,240 lb. The prices used in calculations prior to 1907 were 3 dols. and 5 dols. respectively.

COAL.

The gross production of coal in 1916 was 2,485,580 long tons, as shown in the following table:—

	Tons (2,240 lb.).	
	1915.	1916.
Vancouver Island mines	1,020,942	1,492,761
Nicola and Similkameen mines ..	99,066	110,549
Crowsnest mines	852,572	882,270
Total quantity of coal mined	1,972,580	2,485,580
Less made into coke	361,451	401,487
Net quantity of coal produced	1,611,129	2,084,093

COKE.

	Tons (2,240 lb.).	
	1915.	1916.
Vancouver Island collieries	5,450	27,604
Nicola and Similkameen collieries ..	Nil	Nil
Crowsnest District collieries	240,421	240,121
Total coke production	245,871	267,725

The net coal production last year was 472,964 tons more than it was in 1915, and greater than it has been since 1913. This output would have been considerably greater had not the Crowsnest collieries met with a series of misfortunes during the year that interfered with production, and in addition to this there was a serious shortage of labour—partly caused by the heavy enlistment of the younger men—and in the fall there were labour troubles. All these contributed to occasion a shortage of both coal and coke, when the demand was most keen.

The production of coke in 1916 was 267,725 tons (2,240 lb.), which is 21,854 tons greater than the preceding year, and, with the exception of the year 1913, is greater than any year since 1905. The high market price of the metals, particularly copper, kept the copper-smelting plants, both of the interior and the coast, running to nearly full capacity, or as the coke supply would permit. Of this gross coke production, 240,121 tons was made by the Crow's Nest Pass Coal Company in East Kootenay, and the remaining 27,604 tons was made by the Canadian collieries at Comox, V.I.

The collieries of the coast district, which includes those on Vancouver Island and in the Nicola-Princeton fields, mined 1,603,310 tons of coal in 1916, while 18,238 tons was taken from stock, making 1,621,548 tons distributed from these collieries in 1916. The total coal sales of the coast collieries for the year show, as compared with the sales of the previous year, an increase of 368,219 tons, equivalent to over 42 per cent. The consumption of coal sold in that part of British Columbia served by the Vancouver Island collieries was 782,733 tons, an increase of 189,817 tons, or about 38 per cent. from the preceding year; the amount exported to the United States was 183,930 tons greater at 450,926 tons, and 6,166 tons of coal was exported to other countries. Only one company in the coast district—the Canadian Collieries Limited—has ever made coke, and this year the ovens were again put in operation, after several years of inactivity. This company produced in 1916 some 27,604 tons (2,240 lb.) of coke, of which 26,043 tons was sold in Canada, and 1,561 tons was added to stock. On Vancouver Island, five companies produced coal this year—the Canadian Collieries Limited, the Western Fuel Company, the Pacific Coast Coal Mines, the Vancouver-Nanaimo Coal Company, and the Nanoose Colliery; the majority of these companies each operate two or more collieries. The combined gross output of the island collieries was 1,492,761 tons. In the Nicola and Princeton coal fields of the coast district, the Middlesboro Colliery Company produced 49,005 tons of coal; the Princeton Colliery, 29,458 tons; the Inland Coal and Coke Syndicate (formerly Coal Hill Syndicate), 31,295 tons; the Pacific Coast Colliery Company, 453 tons; and the Merritt Collieries Limited, 338 tons. The total output of this portion of the sub-district was 110,549 tons.

There were only two companies operating in the East Kootenay district last year—the Crow's Nest Pass Coal Company, operating two separate collieries, the combined output of which was 813,250 tons; and the Corbin Coal and Coke Company, which made an output of 69,020 tons; making a gross output for the district for 1916 of 882,270 tons of coal. The Hosmer Mines Limited did not operate. In addition to the coal mined 41 tons was taken from stock, making the amount of coal distributed from the collieries 882,311 tons. Of this gross tonnage 351,991 tons was used in the manufacture of coke, of which there was produced 240,121 tons (2,240 lb.). The coke sold this year amounted to 241,790 tons, of which 1,669 tons were taken from stock.

The following table shows the distribution made of the coal of this district:—

	Tons.
Sold as coal in Canada	75,319
Sold as coal in United States	386,953
Total sold as coal	462,272
Used by the companies in making coke	351,991
Used by the companies under boilers, etc.	68,048
Minus coal taken from stock	882,311
Gross output	41
	822,270

The greater part of the gross provincial production is still being mined by three companies—the Crow's Nest Pass Coal Company, of East Kootenay; the Canadian Collieries and the Western Fuel Company, of Vancouver Island; which mined, collectively, 83.4 per cent. of the gross output, their respective production representing 32.7 per cent., 28.4 per cent., and 22.3 per cent. of such total. Of the other collieries, in the coast district, on Vancouver Island the Pacific Coast Coal Mines Limited produced 153,112 tons, and the Vancouver-Nanaimo Coal Company 78,443 tons; and in the Nicola Valley section of the district, the Middlesboro Colliery Company mined 49,005 tons, the Inland Coal and Coke Company 31,295 tons, the Princeton Coal and Land Company 29,458 tons, and the Pacific Coast Syndicate some 453 tons of coal. In the East Kootenay district, in addition to the Crow's Nest Pass Coal Company, which produced 813,250 tons, the Corbin Coal and Coke Company produced 69,020 tons.

In addition to those companies actually shipping, several other companies have been installing plant and have approached the shipping stage.

The market of the East Kootenay field is provided primarily by the railways of the south-eastern part of the province and of the northern parts of the adjoining States of Montana and Washington, approximately four-fifths of the coal, sold as such, being exported to those States, while the remainder went to supply the demands of the south-eastern part of the province—its domestic needs, its railways, steamboats, mines and smelters.

Coke is sold in the same markets, with the difference that the local consumption—chiefly by the smelters of Trail and the Boundary district—took about 85 per cent. of the product, while 15 per cent. was exported to the States mentioned. As regards the marketing conditions in this field, the East Kootenay collieries are, however, brought into direct competition with the collieries of Alberta, just over the provincial boundary-line, all these collieries being in the same coalfield, with practically the same grade of coal and working under similar conditions. This competition has kept the price obtainable for coal at from 2.25 dols. to 2.50 dols. a ton, with little probability of any material increase in price, owing to the facility with which new collieries can be opened up and the very large areas of coal limits in this district. The coast district may be sub-divided into two fields—the Nicola-Princeton field and the Vancouver Island field—in which the markets differ considerably. In the former field the consumption is chiefly by the local railways, while a small amount finds its way to Vancouver, even under the handicap of what seems to be an excessively high freight charge. The Vancouver Island coal market is provided by the domestic and manufacturing requirements of the coast cities, and of the ocean-going steamers calling at these ports. The demand for coal from the larger coasting steamers and from the railways has in past years diminished, as the Canadian Pacific Railway main line engines are nearly all burning California crude oil, and a large coasting steamer burning coal is now an exception.

Owing to the existing conditions in the Island collieries, prices have been maintained as high or higher than for preceding years; in fact, the high price of coal on the coast is one of the chief reasons for the marked increase in the use of California oil fuel. It does not seem at all likely, either, that the present price of coal on the seaboard, of from 4 dols. to 4.50 dols. a ton f.o.b., will decrease for some time.

The Chief Inspector of Coal and Metalliferous Mines, in submitting his fifth annual review, says that last year showed a marked improvement in the coal business, the demand during the latter half of the year being much greater than the production. Much business was lost owing to scarcity of labour during the last few months of the year. The production was much below the capacity of many of the collieries, and also below the demands of the market; notwithstanding this, the production for the year was 2,487,820 tons, being an increase of 515,420 tons over 1915, but still 650,000 tons below the maximum production of 1910. All of the coal-mining districts showed an increase in tonnage compared with the previous year. This increase of 515,420 tons was divided as follows:—Vancouver Island, 92 per cent.; Nicola-Similkameen, 2 per cent.; East Kootenay, 6 per cent.

The fatalities in and around the coal mines during the year totalled 28, of which number 12 were killed in one accident, an explosion in No. 3 East mine, Michel Colliery. This total is a decrease of 24 from that of the previous year, but an increase of 11 over the figures of 1914, which was free from any large disasters. During the year there were 16 fatal accidents, and one subsequent death due to an accident which occurred in June 1915; this is an increase of four in the number of fatal accidents, but, as already stated, a decrease in the number of persons killed compared with the figures of 1915.

There were 5,060 persons employed in and around the coal mines, being an increase of 69 over the number employed in 1915. The ratio of fatal accidents per 1,000 persons employed was 5.53, compared with 10.42 for 1915 and 2.97 for 1914. The ratio for the last 10-year period was 4.975.

The number of persons employed in and around the mines for the tonnage produced is much less than in former years; the tonnage of 1916 is only 55,000 less than that of 1913, whilst there were 1,611 less persons employed in the industry in 1916 than in 1913, reflecting steadier employment or more days' work for those employed, and a consequent greater risk for the number employed.

During the year two supplementary orders relating to explosives in coal mines were issued, adding to the explosives contained in Explosives Order No. 2 of September 8, 1915.

The production of coal per pound of explosives used is 1.03 tons less than that of the previous year. This is largely due to the heavy use of explosives in removing overburden from the coal in the open pit or surface workings of the Corbin Coal and Coke Company, Corbin, B.C., where 25,257 lb. of dynamite, stumping, and common black blasting powder was used breaking the overburden for removal by steam-shovel. This reduced the yield per pound of explosive used in the East Kootenay from 42.17 tons in 1915 to 19.67 tons in 1916. The Coal Creek Colliery of the Crow's Nest Pass Coal Company produced a little in excess of 500,000 tons of coal without the use of explosives in the coal; only 3,496 lb. of explosive was used at this colliery during the year, this being largely used in outside work. The Nicola-Similkameen District showed an increase of 1.63 tons per pound of explosive used, the yield being 4.28 tons per pound. The Vancouver Island mines showed a decrease in production per pound of explosive, the yield being 3.45 tons, compared with 4.75 tons for 1915.

During the year mining machines produced 279,630 tons of coal, or 11.24 per cent. of the whole. This is a slight increase over the figures of 1915, when the percentage of machine-mined coal was 10.43. Of the total machine-mined coal, the Western Fuel Company produced 229,541 tons, or 82.10 per cent.; the Canadian Collieries (Dunsmuir) Limited, 30,089 tons, or 10.76 per cent.; and the Princeton Coal and Land Company, Princeton, 20,000 tons, or 7.14 per cent.

During the year 176 mine-air samples were taken in the coal mines of the province. One sample was taken from every split and two samples from the main return of every operating coal mine, and in the Crow's Nest Pass Collieries samples were taken on days when the mines were idle for comparative purposes. Much valuable information has been obtained from these samples relative to the flow of methane from the various coal seams being worked, and incidentally the data acquired goes to prove what has long been surmised, that the coal seams operated by the Crow's Nest Pass Coal Company Limited, at Coal Creek and Michel Collieries, may be classed as being among the most gaseous seams being operated anywhere in the world. There has been little change in the number of mine-rescue apparatus in use in and around the coal mines during the year. Interest in training in the use of such apparatus was well sustained, and 103 certificates of competency were issued by the Department during 1916.

WORKMEN'S COMPENSATION (WAR ADDITION) ACT.

This Act, which received the Royal Assent before the adjournment of Parliament last week, is entitled: "An Act to provide for an addition during the present war and a period of six months thereafter to the amount of the compensation payable under the Workmen's Compensation Act, 1906, in cases of total incapacity." It comes into force on September 1, and provides (clause 1) temporary increase of amount of compensation in cases of total incapacity as follows:—(1) Where any workman is at any time during the period for which this Act continues in force entitled during total incapacity to a weekly payment by way of compensation under the Workmen's Compensation Act, 1906, he shall, whether the incapacity arose before or after the commencement of this Act, be entitled to receive from the person liable to pay the compensation, by way of addition to each such weekly payment payable in respect of any week within the said period, a sum equal to one-fourth of the amount of that payment. (2) The additional weekly sum payable under this Act shall be deemed to be part of the weekly payment under the Workmen's Compensation Act, 1906, for the purposes of—(a) The provisions relating to the recovery of weekly payments; (b) any order made with respect to payment into court of a weekly payment; (c) the provisions of paragraph (19) of the First Schedule to the Workmen's Compensation Act, 1906 (which prohibits the assignment, &c., of weekly payments); and shall, notwithstanding that the liability to make the said weekly payment is redeemed subsequently to the commencement of this Act, continue to be payable in the same manner as if that liability had not been redeemed.

By clause 2 provision is made in respect to certified schemes—"where an employer is liable to pay benefits under a scheme certified by the Registrar of Friendly Societies under section three of the Workmen's Compensation Act, 1906, the Registrar may direct that workmen who are at any time during the period for which this Act continues in force entitled to benefits under the scheme as on account of total incapacity shall receive such additional benefit as is specified by the Registrar in the direction as being in his opinion of equivalent value to the additional sum payable under the foregoing provisions of this Act."

Effective Coal Control in America.—Mr. Garfield, the United States Coal Administrator, has given warning that all the machinery of the Government will be used to establish reasonable prices to the consumers if it should be necessary for the Government to take over the mines.

Power from Sawdust.—With the object of effecting a further reduction in the transit and use of anthracite coal for gas making for gas engines, it is suggested that there should be brought before the notice of all users of suction gas plants the value of sawdust and shavings. It is pointed out to those who have quantities of this material available that their gas engines will work equally as well on sawdust as coal, and that three tons of sawdust will give the same result as one ton of anthracite coal. For the conversion of sawdust into gas, the plant is slightly larger than for coal, and with the addition of a tar extractor the principle is the same. The possibility of the use of this waste is not generally known; consequently the volume of sawdust destroyed and wasted is serious.

CAR DUMPER PLANT AT CONNEAUT.

With reference to the description of the projected new dumper plant at Conneaut Harbour, on Lake Erie, which appeared in our issue of August 4, 1916, p. 207, we are now enabled, by the courtesy of the *Railway Gazette*, to give the following additional details and illustrations of this installation:

The new yard adjacent to the tip provides four storage bases for loaded wagons, each about 1,200 ft.

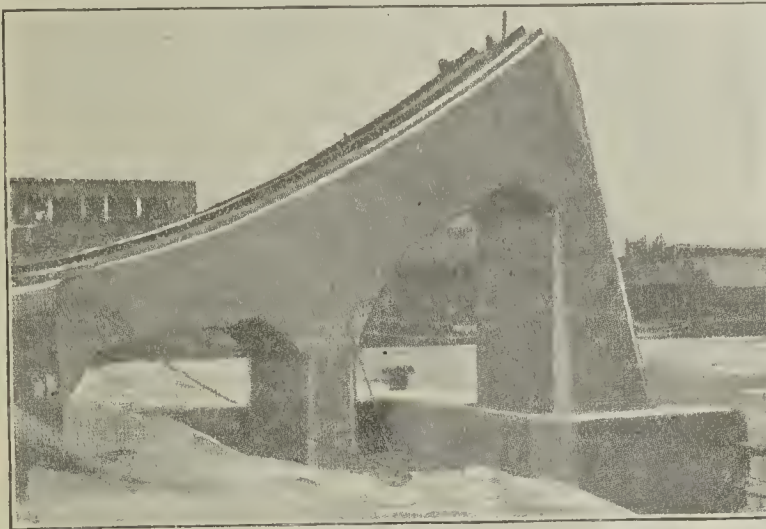


FIG. 1.—REINFORCED CONCRETE "KICKUP."

long, and four for empties, each about 1,300 ft. long. The gradient in the load yard rises at the rate of 2.5 per cent. to a summit, from which it descends at the rate of 1 in 40, and then at 1 in 100 to the "kickup" beyond the dumper. A heavy shunting engine pushes 20 wagons to the top of this tip, and leaves them on the descending slope with the brakes set. When they are wanted at the tip, they are started one at a time,

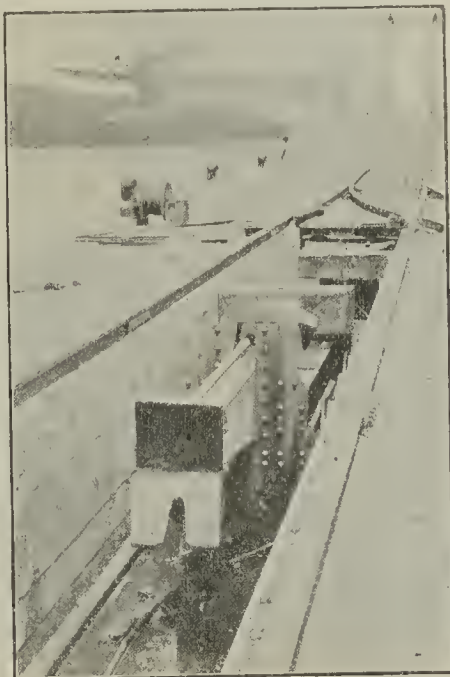


FIG. 2.—MULE CAR, SHOWING ARM LOWERED.

running under the guidance of a guard down to the "kickup," which throws them back over the "mule" pit. They are hauled by the mule up the 1 in 9 gradient to the platform of the McMyler tip, and, after being elevated and dumped, they run by gravity down a 1 in 30 gradient to the empty yard. The full and empty yards are separated by 430 ft. of concrete retaining wall alongside the tip, and are lit by a row



FIG. 3.—MULE CAR, SHOWING ARM RAISED.

of electric lights supported on poles set between the two yards. The indirect feed, as the system of reversing the direction of movement of the cars before they reach the tip is called, was worked out for this place to reduce the elevation of the yard tracks somewhat, and also to allow the tip to be nearer the lake, thus requiring a shorter slip.

The tip is constructed entirely of steel, even the window sashes being of this material. It is erected on a concrete foundation containing about 1,900 cu. yd., which is supported on piles 35 to 40 ft. long driven through hardpan for a loading not to exceed 10 tons per mile. The entire foundation is reinforced heavily with bars, and, in addition, the piers supporting the cradle are reinforced with rails. The foundation and the concrete dock are protected by Carnegie steel sheet piling. The steel superstructure is 40 by 62 ft. at the base, and 89 ft. high. The engine room is enclosed in the base of the structure at the back of the cradle foundation. The top of the rail on the cradle is 13 ft. 9 in. above the top of the main foundation, and about 20 ft. above the water level in the slip alongside. The plate rail on the cradle is 52 ft. long, and the tipping machine is designed to hoist and tip a load of 280,000 lb. In order to ensure clean tipping, the plate is turned through an arc of 160 degs. The power required for hoisting the wagon and its contents is considerably reduced by counter-weights amounting to 60 tons, consisting of two large steel cylinders filled with iron burrs and four smaller weights, which are suspended from cables on the rear of the framework, operating on suitable guides attached to steel columns.

The difference between the highest and lowest tipping is 27 ft. 9 in., which is covered by the travel of the apron girder. The apron is set at an angle of 37.5 degs. with the horizontal, the centre of the discharging spout being 33 ft. 5 in. from the centre line of the front column to the tip frame. A trap door is provided near the end of the pan to allow coal to be dropped through when loading unusually high vessels. The load on the vessel is trimmed by a special rotating nozzle. The framework of the tip is designed with a view to safeguarding the men working around it, all ladders having safety guards and all dangerous edges being protected by steel fences. The approaches to the tip are of concrete and steel trestle construction, with a special reinforced concrete "kickup" (fig. 1) extending about 17½ ft. above the dock level at the end of the receiving track. The coal is watered down in the wagon, just before they are pushed up the incline to the tip, by an automatic tank supported over the mule car tracks.

The "mule" car is of a type especially designed for this installation, running on a track which is depressed for the full length of the incline, thus preventing the possibility of a loaded car coming down from the "kickup" and striking the mule before it has returned to its pit from the last trip. The top of the mule car rails is 3 ft. 8 in. below the top of the main rails, and except when pushing the car up the incline the entire mule is below the level of the upper rails. To make this possible, and also to allow it to engage the coupler of a car to push it up the grade, a pivoted and counter-weighted arm about 17 ft. 6 in. long (shown at rest in fig. 2) is provided. This arm is automatically raised to a position (fig. 3) to engage the coupler of a car, when the mule is started forward by a link connecting the counter-weight to a friction-

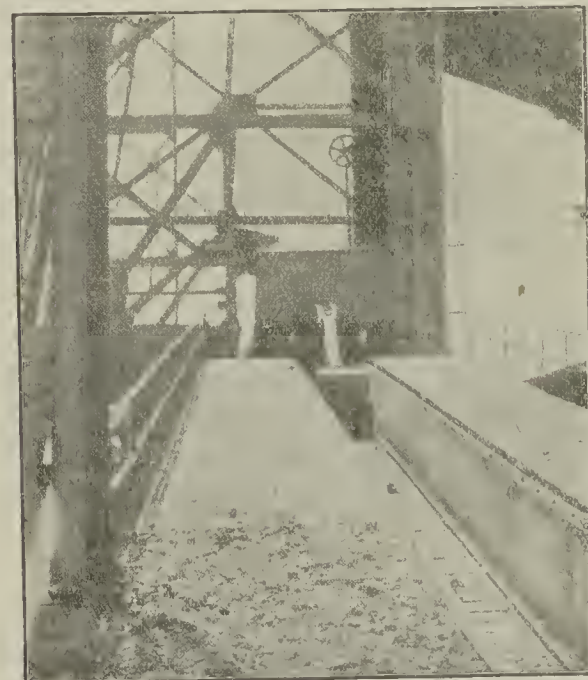


FIG. 4.—MULE CAR PUSHING LOADED WAGON ON TO THE TIP.

bearing on the rear axle of the truck. When running on the 1 in 9 gradient, the counter-weight is just sufficient to balance the parts so that the entire force exerted by the cable is transmitted to the wagon in pushing it up to the tip (fig. 4). As a vertical curve is used in the main track at the upper end of the incline, and the mule car track continues straight, two auxiliary rails inside the rails of the lower track are used to engage rollers on the counter-weights of the arm, and thus to alter its position to conform with the difference in elevation between the two tracks. A rear cable is used to drag the mule down the slope rapidly. This important adjunct was developed by P. J. Fickinger, master mechanic of the dock company.

The new plant is worked from the old power house some distance away, the steam being led to the engine room in the base of the structure. The large engines are worked by steam, the main tipping engine being 22 in. by 30 in., with two cylinders, and the mule engine 18 in. by 24 in., also with two cylinders. A new feature of this installation is the electrical operation of all the smaller movements, including the pan, the trimmer and the elevator screws. This enables one man on the end of the pan to control all movements of the pan and chute. In this way it is possible to deliver

the coal in the hold of the vessel with the minimum delay. With a steam-operated machine, the operator at the end of the chute controls only the telescope and the trimmer, and it is therefore necessary for the operator in the house on the end of the vessel when it is necessary to change the elevation of the pan. This requires so much delay that the pan is usually placed at a high position, and the coal allowed to run. With this tip at Conneaut, the chute operator delivers this coal exactly as he wishes. He can raise or lower the inner or outer ends of the pan, swing the telescope back and forth, and revolve the trimmers separately or simultaneously.

In addition to this operator, one man is required to control the mule car, one for the cradle, and one in the engine room. This machine has transferred 315 loads from cars to vessels in seven hours, an average rate of 45 cars an hour. It has also transferred 53 cars of coal in one hour.

FUEL RESEARCH IN 1915-16.

The following summary of inventions and researches relating to peat, coal, brown coal, briquettes and fuel utilisation in the years 1915 and 1916 has been compiled by Dr. W. Bertelsmann, and recently published in the *Chemiker Zeitung*:—

Peat.

Several patents were taken out in connection with the working and drying of peat, including: Gress (German Patent 290021), peat excavating machine; Persson (G.P. 291513), peat hauling; Heine and Rudeloff (G.P. 288521) and Backmann and Lindeberg (G.P. 290022), drying peat. Heine (G.P. 292845) proposed to combine the carbonising and drying of peat (and brown coal) in one operation, by reducing the water content of the material to about 60 per cent., and then piling it over a conduit containing two pipes. From one of these, ozonised air was blown through the mass, the ozone being absorbed by the humous constituents with liberation of carbon dioxide, water, and methane, the heat generated by the reaction being supplemented by forcing steam in through the second pipe. The progress of the reaction was to be recorded by telethermometers. An anonymous writer in the *Engineering and Mining Journal* (1915, p. 884) proposed to dry peat and reduce it to powder, the latter being then burned in suitable burners, with forced draught, thus producing a temperature high enough to melt brass, iron, steel, etc. Patents for the destructive distillation of peat were taken out by Torfentgasung Stauber (G.P. 290577) and Ziegler (G.P. 294015); and the question of dry distillation was dealt with by Howring in a work on peat utilisation ("Moor-nutzung und Torfverwertung," Berlin, 1915).

Brown Coal.

Tille (*Braunkohle*, 1915, p. 135) reported on the origin of the brown coal deposits in Saxe-Altenburg; Berg (*ibid.*, p. 509) on those in the districts occupied by the German armies; and Turina (*Montanistische Rundschau*, 1916, pp. 90, 124, and 159) on the brown coal deposits at Livno Podkraj and Zupanjac. The use of lignitic coal was dealt with in an article by Hübers (*ibid.*, 1915, p. 168). A patent (G.P. 294498) was taken out by the Zeitzer Giesserei for drying brown coal by steam heat. To free brown coal from ash, Schröder (G.P. 295296) proposed to treat the pulverised material with superheated steam in a closed vessel fitted with stirrers, the mixture being then diluted with water, drawn off by suction, and the dissolved coal precipitated from solution by coagulation with mineral acids. The precipitate was stated to constitute 50 to 75 per cent. of the raw coal, and constitute a practically ashless fuel of high calorific value, and suitable for distillation, the insoluble residue being briquetted. Naumann (*Zeits. für Elektrochemie*, 1916, p. 109) reported on distillation experiments with brown coal from Ludwigshoffnung in an iron retort in the electric furnace at temperatures of 450, 600, 750, 960, and 1,100 degs. Cent. With rising temperature the yield of gas increased, but the calorific value of the gas declined, the total heating power being, however, greater. The yield of tar and ammonia increased, but the yield of coke diminished, though the heating value of the coke improved up to 750 degs. Cent.

Coal.

Studies on individual coal deposits and allied subjects were published by: Krusch (*Glückauf*, 1916, p. 305), on the geological structure of Belgium and the coal deposits of the Haine-Sambre-Meuse basin; Krusch (*Glückauf*, 1915, p. 1149; *Colliery Guardian*, 1916, vol. cxi., pp. 357, 404, 453, 505), on the Campine coal field and its relation to the other coal deposits of Belgium and North-West Europe; Messert (*Glückauf*, 1916, p. 542), on the Olonetz coal deposits; Stepanoff (*ibid.*), on Boroanec coal; Maljarkin (*ibid.*), on the coal supplies of Northern Russia; Petraschek (*Montanistische Rundschau*, 1916, p. 117), on the coal supplies of the Balkans; Boeke, a treatise (published in Berlin) on Germany's coal reserves; Donath and Rzehak (*Montanistische Rundschau*, 1915, p. 1), on the characteristics of certain coals in the cretaceous formation. Donath (*ibid.*) discussed the differences between mineral coals from the technical and mining standpoint, with reference to the work of Bergius and Friedensburg; and Weithofer (*ibid.*, p. 122) also went into the matter.

Experiments carried on by Fischer and Glud (*Berichte*, 1916, p. 1460) to determine the adequacy of benzol as an extractive for coal, showed that over 6½ per cent. of the coal passes into solution at 275 degs. Cent. at a pressure of 55 atmospheres, whereas at 15 atmospheres it is dissolved at 80 degs. Cent. at 25 per cent. and cannel 4 per cent. The dissolved substances were of an aromatic nature from those obtained by dry distillation to the extent of 50 per cent. The extraction of Saar coal with benzol,

Pictet and Kaiser (*Chemiker Zeitung*, 1916, p. 211) obtained in a pure state four hydrocarbons, $C_{10}H_{16}$, of the C_nH_{2n-4} series, and two naphthenes: $C_{12}H_{24}$ and $C_{14}H_{26}$. To recover the most volatile constituents of coal, Fischer and Glud (*Berichte*, 1916, p. 1469; *Colliery Guardian*, October 27, 1916, p. 804) employed liquid sulphurous acid as the solvent, and found that the coal crumbled to dust. The solution was dark red, and left, in evaporation, a deep red heavy oil. By treating Westphalian coal alternately with ozone and water at room temperature, Fischer (*Berichte*, 1916, p. 1472) succeeded in dissolving over 92 per cent. of the material. The dissolved matter is hygroscopic, deliquescent, and soluble in alcohol, less so in acetone, and only slightly in ether. It is precipitated, from the alcoholic solution, by petroleum spirit, and probably consists mainly of an acid formed by the decomposition of ozonides by water. Jones and Wheeler (*Jl. Chem. Soc.*, 1916, p. 341) succeeded in forming coal from dead vegetable matter under pressure at temperatures below 300 degs. Cent. The coal can be separated into cellulosic and resinic bodies by extraction, the former having the structure of furane and furnishing phenols on destructive distillation, whilst the resinic bodies contain alkyl, naphthol, and unsaturated hydro-aromatic radicals. The oxygen compounds are principally oxides, probably cyclic compounds. The unsaturated humous acids tend to absorb oxygen, a property which, according to Bruigom (*Uet Gas*, 1916, p. 178), is apparently the cause of spontaneous ignition. Terres (*Jl. Gasbel.*, 1916, p. 519) investigated the manner in which nitrogen is combined in coal and coke. He started with the assumption that the whole of the nitrogen expelled from the coal in distillation is combined as ammonia, and therefore examined such nitro groups as give off ammonia on dry distillation. These proved to consist solely of the amido and substituted amido groups, and therefore all the nitrogen compounds in coal must be of this kind, i.e., albuminoid in character. The deduction that the extractives in coal must be higher in nitrogen than the residue, was confirmed by the experiments. It was also found possible to convert over 89 per cent. of the nitrogen in coke into ammonia by gasification in a moisture-laden atmosphere at 800 degs. Cent., from which it is concluded that the nitrogen in coke is present as carbon nitrides. A work on coal ("Die Chemie der Kohle," Berlin, 1916) was published by Hinrichsen and Taczak.

The following patents were taken out for draining fine coal: Plzak (G.P. 288391); Hundertmark (G.P. 289423); Jüngst (G.P. 289849); Simon (G.P. 292989). Stratmann wrote a dissertation (Aachen, 1915) on the subject; and Cabolet (*Glückauf*, 1916, p. 1) described the coal screening and sludge treating plant (with recovery of pyrites) at the Mont Cenis Colliery.

Coke.

Pohl (G.P. 292336) proposed to effect the compressing of coking coal, previous to charging it into the ovens, by a combined method of shaking and weighting, with the idea of making it lie more compactly, and ensuring a more effectual removal of water. In order to obtain a denser coke by rotary coking, Summers (G.P. 291183) heats the chamber or retort on one side only, hot gas being passed through the moving material from the unheated side; an oven for carrying out this process is described in G.P. 292143. Gebr. Hinselmann (G.P. 289618) patented a coke oven in which steam is introduced at the bottom of the chamber; and Otto and Company (G.P. 292142) a method of heating coke ovens. Methods of drawing off the coke oven gas are described by Koppers (G.P. 291053 and 294009), Flasche (*Technische Mitteilungen*, 1916, p. 123), and Wilhelm (*Glückauf*, 1915, p. 1195). Auxiliary appliances for use in coking include: Machine for cleaning the upcast pipes, Ollen (*Amer. Gaslight Jl.*, 1915, p. 231); method of operating motor charging trucks, Schöndeling (G.P. 290843); electrically-operated charging truck, Frohnhäuser (G.P. 291540); closing devices, Thomas (G.P. 291008), Méguin and Company (G.P. 292648), and Beckers and Company (G.P. 293584).

Campbell (*Bull. Amer. Min. Engin.*, 1916, p. 177) pointed out that coke often contains more sulphur than the coal, which goes to prove that the sulphur in the latter is present as sulphate and organic sulphur, or that the ash is high in iron, lime, and magnesia. The desulphurisation in quenching—through the decomposition of FeS by the water—is only slight, but can be assisted by adding hydrochloric acid to the quenching water.

New methods of quenching and loading coke were described by: Wärme Verwertungsgesellschaft (G.P. 287043); Wilhelm (G.P. 290700); Méguin and Company (G.P. 292216); Nehring and Company (G.P. 292529); Wilhelm (G.P. 292844); and Lukan (G.P. 293827). Work of a general nature relating to coke was done by: Donath, the economic importance of distillation coking (*Montanistische Rundschau*, 1916, p. 185); and Thaler, valuing and judging coke (*Feuerungstechnik*, 1915, p. 109).

Briquettes.

To prevent the material from getting over-dry before pressing, Schimansky (G.P. 292541) proposed partial drying, followed by an addition of quicklime. This slakes with a portion of the moisture and generates sufficient heat to drive off the rest. It is advisable to remove the lime, as far as possible, before pressing. Donath, too, recommended adding lime, though for preventing the smoke nuisance. According to Efrems (G.P. 292454), briquettes can be made with crude naphthalene, using the fractions melting at about 70 degs. Cent., but keeping the molten mass, before adding it to the coal, at 80 degs. Cent. until about one-fifth has sublimed. The residue will then melt below 40 degs. Cent., and no longer evolves naphthalene vapours, so that inconvenience to the workers is prevented, and, at the same time, pure naphthalene is recovered. Duran sprays the coal, before pressing, with liquids which dissolve the bituminous constituents, for which purpose he proposes to use carbon disulphide (G.P. 271785), crude benzol (G.P. 289205), and the first runnings from the distillation of benzol (G.P. 289425).

According to Herbing (*Feuerungstechnik*, 1915, p. 190) brown coal low in bitumen should be partially coked, and then mixed with cellulose pitch before pressing. Fohr and Kleinschmidt (G.P. 289069) describe a process and apparatus for making briquettes from dust and fusible organic substances. For improving the tensile strength of briquettes, Schimansky (G.P. 289070) recommends adding coke breeze to the dusty material. Richter (G.P. 290528) makes briquettes by mixing the starchy and oleaginous waste from rice-husking mills. Behr (*Jl. Gasbel.*, 1915, p. 110) describes the manufacture of coke briquettes at Kolberg, and mentions that a profit of 30 per cent. is obtained. The Maschinenbauanstalt Humboldt (G.P. 290707) describes a process for the continuous coking of the binding medium in briquettes; and the St. Louis Briquette Company (G.P. 293922, 294266) a briquetting press. On general matters relating to coking, Schapira (*Feuerungstechnik*, 1916, p. 111) dealt with modern methods of making brown coal briquettes; and Eckhardt (*Braunkohle*, 1915, p. 363) with the heat economics of briquetting.

Combustion.

According to Nusselt (*Zeits. Vereines Deutscher Ingenieure*, 1916, p. 102), the gasification and combustion of coal on the grate should be considered mainly from the physical standpoint, and are induced by the visible and molecular flow. The sole factor determining the amount of fuel consumed on the surface of the coal per unit of time is the velocity of diffusion, the penetration of oxygen into the layer of coal. Hellemans (*Feuerungstechnik*, 1916, p. 113) discusses the economy of burning peat under boilers, and points out that in Holland, notwithstanding the use of flat and inside grates exclusively, the boiler efficiency reaches 83.7 per cent., whereas in Germany, although stepped external grates are employed, the efficiency does not exceed 50 per cent. He compared the two methods of firing, and recommends a construction of his own designing, with mechanical stoking. Knust (*Braunkohle*, 1916, p. 57) published tables and diagrams showing the relation between the prices and evaporative values of current fuels. Brauer-Tuchorze (*Erfindungen und Erfahrungen*, 1916, p. 292) dealt with difficulties in firing with high-grade fuels and coke; and Kirsch (*Feuerungstechnik*, 1916, p. 77) with the combustion of fusible-clinker anthracite on cold grates, finding that if the fusing point of the clinker exceeds 1,100 degs. Cent., the anthracite can be burned without artificial cooling, and even with dry bottom draught, whereas, for lower fusing points, atmospheric cooling no longer suffices to solidify the clinker, and the spaces between the firebars are liable to become clogged. This can be remedied by blowing in steam and air; but as this is expensive, the use of cooled hollow bars is recommended.

Markgraf (*St. u. E.*, 1915, p. 847) reports that good results have been obtained on the Prussian railways by firing the locomotives with mixtures of blast furnace coke and coal briquettes, without any alteration in the fireboxes; and that coke can even be used alone when the steam consumption is regular, but is not so suitable as coal when the demand on the boiler fluctuates. The same experience has been obtained with marine boilers. Coke is best adapted for hand-firing; and where travelling grates are used, fine coke can only be fired in admixture with free-burning coal, or when a front extension is provided on the grate. Rösing (*ibid.*, 1915, p. 953) had similar experience with mechanical stokers, and reports that a fair degree of efficiency can be maintained with hand-firing on flat grates if the men make themselves sufficiently acquainted with the peculiarities of the fuel. In particular, it is necessary to keep the fuel layer thicker with large-grain coals than with smalls. Schön (*Zeits. Vereines Gas- u. Wasserfachmänner Oesterreichs*, 1915, p. 327) burned mixtures of brown coal with 25 to 30 per cent. of coke breeze with very good results on chain grates; and was able to burn even pure breeze on a Wilton grate, though in such cases the flues required frequent cleaning, and there was a good deal of waste into the ashpit. The mixture of brown coal and breeze in gas producers led to clogging, whereas an addition of breeze and small nut coke proved satisfactory, and mixtures of large coke with 30 per cent. of breeze were found to be well adapted for evaporator firing in retort furnaces. Coke dust is preferably made into briquettes with brown coal tar or pitch, in rotary presses, and then forms a good locomotive fuel. Geipert (*Jl. Gasbel.*, 1916, p. 225) fired coke breeze on perforated plates or bars, with a bottom draught from steam injector blowers, and, with an expenditure of 5 to 6.44 per cent. of steam, obtained 5.6 to 5.9 evaporation, the amount of coke consumed per square metre of grate surface being 63 to 88.7 kilogs. per hour.

Of late, renewed interest has attached to the subject of coal dust firing. According to Helbig (*St. u. E.*, 1915, p. 1174), the best kind of coal for dust firing is one containing 14 to 24 per cent. of volatile matters and ground so as to leave only 8 to 10 per cent. of residue on a sieve with 4,900 meshes per sq. cm. Part of the air of combustion is forced in, as carrier of the coal dust, above the grate, and the remainder drawn in by suction. With careful adjustment, the oxygen content of the flue gases can be reduced to as low as 0.5 per cent. The coal is ground in ring mills, with pneumatic sifters, which will treat coal containing 4 per cent. of water, and deal with 1 to 1½ cwt. per horse-power hour. The cost of grinding is about 3d. to 5d. per ton of coal. By firing with coal dust, a temperature of 1,500 degs. Cent. can be attained under the boiler, and the flue gases contain up to 18 per cent. of carbon dioxide. Similar opinions are expressed by Kuzell (*Eng. Min. Jl.*, 1916, p. 302), and Amberg (*Montanistische Rundschau*, 1915, p. 811), who advocate it for metallurgical purposes.

Experiments carried on by Barth (*Feuerungstechnik*, 1915, p. 73) proved there is an advantage in firing boilers with coal and coke oven gas jointly, since this considerably improves the excess air figure, which drops from 50 per cent. to between 5 and 16 per cent.

In the latter case, notwithstanding that the evaporation was nearly twice as great as in the former, the efficiency increased by 4.48 per cent. The following articles dealt with air regulation in grates: Lux (*Zeits. Ver. Gas- u. Wasserfachm. Oesterr.*, 1915, p. 329), on a patent firing process with balanced draught; Winkelmann (*Braunkohle*, 1915, p. 115), with the MacLean balanced draught process, and (*ibid.*, 1915, p. 195) the influence of automatic dampers on the economy of the stoking process; Dosch (*ibid.*, 1915, p. 5) with the use of artificial draught. German patents included: Regulating devices, Lehmann (290267), Hildebrand (290579), and Schmidt (293048); fuel feed, Quigley (289801, 289803), Sauerland (289656), Eisenbeis (290399, 290779), Robert and Irinyi (290708), Axer (291207), Schollenbruch (291568), and Neumann (294715); furnaces, Pinlock (288806), Marcotty (289915), Porat (291716), Giesam (293772); grates, Wanderrostfabrik (288931), Grosse and Company (291544); mechanical grates, Häuser and Deppermann (285386), Placzek (290728), Reck (291501), Grosse and Company (291679), Linke-Hofmann-Werke (291866), Walther and Company (293926); accessories, American Engineering Company (290659), Brams (290778), Micheal (291087); and Steinmüller (291502).

Fuel Analysis.

Wagener (*St. u. E.*, 1915, p. 1257) proposes to effect the determination of water in coke at iron works by taking samples of 20 to 30 kilograms, and heating them to 130 degs. Cent. in a steam drying cupboard. Knublauch (*Zeits. angewandte Chemie*, 1915, p. 492) points out that the calorific value obtained with the Dulong formula, on the basis of the ultimate analysis, always agrees with the results of the bomb calorimeter method, provided both determinations are performed with care. Nevertheless, it must be borne in mind that coals often contain carbonates of calcium and magnesium, which give results in excess of the truth, as regards carbon, in the ultimate analysis. The author describes a method and apparatus for decomposing the carbonates with hydrochloric acid and measuring the carbon dioxide. Hopf (*Zeits. Dampfessel- u. Maschinenbetrieb*, 1915, p. 313) also discusses the Dulong method, and shows that coals of similar origin, and not too dissimilar in point of time, have approximately equal calorific power. If this be indicated by W_r , then the calorific value W may be calculated from the formula—

$$W = W_r \frac{100 - A - F - 6F}{100}$$

in which A is the ash content, and F the moisture content. According to von Jüpther (*Montanistische Rundschau*, 1916, p. 521), the method of Berthier—provided the yield of gas be taken into consideration—gives values which differ only by plus 1.35 per cent. on the average from those obtained with the bomb. The true calorific value q is equal to $q_B + 10G$, in which q_B is the heating value according to Berthier, and G the percentage yield of gas. The heating value can be calculated from the ultimate analysis by the formula—

$$q = \frac{C + 3 \left(\frac{H - \frac{O}{8}}{100} \right)}{100} 8,080 + 10G$$

G can be replaced by $100 - (\text{hygroscopic moisture plus coke})$. The values differ by -1.74 per cent. from those given by the bomb. If the simplified formula—

$$q = 80(C + 3) \left(\frac{H - \frac{O}{8}}{100} \right) + 10G$$

the mean variation will be only -0.9 per cent. Hiller (*Jl. Gasbel.*, 1916, p. 129) describes the determination of the gasification value of coal in the laboratory, and proposes a modification which he describes in detail.

MINERS' WAGES.

The executive committee of the Miners' Federation of Great Britain met the Controller of Coal Mines on Tuesday, and put before him a request for an increase of 25 per cent. on present earnings.

Mr. Smillie (the president) and Mr. Herbert Smith (the vice-president) of the Federation, stated the grounds on which the request was based.

The Controller undertook to lay the matter before the Government, and to communicate the result to the secretary of the Federation at the earliest possible moment.

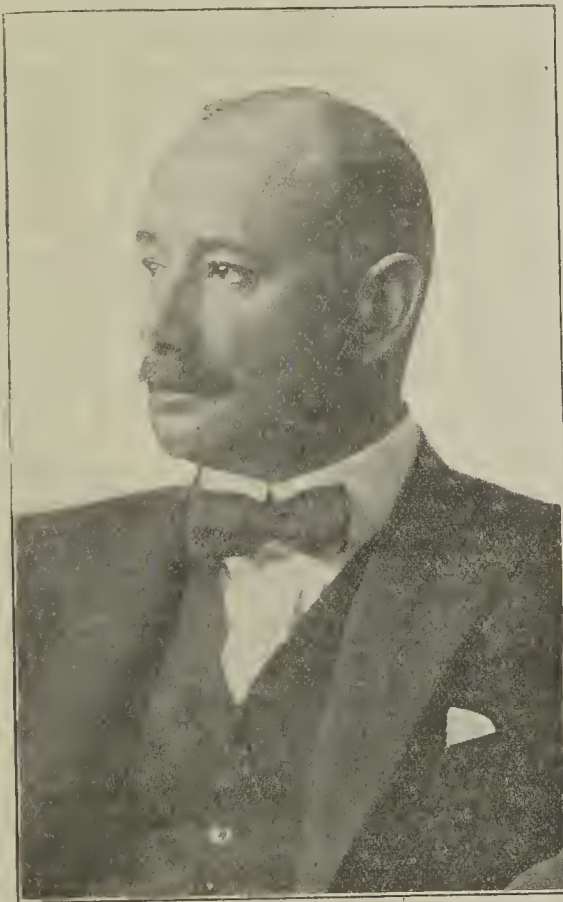
It was reported that the miners in one of the important Midland areas were at present working out their notices, and threatened to come out on strike unless an immediate advance in wage was given. The Controller of Coal Mines and the executive of the Miners' Federation expressed the hope that no action of this kind would be taken until the Government had had time to consider the application put forward that day.

Iron and Steel Institute.—The autumn meeting of the institute will be held at the Institution of Civil Engineers, Great George-street, Westminster, on Thursday and Friday, September 20 and 21, commencing at 10.30 a.m. on the 20th and at 10 a.m. on the 21st. The following is the list of papers that are expected to be submitted for reading and discussion:—"Present Practice in Briquetting Iron Ores," by G. Barrett and T. B. Rogerson; "Micro-structure of Commercially Pure Iron Between Ar_2 and Ar_3 ," by W. J. Brooke and E. F. Hunting; "The Influence of Heat Treatment on the Electrical and Thermal Resistivity and Thermo-Electric Potential of some Steels," by E. D. Campbell and W. C. Dowd; "New Impact Testing Experiments," by G. Charpy and A. Cornu-Thénard; "Heat Treatment of Grey Cast Iron," by J. E. Hurst; "Effect of Mass on Heat Treatment," by E. F. Law; "Investigation upon a Cast of Acid Open-Hearth Steel," by T. D. Morgans and F. Rogers; "The Acid Open-Hearth Process," by F. Rogers; "The Eggertz Test for Combined Carbon in Steel," by J. H. Whiteley; "Failure of Boiler Plates in Service and Investigation of Stresses Occurring in Riveted Joints," by E. B. Wolff.

SIR LEONARD W. LLEWELYN.

Sir Leonard W. Llewelyn, who is one of the first Knights of the new Order of the British Empire, is a Deputy Director-General of Munitions Supply in the Ministry of Munitions. On the inception of that office in June 1915, he became head of the Raw Materials Department, and fixed maximum prices for steel, iron, iron ore, ferro-manganese, and other ferro-alloys, at the same time formulating a scheme to limit freight charges on imported iron ore. On being promoted to be a Deputy Director-General of Munitions Supply, he centralised his energies on the supply of non-ferrous metals, including copper, spelter, zinc, brass, aluminium, lead, nickel, antimony, platinum, tin, tungsten, etc., fixing maximum prices, and controlling their sale, purchase, and use. Dr. Addison recently pointed out that, under Sir Leonard's direction, the production of commercial zinc in this country had been doubled; and, in the case of tungsten, we are now not only self-supporting, but are able to supply our Allies.

The Government also made the fullest use of Sir Leonard's extensive mining knowledge, and he was one of the principal members of the Central Coal and Coke Supplies Committee, and of other bodies which directed the operations of the great coal and coke industry for war purposes. Before the war, and for some time after joining the Ministry of Munitions, he was general manager of the Cambrian Combine Collieries. In this capacity, he acquired a reputation as a hustler, and whilst genial in his relations with the workmen, he was fearless during strikes. For gallantry at the time of the Clydach Vale explosion in 1905, he was the recipient of the first silver medal



SIR LEONARD W. LLEWELYN.

awarded by the Royal Humane Society for saving life in mines. At the great dam disaster in the Rhondda Valley, he was instrumental in saving the lives of numerous school children; and at the time of the Tony-pandy strike he received a decoration for swimming through one of the flooded mines to feed the horses.

A native of Aberaman, where he was born in 1874, Sir Leonard is the son of the late Mr. Llewelyn Llewelyn, J.P., King's-hill, Newport, formerly general manager of the Powell Duffryn Company. His mother was a daughter of Mr. George Wilkinson (also a previous general manager of the Powell Duffryn Company). Educated at the Monmouth Grammar School, Cheltenham, and Heidelberg, he served his engineering apprenticeship at the Abersychan and Newport-Abercarn Collieries. Sir Leonard has visited and made careful inspections of all the large engineering works in Belgium, France, and Germany. He has also visited America and Canada on several occasions, and closely studied industrial methods and conditions in Japan and other countries. At 24 he was manager of the Cambrian pits, Clydach Vale, and later undertook the management of the Ocean Coal Company's Collieries. When 26, he was appointed to the position of agent of the Cambrian Collieries, which he held for eight years. In connection with the formation of the Glamorgan Coal Company Limited, the Naval Colliery Company, the Britannic Merthyr Coal Company, the Consolidated Cambrian Collieries, the Fernhill, and other collieries, and remained general manager of the Combine until some little time after he joined the Ministry of Munitions.

South Wales and Monmouthshire School of Mines.—The session 1917-1918 commences on Tuesday, October 2, 1917, when students will be enrolled for full-time courses (extending over a period of four years) in mining engineering (joint mining diploma course), colliery engineering (mechanical and electrical), and chemical engineering. With the exception of the first year mining engineering course (which is held at the University College, Cardiff), each session extends over a period of six months. During the other six months the students are employed at the collieries by an arrangement of free apprenticeships. For further particulars, application should be made to the principal, School of Mines, Treforest, Glamorgan.

ANTI-FRICTION BEARINGS IN COAL MINE HAULAGE.*

By P. B. LIEBERMANN.

For hauling coal through the mine and on the surface, locomotives are required, the size and power consumption of which depend on the resistance to motion offered by the mine cars. This resistance is principally caused by gravity and bearing friction. The effect of gravity can be reduced to a minimum by a suitable lay-out of the haulage ways; that is, by arranging the grades in favour of the loaded trips, and by fixing the percentage of grade to that value which gives the lowest power consumption for loaded and empty trains. The bearing friction, which is considerably greater than is generally realised, can be easily reduced to a negligible quantity by the installation of a suitable anti-friction bearing that will stand the rough use and abuse of coal mine service.

The present investigation deals with flexible roller bearings in comparison with ordinary plain bearings. A number of tests for determining train resistance have been run during the last two years, both in the bituminous and anthracite coal regions. For these tests a dynamometer car, equipped with recording instruments, and entirely automatic in operation, was used. It is coupled between the locomotive and train, and records the following quantities: Drawbar pull in pounds; speed in miles per hour; and a time interval, usually five seconds; the paper travel is proportional to the distance covered by the car. Opposite these records the profile of the road is drawn in by hand, so that full particulars regarding train resistance for any grade or piece of track can be read from the chart at a glance. As an illustration, two charts were obtained in a comparative test at the Delaware and Hudson Company's Coalbrook Colliery at Carbondale, Pennsylvania. The following types of mine cars were used:—

Item No.	Type of bearing.	Location of bearing.	Diameter of journal.
1	Roller	Outside box	2½ in.
2	Plain	Outside box	2½ in.
Length of bearing.	Track gauge.	Diameter of wheel base.	Drawbar to top of rail.
4 in.	30 in.	16 in.	36 in.
4 in.	30 in.	16 in.	36 in.

These were wooden cars built by the Delaware and Hudson Company in its own shops. They were identical in every respect, except bearings. All wheels were loose, and were held on the axle between a shrink-on collar on the one side, and the bearing box on the other side. All cars had side bumpers. When the test was made, the cars had seen enough actual service to ensure well run-in bearings. For lubrication, a high-grade liquid grease was used, compounded according to the Delaware and Hudson Company's own specifications. The plain bearings were self-lubricating by means of a felt pad in an oil reservoir; the roller bearings were self-lubricating due to their inherent hollow helical construction. No bearings received any overhauling or special treatment for any of the tests.

Each one of the various tests was run first with a train of cars having one type of bearing, and was immediately followed by another test with a train of the same number of cars, but with the other type of bearing, and on the same piece of track, and under identical conditions. This particular series of tests was witnessed by a large number of representative anthracite mine operators and engineers. The record charts are self explanatory.

From the many tests conducted up to the present time, sufficient data have been collected to obtain a definite idea as to train resistance and its relation to speed.

An average value of these data can be expressed in the form of an equation. Any formula for train resistance consists of three terms, as follow:—

$$R = A + BS + CS^2$$

in which: R = train resistance in pounds per ton on level track; A = friction constant relating to bearing and rolling friction; B = friction constant relating to speed; C = friction constant relating to air resistance; S = speed in miles per hour. A , B , C , and S have to be determined by experiment.

On account of the comparatively low speeds encountered in mine service, the air friction is insignificant, and therefore the last term of the above formula, CS^2 , can be dropped. The test data were found to meet the following equations:—

$$R_p = 26 + 0.45S = \text{train resistance of loaded plain-bearing cars in pounds per ton.}$$

$$R_r = 9 + 0.45S = \text{train resistance of loaded flexible roller-bearing cars in pounds per ton.}$$

These formulae apply to average mine conditions, with clean tracks, with cars of from two to four-ton capacity, and with wheels not below 16 in. in diameter.

Tracks covered with coal dust were found to cause an increase in the train resistance of about 30 per cent. for either type of bearing. It should be remembered that this is the figure obtained with the dynamometer car behind the locomotive, and that the locomotive, by rolling down the dust and loose coal particles, lessens to a large extent their effect on the train of cars behind it. The electrical input into the locomotive will, of course, be considerably increased over the 30 per cent., but this additional loss was not measured during these tests.

Tests made with empty cars showed that the train resistance per ton is about 40 per cent. higher for plain bearing cars, and about 15 per cent. higher for the roller bearing cars, than would be obtained from the formula for loaded cars.

Train Resistance and Speed of Cars.

With regard to train resistance and speed of loaded and empty cars, if W_L = the weight of loaded cars in tons, and W_E = the weight of empty cars in tons,

* From a paper presented to the American Institute of Mining Engineers.

of empty cars in tons, the total train resistance in pounds on straight level track will be:—

$$F_L = W_L \times R_L \text{ and } F_E = W_E \times R_E$$

Running on a grade, the effect of gravity is consideration as follows:—

$$F_L = (W_L \times R_L \pm (W_L \times G \times 20)) \text{ and } F_E = (W_E \times R_E \pm (W_E \times G \times 20))$$

The grade also affects the tractive effort of the locomotive by the grade percentage of its own weight. If M = the weight of the locomotive in tons, then, for a loaded train of cars,

$$F_L \pm (M \times G \times 20) = (W_L \times R_L) \pm (W_L \times G \times 20)$$

and for a train of empty cars,

$$F_E \pm (M \times G \times 20) = (W_E \times R_E) \pm (W_E \times G \times 20)$$

The symbols have the following meaning:— F_L = total train resistance of loaded cars in pounds; F_E = total train resistance of empty cars in pounds; W_L = weight of a train of loaded cars in tons; W_E = weight of a train of empty cars in tons; R_L = train resistance of loaded cars in pounds per ton; R_E = train resistance of empty cars in pounds per ton; M = weight of locomotive in tons; G = grade in per cent.; and 20 = gravity force in pounds per ton per 1 per cent. grade.

Comparative Tests.

The following comparisons are based on the ideal case of two mines, one equipped throughout with plain bearing cars and the other with roller bearing cars, each mine being laid out to the theoretical grade that will make the locomotive effort required to pull a train of loaded cars down grade equal to the effort required to pull the same train of empties against the grade. Such an example can easily be altered to apply to any individual mine by simply making the necessary change of those items which differ from the example.

A 1,000 ton per day mine will be considered based on the viewpoint of reducing the cost of mining 1,000 tons of coal a day.

Some mine operators are also interested to know the quickest method of development or increase of output of their mines by equipping their cars with flexible roller bearings with no increased overhead except the additional wages required for the extra miners. An increased output is naturally limited by the length of landings, the accommodation of extra miners, the capacity of the gathering and haulage ways, the capacity of cage and tippie, etc. There are too many different possibilities to make the working out of an example possible, but, fortunately, every mining operator will be able to determine for his individual case the possible increase of output by utilising the figures and test data described above.

The following is a description of the 1,000 tons per day mine:—Output of coal per day, 1,000 tons; capacity of each mine car, 3 tons; number of car loads to supply 1,000 tons, 333½; weight of an empty car, 2,500 lb.; weight of a loaded car, 8,500 lb.; average distance per car per trip loaded, 5 miles; average distance per trip empty, 5 miles; average speed of trains, 6 miles per hour; working hours per day, 8; time for a round trip, 2 hours; round trips per day per train, 4.

To find the theoretical grade that will result in equalised locomotive effort in pulling a loaded train down grade and bringing the same train of empty cars up the grade, that is, $F_L = F_E$, the last two equations can be written as follows:—

$$\frac{F - (M \times G \times 20)}{(W_E \times R_E) + (W_E \times G \times 20)} = \frac{F + (M \times G \times 20)}{(W_L \times R_L) + (W_L \times G \times 20)}$$

$$G = \frac{(W_L \times R_L) - (W_E \times R_E)}{20(W_E + W_L + 2M)}$$

In these equations, F = drawbar pull of locomotive on level in pounds; the other symbols being the same as given above.

Substituting for the train resistance the figures found by test for the speed of six miles per hour, the data shown in the following table are obtained:—

	Cars. Plain bearing.	Cars. Roller bearing.
Train resistance of loaded cars, lb. per ton	28.6	11.6
Train resistance of empty cars, lb. per ton	40.0	13.6
Grade for equalised drawbar pull, per cent.	0.61	0.284
Number of cars per trip	42	42
Weight of coal per train, tons	126	126
Train resistance, loaded cars out, lb.	2,930	1,069
Train resistance, empty cars in, lb.	2,740	1,027
Train resistance, starting (estimate), lb.	4,000	1,200
Necessary weight of locomotives, tons	8	3
Number of locomotives	2	2
Ft.-lb. per train per round trip	136,800,000	54,100,000
Kw.-hrs. per train per round trip	55.3	20.4
Kw.-hrs. all trips per day	443	163
Ft.-lb. per locomotive per round trip	8,430,000	3,160,000
Kw.-hrs. per locomotive per round trip	3.180	1.195
Kw.-hrs. of two locomotives per day	25.40	9.55
Total kw.-hrs. per day of cars and locomotive	468.40	172.55
Total cost of power per day at 2c. per kw.-hr. at locomotive,*	9.36	3.45
Total cost of power per year of 300 days, do.	2,810.00	1,035.00
Lubrication material and labour per car per day	1.73	0.29

* 2c. per kw.-hr. at the locomotive is approximately 1c. per kw.-hr. at the mine due to the losses taking place in transmission line, locomotive, etc.

Lubrication, 164 cars per year.

dols. 284.00 ...

Total cost of power and lubrication per year, do.

Saving, do.

..... 3,094.00 ...

..... 2,011.50

A clear saving of 2,011.50 do. per year has been accomplished through the application of flexible roller bearings. These roller-bearing cars are necessarily more expensive than the ordinary plain-bearing cars. The 164 cars in the above example would require an additional investment of about 20 do. per car, or 3,280 do. based on prices prevailing at the present time. This amount is balanced by the saving in the size of the locomotives. Each one of the eight-ton locomotives costs about 1,000 do. more than one of the three-ton locomotives, resulting in a saving of about 2,000 do. The eight-ton locomotive would require for the track rails weighing 30 lb. per yd., while the three-ton locomotive could get along with 20 lb. rails. The difference in cost amounts to about 3,500 do. for the example, based on 40 do. per ton and five miles of track.

The last item alone has wiped out the extra cost of the roller-bearing cars. On top of this should be figured the saving accomplished in the electrical transmission line, transformers, power house, reduced derailments, reduced wear and tear on cars and tracks, reduced size of repair shop, etc.

Only in new mines, and in a limited number of existing mines, is it possible to arrange the haulage road for an ideal grade; but calculations made on the above basis for a prevailing grade of 3 per cent. in favour of load, and a prevailing grade of 3 per cent. against load, show, in the former case, a saving of 1,196.50 do. in favour of anti-friction bearings, to which must be added the saving due to the reduced size of locomotives and to the reduction in the weight of the rails. Each one of the 13-ton locomotives costs about 1,200 do. more than one of the eight-ton locomotives, resulting in a saving of 3,600 do. The 13-ton locomotive would require rails weighing 50 lb. per yd., against the eight-ton locomotives using 30 lb. rails, which accounts for a saving of 7,000 do.

In the case of the 3 per cent. grade against load, there is a saving of 1,946.50 do.; and through the reduction in the size of locomotives from 25 to 15 tons, a saving of at least 1,500 do. per locomotive, or 9,000 do. for the six locomotives, has been accomplished. The lighter locomotives need 50 lb. rails against the 70 lb. rails of the heavier locomotives. This difference in weight accounts for a saving of about 7,000 do.

In determining the size of locomotives, no attention has been paid to the size of the tunnels. If any such locomotive should be of too large a size, then two smaller locomotives would have to be substituted, each locomotive pulling half the number of cars that could have been hauled by the bigger locomotive. The two smaller locomotives would cost more than one big locomotive. Besides this, there is the expense of the motorman and helper for the extra train. It is obvious that this handicap is particularly great with plain-bearing cars.

Summary.

Ideal grade:—	Dols.
Saving in investment for locomotives	2,000.00
Saving in investment for rails	3,500.00
Total saving in investment	5,500.00
Investment for roller bearings	3,280.00
Net saving in investment	2,220.00
Yearly saving in power and lubrication	2,011.50
3 per cent. against empties:—	
Saving in investment for locomotives	3,600.00
Saving in investment for rails	7,000.00
Total saving in investment	10,600.00
Investment for roller bearings	3,280.00
Net saving in investment	7,320.00
Yearly saving in power and lubrication	1,196.50
3 per cent. against load:—	
Saving in investment for locomotives	9,000.00
Saving in investment for rails	7,000.00
Total saving in investment	16,000.00
Investment for roller bearings	3,280.00
Net saving in investment	12,720.00
Yearly saving in power and lubrication	1,946.50

For obvious reasons, these examples had to be reduced to the simplest possible conditions, and therefore the hauling in of timbers and supplies and the hauling out of rock were not taken into consideration in either case, and no allowance has been made for the increased train resistance on curves, it being assumed that only curves of liberal radius were employed, and that the grade was sufficiently eased up at the curves to compensate for the increased drawbar pull.

These items and others, the acceleration of the trains, for instance, will, of course, increase the total power consumption in each case, but they will not materially affect the relative proportion of the three examples.

Importance of Proper Grade.

It has been clearly established that while considerable economy can be obtained through the introduction of roller bearings on existing grades, yet the maximum saving in the total expenditure for haulage can be obtained only by a proper arrangement of grades, as shown in the first example. When heavy grades occur they are in most cases only of short length, and with roller-bearing cars they can be taken flying, that is, the momentum of the moving train will carry the train over such grades.

It is safe to say that the flexible roller bearing will do more for the mine car than it has done for the modern automobile, because, besides their durability and certainty of operation, there are other features which make them particularly attractive and profitable. To begin with, there is the saving in power,

which accounts for a smaller power bill, smaller locomotives, smaller transmission line and power house, lighter rails, less expensive rail bondings, less wear and tear on cars and tracks, with fewer derailments, greater safety of operation, and steady and uninterrupted production. It will be noticed that only such items as directly affect the haulage cost and can be expressed in dollars and cents have been figured. There are other features, however, which cannot readily be figured, such as the effect on mules of easily running cars, where cars are gathered by mules, or the effect on the miners where cars have to be moved by hand. This is important in itself, as the human element more and more demands the elimination of all useless drudgery. The effect is very pronounced, too, when storage battery locomotives are used.

The merits of storage battery locomotives for gathering purposes and for short hauls are generally appreciated. Their battery capacity is necessarily limited, and it is highly desirable that one charge of the battery be sufficient for one day's run. The two things affecting the battery capacity are grade and car journal friction. The grade quickly limits the use of storage battery locomotives, while bearing friction places a serious handicap on their productiveness. The relative train resistance and a comparison of the kilowatt-hours given in the above examples will prove that a storage battery locomotive with a single charge per day will be able to haul considerably more coal when flexible roller-bearing cars are used in place of plain-bearing cars. By the use of these figures it should be easy to figure out the possible production of any individual mine when full particulars regarding grade, length of haul, etc., are known. Not to be overlooked should be the heavy current discharges when starting a train of plain-bearing cars. These high starting peaks seriously affect the capacity and life of a storage battery. A locomotive pulling roller-bearing cars will not be subjected to such peak loads; on the contrary, it will pick up faster and consequently gather faster.

MAXIMUM PRICES OF SCRAP (WROUGHT IRON AND STEEL).

The Minister of Munitions has issued (under date August 28, 1917) notices to the effect that wrought iron and steel scrap are to be considered as included in the general permit of November 1, 1916, which shall henceforth take effect as if the above war materials were included in the Order of July 7, 1916, and the following materials and prices were specified in the schedule to the said general permit, provided always that condition 2 of the said general permit shall not apply to any sale or purchase under a contract in writing entered into prior to the date of the present notices at a price not contravening that permitted up to such date. The proviso in condition 2 excluding sales by a manufacturer of finished steel rolled from steel purchased by him is withdrawn, as regards steel scrap of all classes and descriptions.

The following maximum prices have been fixed:—

Wrought Iron Scrap.	Per ton.
1. Wrought iron scrap of the classes defined or mentioned in (a), (b), and (c) below	£6 5 0
(a) Wrought iron plates, boiler plates, and sectional material not less than ¾ in. thick, each piece separate, reasonably clear of rivets, without any flanged end plates or circular angles and plates, all suitable for shearing, cable scrap and chain scrap not less than ½ in. diameter.	
(b) Heavy wrought iron scrap not less than ¼ in. thick, including horseshoes, rivet and bolt scrap, scrap from the manufacture of rivets and bolts, and chain scrap not less than ¼ in. diameter.	
(c) Wrought iron scrap under ¼ in. thick, including country wrought iron scrap and all wrought iron scrap not included in any of the classes defined in 1, 2, or 3 hereof.	
2. Wrought iron scrap mixed with steel or other material	£5 5 0
3. Wrought iron turnings and borings mixed with steel or other materials	£2 10 0
4. The prices of wrought iron scrap and mixed scrap may be arranged between buyer and seller, but may not exceed, in the cases of 1, (a), (b), and (c), £6 5s. per ton; in the case of 2, £5 5s. per ton; and in the case of 3, £2 10s. per ton.	
5. The above prices do not apply to heavy forging scrap nor to scrap from the following brands of Yorkshire iron:—Lowmoor; Farnley; Monkbridge; Taylor Brothers; Bowling; Cooper Brothers.	
6. The above prices are free on rail or in barge at nearest convenient siding or wharf to the place where the scrap lies at the time of sale.	
7. The above maximum prices of wrought iron scrap, if selected, loaded in, and delivered from yards used as scrap yards at the date hereof by recognised scrap merchants, may be increased:—	
(a) Where carriage to buyer's works does not exceed 3/- per ton	by 10/- per ton.
(b) Where carriage to buyer's works exceeds 3/- per ton	by 7/6 per ton.
(c) If sheared and cut up ready for piling	by 15/- per ton.
8. A sum not exceeding 2½ per cent. on the above prices may be added in the case of sales by recognised scrap merchants.	

Steel Scrap.

	Per ton.
1. (a) Heavy steel melting scrap	£5 5 0
(b) Steel turnings and borings	£3 10 0
(c) Steel turnings and borings mixed with wrought iron or other material	£2 10 0
(d) All other classes of steel scrap, heavy or light, whether or not mixed with wrought iron or other material	£5 5 0
2. These prices are free on rail or in barge at nearest convenient siding or wharf to the place where the scrap lies at the time of sale; the carriage at actual	

cost or at a fair average rate agreed between the seller and buyer may be charged to the buyer up to maximum of 10s. per ton.

3. To these prices a sum not exceeding 2½ per cent. on such prices may be added in the case of sales by recognised scrap merchants.

Special permits to purchase steel scrap sold with guaranteed analysis may be granted on application, but in no case will permits be granted for any such purchase at prices exceeding the following:—

	Per ton.
Heavy steel melting scrap containing not over 0.04 per cent. phosphorus and sulphur	£6 5 0
Heavy steel melting scrap containing not over 0.05 per cent. phosphorus and sulphur	£6 0 0

All communications with reference to the above notices should be addressed to the Director of Steel Production, Room 381, Ministry of Munitions of War, Whitehall-place, London, S.W. 1.

SOUTH WALES MINING TIMBER TRADE.

For the week ending August 24, the total quantity of mining timber imported from abroad into the South Wales district amounted to 6,398 loads, of which 4,032 loads were reserved by the agents for the collieries on the Admiralty list, the remaining 2,366 loads being distributed amongst various importing merchants. The whole of the consignments were received from France. There were two cargoes of fir wood imported from Archangel, but this is for general purposes. Quotations for French fir ruled at 58s. to 60s. ex ship Cardiff or Newport, but little new business was arranged, the imports being delivered on contract account. The following is the actual quantity received during the past week:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Aug. 20	W. H. Williams and Company	100
" 20	Matthew Thompson	192
" 20	Morgan and Cadogan	108
" 20	Matthew Thompson	177
" 20	Morgan and Cadogan	120
" 20	Morgan and Cadogan	216
" 20	Lysberg Limited	192
" 21	Budd and Company	180
" 21	Budd and Company	276
" 22	Budd and Company	360
" 22	Budd and Company	198
" 23	Lysberg Limited	2,400
" 23	Lysberg Limited	1,440
Total		5,959

Newport:—

Aug. 22	Budd and Company	144
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Swansea:—

Aug. 21	Not named	295
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There is every probability that importers will take up their full quantities allowed to be imported this month. Much difficulty naturally presents itself when the month is nearing its close in order to prevent timber being imported in excess of the quantity stipulated by the Controller. This is only possible by individual importers arranging to forego their balance to others who desire to receive, those who forego being compensated to the extent of 1s. per ton for each ton as imported. Arrangements have been made, however, to prevent importers "sitting on the fence" by not importing, and thereby receiving the 1s. per ton in respect of their licence allocation. Pitwood merchants, even at the comparatively high prices ruling, are making little profit on present transactions owing to the high costs of the wood, the heavy freightage and insurance.

Home-Grown Pitwood.

The torrential downpours of the past few days has made matters most difficult with respect to the home-grown pitwood trade. Cutting throughout many districts has been greatly delayed, and losses have occurred by pitwood being swept away by inundations. In many districts the roads and coppices are quagmires, and continuous traffic upon roads never intended or contemplated for heavy work has caused damage to such an extent that claims by the authorities are likely to be particularly heavy. The heavy rains and bad roads are militating against the scheme for supplying native wood in place of foreign, as it is imperative that cutting and deliveries must, during this and the next two months, be upon a much larger scale in order to neutralise the deficiency caused by the drastic reduction of foreign imports. The cutting proceeding in South Wales and Monmouthshire is greater than at any period in living memory. Unfortunately, there is no conservation, and very little re-planting is going on. In Cornwall, however, planting on the short rotation crop system is being carried out side by side with cutting, but there is no general reafforestation plan in Wales and the west of England. At Weston-super-Mare the arboreal beauty of this popular resort is being rapidly destroyed by the heavy cutting proceeding, negroes and German prisoners being employed.

Trading with the Enemy Acts.—The Controller of the Foreign Trade Department has just published a new consolidating list containing the names of over 2,000 persons and firms with whom persons in the United Kingdom are forbidden to trade under the Trading with the Enemy (Statutory List) Proclamation, 1916. Although the statutory list has now been in existence for more than a year, cases still come to the notice of the Foreign Trade Department in which firms are corresponding with persons on the statutory list, and they not infrequently give as an excuse that they have never heard of the list. It is important that everyone engaged in foreign trade should realise that he is under an obligation to make himself familiar with the statutory list, and to observe it in his dealings. Failure in this respect renders him liable to the heavy penalties provided by the Trading with the Enemy Acts, and these apply to holding any communication whatever with anybody on the statutory list, and not merely to entering into an agreement or continuing to carry on business with such persons. The statutory list is published at intervals in a consolidated form, and additions are made approximately at intervals of a fortnight. Copies of the consolidated list and of all additional lists may be obtained at a small cost from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C. The additional lists are also printed as issued in the *London Gazette* and the *Board of Trade Journal*.

CURRENT SCIENCE AND TECHNOLOGY.

Volatile Products of Carbonisation.

As the result of numerous experiments with four kinds of American coal, Messrs. G. B. Taylor and H. C. Porter (United States Bureau of Mines *Technical Paper No. 140*) come to the following general conclusions regarding the primary volatile products of the carbonisation of coal:—

In the primary decomposition processes, a high-grade bituminous coal of the gas-making type decomposes by heat primarily into paraffin hydrocarbons and a completely altered non-volatile residue, with small quantities of water, CO₂, and CO. The three latter products are the first produced, although in small quantity; from some other types of bituminous coal they are produced in greater relative quantities than from the gas coal type. Complex and varied secondary reactions induced by superheating the hydrocarbons, water vapour, and CO₂ are of great importance in industrial high-temperature carbonisation.

The products of low-temperature carbonisation from coal of the Pittsburgh type on an industrial scale at about 800 to 900 degs. Fahr. (427 to 482 degs. Cent.) will consist of a rich gas amounting to 0.6 to 0.7 cu. ft. per lb. of coal, and a large yield of oil, or tar, comprising 10 to 12 per cent. of the coal. This tar consists chiefly of paraffin hydrocarbons, is very low or possibly entirely devoid of benzene and naphthalene derivatives, and practically devoid of free carbon. The gas will contain 6 to 7 per cent. of unsaturated hydrocarbons, and 20 to 25 per cent. of ethane and its higher homologues, and consequently will have a high calorific and illuminating value. The tar may be either re-distilled or subjected to cracking processes so as to produce light oils—gasoline substitutes—whose yield will be greater than, and probably at least double, that obtained by high-temperature carbonisation.

The results suggest the possibility that low-temperature carbonisation might be utilised in gas manufacture as an enriching process by passing through the low-temperature retorts a relatively large quantity of a thin gas such as "blue water gas," sweeping out the light oil vapours that are primarily liberated at these low temperatures. The utilisation of inferior coals for making gas by such a process may be found practicable.

Based on the experimental results of low-temperature decomposition in a vacuum, the following hypothesis is proposed for the constitution of coal:—All kinds of coal consist of cellulosic degradation products more or less altered by the processes of ageing, together with derivatives of resinous substances in different proportions, also more or less altered. These substances are many in number, and closely graded into one another in their nature and composition. They all undergo decomposition on moderate heating; some, however, decompose more rapidly than others at the lower temperatures. The less altered cellulosic derivatives decompose more easily than the more altered derivatives, and also more easily than the resinous derivatives. The cellulosic derivatives on moderate heating decompose so as to yield water, carbon dioxide, carbon monoxide, and hydrocarbons, giving less of the first three products the more mature and altered they are. The resinous derivatives, on the other hand, decompose on moderate heating so as to yield principally the paraffin hydrocarbons, with probably hydrogen also as a direct decomposition product.

The more mature bituminous coals with good coking properties contain a large percentage of resinous derivatives, and their cellulosic constituents have been highly altered. The younger bituminous and sub-bituminous coals consist chiefly of cellulosic derivatives much less altered than those in the older coals. They undergo a large amount of decomposition below their fusion point, and, partly for that reason, many of them do not coke.

Vacuum Coal Tar.

A. Pictet (*Revue Générale des Sciences*, abstracted in *Gas World*) points out that the tar and ammoniacal liquor resulting from carbonisation in the gas retort or by-product coke oven of to-day are brought about by the high temperatures employed in the process, involving certain modifications of the first products of distillation. In order to avoid these modifications, coal from the Loire district was subjected to distillation in a vacuum. At a pressure of 15 mm. mercury, distillation began at about 100 degs., and was completed at 450 degs. The gas produced had an odour differing a little from that of ordinary illuminating gas, and approaching that of isoprene. The water (about 1.6 per cent. of the weight of coal) gave an acid reaction, and contained no ammonia. The tar (about 4 per cent.) was very different from the ordinary tar, both in appearance and in properties; and the coke was very light and crumbling coke, easier to burn than ordinary coke.

The vacuum tar is a translucent liquid of clear brown colour, showing a slight green fluorescence; it is more of a mobile liquid than the ordinary tar, and possesses a different odour, recalling that of petroleum. At the moment of preparation it floats on the liquid formed with it, but it soon thickens, settles, and increases in density; at the end of three days the latter is exactly equal to 1. This phenomenon also occurs when protected against access of air, and can therefore not be accounted for by an oxidation process. It may be mentioned in connection with this that the tar, slightly stirred after its preparation with a solution of caustic soda, gives off nothing to the latter, showing therefore that it contains no phenols; but the latter appear at the end of a certain period of time, and their quantity increases quite rapidly.

Treated with a dilute solution of hydrochloric acid, the tar gives off a small quantity (about 5 per cent.) of compounds of a basic nature. The two only that have been isolated so far have the formula C₁₀H₁₁N and C₁₂H₁₅N, and constitute very likely a dihydro-methylquinoline and a dihydro-trimethylquinoline.

After the double treatment with soda and HCl, the tar still contains some oxygen compounds (about 2 per cent.). They can be recovered by boiling the liquid with sodium. These compounds have the properties of alcohols.

Once freed of its bases and alcohols, the vacuum tar forms only a mixture of hydrocarbons, some of which are saturated, others unsaturated. After separation by the Edelcanu process, the two products were subjected to fractional distillation, beginning at 120 degs., and only terminating at 350 degs., leaving as residue a small quantity of black substance resembling asphalt. All the fractions remain liquid after cooling, up to those distilled at 300 degs. This indicates that there are no notable quantities of naphthalene, anthracene, or other solid aromatic hydrocarbons. Several of them were also oxidised several times with potassium permanganate, and it was found that only acids of the acetic, propionic, butyric, and oxalic group were obtained. It seems certain that vacuum tar does not contain many hydrocarbons of the aromatic series.

The fractions obtained at lower temperatures are liquid, insoluble in water, and volatilise with it; they possess the odour of petrol, and are inactive in polarised light. Their composition ranges from C₉H₁₈ (b.p. 135 to 137 degs.) to C₃₀H₆₀ (b.p. 218 degs. at a pressure of 0.5 mm.).

As regards comparison with ordinary tar, it was found that the aromatic compounds in the latter are replaced in the vacuum tar by hydrogen-aromatic compounds, the homologues of benzene having given place to those of cyclohexane and of cyclohexadine, the phenols to the alcohols, and the quinoline bases to their dihydrogen derivatives. Certain further assumptions were verified by experiment, and the whole investigation in respect to gas and tar led to this conclusion:—The hydrogen and methane of illuminating gas, the ammoniacal liquor of gas, the phenols and aromatic hydrocarbons of the tar are not the immediate products of the dry distillation of coal. They are formed only at a higher temperature by the decomposition of other more complex volatile compounds, particularly more of the hydro-compounds which have been produced at the lower temperature.

FIREMEN'S, EXAMINERS' AND DEPUTIES' CERTIFICATES.

The Home Secretary has issued a circular with reference to the certificates as to the eyesight and hearing of firemen, examiners, and deputies under section 15 (1) (c) of the Coal Mines Act, 1911, pointing out that the first period of five years under the Act is coming to an end, and that it is necessary for expiring certificates to be taken out afresh, the obligation of seeing that these certificates are obtained resting with the management. The five years' period is reckoned from the date of the certificate.

The Secretary of State has prescribed the form of certificate (Mines and Quarries Form No. 73) to be used for the purpose. A certificate in any other form is invalid.

The expense of obtaining a five-yearly certificate in the case of a fireman employed as such at the time the certificate is obtained is to be borne by the mine owner. The Secretary of State has no power to prescribe the fees to be charged by medical practitioners, but he has fixed the maximum fee which may be charged by an approved school, institution, or authority for the certificate at 5s., or, if it is a certificate as to hearing only (which is all that is required in the case of a fireman employed in a mine in which inflammable gas is unknown) at 2s. 6d.

A fireman applying for a five-yearly certificate will be required at the time of examination to produce to the authority or medical practitioner, as the case may be, his certificate of qualification under section 15 (1) (b), and also, if he is applying for a certificate as to hearing only, a certificate from the manager of his mine that the mine is one in which inflammable gas is unknown. The certificate is to be kept at the office at the mine so long as the fireman continues to be employed there (section 15 (2)).

Every shot-firer appointed in pursuance of clause 6 of the Explosives in Coal Mines Order of September 1, 1913, must (unless employed in a mine in which inflammable gas is unknown) obtain five-yearly certificates as to eyesight similar to those required in the case of a fireman, and the foregoing remarks will apply in such cases except that the hearing test will not be necessary. The form of certificate prescribed under section 15 (1) (c) for firemen may be used with the necessary modifications for shot-firers, and the maximum fee which may be charged by an approved school, institution, or authority for the certificate will be 2s. 6d.

The official cards (Mines and Quarries Forms 74 A-E) for use by medical practitioners in applying the eyesight test are in the press, but will not be ready for three or four weeks.

THE TIN-PLATE TRADE.

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At the official basis of 30s. net, f.o.t. at works, a small trade in Class A orders was reported, delivery November onwards, but most makers are declining to entertain any new business at all. Unrestricted sizes have been sold at 47s. 6d. basis and upwards. The market is now almost cleared of these "free" sizes, the permission to sell which without a certificate is withdrawn on 31st inst.

Messrs. Bromell Patents Company Limited, the makers of "Simplex" specialties for power plants, have just completed the building of the first section of their new works in Glasgow, which is well lighted, and equipped with new machinery and electric drive. The extension will facilitate the quick execution of orders—a great convenience in the case of ships which may have only a brief stay in port.

CONTENTS.

EDITORIAL ARTICLES:—	PAGE
The Inter-Allied Conference	403
Trade of To-morrow	403
Suppression of Rock Dust in Mines	395
Working in British Columbia	396
Miners' Compensation (War Addition) Act	397
Dumper Plant at Conneaut	397
Research in 1915-16	398
Miners' Wages	399
Sir Leonard W. Llewelyn	399
Anti-Friction Bearings in Coal Mine Haulage	399
Maximum Prices of Scrap (Wrought Iron and Steel)	400
South Wales Mining Timber Trade	401
Firemen's, Examiners' and Deputies' Certificates	401
Institution of Mining Engineers	404
Obituary	407
Mining Industry and Military Service	407
The American Coal Trade	408
Labour and Wages	408
The Freight Market	412
Open Contracts	412
Government Publications	412
Publications Received	412
Abstracts of Patent Specifications Recently Accepted	414
New Patents Connected with the Coal and Iron Trades	416
THE COAL AND IRON TRADES	401
The Tin-plate Trade	401
The London Coal Trade	407
The By-Products Trade	407
CURRENT SCIENCE AND TECHNOLOGY	401
NOTES FROM THE COAL FIELDS	409
COAL, IRON AND ENGINEERING COMPANIES	412
MISCELLANEA:—	
Anarchy in the Donetz Basin	396
Effective Coal Control in America—Power from Sawdust	397
Iron and Steel Institute—South Wales and Monmouthshire School of Mines	399
Trading with the Enemy Acts	401
Certifying Surgeons Appointed	404
Price of Coal (Limitation) Act	406
Briquettes from Olive Cake	407
Midland Coal Diverted to London	408
South Russian Brown Coal—Coal Shortage in New Zealand	409
Prohibited Exports—Norwegian Fuel Question	412
Portuguese Coal Outputs and Imports	416

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Town Hall, Edmonton.

30th August, 1917.

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AND

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HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, AUGUST 31, 1917.

The London district shows very little change. The demand is strong both for house and steam coal, and supplies are much below the normal. The rough weather has seriously impeded cartage operations and lessened the supply of seaborne coal. Manufacturing coals are difficult to obtain, gas coke and slacks are plentiful. The Coal Controller's reorganisation scheme is in full swing, but the substituted qualities have given rise to a wholesale crop of complaints.

Business in Northumberland and Durham is still very limited owing to shortage of tonnage, and apart from a slight improvement in the demand for cokes, there is no outstanding feature of interest. Bunker sorts are very inactive.

In Yorkshire and Lancashire there is very great pressure for prompt delivery; pits are working full time, and very heavy supplies are being sent to London, especially of household kinds. The position of manufacturing coal continues satisfactory.

Humber ports are still occupied with shipments on behalf of Allies.

Midland districts report that there is at present no sign of any falling off in the demand for speedy delivery of coal for London and the south-west districts.

The South Wales trade has again developed a dull tone, and stoppages are to be looked for unless an adequate supply of wagons is forthcoming. The Coal Controller's regulations are not appreciated, and it is stated that early trouble may arise owing to the shortage of household coals.

Practically no change is to be noted in the Scotch fuel trade; business is still carried on under restricted conditions, and no improvement is looked for until export conditions take a turn for the better.

The position of the Irish trade remains unchanged, the demand keeping very active at Dublin, while at Belfast the supply of best qualities continues to be much below normal, and there is a brisk demand for households.

The freight market is still suffering from tonnage shortage; at the north-east coast there is a keen demand for French Atlantic ports for coal and coke; and in South Wales a similar state of affairs prevails, although rather more fixtures are reported.

A general meeting of the members of the North Staffordshire Institute of Mining Engineers will be held on Monday, September 10, 1917, in the Central School of Science and Technology, Stoke-on-Trent, at 5 p.m.

Mr. C. F. Rey, Assistant Secretary to the Ministry of Labour, has been appointed to act as Director-General of National Labour Supply. Mr. T. W. Phillips, Acting Assistant Director of the Employment Department of the Ministry of Labour, will be in charge of the Employment Exchanges.

The Inter-Allied Conference.

THE prominence which has been given to the Conference of the Socialist and Labour Parties of the Allied Nations, held this week at the Central Hall, Westminster, is out of all proportion to the significance of the various bodies represented at that gathering, which has not the smallest claim to speak for Labour as a whole, either in this or any other country. That the various Socialist sections would exert a desperate effort to make their voice heard at this stage of the world war has been long foreseen. It is an incident which has not only been predicted, but may be regarded as a normal result of the present situation. There is even ground for the suspicion that the whole movement has been engineered in the interests of Germany, where the Government knows only too well how to use these various groups to the furtherance of its schemes. Although it is not easy to bring forward clear and definite proofs of this point of view, it is impossible to deny that the Socialists of nearly every country have received much of their inspiration from German sources. It is at least a debatable question whether they may not have been deliberately fostered as a part of the general scheme of world domination which Germany has so cunningly engineered in every civilised country. Whether this is so or not, it is at least clear that, in their discussion of war aims, these bodies make a great point of the need for a German peace. A proof of this is to be found in their careful avoidance of a discussion of any question involving the responsibility for the war. It would have been thought that this would have been one of the first questions to be considered, for upon it must necessarily turn the whole problem of the restoration of peace. It can scarcely be conceived that any impartial enquiry into the principles of a just settlement of this matter could ignore the circumstances which led to the disturbance of the peace in the first instance. When a quarrel has to be adjusted, the first point is to define its cause. These Socialists, however, shirk that initial duty by the clumsy device of an anti-capitalistic formula. All wars, in their view, are due to the intrigues of capitalists. Even if this were true in the present case, it is difficult to understand how Great Britain can be held responsible for a war for which she was so manifestly and so lamentably unprepared.

The capitalist theory, however, is obviously not any longer to be held by the Socialist Majority in Germany. An interesting sidelight has lately been thrown upon this point in an article which appeared recently in the *Sozialistische Monatshefte*, from the pen of Herr AUGUST MÜLLER, an Under-Secretary of State. Writing about the problems of economic reconstruction after the war, he urges the necessity for German Socialists to abandon their doctrines about capitalism; and, of course, these tame satellites of Pan-Germanism will do as they are told. Herr MÜLLER points out that anti-capitalism will not work in the case of a crushed economic system, burdened with immense obligations and greatly impaired in technical capacity. In other words, the war having already destroyed capitalism in Germany, it is the duty of all good Socialists to endeavour to recreate it. Perhaps the Independent Labour Party, and the other anti-capitalist denominations in this country, who make such a parade of the evils alleged to arise from capitalism, will ponder over the abandonment by their German confederates of this foremost plank in their platform. But this is not by any means the only direction in which the German

Socialists have deserted their professed principles. No one can accuse them of any real leaning towards either pacifism or internationalism. In the same *Sozialistische Monatshefte*, there is an article by Herr MAX COHEN denouncing the "nonsense" that has been talked about political independence in Poland and Finland. A free Poland, it appears, would not suit the German programme at the present time, because the situation in Russia has kindled thoughts of renewed efforts to dominate that country after the war. German Socialism, in fact, is a plastic medium to be moulded as the exigencies of the Fatherland demand.

We do not quarrel with the decision of the German Socialists to place subservience to what are deemed to be their country's interests before the fetishes they have once seemed to worship; but it is difficult to understand the mental attitude of their *confrères* in other lands, who are still hankering after the revival of the International without the least concern for even the semblance of patriotic feeling. If they elect to remain true to their principles, fantastic as these may be, they should at least shun even the semblance of association with those who renounce the most elementary doctrines of their belief.

The psychology of war time is an interesting study. Pacifism will doubtless always exist in every community, no matter what devilish deeds an unscrupulous enemy may accomplish. It takes all sorts to make a world, and certain of these sorts will, as always, be driven to the necessity of making up for their numerical insignificance by a loud display of irresponsible chatter. We are thankful that British Labour has too much sense to be influenced by such delusions. The Conference itself was a fiasco owing to a failure to agree upon any point.

In the meantime, Mr. HENDERSON's inflated oratory, announcing that the decisions of the Conference would be regarded throughout the world as the considered judgment of the organised proletariat of the countries represented, has received a fitting rebuke from the Pemberton Miners' Association, which has strongly protested against the action of their executive committee in sending delegates without consulting the branches. The whole thing was a hollow farce from beginning to end.

The Trade of To-morrow.

A SMALL book has recently been published, entitled *The Trade of To-morrow*.* It is written by Mr. ERNEST J. P. BENN, whose work, *Trade as a Science*, has already been noticed in these columns. The subject connoted by the title is an attractive one. There are few persons interested in trade to-day who are not anxiously speculating upon the position in which trade will find itself to-morrow. By "to-morrow" most of us mean after the war; but Mr. BENN apparently takes a shorter view, and we gather from his book that the sooner his suggestions are put into force the better it will be for the national prosperity. And without prejudging the merits of his scheme, it may certainly be conceded that if it were well done, "it were well it were done quickly," for there is nothing that he proposes which could not as well be carried into effect to-morrow as at any later date. We are rather inclined to agree with Mr. DE VERE STACPOOLE that we are not using the economic lever as much as we ought for the purpose of bringing the Germans to their senses. This, however, is a matter for the War Cabinet to consider. Mr. BENN appeals, as far as we gather, primarily to the Reconstruction Committee, and he aims at the solution of industrial problems which would still have existed even if there had been no war at all. The war has, it is true, rendered them more evident and more urgent, and the more general recognition of this fact is one of the few benefits that has yet resulted from it.

At the outset, Mr. BENN defines the general position thus: the nation requires more production, while the march of civilisation demands less work. Our main problem, therefore, is to reconcile these two conflicting facts. He says: "When the war is over we shall be faced with the necessity of raising to its highest point the productive capacity of the nation." That is indisputable; but it is equally true now, and it would be well if this point were more generally appreciated by those, fortunately few in number, who appear to think that war time is an

* *The Trade of To-morrow*, by Ernest J. P. Benn. Jarrolds Publishers (London) Limited. 1917. Price 2s. 6d. net.

appropriate opportunity to press for impossible or extravagant concessions.

The author of this little book assumes that "most of the new ministries, which have sprung up like mushrooms, must come to an end when the transient need has passed." With this, again, most people will agree. The aim of Reconstruction should certainly be, as he maintains, to blot out the effects of war as speedily and as effectually as possible. This will not be easily done. There will undoubtedly be a struggle between those who think that the State should continue in the trading career which it has recently adopted, and those who maintain that we should revert to unadulterated private enterprise. The result, in Mr. BENN's view, will be in the nature of a compromise between the two schools of excessive State Control and *laissez faire*. He adopts, however, an attitude of rigid antagonism to the former, and holds that the war has shown that the more the State has to do with the actual work of production, the more the waste and extravagance involved. We are inclined to endorse this view as an abstract principle; but, in justice to the opposite view, it may be doubted whether this conclusion can be legitimately drawn from our experience of the last three years. The nation was caught unprepared for war. A grave emergency arose, and certain vital objects had to be at once secured *coûte que coûte*. Some allowance should certainly be made for the serious difficulties with which the Government was confronted. That mistakes should have been made under these conditions was inevitable. But to admit this is not to endorse the view of the *New Statesman*, which has hailed with enthusiasm the development of State control over the whole domain of industry. We accept Mr. BENN's conclusion for a different reason altogether—viz., because the orthodox official mind is not the type that is required for success in business. Equally unfitted is the successful man of business for discharging the functions of a State official. There has been at times a loud demand for a business Government, but the two types of mind best fitted for business on the one hand and government on the other, are clearly immiscible, except perhaps within very narrow limits.

The supporters of the principle of *laissez faire*, on the other hand, go to the opposite extreme. It is impossible to exclude the State entirely from the domain of industry. There are, in fact, three partners in industry, (1) The State, (2) Labour, (3) Capital. The interest of each must be kept in view in every industrial system. To ignore any one of them is impossible, although various systems have aimed at so doing, as for instance the Marxian Socialists, who would ignore Capital. Mr. BENN endeavours to apportion the functions of each of these partners in accordance with accepted economic principles. This is the real modern meaning of trade organisation—a phrase which is much in the air at the present time. But, unfortunately, hitherto the essential points have been too much obscured by the multiplicity of schemes which have been advocated. The chief value of this book lies in the clear enunciation of a cut-and-dried plan whereby industry may be given an effective place in the Constitution, and the method advocated has certainly the merit of comparative simplicity.

Without going fully into the details of the new machinery which Mr. BENN advocates, his proposals may be briefly summarised as follows:—A Ministry of Commerce and Industry should be set up, whose main duties would consist in establishing and co-ordinating trade councils for the different industries. These trade councils would perform for industry functions analogous to those of the county councils, and would relieve the Government of all detail work in connection with their respective spheres. The trade councils would consist of representatives elected by the trade associations and the trade unions, in addition to which there would be an official element representing Government departments and other interests. The trade unions and trade associations, which would enjoy State recognition, would also be placed upon a real representative basis by the establishment of an industrial franchise. Thus every worker and every employer would have a trading or industrial vote, in addition to the Parliamentary and Municipal vote, by which means the State would be enabled to ascertain the views of each particular industry. In

this way industry would be given a constitution, and the domain of business would be placed upon a footing equal to the political domain.

The advantage of such a scheme would be two-fold. Not only would the industries be organised individually and collectively, but many matters of purely business administration would be capable of being settled by persons possessing practical knowledge and experience, instead of being left to the caprices of politicians, the majority of whom have no means of adjudicating upon the merits of the case. In other words, purely domestic trade questions would be removed altogether from the sphere of politics.

This is the scheme, and the greater part of Mr. BENN's book is devoted to its amplification. There is much to be commended, and perhaps, also, much to criticise in these suggestions, which are offered by the author for careful consideration and study. As a constructive scheme, it should be especially welcome at this time when so much confusion prevails in regard to the questions with which it is concerned.

INSTITUTION OF MINING ENGINEERS.

The 28th annual general meeting of the members of the Institution of Mining Engineers will be held in the Lecture Theatre of the North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, on Friday, September 14, 1917, at 11 a.m. The following papers will be read, or taken as read:— (1) "American Notes," by Samuel Dean; (2) "The Oxidisable Constituents of Coal—Part I," by J. Ivon Graham and J. Hill.

The following papers, which have already appeared in the *Transactions*, will be open for discussion: (a) "Modern American Coal Mining Methods, with Some Comparisons," by Samuel Dean (vol. i., p. 179, and vol. ii., pp. 35, 340, 386, and 458); (b) "The Spontaneous Firing of Coal," by J. S. Haldane, M.D., F.R.S. (vol. liii., p. 193); (c) "Acetylene Mine Lamps," by William Maurice (vol. liii., p. 237); (d) "Contribution to the Micro-Petrology of Coal," by George Hickling (vol. liii., p. 137); (e) "The Higher Training of Colliery Managers," by G. L. Kerr (vol. liii., p. 182); (f) "The Economical Production and Utilisation of Power at Collieries," by F. E. Mairet (vol. lii., pp. 71 and 239, and vol. liii., pp. 58, 76, and 159); (g) "Some Practical Notes on the Economical Use of Timber in Coal Mines," by F. C. Lee (vol. liii., pp. 86 and 162).

Members desirous of taking part in the discussion may obtain an advance copy of each of the papers in which they are interested from the assistant secretary, the North of England Institute of Mining and Mechanical Engineers, Neville Hall, Newcastle-upon-Tyne, who will be pleased to receive written remarks thereon from those who may be unable to be present.

Members' and visitors' letters may be addressed during the meeting week: c/o The North of England Institute of Mining and Mechanical Engineers, Neville Hall, Newcastle-upon-Tyne. During the meeting the headquarters of the members will be at the Central Station Hotel, where the management have quoted a special rate of 8s. 6d. per head for bedroom, table-d'hôte breakfast, attendance, lights, and use of bath.

THE IRISH COAL TRADE.

THURSDAY, AUGUST 30.

Dublin.

The position this week remains unchanged, the demand keeping active both locally and in the country districts, prices of all qualities being unaltered at late rates, viz.: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount. Scotch steam coal, 41s.; coke, 45s. per ton. Irish coals from the Wolfhill Collieries, Queen's County, are: Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.r. Athy, on the Great Southern and Western line. The strike of 300 labourers engaged in the construction of the Wolfhill-Athy Railway has been settled, an advance of 6d. per day in addition to the 6d. an hour worked being granted, with a reduction in working hours. It is stated that a large firm of manufacturers in Limerick recently fitted furnaces, and are now using coal from Irish collieries in place of Welsh steam coal, of which there is a shortage, with satisfactory results. The total quantity of coal discharged upon the Dublin quays during the past week from English, Welsh, and Scotch ports was 31,000 tons. Freights remain unchanged.

Belfast.

The supply of best qualities continues to be much below the normal, and there is still a brisk demand for household coal in the port. The carrying out of the inland trade is again hindered by the shortage of railway wagons. Large supplies of Scotch coals are being distributed over the districts on the Great Northern system. Current quotations for house coals are as follow: Best Arley, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Cheapest Scotch steam coal is 29s. per ton, and best qualities up to 35s. and 37s. 6d. per ton. The price of gas coke ranges from 37s. 6d. to 40s. per ton; foundry coke, from 60s. to 65s. per ton. Irish coal at Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton, and 30s. delivered in Belfast.

Appointed.—The Chief Inspector of Mines, in pursuance of the appointment of Dr. C. E. R. Gardiner, has been appointed to the position of Inspector of Mines under the Factory and Workshops Acts, in the district of the county of Donegal. Mr. Gardiner is a son of Mr. Burton Latimer (Northants), and is now residing at Whitehaven (Cumberland).

THE COAL AND IRON TRADES.

THURSDAY, AUGUST 30.

Scotland.—Western District.

COAL.

There has been practically no change in the Scotch coal trade during the past week. Business is still carried on under restricted conditions, and no great improvement can be looked for until the export trade resumes something approaching former dimensions. In the west of Scotland district the industrial demand maintains a fairly high level, and collieries are managing to keep things moving without any undue amount of idle time. Shipments for the past week amounted to 140,534 tons, against 138,995 in the preceding week and 122,863 tons in the same week last year. Prices remain on the same basis as last week.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	22/-27/6
Ell.....	26/6-28/	26/6-28/	24/-26/
Splint.....	28/-30/	28/-30/	25/-35/
Treble nuts.....	23/	23/	23/
Double do.....	22/	22/	22/
Single do.....	21/	21/	21/

IRON.

There is no falling off in the activity in all branches of the Scotch iron trade. Materials of all descriptions are in constant request, either directly or indirectly for war purposes, and the producing works are taxed to their utmost. It is now almost impossible for private consumers to secure deliveries. In pig iron the call for hæmatite is very insistent, while foundry and forge iron are taking their share of the orders. Prices are firm and unchanged. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. The output of malleable iron is now very much reduced owing to the utilisation of the mills for the production of steel. Prices of the former are firm, however, on the basis of £15 15s. to £16 per ton f.o.b. Glasgow. The supply of black sheets is considerably under requirements, and ordinary consumers have to manage with very small quantities. It is anticipated that outputs will show a substantial expansion in the near future. The engineering trades generally are fully occupied with lucrative contracts.

Scotland.—Eastern District.

COAL.

The prevailing conditions in the Lothians coal trade are dull. Local demands are not large, while Admiralty and the ordinary shipping business is off at present. Shipments for the week amounted to 17,733 tons against 20,571 in the preceding week, and 32,028 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	28/
Secondary qualities.....	25/6	25/6	27/
Treble nuts.....	23/	23/	23/-24/
Double do.....	22/	22/	22/-23/
Single do.....	21/	21/	21/-22/

In Fifeshire, too, conditions are quite unsatisfactory. Home demands are quickly met, and idle time is very frequent. Clearances were 33,148 tons against 18,126 in the preceding week, and 59,655 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	39/-41/
Unscreened do.....	24/-25/	24/-25/	37/6-40/
First-class steam coal.....	28/	28/	35/
Third-class do.....	24/	24/	28/
Treble nuts.....	23/	23/	23/-25/
Double do.....	22/	22/	22/-24/
Single do.....	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 191,415 tons, compared with 177,692 in the preceding week and 214,546 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

Business in the local coal market during the week under review has been exceedingly limited, owing to the shortage of tonnage. Indeed, there has been no outstanding feature of interest save that some improvement in the demand for coke is to be noted, and that Durham gas coals, smithies and coking sorts have continued in good request for inland consumption. Many pits in both counties have been hard hit for want of cargo space, and have only been able to continue work very irregularly. Northumberland has been an especial sufferer in this respect, the bulk of its output being, of course, produced for export. At the time of writing, those collieries producing best coals are stated to be fairly well situated so far as tonnage supplies are concerned. Producers of steam coal are being helped by the considerable demand from Scandinavia for fuel, in respect of which a certain amount of stemmed tonnage is being sent over, whilst several vessels have been chartered on the Tyne freight market. Pits the output of which consists of secondary fuel, are not nearly so well accommodated, and are offering their commodities in excessively large quantities at bare minimum figures. The bunker coal market is particularly inactive at present, little business being done either for prompt or forward delivery.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	37/6-45/
Do. Tynes (Bowers, &c.)	29/6	29/6	37/6-40/
Secondary, Blyths	25/6	25/6	30/-35/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/-40/
Unscreened	23/6-25/	23/6-25/	27/6-35/
Small, Blyths	20/	20/	24/-25/
Do. Tynes	18/6	18/6	22/6
Do. specials.....	20/6	20/6	25/-27/6
Other sorts:—			
Smithies.....	25/-30/	25/-30/	25/-30/
Best gas coals (New Pelton or Holmside)	25/	25/	34/-35/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	30/
Special gas coals	26/6-30/	26/6-30/	37/6
Unscreened bunkers, Durhams	24/-25/	24/-25/	23/-26/
Do. do. Northumbrians	24/-25/	24/-25/	27/6-32/6
Coking coals	24/-25/	24/-25/	25/-27/6
Do. smalls	24/-25/	24/-25/	23/-25/
House coals	28/6-30/	28/6-30/	40/-45/
Coke, foundry	42/6	42/6	40/-45/
Do. blast-furnace	42/6	42/6	37/6-40/
Do. gas	29/-30/	29/-30/	33/-35/

Sunderland.

COAL.

The coal market has a slightly better tone, a fair number of steamers have turned up, and the collieries have a fuller supply of prompt tonnage on hand; their prospects are accordingly brighter, and for this week steady work is expected. All descriptions of coal are readily obtainable. Smalls continue to accumulate at the pits, but there is a slightly better demand for coking coal, both for home and shipment. Household coals are weak, and bunkers are very dull; coke is meeting with a brisk enquiry, the consumption of furnace sorts being much heavier than it was. Market values are nominally steady, but unchanged at the official figures as per list below. The outward freight market is still suffering from an acute shortage of tonnage. Gothenburg has been fixed at the high figure of 200 kr., and Gibraltar at 85s., for neutral steamers; only a moderate amount of business is heard of in allocations for France. The home coast demand is active, and rates are firm on the basis of 16s. to 17s. for London.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	37/6
Secondary do.....	23/6-25/	23/6-25/	30/
House coals:—			
Best house coals	30/	30/	38/
Ordinary do.....	28/	28/	30/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	35/
South Hetton do.....	28/6-30/	28/6-30/	35/
Lambton unscreened ...	24/	24/	26/6
South Hetton do.....	24/	24/	26/6
Do. treble nuts	20/	20/	—
Coking coals unscreened	25/	25/	25/
Do. smalls	25/	25/	24/
Smithies.....	25/	25/	25/
Peas and nuts	24/6-26/	24/6-26/	26/
Best bunkers.....	25/	25/	25/
Ordinary bunkers.....	24/	24/	23/
Coke:—			
Foundry coke	42/6	42/6	45/
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	33/

Middlesbrough-on-Tees.

COAL.

No change of moment is noticeable in the fuel trade, considerable enquiries from neutrals continue, and a few orders are accepted from time to time, mainly for Norway and Denmark. Tonnage irregularities continue to cause much inconvenience, the non-arrival of steamers overdue being accounted for to a very great extent by delays in discharge abroad. Official absorption of coal is increasing, and promises to become heavy. Sellers are eager to book coal orders at the fixed minimum rates. Quite a brisk business is passing in best Durham gas coals, and this promises to continue, but second qualities are slow of sale. Bests are 25s., and seconds 23s. 6d., whilst Wear specials are 26s. 6d. Bunkers are in only moderate request. For unscreened Durhams the price ranges from 24s. to 25s. Coking coal continues to be fairly well taken up at unchanged prices. Coke conditions are unaltered. Beehive and patent oven are each quoted 42s. 6d., and gas-house product is in fairly good request at 28s. to 30s. Blast-furnace coke is in large demand for local use, and fixed maximum rates still rule, average kinds realising 28s. at the ovens, and low phosphorus sorts selling at 30s. 6d. at the ovens.

IRON.

Much firmness characterises the pig iron branch of trade, and, so far as Cleveland descriptions are concerned, anticipated renewal of activity after the local holidays is being realised. With supply quite plentiful, September allocations to home customers are being issued freely, and arrangements are proceeding for distribution of next month's supplies. Very considerable Continental enquiries are in the market, but they are not resulting in anything like extensive business, though plenty of iron is available for shipment, and tonnage arrangements are stated to be better. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d., and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. No new development is noticeable in the east coast hæmatite department. Rigid official supervision of distribution continues to assure adequate supplies to customers accessible by rail, and strenuous efforts are made to ship to our Allies as much iron as possible against old contracts, but new business is quiet. Occasional home transactions are reported, but foreign sales are not heard of. Nos. 1, 2 and 3 are 122s. 6d. for home use, 137s. 6d. for shipment to France and 142s. 6d. for export to Italy, the export quotations being nominal. A fair amount of business is passing in foreign ore, and supplies are coming steadily to hand. There is no change of importance in the finished iron and steel industries. Suspension of opera-

tions at the works last week has enabled essential repairs and renewals to plant to be made. Government requirements continue heavy, and demands of the shipyards are large and growing. Quotations are well upheld.

Cumberland.

Maryport.

COAL.

The Cumberland coal industry remains in a fairly steady condition. Of course, trade is not as brisk as it was in April or May, and requirements, either for shipping or local purposes, are not so large; but there is now a much better enquiry for fuel for home use, and the tone of the market is steadily improving. About the middle of last week the dislocation in the iron and steel trade in West Cumberland was beginning to affect both the coal and the coke industries. One or two of the coke plants were on short time for a few days owing to lack of empties, but so far very little time has been lost, and practically all the collieries in the county are still working on an average of six days a week. Happily the trouble at the iron ore mines has been settled, and with the increased activity in the iron and steel industries in West Cumberland, the coal trade is almost certain to be very much brisker during the next few weeks. The collieries have still enough orders to be going on with, and while there is sufficient coal being raised to meet all requirements, the supply is very little, if any, in excess of the demand. Large quantities of works and coking fuel are still being imported from the east coast, but it is mainly for shipping, for the local railways and for use at the by-product coke ovens. Landsale is very much steadier, and the demand for house coal has improved considerably during the last week or two. Nearly all the depots are busier, and new business is coming in more freely. Industrial needs are considerable, and although local requirements are not as large as they were, they may be much larger during the next few weeks, when all the furnaces which have been damped down are again put into full operation. Gas coal is in firm request, and engine fuels for local use are in steady demand. The export trade is rather easier, and business on Irish account is quieter than it has been this year. The demand for works fuel is good, but house coal is dull. As a rule, however, this is usually the quietest time of the year, so far as the Irish shipping trade is concerned. The shipments at most of the Cumberland ports are therefore very much below normal this week. For the present, at any rate, Irish needs are not quite so heavy, but business in this branch will no doubt improve again as soon as the harvest is over. During the week seven vessels have sailed with coals, all for Irish ports, and the shipments have amounted to 1,300 tons, as compared with 4,205 tons at this time last year, or a decrease of 2,110 tons compared with the previous week. The largest cargoes have been for Coleraine, Carrickfergus and Bangor. Coke is slightly easier, and local coke makers have not been quite so busy of late. The majority of the ovens, however, are still in operation, and a large portion of the output is going to the local blastfurnaces. The by-products trade is active, and all the plants in this district are working at their fullest capacity. Prices of all varieties are firm, and the only change that has occurred since last week is that bunkers, which were formerly quoted at from 25s. and 30s. per ton, have been fixed at 28s. 6d. per ton, for both coastwise and foreign-going vessels. At Workington, best house coal delivered is 1s. 4d. per cwt., or 25s. 10d. per ton, with best washed nuts at 1s. 3d. per cwt., or 24s. 2d. per ton. Other current quotations are as follow :—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberland coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " "	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit.....	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberland coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	28/6	25/	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

There has been a marked improvement in the condition of the hematite pig iron trade in Cumberland and North Lancashire, and the outlook, as far as production is concerned, is now very much brighter. The dispute pending in the Cumberland iron ore industry has been settled, and work was resumed at most of the mines with the first shift on Monday morning, and all the furnace plants will soon be in full swing again. The market for pig iron is very firm, and the demand for both ordinary and special brands of iron keener than ever. Makers have sufficient business on hand to keep them fully employed for the next few months, and requirements of both local and outside users are still increasing more quickly than they can be dealt with, practically all the output going into consumption on Government account. The pig iron in stock in Cumberland storing yards now only amounts to 430 tons. Prices are unchanged at the Government maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at cash at 115s. per ton. Special iron is 140s. per ton, and semi-special at 135s. per ton f.o.t. The steel industry continues in an exceedingly brisk condition. Some of the mills have been idle for a few days, but work is being resumed in all departments. Engineering is brisk, and all the shops are very busily employed.

South-West Lancashire.

COAL.

So far as regards house coal for inland purposes the situation changes very little. The demand keeps far above the actual present consumption, and what is being stocked

is as a general rule being taken by the ultimate user, and not by the merchant at his wharf. Shipping requirements for ordinary bunkering and export continue on the comparatively moderate scale that is to be expected in view of the shortage of carrying tonnage. Admiralty demands are fairly heavy, and after these are satisfied there is little or no surplus coal. Prices, of course, are in accordance with the Controller's official list. With regard to the coastwise and cross-Channel trade for household fuels, the merchant is anxious to get much more than can be delivered. Slacks and small fuel, notwithstanding the full production, finds a market. Factors and merchants are busy equally with the colliery proprietors with the new control scheme, the merchant to see that he has a sufficiency of the new fuels of suitable grades for his business, and the producer that he has the tonnage and the grade necessary to meet the allocation that has been passed over to him.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Best	21/-22/	21/-22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	23/-24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. No change can be reported as to the condition of the trade. Little actual business passed, the minds of members being almost wholly occupied with the allocations of fuel, and there is a disturbed feeling abroad as to the possible results. Supplies of house coal are not equal to the demand—in fact, pressure is on all classes of fuel except perhaps slacks, the present consumption of which is reduced by holidays at different towns. Prices generally are as below :—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Best	22/-23/	22/-23/	22/-23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/-18/6	18/-18/6	18/-18/6
Furnace coal	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

IRON.

Conditions remain the same. The full output of both iron and steel works is allocated by the Government. There are no changes to report in prices of pig iron. The foundries are busier than they have been, with good No. 3 foundry pig procurable at £4 18s. 11d. and cast scrap at £5 10s. Boiler makers are not able to secure any quantity of plates, and consequently boilers that would have been removed have to be kept at lower pressures, or replaced with second-hand ones. Engineers full of work, also wagon builders.

Yorkshire and Derbyshire.

Leeds.

COAL.

The market on Tuesday attracted a larger than average attendance, all branches of the industry being well represented. The distribution scheme was the subject of a good deal of more or less animated conversation. As the date for the scheme to come into operation approaches and the Coal Controller's new allocations of supplies come to hand, a feeling of concern as to the working of the scheme and its probable local effects is arising. At present matters appear to be in great confusion, and although by the time the scheme comes into operation things may have been smoothed out, it is the strong and apparently unanimous feeling of the trade that the date ought to be deferred, with a view to minimising the disturbance and unsettlement which is necessarily entailed. So far as the current demand is concerned, there is very great pressure for prompt delivery, particularly of house coal and large steam coal. Of the latter quality there is very great scarcity at the present time. Colliery agents on the market reported

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Prices at pit (London) :			
Haigh Moor selected ...	20/-21/	20/-21/	20/-21/
Wallend & London best	19/-20/	19/-20/	19/-20/
Silkstone best	19/-20/	19/-20/	19/-20/
Do. house	17/-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull :—			
Haigh Moor best	23/-24/	23/-24/	23/-24/
Silkstone best	22/-23/	22/-23/	22/-23/
Do. house	20/-21/	20/-21/	20/-21/
Other qualities	19/-20/	19/-20/	19/-20/
Gas coal :—			
Prices at pit :			
Screened gas coal	16/-17/	16/-17/	16/-17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/	15/-16/	15/-16/
Other sorts :—			
Prices at pit :			
Washed nuts	17/-18/	17/-18/	17/-18/
Large double-screened engine nuts	16/-17/	16/-17/	16/-17/
Small nuts	15/-16/	15/-16/	15/-16/
Rough unscreened engine coal	15/-16/	15/-16/	15/-16/
Best rough slacks	14/-15/	14/-15/	14/-15/
Small do.	12/-13/	12/-13/	12/-13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke :—			
Price at ovens :			
Furnace coke	25/8	25/8	25/8

full time working of the pits, but the output has for some reason reached the pre-holiday level. The demand for house coal for London, if it varies at all, is not such that the pressure can hardly affect the collieries, and it is not to take instructions with regard to deliveries from the Coal Controller. Very big quantities are being sent to London from West Yorkshire, and provincial consumers are grumbling considerably that they are being left short in order to supply London. There are those familiar with this branch of the trade who are confident in their opinions that present indications are in the direction of eventually a comparative glut of coal in London at the expense of the provincial markets. London representatives, however, report that coal is still very scarce at depots south of the Thames. In the coastwise branch there is not much doing, and what there is is mainly from Goole. Freights are fairly steady, but very few boats are offering, an average rate being about 16s. for handy-sized boats. House coal merchants in the West Riding experience a steady trade. The great scarcity of best qualities is still a feature. The position in regard to manufacturing coal shows no change, being fairly satisfactory, and the same applies to gas coal, except that supplies of these qualities are also being reorganised and some works are having to suffer. In view of the unsettled situation new contracts are not being entered into. Coking slacks continue to be very firm, and washed furnace coke is very scarce, except perhaps in regard to some inferior qualities.

Barnsley.

COAL.

In every branch of the trade the utmost activity prevails, and the shortage of fuel is experienced in almost every respect. So far as manufacturing fuel is concerned, there is every evidence of the activity of the Controller to ensure something like proportionate supplies, and in case of any surplus fuel, this is speedily dealt with through that source, preventing any opportunity of placing it on the open market. The new conditions still call for the careful attention of colliery staffs. Though the product of large steams is well maintained, the demand absorbs this, and exceptionally large supplies interfere with the usual contract deliveries. The export trade continues to be of a restricted character, apart from the shipments to the Allies and the requirements for Admiralty purposes, which, so far as this district is concerned, continue to be of an extensive description. A large tonnage is still required to keep pace with the needs of the railway companies, whose stocks are not so large as desired. There is still a shortage of steam nuts, which are again in almost full demand for the munition and engineering concerns. A good deal of pressure is again felt for coking slacks with the constant effort to keep the by-product plants in full operation, owing to the big demand for furnace coke, particularly for the North Lincolnshire district. Contract deliveries of gas coal are the subject of more enquiry, owing to the heavier demands upon gas concerns, and there is a much larger consumption of nut slacks by the electricity plants. The position in regard to house coal is practically unaltered as regards the supply, but there is a greater rush on the collieries, which, however, cannot be met. The restrictions are not relaxed in regard to the large supplies for London and the south, though there are expectations that shortly this will be so, having regard to the big quantity which has been sent in that direction. Nearer areas are keenly waiting the opportunity to receive increased contract deliveries to meet the large number of orders on the books. Values are again mainly of a nominal character, about as follow :—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals :—			
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	17/-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals :—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/6-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals :—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.

COAL.

Supplies of coal are coming over rail fairly well, but they are only sufficient to meet current requirements and contract commitments. The demand upon the Yorkshire and Derbyshire output for all purposes is enormous, and collieries are finding it more and more difficult to keep pace with it. Home consumption for industrial and official purposes is inexorable, and the pressing needs of our Allies must be attended to to the maximum of our power. Shipments from the Humber ports are now chiefly concerned with the latter, and although delays to shipping are not unknown, every effort appears to be made to push supplies over rail forward so that vessels may leave promptly. Large steams are well taken up, and West Yorkshire Hartleys in particular are sought after for French customers. Nuts and small coal are practically unobtainable for export. House and gas fuels are in keen request. The prompt market is firm, and values maintained at the level of the official minimum schedules.

Chesterfield.

COAL.

All classes of coal are in great request, but supplies are far short of the needs of the market. House coal orders are still coming to hand in goodly numbers, with little prospect of early deliveries in execution of them. Manufacturing kinds are in brisk demand, cobbles and nuts being very urgently wanted. These qualities, however, are difficult to procure in anything like adequate quantities. Gas coal and steam coal for locomotive use are eagerly sought after for

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

mediate delivery. There is a steady enquiry for slack for burning purposes. The export trade continues to be very active and so far as Derbyshire coal is concerned, it is at a standstill. The coke market is very active, and the whole of the production of the district is being turned into consumption.

IRON.

Works of the district continue to be fully employed, and customers are pressing for deliveries of all classes of iron. Engineers and ironfounders are very busy.

Nottingham.

COAL.

There are indications that the pressure on collieries is increasing with the approach of the autumn. The demand on local merchants has become more active since the advent of colder weather, and although they are receiving fair supplies from the pits considering the exceptional circumstances, they are unable to fully comply with customers' requirements, particularly with respect to some of the better class grades of household. There is a stronger enquiry for hards, but it is difficult to obtain much of this class of fuel for household use in view of the heavy demand for war purposes. All grades of steam coal continue in big request, and apart from contracts and war requirements there is very little for the open market. There is a scarcity of small manufacturing fuel, and it is still difficult to cope with the demand for nuts on account of the heavy tonnage needed for munition works. Slacks are going out of hand briskly, and it is almost impossible to satisfy the need for those grades used in the manufacture of coke. The output of gas coal is fully absorbed by contract obligations.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/-	17/-18/-	16/-16/6
Best hard coals	16/9-17/6	16/9-17/6	17/-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/-	12/-13/-	12/-13/-
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/-	11/-	11/-

Leicestershire.

COAL.

A very large proportion of the supplies are taken up day by day to increase the reserves required for London and district. During the past three months the deliveries have been very much in excess of the average since the outbreak of war, and there is at present no sign of any easing off in the demand for speedy deliveries. The views of colliery managers generally are that if the rate of delivery is maintained till the end of the year it is almost impossible to have any shortage in London and district during the coming winter. The demand, however, continues to be remarkably keen, and embraces all qualities of coal. Merchants are glad to accept deliveries of any class of household, large or small nuts, that may become available at any time. Very good nuts, free from dust, are very much favoured, as they are easy to handle by the lighter and less skilled labour now generally available. Small nuts for mechanical stokers command a very brisk trade, and the whole of the supplies are taken up as fast as they are available. There is a strong demand for all classes of household for the south-west of England in order to increase the reserves on hand. Country coal merchants complain that their orders are very much behind in delivery, and very urgent calls are being made for larger deliveries for public works and institutions. There is every sign that the supplies next month will show a large increase to remedy this grievance. Very little stocks are in hand at country stations, and none whatever at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/-	16/6-18/-	17/-19/-
Second, hand picked	15/6-16/6	15/6-16/6	15/6-17/-
Deep screened cobbles ...	16/-17/-	16/-17/-	16/6-17/6
Deep large nuts	16/-16/6	16/-16/6	16/-17/-
Bakers' nuts	15/-15/6	15/-15/6	15/-16/-
Small nuts	14/6-15/-	14/6-15/-	14/6-15/6
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/-	6/-7/-	6/-7/-
Main nuts for London			
Kitcheners	13/6-14/-	13/6-14/-	13/6-14/6
Steams, best hand picked	14/-14/6	14/-14/6	14/-15/-
Steams, seconds	13/-13/6	13/-13/6	13/-14/6
Main cobbles for kitcheners	13/6-14/-	13/6-14/-	13/6-14/6
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

COAL.

The shortness in the coal supply in this district is likely to become accentuated owing to the action of the Coal Controller, who has given instructions that a proportion

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase) :—			
House coal, best deep ...	22/-	22/-	22/-
Do. seconds deep	20/-	20/-	20/-
Do. best shallow	19/-	19/-	19/-
Do. seconds do.	18/-	18/-	18/-
Best hard	18/6	18/6	18/6
Forge coal	16/-	16/-	16/-
Slack	11/6	11/6	11/6
Warwickshire :—			
House coal	19/-	19/-	19/-
Do.	8/-	18/-	18/-
Do.	0/-	20/-	20/-
Do.	6/-	16/-	16/-
Do.	4/6	14/6	14/6
Do.	4/6	14/6	14/6

of Midland coal must be sent to London each week. As all the available coal was already being distributed as fast as it could be obtained, and as there is no emergency stock, this new development is likely to be strongly resented. Pressure is so keen that there is the greatest difficulty in meeting contract deliveries, and the pits are greatly exercised in even approximately meeting the demand. All descriptions of manufacturing fuels are quickly snapped up, and there is nothing on the open market except, perhaps, some lots of the commoner slacks, which few people want so long as they can get better qualities. For house coal, too, merchants are as intent as ever in securing supplies for immediate delivery, and stocking at the depots is impossible for the time being.

IRON.

The iron and steel industries continue to be marked by ceaseless activity. The sheet branch is an exception, and a good deal of interest has been focussed in this by the report that maximum prices for sheets are about to be fixed. Present uncontrolled rates are £28 10s. for galvanised and £19 10s. for black sheets. Merchants express themselves as indifferent so long as reasonable prices are fixed, in accordance with prevailing conditions. They point out that already the material they use is controlled, and it is an easy step to the control of the finished article. Sheet bars, for instance, are doled out sparingly at fixed prices, and galvanisers have to obtain spelter from the Government before they are able to undertake orders. This branch of the business has dwindled to a very low ebb, and a large portion of the galvanising plant is idle. The strength of the bar iron branches is fully maintained, and the margin of material on the market, after Government needs are satisfied, is becoming more and more restricted. Outside the controlled classification—£15 10s. less 2½ per cent. for marked bars, and £13 15s. net at makers' works, for merchant bars—rates are very stiff. The quotation for puddled iron is maintained at £12 5s. to £12 10s., a figure which tends to keep up prices of nut and bolt iron and also small sizes. The latter are very difficult to obtain, so full up are makers with orders. For the larger gauges—three-quarters inch and upwards—the quotation is £14 10s.; for three-eighths sizes, £16 10s.; and for the thinner gauges price is largely regulated by delivery. The pig iron market keeps firm. Output of forge and foundry grades is affected by the efforts being made to hasten the output of basic iron. Furnaces are being gradually started in different parts of Northamptonshire and Derbyshire, and some important enterprises, it is said, are in contemplation in Staffordshire. The result is the smelters are compelled to keep a tight hand upon such proportion of their potential output as is uncommitted, and buying beyond two months ahead is not in most cases encouraged. The market for wrought iron scrap will be aided to some extent by the new Order revising maximum prices. All descriptions have now been put on the same basis of £6 5s. a ton, instead of being graded from £5 5s. to £6 5s. These prices are free on rail, 10s. is allowed for carriage, plus 2½ per cent. for the merchant, and an extra 15s. if sheared and cut up ready for piling, so that the price delivered will work out at about £7 13s. 4d. a ton. Outside the 10s. radius the benefit will not be so marked. Staffordshire is not affected by the new official Order fixing the price of tin-plates. The steel trade is characterised by ceaseless activity, directly or indirectly in the production of munitions of war. The scarcity of billets is very pronounced. Birmingham Brassmasters' Association has passed a resolution protesting against the Order with respect to the sale and purchase of brass swarf.

Forest of Dean.

COAL.

The conditions at the house coal collieries in this coal field become more strenuous as the colder season approaches. The order books at all the pits are heavily filled, and in many cases there is a delay of three or four weeks in getting off supplies. Merchants are endeavouring to lay in stocks, but are experiencing considerable difficulty in getting a portion of their requirements. Steam coals, too, are in heavy request, and the collieries are quite unable to accept all the orders offered.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals :—			
Block	24/-	24/-	21/6
Forest	23/-	23/-	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/-
Rough slack	13/6	13/6	13/-
Steam coal :—			
Large ..	20/-21/-	20/-21/-	18/-19/-
Small ...	16/-16/6	16/-17/-	16/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

COAL.

Messrs. W. Wade and Son report that the merchants of the west of England feel considerable apprehension as to the re-arrangement of their house coal contracts under the new traffic regulations, as it is believed that smaller quantities and some very inferior qualities will be proposed by the committee. It is also feared that the present delay in arrangement will have the effect of preventing sufficient supplies being forwarded to form the usual autumn stocks, especially in the country districts. A plan has been locally suggested to the Coal Controller, by which an extension of his present plan would easily secure very plentiful supplies of house coal for the London and central districts of England from coal fields now only half employed, without disturbing any of his other far-reaching transit arrangements.

The Hoesch Iron and Steel Works, of Dortmund, Germany, with a capital of 28,000,000 mk., has made a gross profit for the year 1916-17 of over 27,000,000 mk., more than double that of the preceding year.

Price of Coal (Limitation) Act.—We are asked by Direct Coals Limited, Yeovil, to publish the following announcement: "Following a communication of the Controller of Coal Mines, Direct Coals Limited, of Yeovil, hereby withdraw the recent offer of 22s. per ton C. and W. for approved nuts, brights, cobbles, or large, tendered to the Midland and other collieries."

THE WELSH COAL AND IRON TRADES.

THURSDAY, AUGUST 30.

North Wales.

COAL.

Trade generally has been normal in this district during the past week, and there is no lack of orders. Full time has been worked at all the pits, and every effort has been made to maintain the output. As regards house coal, merchants continue to press for supplies, but there appears to be a shortage of this class of fuel, and the stocks at the various depots are comparatively small. Gas companies, like merchants, are eager to secure all the coal they can get, and the amount of business done in this department during the past week has been considerable. There is little variation in the steam coal trade. Railway companies and Government works have taken the bulk, with the exception of what has been sent down for shipment from the Mersey ports. Much satisfaction is felt at the action of the Mersey boilermakers' resumption of work. At a mass meeting held on Sunday last, when about 4,000 men were present, and about 2,000 voted on the question of whether work should be resumed, the majority were in favour of returning to work on Monday last, on condition that a court of arbitration is set up immediately. The employers have agreed to have the case heard locally, with a neutral chairman to be appointed, together with an assessor on the side of the men. On being put to the meeting, 1,309 voted in favour and 850 against. The case will be dealt with under the Munitions of War Act. At the Liverpool Munitions Tribunal on Saturday last a number of requests for leaving certificates were refused on the grounds that the court could not recognise applications which arose out of the boilermakers' strike. The Mersey Dock and Harbour Board have decided that on and after September 15, 1917, 66 per cent. shall be added to each of the charges specified in the schedule of master porters' charges, in lieu of the 52½ per cent. fixed by by-law No. 3 (1) of the master porters' by-laws approved by the Board of Trade on April 26 last. Slack has a fair market, and the demand for gas coke has been good. Prices remain steady.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit f.o.b. :—			
Best house coal	21/-23/-	21/-23/-	—
Secondary do.	20/-22/-	20/-22/-	—
Steam coal	19/-22/-	19/-22/-	—
Gas coal	19/-21/-	19/-21/-	—
Bunkers	19/-22/-	19/-22/-	—
Nuts	18/-20/-	18/-20/-	—
Slack	12/-14/6	12/-14/6	—
Gas coke (at works)	21/8-23/4	21/8-23/4	—
Prices landsale :—			
Best house coal	27/6-30/-	27/6-30/-	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

There has been a considerable arrival of tonnage of late, and but for stormy weather this would still further have improved the prospects. The market has been fairly steady during the week, except that there has been a good deal of speculation as to the working of the Government Order concerning the transit of coal beyond certain limits. Large coal has been stationary in value. A great deal of it has indeed been commandeered, and is not on a free market. Small coal has been dull, and in greater supply than demand. There has been a spirited request for house coal. Patent fuel and coke have shown no fluctuations.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals :—			
Best Black Vein large ...	30/-	30/-	41/6-42/6
Western-valleys, ordin'y	29/-	29/-	41/-42/-
Best Eastern-valleys ...	29/-	29/-	40/-41/-
Secondary do.	28/-	28/-	38/-39/-
Best small coals	21/6	21/6	28/-28/6
Secondary do.	20/-	20/-	26/-27/-
Inferior do.	18/-	18/-	20/-22/-
Screenings	23/-	23/-	28/-28/6
Through coals	27/-	27/-	26/-28/-
Best washed nuts	30/-	30/-	30/-31/-
Other sorts :—			
Best house coal, at pit...	33/-	33/-	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/-
Patent fuel	32/6	32/6	45/-47/6
Furnace coke	47/6	47/6	50/-55/-
Foundry coke	47/6	47/6	60/-65/-

IRON.

The tin-plate trade has shown considerable improvement of late, and there are considerably larger quantities of raw material available than had been the case for several weeks. There is also an improvement in the supply of iron ore. Pitwood arrivals have been shorter than in the recent past, and prices have shown an upward tendency to from about 59s. 6d. to 64s.

Cardiff.

COAL.

The stormy weather of the last few days has considerably interfered with arrivals, and the result has been a dislocation of the shipping arrangements. For Admiralty purposes there has been an ample supply, but other people have been unable to obtain tonnage, and the market has become stagnant. Prices are not affected, as all business is being done on the basis of the Government schedule. Many firms, however, are holding their hands, and refuse to entertain any business unless they can see a profit at the end of it. This, of course, applies mostly to middlemen, who complain that the action of the Government tends to their elimination or suppression altogether. Whatever the effect may be, the result is that the market is extremely slow, and there is little doing, except in the case of merchants who have prompt tonnage at their disposal. Chartering, last week, showed a considerable improvement, and amounted to over 25,000 tons, nearly half of which was fixed on Saturday, which is regarded as an off day. Prospects, however, are not bright, and stocks are accumulating at such a rate that stoppages are imminent in many districts owing to shortage of wagons. The regulations of the Coal

Controller with regard to inland distribution have come in for a great deal of criticism, and already many anomalies have become apparent. The artificial regulation of the trade is regarded in many quarters as inefficient and retrograde. Difficulties are created which ought not to exist, and unless these can be smoothed over, there is bound to be trouble, both with the consumer and the producer, before the winter has fairly commenced. The policy of economy in transit and waggons was all right in theory, but when it interferes with the established customs of many years' standing, there is sure to be difficulty. Many districts of South Wales have relied upon Forest of Dean coal, not because of its quality, but because it was cheap and readily obtainable. To-day that is prohibited, and there is not any other coal to take its place. Midland coal came into certain districts, and that is also debarred, with the result that it is probable that a famine in house coal will occur in South Wales before December. Regulation of output may be advisable in certain instances, but diversion is inexcusable unless ample provision is made for substitution. Definite figures are not obtainable, but it is estimated that the shortage in South Wales will be not less than 40,000 to 50,000 tons per week. This is a serious problem, and the difficulty will be great unless it is faced at once. All transactions are on the basis of the fixed schedule. Patent fuel remains steady at 30s. to 32s. 6d. per ton. Owing to the meagre arrivals of pitwood, quotations have advanced slightly, and sales are being done on the basis of 59s. to 61s. per ton.

Prices f.o.b. Cardiff (except where otherwise stated).

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	41/-42/6
Ordinary	30/	30/	40/-41/
Best bunker smalls	23/	23/	30/-31/
Best ordinaries	21/6	21/6	28/6-29/6
Cargo qualities	20/	20/	24/-25/
Inferior smalls	18/	18/	23/-24/
Best dry coals	30/	30/	38/-40/
Ordinary dries	28/6	28/6	36/-37/6
Best washed nuts	30/	30/	35/-36/
Seconds	28/6	28/6	32/6-34/
Best washed peas	27/6	27/6	32/6-33/
Seconds	26/6	26/6	30/-32/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	41/-42/6
Western-valleys	29/	29/	40/-42/
Eastern-valleys	29/	29/	39/-40/
Inferior do.	28/	28/	37/-39/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	37/6-40/
Through-and-through Small	26/	26/	34/-35/
No. 2 Rhondda—			
Large	27/	27/	36/-37/6
Through-and-through Small	25/	25/	29/-31/
Best patent fuel	20/	20/	24/-25/
Seconds	32/6	32/6	45/-47/6
Special foundry coke	30/	30/	42/6-45/
Ordinary do.	47/6	47/6	62/6-65/
Furnace coke	47/6	47/6	58/6-62/6
Pitwood (ex-ship)	47/6	47/6	50/-50/6
	59/-61/	58/-60/	45/6-46/

* Nominal.

IRON.

There is practically no change in the position of the iron and steel trades. All works are operating at high pressure, and maximum outputs are being turned out. There is a brisk demand for rails, but outside Government requirements there is nothing being done unless of an urgent character. In the tin-plate trade there is pressure for deliveries, but these are being delayed owing to the shortage of steel bars. Every effort is being made to provide the necessary supplies, but manufacturers are unable to cope with the demands now being made upon them. The result is that new business is being refused, and reports are current that new tin-plate works are being established in many countries which formerly used to obtain the whole of their supplies from South Wales. Certificated business is being done on the basis of 30s. for standard sizes, but as much as 50s. is being paid for unrestricted plates. This business, however, comes to an end this week, when all plates will be fully controlled. Shipments last week were 17,701 boxes against 13,869 boxes received from works, leaving 44,161 boxes in stock against 47,993 boxes last week and 106,495 boxes at the corresponding date of last year. In the galvanised sheet trade there is no change. Iron ore supplies are satisfactory. In scrap metals all dealings are on the basis of the Controller's schedule of prices. Quotations in all cases are nominal.

Swansea.

COAL.

The trade of the port during the past week showed considerable improvement compared with the preceding period, both coal and patent fuel being more active. The shipments together totalled 100,874 tons. The anthracite coal market was not particularly brisk this week, probably owing to the delay in arrival of tonnage occasioned by the stormy weather. There was, however, a good demand for large, and machine-broken sizes were difficult to obtain. Culm and duff were quiet. Steam coals were inactive. There was a good call for bituminous and gas coals for inland requirements. Values were on the fixed levels.

Llanelli.

COAL.

The local market maintains its improved tone, and with the exception of culm and duff, all anthracite qualities are in demand. Large kinds are a much improved market, and the better grades getting a little scarce. Machine-made qualities are very strong, with supplies of nuts and beans difficult to secure. Peas are fairly firm, but culm and duff are very slow. Inland enquiries are satisfactory, especially so for the machine-made qualities. Large steam coals are active, with a strong inland demand for supplies of the better grades. Through and smalls are not very firm, owing to the lack of tonnage, and the lower grade qualities are moving very slowly. Manufacturing coals and also house coals are strong.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	28/-29/
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	26/6-27/6
Machine-made cobbles	42/6	42/6	38/-39/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles	36/	36/	—
Machine-made nuts	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-32/
Seconds	34/	34/	—
Thirds	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm	18/	18/	15/-15/6
Red Vein culm	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	27/6-31/6
Smalls	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through	27/	27/	—
Smalls	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—
Coke-oven coke	—	—	26/6-28/6

THE LONDON COAL TRADE.

THURSDAY, AUGUST 30.

The London coal trade for the past week has shown very little change from the weeks previous. The demand is still exceedingly strong, and the prevailing weather has seriously interfered with all the cartage and delivery arrangements, as well as the sailings from the various shipping ports. The arrivals have not been so good either from the railborne side or the seaborne quantities. Collieries report a very heavy demand, and the large numbers of unexecuted orders are scarcely touched whilst the output is so much diminished. In the seaborne market, the Admiralty requirements are absorbing nearly all the available supplies, and there is very little left for ordinary shipping orders; 27 contract cargoes arrived in the River Thames for Monday's market, and 15 for Wednesday. Vessels are exceedingly scarce, but with the lessened danger along the coast, freights have ruled somewhat lower; 15s. 6d. to 16s. has been the price accepted from the Humber to London. The reports from the Tyne show a better tonnage during the week, and a larger supply of boats. Collieries are, therefore, enabled to work better time. An unusual quantity is called up for Government requisition orders. Prices remain firm, and unchanged. Gas coals, 23s. 6d. to 25s. f.o.b.; steam, 29s. to 30s. f.o.b.; bunkers, 24s. to 26s. Smallsm are difficult to sell, and stocks are accumulating. Gas coke, 29s.; furnace coke, 42s. The Coal Controller's scheme is now beginning to work. The main point is that every consumer shall have a sufficient supply for the winter months, but up to the present time there are thousands of tons wanted, and it is certain the merchants have very little stock coal to fall back upon. Local authorities are doing their utmost to secure a sufficient quantity to be stored for the coming winter, principally for distribution in the poorer localities, but the difficulty of securing it would appear almost insurmountable. Special appeals have been issued to the trade dealing with the importance of discharging the wagons promptly on arrival at the different depots, and the siding rent clauses are to be strictly enforced. Re-arrangement of transports from the various districts gives rise to a wholesale crop of complaints on all sides, but merchants are strongly endeavouring to fall in with the scheme, although the different qualities of coal allocated to certain districts have in many cases been found to be impracticable. The area marked 13 (Dorset, Devonshire, and Cornwall) seems at present to be the most difficult, and the endeavour to bring in the nearest coal fields, such as the Forest of Dean and Welsh coal, into the area, where so much of the Leicester, Nottingham, and Derbyshire coal has hitherto been sent, has aroused a strong amount of opposition. Durham coal fields, which have hitherto provided London with its best Durham Wallsend coal, is now cut off by rail, and the qualities will not be allowed to come further south than Nottingham, Derbyshire, and Leicester, whilst these coal fields will be the principal senders into the London area. Reports are current that 20,000 tons per week is to be allocated to London, in addition to what has been usually sent there, but of course everything must depend upon the output at the collieries.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, AUGUST 24.—There were no seaborne house coal cargoes on offer at to-day's market, which remained steady. Cargoes, 25.

MONDAY, AUGUST 27.—Seaborne house coal was enquired after at to-day's market, but supplies continued scarce, no cargoes being on offer. Cargoes, 27.

WEDNESDAY, AUGUST 29.—There was no alteration in the seaborne house coal market to-day. The demand continues good, but nothing doing. Cargoes, 15.

OBITUARY.

Mr. T. H. Catcheside, head of the Newcastle ship owning, coal exporting, and ship broking firm of Messrs. T. H. Catcheside and Company, died on Tuesday from pneumonia, at the age of 52 years. His only son, Mr. T. H. Catcheside, is now the sole surviving partner in the firm.

The death has occurred in London of Mr. Arthur Law, coal merchant, of West End, Morecambe. Mr. Law was very well known throughout Morecambe, was one of the leading tradesmen, and actively associated with various local organisations.

MINING INDUSTRY AND MILITARY SERVICE.

The Abercarn tribunal has had before it the case of a colliery clerk, aged 21, for whom the Newpor Colliery Company sought conditional exemption. He had been classed C3 after a previous rejection. It was stated, in his behalf, that six clerks had joined the Colours, and that if any more were taken the work would be seriously affected; that, moreover, according to a letter from the secretary of the Coal Owners' Association, colliery clerks passed B2, B3, C2, and C3 were not to be called up. The clerk to the tribunal stated that he had not received any official intimation of this; but he was informed by the applicant's representative that the statement was confirmed by the inspector of mines. Conditional exemption was granted.

The Blaina tribunal had before it an interesting case where a collier, Class A, 27 years of age, married, with three children, sought exemption on domestic grounds. He had formerly worked as a collier, but had left for tin-plate work because his brother was killed. However, in October 1916 he returned to the mines; and his plea to the tribunal was that, being an old miner, he was doing greater national service in returning to the colliery than if he went to the munition works. The chairman thought the case should be adjourned in order that it might be considered by the colliery tribunal, especially in view of the fact that there were so many single men in the pits. The applicant said that there were scores of single men at the Cynon Colliery where he worked; and another statement made was that in that pit there were 114 single men between 18 and 25 years of age, but that most of them had been there before the war broke out.

Appealing at Hexham appeal tribunal for a colliery clerk, 26, Class A, who was employed by the Mickley Coal Company Limited, the manager stated that they had recently lost five men, and had engaged three girls, besides which a local minister had offered his services for three days per week. If the clerk went, they were absolutely "fast." Since the appeal was made, the Government had taken over the collieries, and there was a question before the Ministry of Munitions with reference to the position of colliery clerks. The decision of the local tribunal to grant three months' exemption as from June 6 was confirmed, and it was added that no hope of the man being retained after September 9 need be entertained.

The Aberavon tribunal has dealt with the case of a man, formerly a collier, but afterwards a tin-plate worker, who returned to the colliery and now claimed exemption. The tribunal decided to dismiss the application on the ground that they had no jurisdiction.

When John Cuskern was charged at Wallsend with being an absentee under the Military Service Act, it was stated that his exemption as a miner had been withdrawn because he had kept bad time. Defendant stated he had been twice to the recruiting office at North Shields, and had been sent back to the pit. He had also offered to join the Navy, but had been sent back. The case was adjourned for a week, and defendant was instructed to take his papers to the North Shields recruiting office.

The case of a picture hall manager who has recently taken up mining at St. Helen's Colliery was brought before the Auckland Rural tribunal by the military representative, who claimed that the man had gone into the colliery to evade the Military Service Act. It was stated that the military had been promised that another batch of miners would be released from the colliery, but that there would be no further release of genuine miners until this man was taken. The tribunal decided that the man was not a miner, and must join up.

After a long and interesting argument, the Rotherham Rural tribunal last week refused the military appeal against the exemption of nine colliery clerks in the employ of the Rother Vale Collieries Limited. A letter was read from Mr. T. H. Mottram (H.M. divisional inspector of mines), strongly advising no further depletion of the staffs should take place, as it would be impossible to carry on the office work of the collieries, which at the present time were of great national importance, without efficient substitutes. The mines inspector pointed out that the company paid between £10,000 and £11,000 in wages weekly, and that he had found no disposition to withhold any man fit for military service, if substitutes, possessing a fair knowledge of colliery accounts, could be provided. In the discussion, the military representative contended that what applied to colliery clerks also applied to other clerks, and that the company had had three years in which to train girls. It was contended, however, that girls are not suitable for the delicate analysis of figures required in colliery offices, that the calculations involved were very intricate, and that mistakes in wages might easily bring about trouble and reduce output. The tribunal agreed, and refused the military appeal.

THE BY-PRODUCTS TRADE.

Tar Products.—There is no particular change to be noted in the London and provincial markets for tar products. Makers of pitch are not ready sellers, and are holding out for higher prices; fair shipments continue to be made to the Continent. Solvent naphtha has developed a stronger tone, and heavy has also improved. Creosote remains nominal; the few licences which have been issued expire in about a month's time, and in the meantime the Government will probably fix the basis on which the supply will be taken over. Quotations are as follow: Coal tar, 23s. 3d. to 28s. Pitch, east coast, 17s. to 18s. per ton; west coast, Manchester, 17s. 6d. to 18s. 6d.; Liverpool, 17s. 6d.; Clyde, 19s. to 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 1s. 11d. to 2s. Heavy naphtha, north, 1s. 1d. to 1s. 2d. Heavy oils, in bulk, north, 3¾d. to 4¼d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene. "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The demand for this product for home agricultural purposes continues in increasing volume. Practically no export business is being done.

Briquettes from Olive Cake.—The Government has recently been engaged in testing the efficiency of briquettes made with the residue from the olive oil industry. The results have been successful enough to lead to an increased output of the new combustible. The consumers of the new briquettes will be the B. & G. and the tramway company, the present demand of the latter being 12 tons per day for its electric works.

THE AMERICAN COAL TRADE.

It is very difficult to buy any bituminous coal in the United States (says *Coal Age* of August 11). The tendency is to observe the Government maximum, and figures are to be had on contracts and in the American and foreign trade, there is naturally very little being offered in this direction. In addition to this, the car supply is limiting shipments to such an extent that there are occasional instances of fuel shortage, and some manufacturing plants are running on very narrow supplies. In view of the heavy Government requisitions, not only for their own uses but for the foreign governments as well, there is certainly not very much encouragement from the buyer's standpoint in the market, especially now that the fall business is in sight. The pooling arrangement is still too new to expect a very satisfactory result as yet, but reports indicate that the arrangement is progressing satisfactorily.

Prices show little change from a week ago. Spot sales are made all the way from the Government basis of 5.14 to 7 dols. f.o.b. Hampton Roads, the latter figure being a recent quotation for bunker use. Now and then a barge owner sits in his boat, buys a cargo, and then disposes of it here on the open market. Such sales will usually net 6 to 6.25 dols. f.o.b., and yield a fair profit on the freight. Such cargoes are now the exception, however, for only a few of the more fastidious under present conditions will pay the extra price over the basis prevailing on Pennsylvania coals.

A factor in the comparative shortage of Pocahontas and New River is the increased demand for slack for Western shipment. Smokeless slack is popular for use in by-product ovens, and so long as it will command present prices along with screened coal, the average will be considerably above the f.o.b. mine basis of 3 dols. per ton net, plus 25c. commission. Pocahontas and New River can respond to this demand, while most of the Central Pennsylvania grades cannot.

At Baltimore, the demand for soft coal is apparently a little lighter, and this fact, combined with a better movement of coal over the railroads, makes conditions easier. This applies largely to contract coal, and while there is possibly a little more low-priced coal at spot sales, the comparatively light call for coal is probably largely due to the fact that consumers have recently found it very hard to get the so-called Government maximum fuel. That middlemen are still confused is shown by the fact that a number are keeping up correspondence with officials in Washington in an effort to get advice that will hold them within the Government agreement and at the same time protect their own business.

Producing interests at Philadelphia are somewhat discouraged. The car supply does not improve in the least, and the complaint is general that the mines are cut down in operating time on this account. The larger and more important houses are still maintaining the agreed prices of 3 and 3.50 dols. per net ton for mine-run and lump coal respectively, and they admit that the business at these prices would be profitable were they able to secure the needed cars. Most all the coal produced by local operators continues to be applied on contract business, and it is also of interest to note that where contracts were made a few months ago at better than the 3.50 dols. price, the shipments have been particularly good. Inasmuch also as higher prices are allowed for lump coal more coal than usual is being screened, which also relieves the shortage which had existed for some time in the slack coal market. Heavy shipments of coal continue to be made to Canada and to tide for foreign bunkering trade. The railroads have also confiscated quite heavily of shipments in transit.

The excessive heat wave has exerted a sentimental effect on the anthracite market, which is easier than for many months. There is, further, a growing feeling that the big companies are going to make good on their promises of increased shipments, which is doing much to relieve the tension. In fact, the steam quotations in sympathy with the lower price level on bituminous coal are showing a distinct indication of weakness. On the other hand, there are incipient labour difficulties in the mining regions which are affecting production, while the shortage of miners is becoming generally more noticeable, and operating interests are much concerned over what effect the draft will have on the labour supply. In the meantime, there are still many areas where the supply is deficient. Very considerable shipments continue to be made in box cars, and there is no doubt that this has been an important factor in meeting the existing emergency.

The prices per gross ton f.o.b. cars at mines for line shipment are as follows:—Broken, 5.10 dols.; egg, 4.35 dols.; stove, 4.60 dols.; nut, 4.70 dols.; pea, 3.30 dols.; buck, 2.90 dols.; rice, 2.40 dols.; boiler, 2.20 dols.; barley, 1.90 dols.

Ocean Freights.—There has been very little change in the freight market since last report, and steamers are still very difficult to obtain. Rates on coal to Europe by steamer are as follows:—Marseilles, about 100 dols.; Spain (Atlantic), about 42 dols.; Spain (Mediterranean), about 44.40 dols.

Midland Coal Diverted to London.—Staffordshire and Warwickshire coal owners have received instructions from the Coal Controller to send the bulk of their output to London. The unexpected order has occasioned considerable surprise, and it is said that if it is enforced for any length of time it will lead to a coal famine in the Midlands. Coal merchants regard the position as serious, and strong representations are to be made to the Controller. It has been found necessary to divert supplies to London owing to special circumstances, but probably the diversion will only be temporary. It is intended to give London a reserve of coal to prevent a repetition of last winter's experience. The diversion has caused an immediate rush for coal, and it is feared that if preferential treatment is to be given to London, the coal supply should have been extended over a longer period. The local collieries miners have been working only four days a week.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The Miners' Executive Council had before it on Friday of last week a number of applications for out-of-work pay because of stoppages due to shortage of shipping, and each application was referred to the Out-of-work Committee in order that circumstances might be investigated and a report made to a later meeting. Lock-out pay was granted to men at the Clydach Colliery, Blaina, where they had been idle from July 2 to July 20. From the Havod Colliery a deputation attended and explained to the council the stoppage consequent upon the men having left work after a fatal accident. Mr. Brace and Sir Richard Redmayne had been seen at the Home Office on the subject; and as another meeting had been arranged they desired that they should be accompanied by the president and general secretary when that interview took place. The council granted this request. It was further resolved that the president and secretary, together with Mr. Morgan, the anthracite men's agent, and a deputation from the Gwaun-cae-Gurwen Colliery, should deal with the recent stoppage, and should request an interview with Sir Richard Redmayne in order to discuss the matters at issue.

At the monthly district meeting of the Avon Valley miners, on Friday of last week, a resolution was passed desiring their agent to impress upon the Federation executive, and, through them, the Coal Controller and the Admiralty, the necessity of the Port Talbot district getting a fair share of tonnage. It was stated that some collieries were heavily penalised, and were losing considerable time owing to shortage of shipping.

The Blaina district of colliers have had a meeting, whereat was discussed an alleged practice among some of the members of doing casual work at the furnaces, to the detriment of the workers at the Steel Smelters' Union. The practice was disapproved, and the secretary will place notices at the pit head desiring members to refrain from undertaking work of that character at either of the Blaina furnaces under penalty of being dealt with by the district meeting. Upon an allegation that similar practice prevails at other collieries in the neighbourhood, the Western Valley Miners' council has been invited to co-operate in securing cessation.

The application of pitwood men in Cardiff and Penarth Docks for a further war bonus of 25 per cent. has again come before a joint meeting representing the Freighters' Association and the Pitwood Importers' Association. To the men's original demand the employers offered 15 per cent., and the men replied that they were willing to compromise on 20 per cent. It has now been, however, agreed that the men will take the offer of 15 per cent.; and this makes their total increase since the war started 47 per cent.

The Chief Inspector of Mines has been approached by workmen of the Nine Mile Point Colliery in order that steps may be taken to do away with the system of double-shift working.

At the monthly meeting of the Eastern Valley Miners' District (Monmouthshire), held under the presidency of Mr. John Martin, Abersychan, at Pontypool, on Monday, discussion took place on the question of an inclusive price for timbering in the Blaenavon section. Blaenavon delegates urged that they should be allowed to conclude negotiations with respect to it. It was decided to send the chairman and Mr. Tom Morgan, treasurer, to Blaenavon to decide, after enquiry, whether the inclusive price should be agreed to or not. The secretary (Mr. Tom Langley) reported the receipt of a letter from the Abertillery district, where strong action is being taken to oppose the payment of income tax on wages, which embodied a request that (1) workmen should refuse to fill income tax forms after the first year, and also refuse to pay; (2) that sub-collectors should be withdrawn; and (3) that the executive committee of the South Wales Miners' Federation should demand a repeal of the tax, failing which they should adopt a down-tools policy. No action was taken at the meeting. Following further discussion on the high cost of living, it was decided, on the motion of Mr. E. Arscott, Pontypool, to consult the lodges with a view to ascertaining opinions as to whether or not the South Wales miners should have a stop-day to hold demonstrations of protest. At a later stage Mr. Zachariah Andrews, who submitted a report on the recent Labour conference in London, expressed personal opinions, to which Mr. Wm. George (Crumlin Valleys Lodge) objected on the ground that it was the duty of a conference delegate to give only a fair and accurate report, and not his opinions. Mr. John Beard, Abersychan, said many miners felt that Mr. Robert Smillie had "let them down" as it would have been in his power to stop profiteering if he had accepted the position of Food Controller. A motion from the Blaenavon Lodge that delegates to district meetings should be paid out of district funds; and not by their lodges, was defeated.

The subject of out-of-work pay to men rendered idle through various causes, provoked considerable discussion at the monthly meeting of the Monmouthshire Eastern Valley Miners' district on Monday. Mr. Tom Morgan, treasurer, applied for a grant for about 30 workmen employed at Tirpentwys Colliery, Pontypool, who were idle throughout Bank holiday week in consequence of a fall of earth in the Meadow Vein seam. Mr. J. Winstone, J.P., agent (acting president of the South Wales Miners' Federation), urged the delegates to exercise caution in dealing with such applications. During the year £25,000 had been paid out, largely in the western part of the coal field, and partly in that district. It was a serious matter, and one that might lead them to a position in which they would have no money if they needed it for fighting purposes. Several delegates opposed the application, and upon a vote being taken there was a majority against the grant. After some further remarks by Mr. Morgan, it appeared that the vote was given under a misapprehension, and a second vote was agreed to, the application being approved by ten votes to five.

Referring, in the course of his monthly report, to the price list dispute at the Elled Colliery, Pontnewynydd, where the men have been on strike since July 1, Mr. James Winstone, agent, said the matter had, at the suggestion of the Coal Controller, been relegated to arbitration. Nineteen out of the 26 items in the price list had been agreed to now, and he hoped the dispute would be finally settled before he went to Canada in September. He also trusted that whilst they were out of work, the Elled men would receive the fullest support of the district. A representative of the Elled Lodge moved that a down-tools policy should be adopted throughout the district in the event of the dispute being unsettled on Friday, and other delegates urged that the whole of the South Wales coal-field should strike, so as to expedite a settlement. On the advice of the agent the matter was deferred until next Monday.

The colliery examiners of South Wales had a meeting of the executive council of their association in Cardiff on Saturday, the chief business being to ascertain the result of the ballot recently taken. The question at issue was the advisability of tendering notices on September 1 throughout the coal field to terminate contracts. It was reported that an overwhelming majority had voted in favour of this course being taken; and it was decided, therefore, to issue instructions to lodge secretaries that every member should tender his notice to-morrow. The intention of the movement is to secure "recognition" of the association by the employers, and also to establish uniform rates of remuneration throughout the coal field.

A number of workmen at Bedwas Colliery submitted to the Caerphilly district meeting a claim to share in the pooled earnings on several conveyors, their contention being that they were competent miners, and that their claim was justified by a recent ballot vote on the subject. They sought permission to institute legal proceedings, if necessary, in order to enforce the claim; but the meeting decided that before taking this extreme step their agent (Mr. Jenkins) should meet the poolers and endeavour to adjust matters.

Over 1,000 men at Llanhilleth came out on Monday because of a dispute affecting a single haulier, but have now resumed work pending arbitration.

At Swansea, on Saturday, it was reported to the monthly district meeting of anthracite men that the disputes at Llandebie Colliery and at Gurnos had been settled.

North of England.

About 150 delegates from 56 lodges were present at a conference held at New Kyo, last Saturday, convened by the South Moor No. 1 lodge of the Durham Miners' Association with a view to making a big effort to get the minimum wage rates raised at least 25 per cent. for all classes. The circular convening the meeting expressed the lodge's opinion that, even in pre-war days, the amount fixed for minimum wage purposes was scarcely sufficient to live on and that, at present, when the cost of living has gone up to such an enormous extent, the thing is simply impossible. Mr. Stephen Clark, president of the lodge, compared the Durham miners to a flock of sheep following a fat and prosperous-looking leader and said that the miners' leaders sat in the lap of luxury every day, living on the fat of the land, and were conceited enough to think that, while they sat still, the miners should do the same. He knew one miner in South Moor who had gone to the pit for the last three weeks with dry bread and came back to it. It was unanimously resolved to demand a special council meeting and instruct the executive to meet the owners at once and demand an immediate increase of at least 50 per cent. in the minimum wage rates of all classes: failing a satisfactory reply within a fortnight of such council meeting, that the county be balloted on a down-tools policy until their claim was recognised. The mover claimed that the miners had suffered a 70 per cent. reduction in consequence of the war. The seconder declared that nowhere in the British Isles was food dearer than in that district.

Mr. J. Lawson, secretary of the Durham Miners' Forward Movement, speaking at Chester-le-Street last Saturday, stated that before the war the Durham miners were due for a big advance in their basis wage and a considerable raising of their minimum wages, but had waived these claims under the circumstances. Since the war started they had received advances of 37 per cent., whilst the cost of living had increased by 104 per cent., leaving them 70 per cent. worse off. Mr. Lloyd George had said that there was plenty of combustible material lying about among the workers. Durham was one of the most moderate mining districts in the country, but unless something considerable was conceded in the way of wages advances, there would be a conflagration in the county.

Attention is directed in the local Press to the fact that whilst the totally incapacitated men in receipt of compensation are to be granted a 25 per cent. increase, those "compensation men" who are doing light work are not to receive anything extra, and it is suggested that the branches of the Durham Miners' Association should take up their case, and if satisfaction is not obtained locally, should lay it before the members of Parliament for the county.

Mr. Aneurin Williams, M.P. for North-West Durham, has been interesting himself in the problem of the provision of more regular work for the collieries in his constituency, and has approached a member of the Government urging that something should be done to ensure a reasonable number of shifts per week for each colliery, even if full time cannot be worked. He has received a letter from the Controller of Mines, stating that the matter is receiving attention, that the suggestion made is one that has already been adopted to some extent, and that it is proposed to develop it as far as possible.

A strike of members of the Cleveland and Durham Blastfurnacemen's and Cokemen's Association, last weekend, was averted at the eleventh hour by the firm but conciliatory attitude of the Ministry of Munitions.

A special meeting of the Cumberland Miners' Association was held at Workington on Saturday afternoon. Mr. J. Dickinson (president), Aspatria, presided, and there was a good attendance of delegates. The question of surface wages was considered, and after some discussion it was decided that the surface workers be allowed to give 14 days' notice to terminate contracts on Saturday, September 1, and Mr. Cape, the miners' agent, was instructed to make the necessary arrangements during the incoming week. It was stated that what is causing discontent is the inability of the Conciliation Board to appoint a neutral chairman.

The Cumberland Coke Trade Conciliation Board had before them disputes which had arisen in the following matters affecting coke workers' wages: (1) As to the interpretation of rule 8 in respect of the variation of wages; (2) an application by the workmen for an advance of 25 per cent. on their present wages as a special war bonus, and (3) the overtime rate which should be paid to workmen on August Bank holiday. The board having considered these matters and failed to agree, the Rev. Canon Sutton, as neutral chairman, was called in and has made the following award:—That an advance of 7½ per cent. be granted as an addition to the present war bonus of 18 per cent., making a total of 25½ per cent. to be paid on the gross earnings as on and from July 1, 1917. It is to be understood that this award shall be made to conform with the pending settlement by the Midland Conciliation Board in respect of the miners' application for 25 per cent. in their war bonus.

At an executive council meeting of the Lancashire and Cheshire Miners' Federation, held last Saturday at Bolton, it was reported that a number of grievances relating to working conditions had been amicably adjusted in the

Information has been received that Maj. Norman Q. Burnycat, Royal Field Artillery, a nephew of Mr. W. Burnycat, of Millgrove, has succumbed to wounds received in action in France on the 8th inst., at the early age of 25 years. Maj. Burnycat was a son of the late Mr. Burnycat (Burnycat and Dalzell), of Liverpool. He was educated at the Liverpool College, leaving there in 1909 to enter the works of the Workington Iron and Steel Company, where he remained for four years. He then joined

his brother, Mr. Harry Burnyeat, in Antwerp, where he was at the outbreak of war. After the evacuation of Antwerp, Maj. Burnyeat joined the Army as a private in the Royal Field Artillery. He went to France early this year, and was appointed major whilst in command of a battery.

Meeting of the Cumberland Miners' Association at Workington last Saturday, the new Order with reference to the recruitment of miners was discussed at length, and it was decided, with respect to No. 1 question, that the Miners' Federation should take part in the recruitment. With regard to No. 2 question, the council were unable to give an affirmative answer, stating their disagreement with the amended scheme, and submitting an amendment to the Federation to the effect that there should be no exempted class. It was also decided to send the following resolution to the Federation:—"That all men who have entered the mines since 1914 be 'combed out' before any new scheme becomes operative, and that a new allocation as to the numbers required from the different pits be made after the 'comb out' is completed."

Yorkshire.

Colliery War Relief Fund's Good Work — Doncaster's Winter Coal Supply—Mexboro's Housing Problem—Serious Offences at Collieries.

The consent of the Board of Trade has been received to the proposal of the Doncaster Coal Supply Committee to purchase 500 tons of coal for the poor in case of emergency next winter. The Corporation will provide the money.

Some rather serious offences were alleged against colliery employees at the West Riding Police Court at Doncaster on Saturday last. Albert Hout, haulage hand, Mexboro', was fined 30s. for taking a cigarette down the Denaby mine. James Humphries, miner, Denaby, was ordered to pay £3 for failing to report a damaged lamp to the lampman. Four young haulage hands in the employ of the same company were penalised for entering a part of the mine other than that in which they were working. They went down a heading to a sump for the purpose of bathing. It was explained that such places generally contained an accumulation of carbonic acid gas, and were very dangerous.

The splendid work which the colliery war relief funds have accomplished since war broke out is shown in the case of the Hickleton Main Colliery. Here the sum of £20,917 4s. 5d. has been raised since its inauguration, and there is at present a balance in hand of close upon £1,000. This, be it remembered, is only one of the numerous pits of Yorkshire. A similar story could be told in regard to scores of others.

At last week's meeting of the Doncaster Town Council, in committee, an application was made through the Rossington Main Colliery Company for the granting of a licence to some person to run motor char-a-banc vehicles between Rossington and Doncaster, to enable the dwellers of that model village to visit Doncaster for shopping and other purposes. The Corporation acceded to the application, so far as that portion of the route which is within the borough boundary is concerned. The permission of the Doncaster Rural District Council will now have to be obtained.

Mexboro', which is in the very heart of a thickly populated mining district, is to approach the Montagu Trustees with a view to acquiring three fields off Harlington-lane for housing purposes. The Urban District Council estimate that 200 new houses are immediately required, and that a further 140 houses will have to be provided every year, either by public or private enterprise, to cope with a natural annual increase of population amounting to 700. Sites for factories are required in the urban district, and it has been decided to approach local land owners with a view to the provision of these.

Skipton Urban District Council has instructed its Gas Committee to endeavour to secure, in collaboration with the local coal merchants, a sufficient stock of household coal to safeguard the town against a repetition of the shortage which was experienced last winter, it being realised that the townspeople have not room for appreciable storing. If no better plan can be devised, the Council, it is understood, are prepared to store coal for distribution to the people when the need arises. The final proposals of the Gas Committee are to be put before a special meeting of the Council.

Lieut. W. E. Woodhead, son of the late Mr. Edwin Woodhead, of Wyke, Bradford, has been wounded. He joined a locally raised battalion in February 1915 as a ranker, later being granted a commission, and allocated to the Royal Engineers. He has been in the Gallipoli campaign, and is now in France. He was mentioned in despatches early this year, and shortly after received his full lieutenantcy. He was educated at Bradford Grammar School, and before joining up was engaged as the colliery manager for the Lowmoor Company Limited, Bradford.

Lancashire and Cheshire.

Effect of Cotton Trade Restrictions—Co-operative Society's Coal Proposition—Manchester's Winter Coal Supplies—Forthcoming Examination for Firemen at Walkden.

The Westhoughton Coal and Cannel Company's allotments have done well this summer, both in quality and quantity. One of their workmen has raised a vegetable marrow weighing 30 lb. on his patch. Lord Ellesmere has offered prizes for the best kept allotment on his Walkden and Worsley estates. Many of the allotment holders here are colliers in his lordship's employ.

The cotton trade restrictions which come into operation on September 10 will mean a greatly reduced demand for coal of the slack and steam engine variety, for hundreds of mills will stop 40 per cent. of their machinery or go on four days per week rather than pay the levy fixed by the Cotton Control Board. Many of the larger mills consume over 100 tons of coal per week, and the curtailment of production must mean a greatly lessened demand for fuel.

Up to last week over 100 men who worked in Lord Ellesmere's pits in Manchester and Bolton areas had laid down their lives, whilst between 200 and 300 have been wounded. Men who have been wounded and discharged from the Army are being found light employment at the Ellesmere and other collieries in the above-named districts.

Miners in the Leigh, Tyldesley, Atherton, and Bolton districts, through their branches, are asking for increased working class representation on local Food Control Committees.

The Co-operative Wholesale Society, of Manchester, following upon the purchase of Shillbottle Colliery, in Lancashire, are reported to be on the market for colliery properties in the Lancashire and Cheshire districts. Some time, however, may elapse before any other collieries are acquired. The Society is at a particularly favourable time for pur-

The Scot Lane Colliery Company, Blackrod, has given a donation of £45 through the Westhoughton War Charities Committee for equal division between the Bolton Infirmary and the East Lancashire Disabled Soldiers' and Prisoners of War Fund.

Under the auspices of the Bolton Domestic Coal Supply Committee, coal is now being stocked in the Mayor-street Yard, close upon 200 tons having already been delivered. It is expected to have between 5,000 and 6,000 tons in stock to supply the winter requirements.

A special committee appointed to control the winter supplies of coal for domestic use in Manchester met at the Town Hall recently. It was pointed out that last winter many small householders who had no accommodation for stocks were without supplies, but during the coming cold season everything would be done to ensure adequate supplies for all. A sub-committee was appointed to find suitable depots for the storage of coal, and stocks would be placed there daily in order to be ready when the demand increased.

The Higher Education Committee of the Worsley District Council has this week issued notices intimating that the five years' period having now expired since the first examination for firemen was held under the Coal Mines Act of 1911, section 15, arrangements are being made for the re-examination required under the Act. The examination will take place at the Walkden Technical School, and the Act provides that the fee for re-examination will be payable by the firemen's employers. A great number of local firemen passed the first examination.

Notts and Derbyshire.

In last week's article on "Search for Petroleum in the United Kingdom," reference was made to the important discovery of oil in the Riddings Colliery, Alfreton, in Derbyshire, 70 years ago. Further particulars have come to hand regarding this discovery, which was in a pit called the Old Deeps at Pye Bridge, which has long since been abandoned, its grass-covered spoil bank being the only reminder to the onlooker of the earlier days of coal mining. The pit was worked and owned by Mr. James Oakes, a coal and iron master, and grandfather of the present Ald. James Oakes, of Messrs. Oakes and Company, who own collieries in the Erewash Valley district, on the borders of Nottinghamshire and Derbyshire, and also the Riddings Iron Works. It was whilst working in this pit in 1847 that the men came across a stream of oil. Mr. Oakes reported the discovery to his brother-in-law (the first Lord Playfair), who was a distinguished scientist, and he at once appreciated its significance as a commercial product. As a result, a refinery was erected, which produced a light oil for illumination and a heavy oil for lubrication. From the residue of this oil Lord Playfair produced a couple of candles at a cost of £1 each, and these can be regarded as the "parents" of the paraffin wax candles. With these candles Lord Playfair lighted his desk at the Royal Institution for a lecture on "Petroleum and its Products." The stream at Pye Bridge produced, it is stated, about 300 gals. a day for two years, and then it ran dry. It is estimated that the oil was confined to one area of land. Since then, no evidence of oil in the district has been met with. Pye Bridge has thus come into prominence as the result of the Bill which has been issued for the purpose of developing the nation's natural oil resources.

The Midlands.

The prospective winter supply of house coal is engaging much attention in the city of Birmingham and in some of the towns in the South Staffordshire district. Acting upon the suggestion of the Coal Controller, local committees have been formed to take the matter of supplies in hand by several of the municipalities, and it is suggestive that some of the strongest representations on these local committees alike in Birmingham and the Black Country towns have been allotted to the interests of the railway carriers and the coal factors. Reports are being submitted with regard to the present stocks of domestic coal and the probable requirements of small consumers during the winter, including the amount of coal likely to be obtained from coal yards and from dealers who sell coal on the bag system. The Birmingham Committee have already issued notices urging the utmost economy in respect of the consumption of fuel by householders. It is suggested by the committee that the ordinary consumption should be reduced one-fourth. To facilitate distribution, and to prevent the occurrence of monopoly, the public have also been asked not to order or to stock more supplies than they will actually consume; and, further, to deal only with one coal merchant. In the carrying out of these orders, of course, much must depend upon whether the winter will prove to be severe or mild.

At Walsall, the Municipal Committee have experienced considerable difficulty in securing all the supplies they needed for distribution, but they have been assured that from September 1 onwards they will be able to have all they require from the Cannock Chase district. Up to the present, the local coal merchants have been limited by the Coal Controller to 60 per cent. of their usual requirements from Cannock Chase, the rest being earmarked for the London market. It is hoped by the Municipal Committee that suggestions which they have in hand for regulating winter prices at the coal yards will shortly eventuate, since there is a strong impression in the Walsall district that as prices at the pithead are fixed, the same control should extend to the merchant business. The enormous amount of coal required for the district munitions works is one of the chief difficulties in the way of supplies at date. Certain works in the Black Country are still very short of coal, and cannot make their full output in consequence. The distribution to large well-to-do householders is very irregular; in some cases cellars are said to be over-stocked, while others are empty. In respect of the first cases, this local situation is said to have arisen from a mistaken impression which has got abroad in some of the South Staffordshire towns bordering upon the Cannock Chase and Walsall and Walsall Wood coal fields, that somehow or other the London household coal distribution Order has also a provincial application. Some local factors have been receiving orders much in excess of usual for the month of August. It is, however, quite incorrect that after October 1 householders in the provinces will only be allowed a specified quantity of coal. Merchants will continue to deliver as usual till instructions are issued to the contrary.

Cannock Chase coal owners are greatly interested in the local workings of a scheme which is being carried out at the instigation of the Ministry of Munitions for providing more boatmen for the working of the mineral traffic along the canals ministering to the collieries. The demands of the military authorities have greatly depleted the ranks of the canal boatmen, and the collieries are greatly delayed in the matter of transport in consequence. The Ministry mentioned has therefore determined to provide an increased supply, but with this object—the men have to be speci-

ally trained. It had been thought even by many of the Cannock Chase colliery managements that the place of a canal boatman could be filled by means of substitution, but this has proved to be a mistake, as certain qualities are necessary, which have to be acquired by training or practice. It is essential, too, for the safe conduct of the boats that a boatman should know the construction of the basin of the canal he navigates, as well as the exact ins and outs of the waterway, and this is a particularly difficult job in the tortuous waterways which connect the Cannock Chase collieries with the many consuming works in the South Staffordshire industrial area. Fortunately, the men now in training are showing considerable adaptability to their new experience. They have been selected with a good deal of care as to their suitability. It is estimated that at one time there was a deficiency on the local canals of some 40 per cent. in the boatmen, but it is hoped that this shortage will now be steadily reduced. Including the South Staffordshire and other adjoining Midland districts, it is calculated that between 500 and 600 barges are lying idle awaiting labour for their canal conduct.

Kent.

Canterbury Town Council have passed a resolution requesting the Home Office and the Board of Trade to sanction the employment of more sinkers at the Chislet Colliery, in order that the coal there may be reached and worked at the earliest possible date. The matter was brought forward by Coun. Stone, who urged that it must be in accord with national economy if they could wind in this district the coal required in the district. He supposed a train would be required for 200 tons of coal, and where it had to be brought 200 or 300 miles, the consumption of coal by the locomotive was great, and there was the use of the rolling stock, which was essential for other purposes. He was informed that at Chislet Colliery they were within a very short distance of being able to wind coal. The Kent coal was being used at Canterbury electricity works and the workhouse, and they would be on their beam ends for coal in Canterbury were it not for Kent coal at the present time. In supporting the proposition, Coun. Wood said it was hoped to be raising coal by Christmas at Chislet. The Blean Council had passed plans for 200 houses for the Chislet colliery workers. It was suggested by Coun. Arrowsmith that it would be more important to allow additional labour to the Tilmanstone and Snowdown collieries which were already raising between 2,000 and 3,000 tons of coal weekly. The result of the discussion, however, was that Coun. Stone's resolution was carried, and the town clerk was instructed to draft the letter to the authorities.

Scotland.

Scottish Miners' Association — Improved Burntisland Figures—Scarcity of Houses in Fife—Exemption Card Warning.

Through the courtesy of Mr. W. W. Lackie, chief engineer to the Glasgow Corporation Electricity Department, upwards of 50 members of the Scottish branch of the National Association of Colliery Managers had an opportunity on Saturday of visiting the new Dalmarock electrical power station, situated at Dalmarock-road, Glasgow. The chief object of the visit was to inspect the Consider system of reinforced concrete, or steel piling, which has been extensively carried on in the excavations at the ground, and to appreciate how far the system is applicable to shaft sinking. The visitors were met by Mr. Wm. Burnside, of the Glasgow Corporation Electricity Department, and Messrs. James Barron and David Smith, of Messrs. Train and Taylor, contractors, Cambuslang, who explained the chief features of the reinforced concrete operations.

Mr. David Gilmour, secretary of the Lanarkshire Miners' Union, who has been decorated with the honour, Officer of the British Empire Order, has been an indefatigable worker on behalf of war activities since the beginning of the war. His best work has probably been accomplished as a member of the Labour Advisory Committee under the National Service Scheme. Here he has performed signal service in adjusting labour problems and difficulties.

The executive of the Lanarkshire Miners' Union have issued a timely warning to the effect that those members of the organisation who have not yet been supplied with exemption cards should have this omission rectified as speedily as possible. It transpires that a number of miners employed at Greenfield Colliery, Hamilton, who have laid idle in consequence of a stoppage of the colliery, have found themselves unable to secure fresh employment since they do not hold cards of exemption.

Mr. Thomas Arnott, Brownside-avenue, Cambuslang, has been officially notified that his second son, Lieut. A. M. W. Arnott, Canadian Railway Troops, was killed in action on August 6.

Owing to the breaking of a wood guide, with which the shaft is fitted, 16 men were suspended in the winding cages of Lumphinnans Colliery for a period of about five hours.

Everywhere in Fife the scarcity of workmen's houses, especially in mining districts, is being very keenly felt. Workmen are afraid to move from one place to another owing to the housing question. Those engaged at collieries getting idle time are in a very awkward position indeed. Work can be got at other collieries, but there are no houses, and this is having a detrimental effect on the output of the county, as collieries getting no idle time could greatly increase their outputs if men could be got. Representations have been made for increased railway facilities, but so far without effect.

An attempt is being made in several of the counties to stamp out the custom of "making up," and to introduce a proper ton rate without extra. One is surprised at owners allowing such a system to be introduced, as it certainly gives the men encouragement not to do their utmost, which consequently means a low output per person.

A largely-attended meeting of the Scottish Mine Managers' Association was held on Saturday last at Glasgow, at which it was reported that 50 new members had been added to the list since the previous meeting. The salary question gave rise to a discussion, and satisfaction was expressed at the success which had attended the efforts of the Colliery Under-Managers' Association to secure greater remuneration. It was announced that the council intended as soon as possible to establish an information bureau, which, it was believed, would prove of assistance to managers when applying for situations.

At Burntisland, a good coal export trade was done during the week, when 13,130 tons were shipped, as against 6,640 tons in the previous week, and 14,350 tons in the same week last year.

The Labour Party has been requested by the Northumberland miners' executive to support a movement for an additional Parliamentary constituency in Northumberland.



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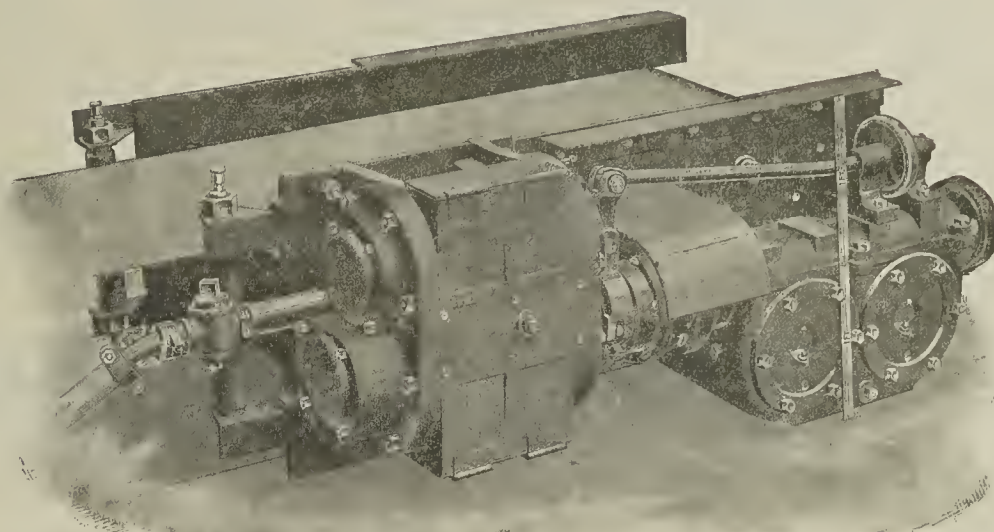
Length of Face - - 80 yards

Height of Seam - - 2 ft. 9 in.

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against load 1 in 12

Average discharge
(5 men) - 60 tons per shift

Average load (input) - 4 B.H.P.



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THE FREIGHT MARKET.

Portage shortage continues to exercise its deadening influence upon the outward freight market. At the Tyne, keen demand for coal and coke carriers for the Atlantic, but few indeed are on offer. Traffic with the Baltic is rather busier, three vessels having been chartered—two at 195 kr., and the others at the rate of 200 kr.—and a fairly large steamer for Stockholm at 207½ kr. In no other direction has there been anything done, although very high rates are on offer. Thus, for Portugal, from 87s. 6d. to 90s. is quoted for Lisbon, and 100s. for Oporto. The Spanish Mediterranean is represented by offers of up to 220s. to Barcelona. Gibraltar is based on 85s., at which rate it has been done from the Tees. Port Said is quoted at fully 165s. At South Wales, the position is very little better than on the north-east coast, although rather more fixtures are reported. Orders for neutral destinations are numerous, but very few free boats are available. There is an active enquiry for vessels for French ports, but the local committee has few steamers to allocate. Rates in unrestricted directions are indicated by the charters for Gibraltar at 95s., and Rio de Janeiro at 125s.—both for Cardiff loading.

Homewards, the River Plate is quiet, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. In the American market, rates are well upheld. Coal freights are based on 125s. from Virginia to the River Plate, with 30 dols. for Rio discharge. On net form, the Northern Range to the United Kingdom is still mentioned at 200s., with 220s. for French ports, and up to 360s. for West Italy discharge. On heavy grain basis, Gulf to Mediterranean is quoted at 35s., with 32s. 6d. to France, whilst for Northern Range loading, 2s. 6d. less is asked. Nitrate ports to Vladivostok are quoted at 200s. At the Far East, Madras Coast to Marseilles with kernels is quoted at 500s. Bombay to the United Kingdom is 25s. advanced, being listed at 275s., with a similar rate for Kurrachee loading. Saigon to French Atlantic with rice is firm, at 500s. Burmah to the United Kingdom is mentioned at 480s. There is a good demand for homeward tonnage at the Mediterranean ore and phosphate ports, and rates are easily upheld.

Tyne to Calais, 200, 50s.; coke; Fecamp, 1,250, 60s.; pitch; Gothenburg, 3,000, 195 kr.; 600 and 1,600, 200 kr.; Gibraltar, 3,500, 85s.; and Stockholm, 3,200, 207½ kr.

Cardiff to Brest, 2,000, 45s.; neutral; Bordeaux, 1,900, 34s.; 1,400, 69s.; neutral; Caen, 600, 48s.; neutral; 1,350 and 1,400, 46s. 6d.; neutral; Cherbourg, 1,000, 23s. 6d.; Gibraltar, 2,000, 95s.; Rouen, 1,300, 49s. 6d.; patent fuel, neutral; 1,300, 48s. 9d.; neutral; 1,350 and 1,400, 74s. 3d.; coke, neutral; Rio de Janeiro, 3,000, 125s.; and Tonnay Charente, 1,000, 63s.

Swansea to Rouen, 1,300 and 1,500, 48s. 9d.; neutral; 3,100, 47s. 3d.; neutral; 1,500 and 1,400, 24s. 6d.; 900 and 800, 50s. 3d.; neutral; St. Malo, 1,100, 46s. 6d.; neutral, two voyages; 850 and 900, 22s.; 700, 45s.; neutral; Treport, 1,100, 47s. 3d.; neutral; Havre, 1,400, 45s. 9d.; neutral; and Trouville, 1,100, 46s. 6d.; neutral.

Newport to Bordeaux, 3,500, 69s.; neutral; and Caen, 1,300, 46s. 6d.; neutral.

Tees to Gibraltar, 6,400, 85s.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

EDMONTON, SEPTEMBER 12.—The Edmonton Urban District Council invite tenders for the supply and delivery of 1,500 tons of household coal at Lower Edmonton Station on the Great Eastern Railway. Forms of tender and full particulars may be obtained of Mr. Cuthbert Brown, engineer to the Council, Town Hall, Edmonton. Sealed tenders (which must be on the form supplied by the Council's engineer), endorsed "Tender for household coal," to be delivered to the clerk to the Council, Town Hall, Edmonton, not later than 12 o'clock noon on Wednesday, September 12, 1917. The Council do not bind themselves to accept the lowest or any tender, and any person whose tender may be accepted will be required to enter into a proper contract and to provide sureties as the Council shall direct.

Abstracts of Contracts Open.

BECKHAM (NORFOLK), SEPTEMBER 3.—Coal for the Guardians of the Erpingham Union; also coke. Tenders to the clerk.

BICTON HEATH (NEAR SHREWSBURY), SEPTEMBER 17.—Coke, etc., to the Salop County and Wenlock Borough Lunatic Asylum for three months from October 1 next. Tenders to the Visiting Committee.

BLANDFORD, SEPTEMBER 15.—Coal and coke, etc.; also for haulage of same from Blandford Station to the Workhouse. Tenders to the Master's House at the Workhouse.

BLETCHINGLEY, SEPTEMBER 4.—Coal for the Guardians of Godstone Union; also coke. Tenders to the clerk, at the Institution.

BROMLEY (KENT), SEPTEMBER 5.—Coal and coke for the Bromley and Beckenham Joint Hospital Board. Tenders to the clerk.

BROMLEY, SEPTEMBER 18.—Coal for the Guardians. Tenders to the clerk.

CLITHEROE, SEPTEMBER 5.—Coal for the Guardians. Tenders to the chairman, under cover to the clerk.

COATBRIDGE, SEPTEMBER 4.—Coal and coke during the year commencing October 1 for the Old Mankland School Board. Tenders to the clerk, Municipal Buildings.

DORCHESTER, SEPTEMBER 6.—Coal for the Visiting Committee. Tenders to the Asylum.

DROMORE WEST (IRELAND), SEPTEMBER 11.—40 tons best screened coal for the Guardians. Tenders to the clerk, Board-room, Dromore West.

EDGWARE (MIDDLESEX), SEPTEMBER 13.—Coal for the Guardians of the Hendon Union. Forms at the office of the clerk, Edgware.

HOLBEACH, SEPTEMBER 12.—Coal for the Guardians. Tenders to the Workhouse.

KEIGHLEY, SEPTEMBER 5.—Coal for the Guardians. Forms of tender from the clerk.

KINGSLERE (BERKSHIRE), SEPTEMBER 4.—Coal for the Guardians. Tenders to the clerk's office.

SEPTEMBER 5.—Coal and coke for the Guardians of the Hendon Union. Tenders to the clerk's office, E.C. 1.

SEPTEMBER 3.—Burgie coal for six or 12 months, 17, 1917, for the Baths and Workhouse. Approximate quantities, 5,250

tons and 10,750 tons respectively. Tenders to the chairman of the Baths and Washhouses Committee.

NEWARK, SEPTEMBER 3.—Coal for the Guardians. Tenders to the clerk.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport.

NEWPORT (MON.), SEPTEMBER 11.—Steam coal for the Guardians. Tenders to the clerk.

PORTLAND, SEPTEMBER 4.—200 tons large Welsh steam coal and 300 tons anthracite nuts or beaus for the Waterworks Committee. Tenders to the engineer.

SEVENOAKS, SEPTEMBER 4.—Coal for the Guardians for six months. Forms from the clerk, Bank Chambers, High-street.

SHOREHAM-BY-THE-SEA (SUSSEX), SEPTEMBER 4.—Coal for the Guardians of Steyning Union; also coke. Tenders and various samples to the Board-room.

SOUTHWELL, SEPTEMBER 6.—Coal for the Guardians. Tenders to the clerk.

STOCKPORT, SEPTEMBER 17.—Coal for the Guardians. Tenders to the clerk, Union Offices, Shaw Heath.

UPPINGHAM.—Coal to the Uppingham Auxiliary Hospital—20 tons a month household coal, seven tons a month steam coal—delivered at Uppingham Station. Replies to Commandant, Auxiliary Hospital.

WEYMOUTH, SEPTEMBER 10.—Coal for the Guardians. Tenders to the Union House, 1, Wyke-road, Weymouth.

WHITECROFT (ISLE OF WIGHT), SEPTEMBER 4.—300 tons steam and 100 tons house for the Committee. Forms of tender from the clerk to the Committee.

WINDSOR, SEPTEMBER 10.—Coal and coke for the Guardians. Tenders to the clerk's office, 3, Sheet-street.

WOKINGHAM, SEPTEMBER 10.—Coal for the Guardians. Tenders to the clerk, Workhouse, Wokingham.

The date given is the latest upon which tenders can be received.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Argentine Iron and Steel Company (Pedro Vasena é Hijos) Limited.—The directors propose to pay dividends of 6½ per cent. on the preference shares and 4 per cent. on the ordinary shares in respect of the year ended February 28 last.

Bedwas Navigation Colliery Company Limited.—The directors have declared an interim dividend on the ordinary shares in respect of the half-year ended June 30 last of 6 per cent., less income tax, which compares with 5 per cent. for the corresponding period of last year.

Cardiff Exchange and Office Limited.—The report for the financial year states that the balance to the credit of revenue is £2,528. The directors recommend a dividend of 3 per cent., free of income tax, making 6 per cent., free of tax, for the year; carrying forward £1,628. The sinking fund now stands at £11,522.

Glencoe (Natal) Collieries Limited.—The directors have declared an interim dividend at the rate of 3 per cent. per annum (6d. per share) for the half-year ended June 30 last. This is the first interim dividend paid since 1914, when the dividend was at the same rate, and was made up to 3½ per cent. for the completed year. No dividend was paid for 1915, but 5 per cent. was paid for the full year 1916, in respect of which no interim dividend had been paid.

Main Colliery Company Limited.—The directors have decided to pay an interim dividend at the rate of 6 per cent. per annum on the ordinary shares for the half-year ended June 30.

Metropolitan Coal Company of Sydney Limited.—The report for the year ended March 31 last states that the output of coal was 192,442 tons, as against 229,518 tons for the previous year. The result of the year's working, after payment of debenture interest and other charges, and deducting £3,000 for depreciation of buildings and plant, shows a loss of £1,113. Deducting this from £18,199 at the credit of last year's revenue account, there remains a balance of £17,087, which the directors propose to carry forward in view of the future requirements of the company. Since the date of the balance-sheet, a cable has been received from Sydney stating that the whole balance of debentures (£15,000) had been paid off. As to the raising of the necessary capital for the immediate development of the rediscovered Bulli seam in the western portion of the area, the directors had in contemplation the offering for subscription the unissued balance of the authorised issue of the 8 per cent. first preference shares, but on making the necessary application to the Treasury consent was refused. The sinking of another bore has fully demonstrated the existence of the Bulli seam over a great area in normal thickness and quality.

New Monckton Collieries Company Limited.—The report states that the profits for the year to June 30 were £84,274, and £41,065 was brought forward. Debenture interest absorbs £4,817, and a final dividend of 5 per cent. is proposed on the ordinary shares, making 10 per cent. for the 12 months, free of income tax; adding to the reserve £42,500 to replace the bonus distributed last year; and leaving £59,137 to carry forward. The profits were abnormal, as they had no excess profits to pay consequent on their being entitled, under the provisions of the Finance Act, to recoup the deficit arising from the results of the year 1914-15, when no dividend was paid on the ordinary shares. The coal has been proved in the New Haigh Moor coal field, and is good in both quality and thickness. The development of this large area is being proceeded with as rapidly as possible.

Normanby Iron Works Company Limited.—The report for the year ended June 30 last states that interest and other income amounted to £14,767; less debenture stock interest and directors' fees, expenses and tax, £1,469, to which was added balance brought forward £1,607, making a total of £12,444. After various appropriations, a balance of £5,044 remained, and the directors recommend a final dividend on the ordinary shares at the rate of 5 per cent., making, with the interim dividend already paid, 10 per cent. for the year, the balance of £2,044 to be carried forward.

Sheepbridge Coal and Iron Company Limited.—A final dividend of 10 per cent., payable October 1, making 15 per cent. for the year, free of tax, is recommended.

South Hetton Coal Company Limited.—The directors recommend a dividend of 5 per cent. (10s. per share), free of income-tax, on ordinary shares, making 7½ per cent. for the half-year; £12,000 for income-tax; £2,684 for fluctua-

tion of securities; £20,731 forward. Last year, 12s. 6d. per share, making 10 per cent. for half-year.

Staveley Coal and Iron Company Limited.—The directors recommend a dividend of 2s. per share on the fully-paid and 1s. 6d. per share on the partly-paid shares, making 15 per cent. for the year; with £100,000 to the reserve fund.

Wigan Coal and Iron Company Limited.—The directors have declared an interim dividend after the rate of 8 per cent. per annum, free of income tax, for the six months ended June 30 last. They state they regret they are still unable to present to the shareholders a balance-sheet for the year ended December 31, 1916, for the reasons explained in their circular of February 8 last, and which they say still subsist. A similar interim dividend was paid in August last year, this being increased to 10 per cent., free of income-tax, for the completed year.

NEW COMPANIES.

Capron Neutral Sulphate of Ammonia Syndicate Limited.—Registered August 24. To carry on business of manufacturers and importers of and dealers in and agents for chemicals and manures of all kinds, dyes, gas, electricity, coal, tar, etc. Capital, £1,000. Directors: F. Capron, S. H. Azancot, H. C. Scall, and F. Cumbers.

Hayward and May Limited.—Private company. Registered office, 5 and 6, Great Winchester-street, E.C. 2. Registered August 24. To carry on business of iron founders, mechanical engineers, and manufacturers of machinery, etc. Capital, £1,500. Directors: J. T. Hayward and F. H. May.

Kersons Manufacturing Company Limited.—Private company. Registered August 22. To carry on business of general machinists and manufacturers in metal, etc. Capital, £2,000. Directors: H. B. Baker and T. H. Barham.

Lilly (B.) and Sons Limited.—Private company. Registered office, 62, Barr-street, St. George's, Birmingham. Registered August 23. To carry on business of brass founders. Capital, £10,000. Directors: W. J. Panton and J. F. Ward.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named post free.

Trading with the Enemy: Consolidating Statutory List of Persons and Firms in Countries, other than Enemy Countries, with whom Persons and Firms in the United Kingdom are Prohibited from Trading; with Notes to British Merchants Engaged in Foreign Trade. Complete to August 17, 1917. London: Published by H.M. Stationery Office. Price, 6d. net.

PUBLICATIONS RECEIVED.

"Industrial Management" (Vol. 53, No. 5), August 1917, edited by John R. Dunlap, price 25c.; "Monthly Bulletin of the Canadian Mining Institute" (No. 64), August 1917, edited by the secretary; "Compressed Air Magazine" (Vol. 22, No. 8), August 1917, price 10c.; "Registration and Publication of Directors' Names under the Companies (Particulars as to Directors) Act, 1917, by Herbert W. Jordan (London: Jordan and Sons Limited, 116 and 117, Chancery-lane, W.C. 2), price 6d. net; "Bulletin No. 155 of the Institute of Mining and Metallurgy," dated August 23, 1917; "Second Report of the Committee for the Inter-connection of the Lancashire and Cheshire Electricity Supply Systems" (July 1917), price 2s. 6d.; "The Journal of State Medicine" (Vol. 25, No. 8), August 1917, edited by William R. Smith and A. Corbett-Smith, price 2s. net; "The Journal of the Chemical, Metallurgical and Mining Society of South Africa" (Vol. 17, No. 12), June 1917, price 3s.; "The Mining Congress Journal" (Vol. 3, No. 8), August 1917, price 20c. per copy; "Proceedings of the Institution of Mechanical Engineers," January-May 1917 (published by the Institution, Storey's-gate, St. James's Park, London, S.W. 1).

Prohibited Exports.—The supplement to the *Board of Trade Journal* of August 30 contains complete lists of articles which, according to the latest information received by the Board of Trade, are prohibited to be exported from Denmark, France (including Algeria), Italy, Japan, and the Netherlands. The supplement also contains the list of articles (complete to date) which are prohibited to be exported from the United Kingdom. Copies may be obtained at a cost of 3d. (3½d. post free) either from any bookseller or from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2.

Norwegian Fuel Question.—The problem which the Scandinavian countries are facing over the fuel question is only very inadequately understood not only in belligerent countries, but in the Scandinavian countries themselves. Owing to the submarine warfare, not only are the prices of coals now about 20 times as high as before the war, but tonnage is so scarce that even at that price only a fraction of the normal needs is reaching the Scandinavian countries. Most people are inclined to think that Norway is so well forested that they should not lack fuel. It is, therefore, interesting to contemplate that, according to the *Norwegian Paper Journal*, the total output from the forests of Norway is 12½ million cu. m., of which eight millions are for home consumption, four millions are exported in the shape of timber, wood pulp, and paper, and half a million is waste. It is calculated that Norway's imports of coal, coke, and mineral oils equalise 3½ million tons of coals, such a quantity of coal having the same heating value as 14 million cu. m. of timber; if, therefore, the industries of Norway are to be kept going on wood, and if the population is to have the same amount of fuel at their disposal as in normal times, it would be necessary in case of total stoppage of coal imports to more than double the cutting in the Norwegian forests. This would mean not only taking out the annual growth, but cutting into the forest capital at the rate of more than 3 per cent. per annum. It will, however, also be realised that even if such a risk were run, there is not the transport available for bringing forward such vast quantities of timber.

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Wrought Iron and Steel Pipes for Hydraulic Stowing.

Screwed and Coupled Tubes (Black and Galvanized) for Air, Steam, Water, &c.

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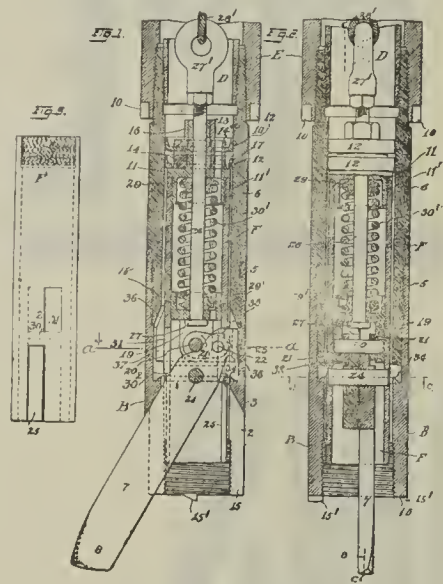
STEEL PLATES.

Catalogues sent on application.

STEEL CASTINGS.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

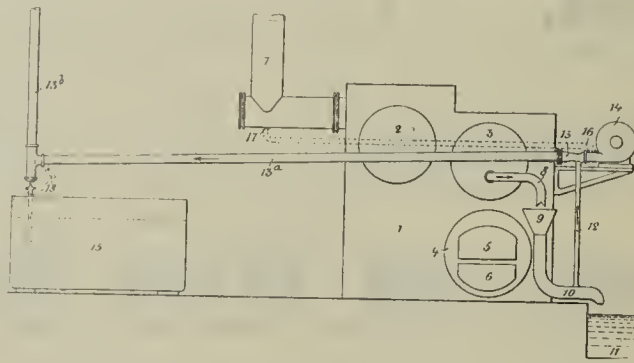
Improvements in the Method of Enlarging Bore-
A. R. Hughes, Hotel Biltmore, 43rd Street and
Avenue, New York, U.S.A.—The main object of
the invention is to provide a new and improved
method of enlarging a bore which has been previously
drilled, and that claimed in Specification No. 101162, and
to provide a new and improved apparatus for carrying
such method into effect by drilling a pilot bore to the
required point, and enlarging the hole thus bored by means
of an expanding cutting mechanism, combined in such a
manner with a boring tool that the expanding cutting
mechanism can be used after first releasing the boring tool
without withdrawing the tool stem from the hole. Fig. 1
is a view in central longitudinal section of the mechanism,
with the front cutting or pilot bit removed therefrom, show-
ing one of the enlarging blades extended into the enlarged
boring position, such view being taken in central longi-
tudinal section substantially on the line c-c of fig. 2, look-
ing from left to right thereof; fig. 2 is a like side view of
the same mechanism, in substantially central longitudinal
section, taken at the right angle to the section shown in
fig. 1, looking from right to left; fig. 3 is a side perspec-
tive view in detail of the expanding bit mechanism sup-
porting end sleeve removed, looking from left to right of
fig. 1. Referring to the drawings, as shown, the drills
may be of the rotary form, and in the case of drilling at
angles between the horizontal and the vertical the rotary
drill is of necessity the one preferred. In vertical or sub-
stantially vertical drilling, drills of the jar or churn form
may be used with substantially equal effect. Such
apparatus consists of a drill holder sleeve B provided on
opposite sides from the bottom up with the blade slits 2,
staggered or lying in different planes, as shown in fig. 2,
such slits having at the upper end the diagonal inner wall
surface 3 to limit the outer play of the bit blades 7. The
pilot bit or drill supporting sleeve B, is provided at the
bottom or lead or breast end with means for removably
supporting therein the shank of the pilot bit or drill A in
such manner that without removal of the drill rod the pilot
bit can be quickly disconnected from such supporting sleeve
and left abandoned at the bottom of the pilot bore G, so as
to permit of the lowering and forcing into position of the
expanding boring bit mechanism; and a very efficient joint
of such character is found to be a somewhat loose screw-
joint, the female thread being in the sleeve B, and the
male thread upon the shank of the pilot boring bit A;
which preferably and usually is provided with the shoulder
14², which abuts against the lower end 15 of the sleeve
B when in position; and the female screw thread in the
sleeve B ends below the upper ends of the staggered blade
slots 2, to allow of free passage of the muck removing
stream of water down to the bottom of the pilot bore when
the pilot bit is in position; or other suitable perforations
(not shown) may be formed in the wall of the sleeve B
above the slots 2 for the same purpose. Any suitable



releasable joint may be used for connecting the main boring
or pilot drill or bit to the sleeve B. In well boring, it is
the custom to have a pipe casing of steel or iron C usually
provided with a sharp edged driving shoe 4 of hard steel,
which follows the pilot bit closely, by driving down or
forward at frequent intervals. Secured to the rear or upper
end of the pilot bit sleeve B by a screw thread joint 5 is the
main sleeve 6, into the top of which may, as desired, be
screwed the hollow cylindrical drill rod D; and on to this,
if desired, is screwed a modified form of a known type of
perforated centring and supporting sleeve, which here fits
in the well casing C, and has the peripheral spiral or rifle
water grooves 30, up which the muck filled water is
forced; and is ratcheted at the top and bottom, the ratchet
teeth facing in the direction of the operative rotative
movement of the drill rod, in this case a right or watch
hand rotation when looking from the top, the ratchet teeth
and grooves causing a stirring up and constant agitation of
the muck laden water, and a swirl in the bore above and
below such sleeve E. The expanding mechanism comprises
a carrier sleeve F, secured at the top by a screw joint to
the bottom annular flange 11¹ of the piston head 11, carry-
ing the hydraulic cup washers 12 held in place on the
upper central spindle 13 of the piston flange 11 by the
space ring 14, holding ring nut 14^a and lock nut 16, the
washers, piston flange and rings being provided with one
or more perforations 17, which when in position register
so as to form a free passage for the water stream from the
hollow drill rod D to the drilling mechanism. The refer-
ence numeral 18 designates a lower piston head, having on
the outer and lower face the wings 19 to receive the link
bolt 20 pivotally securing in place the pivot rock links 21,
each pivotally connected by a pivot pin 22 to the throw-
head figure 23 of one of the expanding boring bit blades 7,
pivotally supported in the carrier sleeve F on the pin bolt
24; such pins 20 and 24 passing through the carrier sleeve
F at a right angle to the bottom blade slots 25 thereof, out-
through which slots 25, as well as the like slots 2 of sleeve
B, the blades 7 are thrown as hereinafter set forth, when
the same are brought into registry therewith as hereinafter
set forth. The upper and lower pistons are slidably
secured together by the lift rod 26, having the head 27 at
the lower end, and screwed into the cable ring 27¹, to which
the lower end of the enlarging mechanism is slidably
mounted on the lift rod 26. The upper and lower pistons
are provided with spring seat washers 29 and are interposed
the helical coil spring 30¹, and the lower reciprocable piston head
is so arranged that the blades 7 will be forced

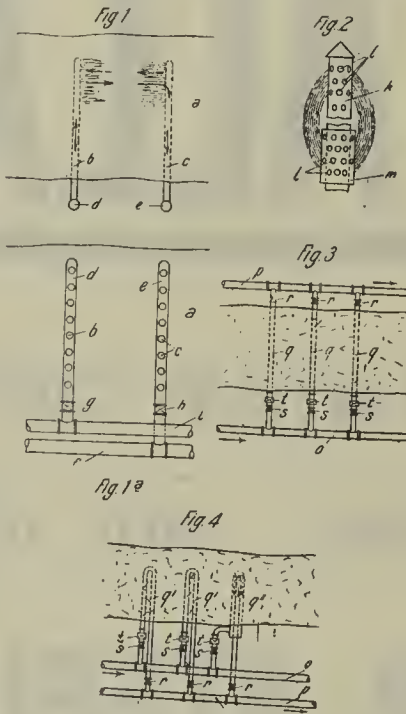
peripherally outward into the position shown in figs. 1 and
2. Such blades 7 are provided on their cutting edges with
the cutting teeth 8. (Eleven claims.)

**107345. Improvements in Apparatus for the Continuous
Distillation of Tar.** B. E. D. Kilburn, of Chancery-lane
Station Chambers, High Holborn, London, W.C. (A com-
munication from Sulzer Frères Société Anonyme, of Winter-
thur, Switzerland.)—Relates to an installation suitable for
carrying out a process for the continuous distillation of tar
with discharge of the pitch into the open. The drawing
shows diagrammatically a construction according to the
invention. The furnace 1 contains two distilling drums 2
and 3, and is heated directly. 4 is the furnace, with fire
door 5, and ashpit door 6. The smoke gases escape through
the outlet flue 7. Of the pipes connected to the distilling
drums, only the pipe 8 is shown, through which the pitch
escapes continuously. A funnel 9 collects the escaping
pitch, and the pitch pipe 10 carries it away to the pitch



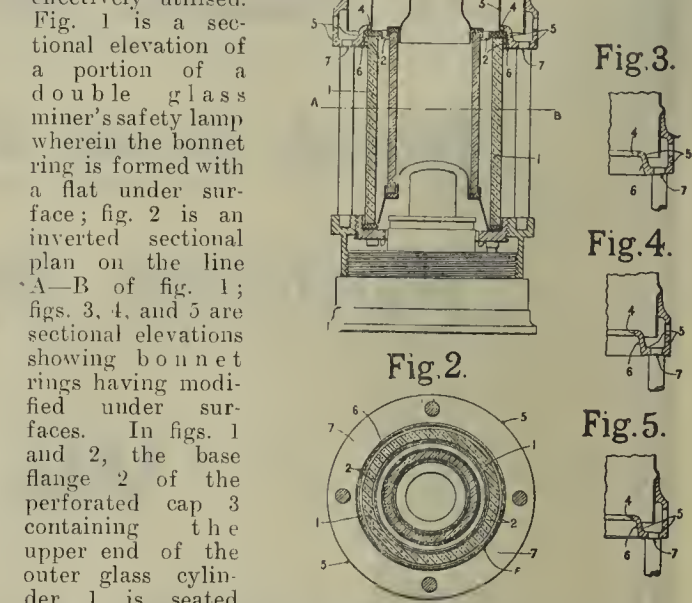
pit 11. The fan 14 feeds the ejector 13, having its suction
pipe 12 connected to the pitch pipe 10. The pitch pipe
should be arranged so that the pitch passes through it with
a slow speed, and large surface. The ejector 13 draws in
all the pitch vapours through 12, and carries them away
through its discharge pipe 13a. Here the vapours condense
and can be discharged through the pipe 18 into the collect-
ing tank 15, whilst the conveying air of the ejector escapes
into the open through the pipe 13b. One or more ejectors
could be further advantageously provided, which would
produce an artificial suction or induce draught for heating
the distilling drums, and would be fed by the fan 14. To
the pressure branch of the fan 14 is connected a branch pipe
16, which feeds an ejector which is connected at 17 to the
pipe 7, and produces an induced draught in the furnace 4.
(Three claims.)

**107446. Improvements in the Utilisation of Mine Waste
by Means of the Heat of Waste Fields.** W. Ostwald, of
Grossbothen, Saxony.—Has reference to the utilisation of
mine waste, that is to say, of rubbish resulting from mining
and like operations, and the recovery of 80 per cent. of the
nitrogen compounds contained in the waste product. Figs.
1 and 1a show in plan and elevation an arrangement for
carrying out the invention in connection with a heap of
waste; fig. 2, a double pipe for the same purpose; and
figs. 3 and 4, cooling arrangements for keeping down the
temperature. The waste heap a has introduced into it at
definite distances apart the pipes b and c, leading to per-
pendicular pipes d and e respectively. The pipes d and e
are connected with the main conduits i and f by means of
the valves g and h. The sodium or other chloride solu-
tion adapted to convert the nitrogen constituents into
ammonium chloride, are introduced through the pipes b, i,
and d, and the resulting gas is carried off through the
pipes c, e, and f. It is advantageous to change the direc-
tion of flow from time to time, in order to circumvent any
kind of obstruction which may take place in the part of the
heap between the pipes b and c. In this manner it is
possible to fully utilise the several parts of the heap in a
comparatively short time, and in an economical manner.
Instead of introducing several rows of pipes, double pipes may
be introduced into the heap, as shown, for instance, in fig. 2;
the one part k of the pipe project-
ing beyond its other part m. The two parts k
and m have openings l at their peri-
pheries, so that between these
openings a flow of gas and a
transformation will take place
in the same manner as be-
tween the pipes b and c. Through
one of the pipes chloride solutions
are introduced, and through the
other pipe the evaporation pro-
ducts are carried off. In this case also, it is advisable
from time to time to reverse the flow. Besides these pipes
which serve for the introduction of air and steam, and for
carrying off the gases and their by-products, it is advisable
to embed special cooling elements into the particular zone
under treatment at the time, in order to keep down the
temperature, and to avoid the production of slag. A simple
arrangement for this purpose comprises one or more lower
boilers united with an upper boiler, the lower boilers being
set in the interior, and the upper boiler upon the surface
of the waste field. It is, however, more advantageous to
divide the lower boiler, as shown in figs. 3 and 4, into a
number of pipes, in order to obtain greater uniformity in
the utilisation of the heat. At the burnt-out parts of the
waste field the pipes are pulled out, and are again inserted
at places where new waste material has been deposited.
The pipes may be arranged as shown in fig. 3; the cool
water being introduced at o and the heated water carried
off at p; whilst between these points there are arranged
the conduit pipes q, which pass through the waste field; r
and s are the valves for closing the several conduit pipes; t
are the several rotary conveying pumps for regulating the
velocity of flow through the pipes according to the tem-
perature of the various parts of the waste field being treated
by the respective conduit pipes. In the arrangement illus-
trated in fig. 4, the pipes do not pass completely through

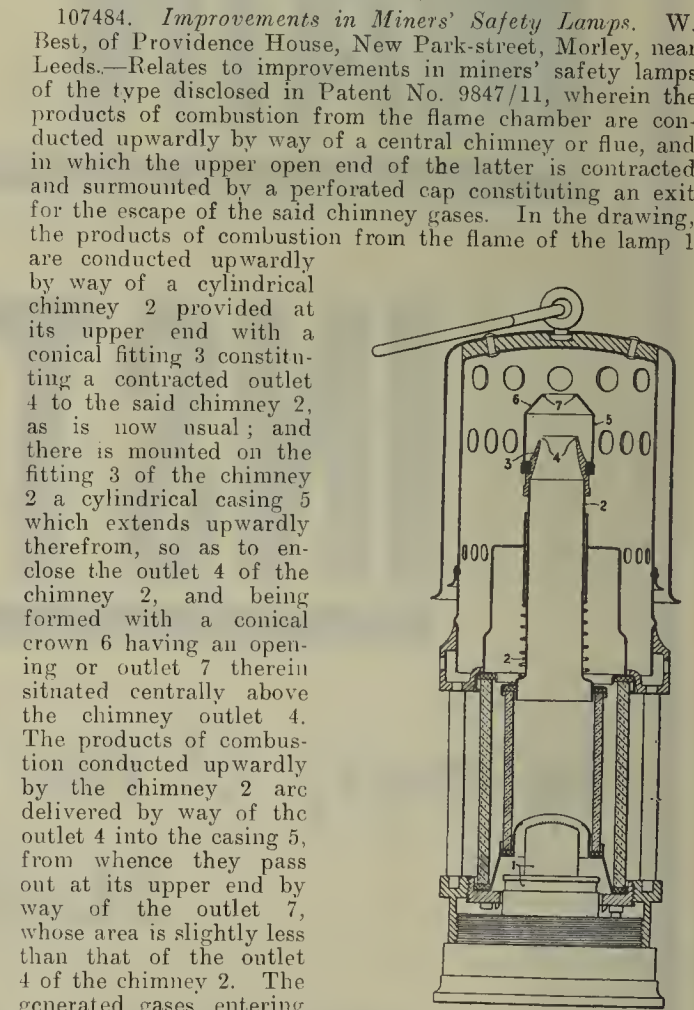


the waste field, but return towards the same side. Instead
of the return tubes q¹, there may advantageously be
employed concentric tubes q¹¹, of known construction,
which may more easily be introduced into the waste heap.
(Ten claims.)

107459. Improvements in Miners' Safety Lamps. W.
Best, of Providence House, New Park-street, Morley,
near Leeds.—Relates to miners' safety lamps of the kind
wherein the base flange of the gauze or perforated cap con-
taining the upper end of the glass cylinder is seated within
an annular recess formed in the underside of the bonnet
ring so as to give free egress to the light by way of the
entire glass cylinder below the said ring; and the object
is to improve the construction of the lamp so as to en-
able all the light given off to be effectively utilised.
Fig. 1 is a sectional elevation of a portion of a
double glass miner's safety lamp wherein the bonnet
ring is formed with a flat under surface; fig. 2 is an
inverted sectional plan on the line A-B of fig. 1;
figs. 3, 4, and 5 are sectional elevations showing bonnet
rings having modified under surfaces. In figs. 1
and 2, the base flange 2 of the perforated cap 3
containing the upper end of the outer glass cylinder 1 is seated
within an annular recess 6 formed in the underside of the bonnet ring 5
around the central opening 4, so as to give free egress to
the light by way of the entire glass cylinder 1 below the
under surface 7 of the said bonnet ring 5, all as is now
usual; and the whole of the under surface 7 of the bonnet
ring 5 around the glass cylinder 1 is polished or burnished
so as to form the under surface 7 into a reflector, by which
the light is diffused or deflected. Instead of making the
reflecting surface 7 of the bonnet ring 5 flat, as shown at
fig. 1, such reflecting surface 7 could be made either cone-
shaped, as shown at fig. 3; concave, as shown at fig. 4; or
convex, as shown at fig. 5, so as to cause the light to be
deflected at various angles, and the said reflecting surface
7 might be plated or silvered with a view to increasing its
deflecting powers. (Three claims.)



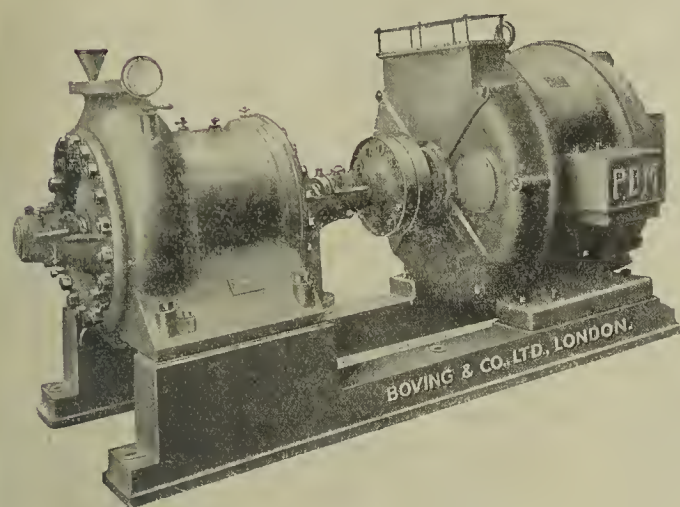
107484. Improvements in Miners' Safety Lamps. W.
Best, of Providence House, New Park-street, Morley, near
Leeds.—Relates to improvements in miners' safety lamps
of the type disclosed in Patent No. 9847/11, wherein the
products of combustion from the flame chamber are con-
ducted upwardly by way of a central chimney or flue, and
in which the upper open end of the latter is contracted
and surmounted by a perforated cap constituting an exit
for the escape of the said chimney gases. In the drawing,
the products of combustion from the flame of the lamp 1
are conducted upwardly by way of a cylindrical
chimney 2 provided at its upper end with a
conical fitting 3 constitu-
ting a contracted outlet
4 to the said chimney 2,
as is now usual; and
there is mounted on the
fitting 3 of the chimney
2 a cylindrical casing 5
which extends upwardly
therefrom, so as to en-
close the outlet 4 of the
chimney 2, and being
formed with a conical
crown 6 having an open-
ing or outlet 7 therein
situated centrally above
the chimney outlet 4.
The products of combus-
tion conducted upwardly
by the chimney 2 are
delivered by way of the
outlet 4 into the casing 5,
from whence they pass
out at its upper end by
way of the outlet 7,
whose area is slightly less
than that of the outlet
4 of the chimney 2. The
generated gases entering
the casing 5 cannot pass
out therefrom as quickly as they are delivered thereto by
way of the chimney 2, and thus the said casing 5 becomes
a reservoir for the chimney gases. In this way, a volume
of the chimney gases is always retained within the super-
posed casing 5 of the chimney 2, with the result that the
said confined gases form a cushion which has the effect of
exerting a downward pressure on the flame of the lamp 1,
sufficient to prevent it from elongating or becoming enlarged
whereby the disadvantage hereinbefore referred to is
entirely obviated. (Two claims.)



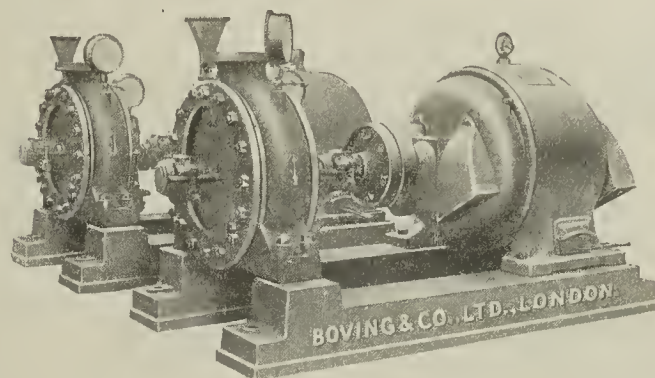
107506. Improvements in Miners' Hand Lamps. J. L.
Conway, of 21, Upper Albert-road, Heeley, Sheffield.—
Relates to acetylene hand lamps, and consists in an
improved form of construction of the locking bridle and
the means for securing together the water vessel and the
carbide container. The drawing is a side view of an acety-
lene hand lamp. a is a bridle, readily detachable from
the lamp when required, but when in place the two ends
of the bridle, each of which has a hole formed in it, are
sprung over pivots b¹ on each side of the carbide container
c, and engaging in the holes in the bridle a. Fixed on each
side of the water vessel d, and vertically in line with the
pivots b¹, are ears e¹, each having the lower edge turned up
in the form of a lip with a cambered edge e², intended to
engage with the shanks of studs secured to the inner sides
of the bridle. As the bridle is raised to a central vertical
position, the heads of the studs pass inside the lips on the
ears e¹, and as the bridle approaches its highest position,
as shown in dotted lines in the drawing, the shanks of the

BOVING TURBINE PUMPS.

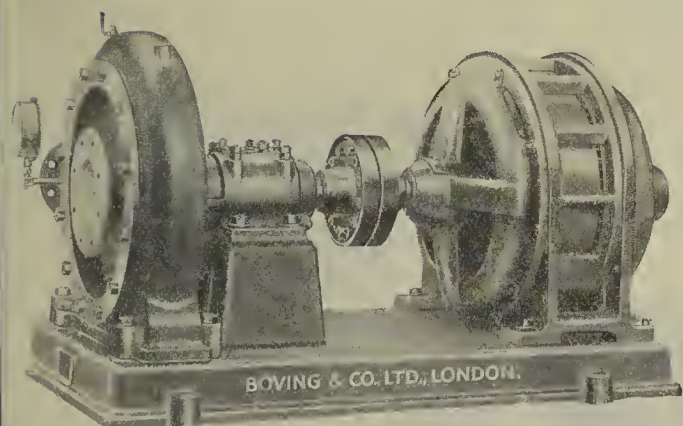
THE MOST RELIABLE AND EFFICIENT
BRITISH MADE PUMP.



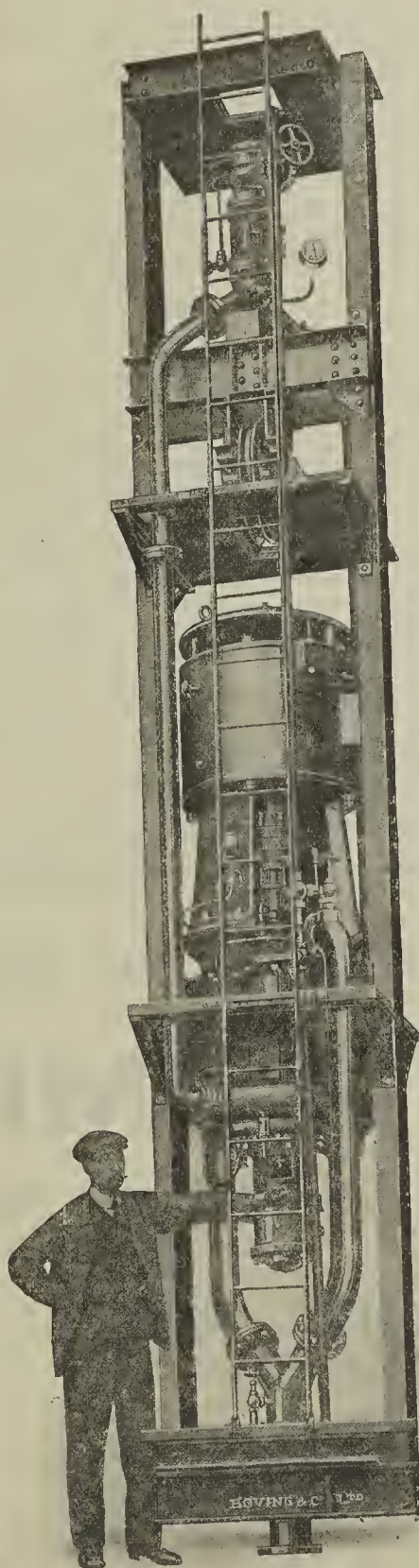
LARGE MINING PUMP
(6 Repeat Orders).
860 g.p.m.
755 feet.
1,450 r.p.m.



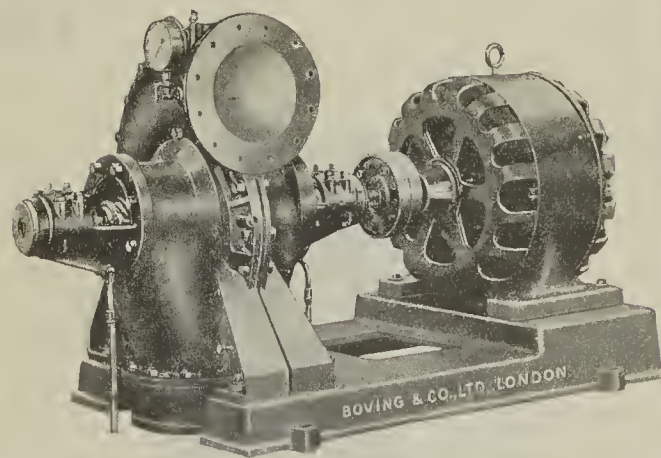
2 SMALL MINING PUMPS.
220 g.p.m.
328 feet.
2,900 r.p.m.



STEEL WORK PUMP,
Medium Pressure.
800 g.p.m.
125 feet.
1,450 r.p.m.



2 SINKING PUMPS
as shown (Repeat Order).
333 g.p.m.
475 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Low Pressure.
3,000 g.p.m.
40 feet.
725 r.p.m.

BOVING and CO. Limited,

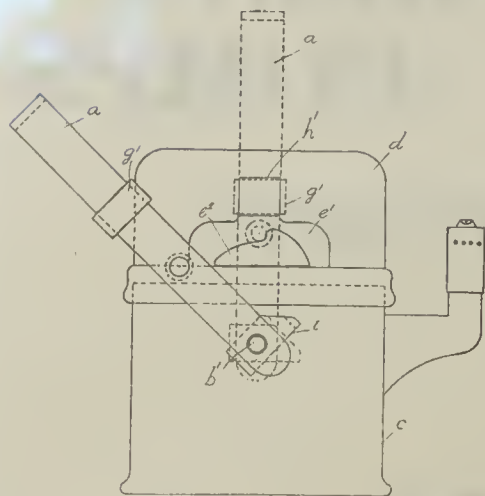
HYDRAULIC ENGINEERS,

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HOLBORN 6420 (3 lines).

56, Kingsway,
LONDON, W.C. 2.

sands engage with the cambered edges c^2 of the lips, until when the bridle a is quite vertical, the pressure between the studs and the ears c^1 is such that the water vessel d and the container e are held securely together, thus forming a gastight joint between the two. The bridle is in its upright position by means of sliding clips



g^1 , which encircle the side members of the bridle and also engage with outstanding lugs h^1 on the top portion of the ears c^1 when the bridle is vertical. (Two claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Aktiebolaget Carlit. Explosives. (12009)
Aldridge, J. G. W. Charging machines for gas retorts, etc. (12190)
Altabeb, A. Boilers. (12139)
(Ashford, J.). Centrifugal pumps. (12066)
Automatic Telephone Manufacturing Company. Electric signalling systems for mines. (11909, 12199)
Bailey, W. Furnaces for melting steel, etc. (12200)
Bolton, C. H. Mine props. (12100)
Bowhill, J. H. Internal combustion engines. (12206)
Bray, E. N., and Bray, Markham and Reiss. Pump. (11928)
British Thomson Houston Company (General Electric Company). Electric transforming and converting apparatus. (11983)
Brook, P. S., and Hirst, J. A. Switchgear for starting and controlling electric motors. (12035)
Callender, L. Apparatus for using compressed or condensed gas to drive internal combustion engines. (11957)
Carreira, J. G. Vehicle for transport of sick or wounded persons or merchandise. (12065)

- Chemische Fabrik Rhenania. Fritzweiler, H., and Stuer, B. C. Process of carrying out catalytic reactions with contact substances of natural ores containing hydrated iron. (12072)
Clark, F. W. Gas manufacture. (12042)
Clayton, R. Boilers. (12139)
Collins, F. E. Utilisation of compressed gas as fuel for engines, etc. (12161)
Compagnie des Forges d'Andincourt et Dependances, and Guillemin, A. Calorimetric meters. (12102)
Compagnie des Forges d'Andincourt et Dependances, and Guillemin, A. Apparatus for recording the quantities of heat or mean temperatures of fluids passing through a calorimetric meter. (12103)
Contraflo Condenser and Kinetic Air Pump Company. Steam condensers. (11976)
Didier, J. L. Explosion engines. (12227, 12229)
Dudbridge Iron Works Limited. Pumps. (12167)
(F.I.A.T. Fabbrica Italiana Automobili Torino Soc. Anon.). Direct current electric motors. (12077)
Fileti, G. Method of increasing heat given out by agglomerated combustible materials. (11941)
Freeman, N. H. Inclometers. (12018)
Freeman, N. H. Means for controlling temperature in furnaces, etc. (12020)
Gibbons Brothers. Gas manufacture. (12042)
Green, H. Electric signalling systems for mines. (11909)
Groves, A. Pedestals for pit tubs. (12204)
Hall, I. Furnaces for melting steel, etc. (12200)
Hall, I. Furnaces for melting metals, heating bars, etc. (12201)
Harger, J., and Helps, G. Utilisation and combustion of fuel. (12044)
Helps, G. Gas manufacture, etc. (12043)
Herbert, A. Rotary pumps. (11912)
Higgins, C. F. Steam condensers. (11976)
Hill, P. W. Cupolas, blast furnaces, etc. (12045)
Jarman, C. R. and W. E. Machine for producing driving power. (11970)
Jones, S., and MacDonald, J. D. Vertical retorts for destructive distillation of coal, etc. (12134)
Knight, J. Four-stroke valveless single-cylinder engine. (12082)
L'Effort, S. A. Mechanical high-pressure compressors. (12171)
Mascart, C. Band conveyors. (11917)
Muskier, A. Discharge of cargo in bulk from barges, etc., and delivery thereof. (12138)
Quarmby, F. Internal combustion engines. (12101)
Ramuz, O. Mechanical high-pressure compressors. (12171)
Raymond, F. E. Internal combustion engines. (12110)
Reid, W. T. Internal combustion engines. (12061)
Remington, C. Electric signalling systems for mines, etc. (12199)
Renault, L. Power transmission devices. (12226)
Ricardo, H. R. Internal combustion engines. (12013)
Ridley, J. Rotary pumps. (11912)
Roe, J. P. Sheaves for aerial ropeways. (12078)
Roe, J. P. Rope supporting sheaves for aerial ropeways. (12079)
Roe, J. P. Rope tighteners for use in erection of aerial ropeways, etc. (12080)
Rose, J. F. Internal combustion engines. (12128)
Salmon, E. J. J. Pumps. (12167)
Stobie, V. Metallurgical furnaces. (12088)

- Stroud, W. Apparatus for conversion of motion of one type into motion of another type. (12056)
Townsend, W. W. Intermittent vertical retorts. (12089)

Complete Specifications Accepted.

(To be published on September 13.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
6879. Parsons, C. A., and Cook, S. S. Steam superheaters. (108690)
11374. Ionides, A. C. Gaseous fuel furnaces. (108701)
11422. Thornycroft and Company, J. L., and Mackie, R. steam turbines. (108706)
11471. Lymn, A. H., Riley, L. A., and Rambush, N. E. Regenerators or heat interchangers in or for use with gas producer plants. (108710)
11543. Greve, L. W. Fluid-operated tools. (103287)
11789. British Electric Transformer Company, and Mount, S. C. Electric transformers. (108727)
11912. Ricardo, H. R. Internal combustion engines. (108733)
12283. Mitchell, W. A. Method of and apparatus for utilisation of the heat of exhaust gases from heat engines. (108744)
12624. British Thomson-Houston Company (General Electric Company). Systems of electric motor control. (108752)
13128. Bullivant, F. A., and Selby, G. M. Devices for application to ropes. (108761)
13405. Riddell, M. Barless fires. (108764)
13758. Latour, M. Dynamo electric machines. (107193)
14130. Hammond, E. V. Internal combustion engines. (108769)
14477. Dodson, E. Pumps. (108771)
14870. Dugon, A. L. Recording pressure gauges, indicators, and other measuring instruments. (108775)
15800. Kermode, G., and Miller, A. R. Furnaces for refining metals. (108782)
1917.
2852. Bald, C. Surveying instrument for vertical and horizontal angles. (108816)
4336. British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Electric motor control systems. (108824)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
10271. Marin, A. J. Explosives. (108853)
11459. Iterson, F. K. T. van, and Kuypers, G. Construction of cooling towers of reinforced concrete. (108863)

Portuguese Coal Outputs and Imports.—The estimated output of coal in Portugal for the current year is given at 96,000 tons, which would compare with an actual output of 83,800 tons in 1916. The imports have declined from 1,251,764 tons in 1913 to 1,050,000 tons in 1915, and still further to 700,000 (roughly) tons for last year.

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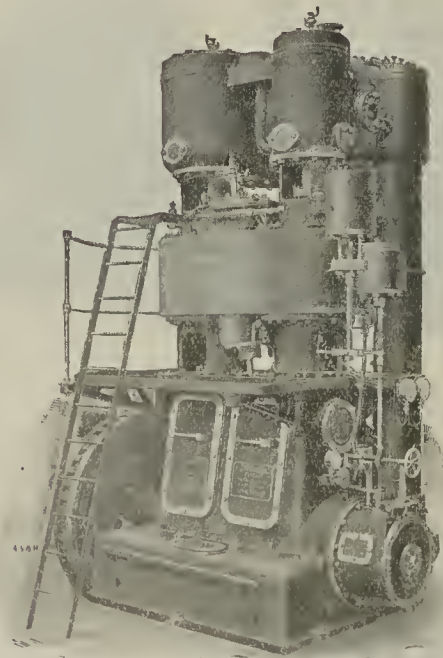
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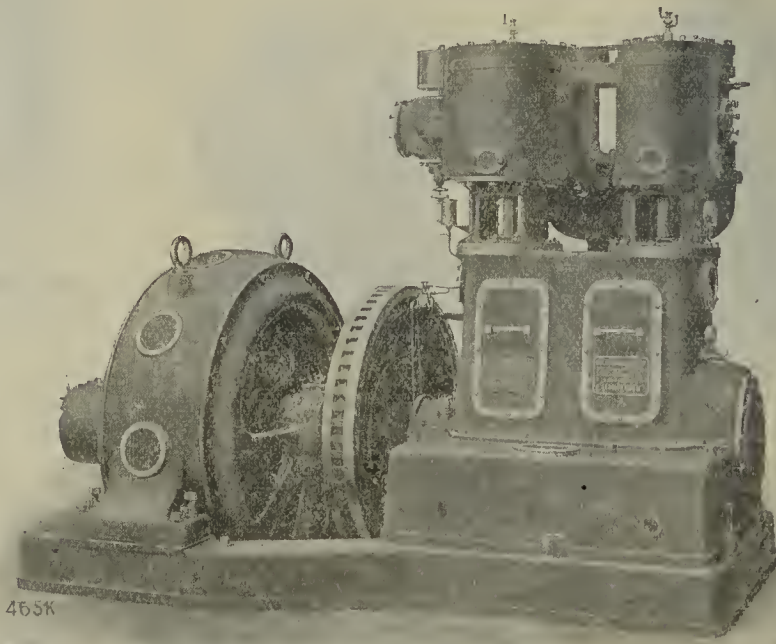
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COAL AND SHIPPING.

By F. J. WARDEN-STEVENS,
M.I.M.E., A.M.I.E.E., &c.

XXI.—Storage of Coal: OVERHEATING AND DETERIORATION.

The problem of the storage of coal has frequently been under consideration, and is one that requires investigation from several points of view. The two questions of overheating or spontaneous ignition and deterioration alone have given rise to considerable controversy; yet it may be said that no definite decision has been arrived at regarding the causes of, or best methods of preventing, either the spontaneous ignition or the deterioration of coal while in storage. Closely associated with both questions are the class, size, and quality of the coal, as well as the conditions and methods of storage, to which latter it is intended to refer more particularly next. Then must be considered the economic point of view of storage, as regards not only market fluctuations, but also the effects of labour disturbances, which unfortunately only too frequently occur, either in connection with the collieries, where they limit or stop supplies; or on the railways, or at the docks, where they prevent the transport of supplies. It is generally recognised that if the storage of coal can be satisfactorily arranged for, advantages will accrue at the collieries in the directions of lower costs of production and greater satisfaction to the miners, due to more regular working; and transport can be more efficiently provided for on account of reduced fluctuations in the demand. Economies, not entirely dependent on storage, can also be effected by the proper selection of coal—from collieries within a reasonable distance—to avoid excessive transport, which results not only in higher costs, but also in congestion and wagon shortage on the railways. This really concerns supplies for inland use, as cargoes for shipment are usually consigned to the nearest port, except in the event of congestion occurring there. Fluctuations in available tonnage for coal shipments, however, indicate the desirability of storage at or near the port when the collieries are far distant. Coal requirements for inland use, generally speaking, can be more easily met by varying the class or quality than can supplies for shipment—either as cargoes or for bunkers (which latter will be referred to in a future issue of this series). Selection of supplies is here mentioned, not from the point of view of the most economical combustion, but from that of more satisfactory mining and transport conditions, as well as the reduction of waste by the neglect of lower-grade coals which can be utilised instead of those of a higher class. This problem is at the present time being dealt with in England by the Controller of Coal Mines, in order to prevent shortage of supplies, as well as to reduce congestion on the railways and unnecessary transport, and also to reserve the higher grade coals for important national requirements.

The methods of storing coal may be divided into three general headings, viz.: Stacking either in the open or under cover; storage in elevated bunkers; and tank or underwater storage. Not only must questions of overheating or spontaneous ignition and deterioration be taken into consideration in deciding on the most suitable system for the conditions, but the arrangements for handling to and from, and distribution or transfer in storage, also greatly affect the problem, and will be referred to in subsequent issues. Moreover, there is, of course, the financial aspect—capital outlay and working costs—to be considered.

SPONTANEOUS IGNITION. Effects of Composition of Coal.

The conditions affecting the outbreak of fire in coal stacks or bunkers having, as already mentioned, been considerably debated without resulting in agreement, it will therefore be best to indicate briefly the divergent views. The chemical composition of coal is claimed to have a bearing on the cause of overheating in storage: a high volatile, a high moisture, and a high oxygen content being considered detrimental by some investigators respectively; whilst others attribute at least a partial cause of the trouble to the presence of iron pyrites, with its accompanying sulphur, in the coal. The pyrites theory, however, has been almost abandoned during recent years as a main cause, although it may possibly have a contributory effect; but even this is now doubtful. Since the oxidation of pyrites liberates sulphur, it follows that, by subjecting a sample of coal to an oxidising action, the difference in the sulphur content before and after can be ascertained by analysis, and will indicate the presence or otherwise of pyrites. Experiments have been carried out in which heating the coal in a current of air sufficient to cause excessive oxidation and ignition, and finally cooling, resulted in no reduction in the percentage of sulphur in the coal; neither was there evidence of an increase in sulphate by oxidation. The oxygen and also the moisture of coal doubtless have a contributory effect in association with outside

influences that is, by the process of oxidation or the absorption of oxygen from the air, and by the addition of surface or atmospheric moisture. The views as to the effect of moisture, however, as well as that of the volatile contents, on the overheating of coal are somewhat contradictory. Some observers maintain that a dry coal is more liable to absorb atmospheric oxygen, whilst others disagree regarding the volatile contents, a coal low in volatile matters being claimed by some as being equally liable to overheating. The dissociation of the carbon, nitrogen, and sulphur compounds in coal at the centre of a heap, not exposed to atmospheric influences, is yet another reason given for the initial stage of spontaneous ignition, as by such action it is maintained that heat is evolved, and the firing of a stack commences, so it is believed, at or near the centre or base—the unexposed portion of the pile.

From what has been stated, it will be realised that there is, as yet, nothing definitely known of the effect of the chemical composition of coal on its liability to spontaneous ignition.

Effect of the Physical Characteristics of Coal.

Size and friability are claimed to have some bearing on the liability of coal to overheating. Small or dust coal, when spread out, exposes a greater surface to the atmosphere (oxidation), but it seals up the interior of a pile, reducing the passage of air to a greater degree than when large coal is in question. In the course of handling and stacking, coal of a friable nature will be partially reduced from large to small, and considerable dust will result. Such a class of coal appears to be more liable to overheating in the pile than a heap of coal dust or slack solely, for the above-mentioned reason. The dust in the former case is distributed, and will not all be at the exterior of the pile; therefore the ventilation within the heap is not substantially reduced (this, however, is questionable). The friability of coal, and therefore the increase in the surface exposed to oxidation, is claimed to be aggravated by the presence of iron pyrites, which may perhaps, by expansion in heating, split the coal and expose new surfaces to oxidation.

Free, or absorbed, moisture, as apart from the natural moisture of coal, is another physical feature claimed to affect the liability to overheating in storage. This it is believed to do by increasing the oxidation effect at the exterior of the pile (although drying occurs), and/or by bacterial action—akin to the decomposition or fermentation of cellulose or vegetable substances—occurring at the centre of the pile when there is no ventilation or access of air; coal originating in fact from decomposed or fossilised vegetable matter. Other observers dispute that theory, and state that constant exposure to moisture reduces the tendency to spontaneous combustion; whilst an intermediary condition of frequent change from wet to dry is claimed, by others again, to be most objectionable, and is found to cause disintegration of the coal. Coals of a free burning nature, and with a high oxygen content, have been found more susceptible to the absorption of moisture than others.

Conditions of Storage.

We must next consider the effect of the conditions of storage on spontaneous ignition. Taking climatic conditions first, a heated atmosphere is naturally more conducive to the heating of coal—whether stored in stacks or bunkers—whether this heat is contributed by exposure in the open in a hot climate or by radiation from heated surfaces, or, again, due to a confined space without ventilation. In this connection, there is the question of permissible height of stacking, which has been so frequently discussed; then the internal heating properties of the coal, apart from the exterior heating effects just named, must be borne in mind. Coal fresh from the seam has a greater avidity for oxygen than has a coal which has been what may be termed seasoned, or exposed for a few weeks. The same applies, but perhaps to a less extent, in the case of the extra surface exposed when a lump of coal is broken, the absorption of oxygen being rapid at first, but diminishing with the time of exposure. Again, newly mined small coal absorbs oxygen to a greater extent proportionally than large lumps, on account of the greater surface exposed. It should also be noted that the temperature in the mine is higher than at the surface, and the coal when it reaches the pit bank has a higher temperature than that of the atmosphere, to the extent of from about 3 or 4 degs. to 15 degs. Fahr. in the summer months, and to as much as 20 degs. in the winter months. As the stacking of coal when hot or damp induces more heat, seasoning is desirable before stacking for storage over any considerable

period; also, as cooling is more readily effected by exposure in the open than under cover, stacking in larger and higher piles is more permissible with open than with closed storage, although this condition is frequently disregarded.

Again, there is a difference of opinion regarding the effect of the height of stacking, some investigators claiming that the bulk or area of the pile has a greater effect on heating than the height; and there is a divergence of views as to the maximum height to which coal should be stacked, although it is generally recognised that this depends on the class and size of the coal. Mention may be made of observations on storage piles for railway requirements in the United States, which indicate the indefinite effect of the bulk and height of the stack, not only on overheating, but also on physical deterioration. Thus, when 2,250 tons were stacked in a rectangular heap, 300 ft. in length and 41 ft. wide, to a height of 6 ft., this heap disintegrated in the course of six weeks to the extent of 30 per cent. of slack; another, but larger, stack (3,300 tons) of a similar class and size of coal gave a smaller amount (20 per cent.) of slack in the same period; and yet another pile, also of a similar class and size of coal, but containing 19,000 tons, deteriorated to the extent of 35 per cent. of slack, and also ignited at several positions. That overheating occurred in this last-named stack and not in the other two was attributed to the increased height of stacking—10 ft. instead of 6 ft.—as well as to the increased area—80 ft. wide instead of 41 ft.; and it was claimed that the heat generated in the early stages of storage was radiated to a sufficient extent to prevent ignition in the case of the two stacks first mentioned.

According to some recommendations from collieries, gas coal should not be stacked more than 10 to 15 ft., but in practice we find piles 25 ft. in height. As regards area, a recent instance on record is that of a storage pile, at a gas works, with a circumference measuring no less than three-quarters of a mile at its base. Much, however, depends upon the conditions—the size and class of coal, condition as regards moisture, temperature of coal and atmosphere at the time of stacking, and whether the storage is under cover or in the open. Moreover, provision for ventilation is claimed by some to be advantageous, yet this is disputed by others; and grading the size of the coal when stacking has been found beneficial in providing vents for heat generated at the centre and near the base. As an approximate rule, it may be allowed that slack coal should not be piled higher than about 10 ft., or in greater stacks than, say, 500 tons capacity, at all events, under cover, except when special arrangements are adopted to reduce and notify overheating. Large, nut, and graded coal can be stacked to a greater height and in larger piles with less liability of trouble from overheating, and piles of 2,000 to 3,000 tons stacked to a height of 20 to 25 ft. are quite usual. In America, enormous stacks of five times that quantity and more are quite common, and a height of even 80 ft. is not unusual for stacks of anthracite. Even in a hot climate, such as exists in India, the writer is aware of great piles 30 ft. or more in height, provision being made for ventilation.

Graded storage of coal is desirable if it can be arranged, that is, separating the nut, lump, and slack into separate piles, or divided by partitions or bunkers. If this method is not adopted, then it is questionable whether it is better to mix well rather than that packets of slack should form in a pile. However, there can be no general rule, experience and opinions differing so greatly, and so much depending on the class of coal, temperature, and conditions of storage.

As to the extent of storage, in the case of a public utility service, such as gas or electricity supply, the consumption of coal is fairly well known, or can be estimated, and therefore the extent of storage desirable is more a question of precaution against market fluctuations, labour troubles, or unusual conditions. As an example, 50,000 to 250,000 tons per annum may be required for such a service, and the usual extent of storage would be about three months' supply, or 12,500 to 62,500 tons. At a coaling station for bunker requirements, the demand can also, normally, be fairly well estimated, and based on bunker contracts—so far as concerns the supplies to regular liners—although, of course, there may not be a call for bunkers at that particular port every voyage, and the supplies to a liner at each call will not be uniform. It is the irregular demand of the tramp steamer, however, that is most uncertain.

Overheating of Coal Cargoes and in Steamers' Bunkers.

So far, reference has been directed more particularly to storage on land, but some comments should be made on the question of spontaneous ignition, which frequently occurs, in vessels at sea, and not only in the cargo holds of coal-carrying vessels, but also in the bunkers of steamers. The carrying of coal cannot be properly termed storage in the case of cargoes, although, with long distance voyages, six weeks or two months may elapse; but bunker supplies for the vessel's own use really constitutes storage, and not only for a short period, because a vessel may occupy six months on a round voyage, and, in the case of a

tramp steamer, one or two years may elapse from the time of leaving to return to the home port. True, a storage of coal is not carried to suffice for the whole voyage, or series of voyages, because maritime trading stations have been developed, and have made distance voyages financially practicable, by enabling bunkers to be replenished, and allowing of greater cargo carrying space, with less provision for storage of bunker coal. Although the aim is to work the coal bunkers regularly, it may not always be practicable to clear out a bunker entirely before replenishment, or even to trim over the coal, and thus a certain quantity of coal may be in storage for a considerable time, and even on the return of the vessel. The losses of vessels, through fires occurring by spontaneous ignition of the coal either in the bunkers or holds, have occasioned many enquiries. It is to be observed that the conditions of storing coal on land are different from the carrying of coal at sea, more particularly on account of the continuous variation of temperature and movement or buffeting of the coal in the latter case. Cargo coal is subject to conditions differing from those in bunkers. In the latter case, the coal is frequently disturbed, exposing fresh surfaces, and allowing admission or egress of air, and the number of fires which occur in the bunkers on board ship is greater than in cargoes. It is also found that spontaneous ignition is more frequent in the cross bunkers of vessels than in the side bunkers. As regards coal cargoes, it has transpired that fires have been more usual in large cargoes than small, and on vessels in tropical zones; but as regards the time of storage or the time from loading the cargo, it does not appear that spontaneous ignition more frequently occurs when a ship has been a long time out. Therefore, it has not been proved that the length of the voyage, that is, time of storage, makes any noticeable difference in the liability to spontaneous combustion. Enquiries have, however, indicated that the method of loading either cargoes or bunkers has an important bearing on the overheating of the coal, during a voyage, by reason of the fine coal produced and its distribution in the cargo holds or in the bunkers. As a general rule, and with the usual methods of loading, the first few wagon loads at each hatchway or bunker deteriorate to the greatest extent from breakage, and the coal gets broken and further pulverised by the following loads falling on top, pockets of fine coal being formed at the bottom of the cargo or bunkers near the hatchways; and, as already indicated, it is under such conditions that spontaneous ignition frequently commences.

In concluding these comments on spontaneous ignition, it may be mentioned that, in some cases, the overheating of coal in storage results not only in outbreaks of fire, but also in explosions, when the storage is in a confined space, such as the cargo holds or bunkers of a vessel. Explosion is brought about by the liberation of gases from some part or other of the coal heap, and if these gases come in contact with a naked light, or reach other portions of the storage where ignition has occurred, both fire and explosion will result. It is sometimes claimed that gases are evolved from coal without the aid of heat, but it seems more probable that heat is necessary for their liberation, that a process of preliminary fermentation or distillation occurs, and that when there is no efficient circulation of air in the mass of coal these gases collect in the voids.

The next point to be dealt with is the question of the deterioration in the quality or value of coal during storage.

Deterioration of Coal in Storage.

Numerous investigations have been made to ascertain the extent and under what conditions coal may deteriorate during storage, bearing in mind more particularly the loss in heating value and volatile constituents. This question does not involve such lengthy comment as that of spontaneous combustion, but it will be observed that the deductions arrived at are not uniform or conclusive. American investigations on the question have probably been more numerous than those of other countries, doubtless owing to the fact that the United States is the greatest coal producing country in the world, and that coal is stored there on a far more extensive scale than elsewhere. Deterioration is generally attributed to the evolution of the gases or volatile constituents by exposure, but also to the effects of oxidation, and, from the physical aspect, of disintegration. That the nature of the coal has an important bearing on the extent of deterioration, is only to be expected, and, of course, the method of storage—which will be referred to next—is the principal consideration. The results of a series of observations on American coal have indicated, in the case of a small pile (120 tons) of unscreened steam coal, stored in the open in a semi-tropical climate, that the loss of heating value in one year was less than 0.5 per cent., and that the size of the large coal was not appreciably affected. Other examples, also of unscreened steam coal, showed a loss of heating value in two years of from just over 0.5 to over 1.25 per cent. The former observation was made in the State of Virginia, U.S.A., whereas the latter was in Florida, a hotter climate. In the case of $\frac{1}{4}$ in. screened steam coal, also stored in open piles, the variation in two years was from just over 0.75 per cent. in the State of New Hampshire, to over 1.75 per cent. loss in Florida. Here, again, the climatic conditions appear to have had some influence. With coal from the same district, unscreened, but stacked under cover, the loss in different localities varied in two years from less than 0.1 per cent. to just under 0.25 per cent.; and in the case of similar coal, screened to $\frac{1}{4}$ in., from about 0.5 to 0.75 per cent.

Now, tests with steam coal, again from the same district, screened to $\frac{1}{4}$ in. size, but stored under water for a similar period, indicated that the loss in heating value was, in one case, and less than 0.5 per cent. As regards the physical deterioration, these observations, the small coal was worse than the large. A coal of a more recent—bituminous lignite—was stored in a closed

bunker, 15 ft. in depth, the loss in heating value of this unscreened coal during the first three months was 2.5 per cent., which increased to about 5.25 per cent. in about 2½ years, and the disintegration of the large coal at the surface was found to be considerable. Even, however, in the case of open bunker storage, the crumbling did not extend beyond a depth of about 18 in. from the surface. These results would not appear to justify the extra initial outlay entailed by the construction of reservoirs for underwater storage, as both the loss in heating value and physical deterioration were low. On the other hand, instances occur, especially in hot climates, of loss of as much as 25 per cent. or more in calorific value when coal is stacked, and this loss justifies serious consideration of improved methods of storage. Also extensive storages occupy considerable ground areas, which may be valuable and call for alternative arrangements. There does not appear to be any necessity to store coal for industrial requirements for a greater length of time than two years, or even as much, but instances have come under the writer's notice of storage in England for from three to six years without signs of spontaneous ignition; and even in the latter instance, which was that of a stack of about 700 tons of small screened coal, no appreciable reduction in the heating value occurred, and physical deterioration was only noticeable on the surface. It is generally recognised that the loss in heating value and also the physical deterioration are less in the case of storage under water, but objections are raised to this system on account of the disadvantages attending the use of wet coal, if conditions do not permit of proper drying after taking from storage, as some coals have been found to retain 10 or 12 per cent. of surface moisture after draining. In this connection, it will be well to recall experiments carried out with certain Western Australian coal, as mentioned in article No. 4 of this series.* This coal, which has a high natural moisture content, has been found to deteriorate physically, becoming friable, and this has been attributed to the rapid evaporation of the moisture in the coal after reaching the pit bank from the seam. Storage under water for three months has shown that the coal retained its solidity; also that the water did not penetrate much beyond the surface, a result considered to be due to its high natural moisture content. Underwater storage, of course, is an absolute preventive of spontaneous ignition, as overheating cannot occur by oxidation, and deterioration is at least greatly reduced because the volatile constituents of the coal are, as it were, sealed in the coal; also the water is found to have a protective effect against abrasion of the coal surfaces. In connection with underwater storage and deterioration, it has been observed that small coal or slack subjected to immersion in water containing a solution of chlorine has improved in calorific value and burning properties, this being due, it is claimed, to the absorption of the chlorine gas by the coal. It would therefore appear that storage in salt water has an advantage over fresh water.

Before proceeding to more practicable considerations as to the methods of storage, and describing further the means of preventing ignition and deterioration, in the next issue of the series, it may be well to add a note on the temperatures of overheating and ignition. By the absorption of oxygen, the gases in the coal become compressed, and chemical action commences by combination with the carbon and hydrogen. This results in heating, which is cumulative, the increase of temperature increasing the chemical activity and the avidity of the coal for oxygen. It has been found that a temperature of about 220 degs. Fahr. is a dangerous one as regards overheating and spontaneous ignition; the volatile constituents of the coal commence to become dissociated at about 260 degs. Fahr., considerable heat being produced, and at 410 degs. Fahr. combustion of the carbon and hydrogen occurs without the aid of fresh oxygen, the coal igniting at a temperature of about 660 degs. Fahr. These temperatures, however, depend somewhat on the class of coal, the ignition temperature of Tyne coal, for example, being about 765 degs. Fahr., and that of Welsh about 870 degs. Fahr. It has also been observed that the degree of inflammability is really proportional to the percentage of resinous matter in the coal.

* *Colliery Guardian*, vol. 112, p. 110.

Coal Tar Regulations.—The Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Acts and of all other powers enabling him hereby orders as follows:—1. No person shall as and from October 1, 1917, until further notice purchase or offer to purchase any coal tar (whether crude or dehydrated) except under and in accordance with the terms and conditions of a licence issued by or under the authority of the Minister of Munitions. Provided that no licence shall be required (a) by a tar distiller for the purchase of coal tar in any quantities, provided that the whole quantity purchased is intended to be and is in fact distilled by such distiller; (b) by any person for the purchase of coal tar (whether crude or dehydrated) in quantities not exceeding 10 gals., provided that the total quantity purchased by any one person during any one calendar month does not exceed 50 gals. 2. No person shall as from October 1, 1917, until further notice, except under and in accordance with the terms and conditions of a licence issued by or under the authority of the Minister of Munitions, accept delivery of or make payment for any coal tar tendered for delivery under any contract existing at the date of this Order, unless (a) such contract is in writing, and (b) full written particulars of such contract have been furnished to the Minister of Munitions before October 1, 1917, by the person for the time being entitled to deliveries thereunder. 3. For the purpose of this Order the expression "coal tar" shall mean and include tar produced or derived from the destructive distillation of bituminous material by any means other than blast furnaces. All applications in reference to this Order (including applications for licences) should be addressed to the Ministry of Munitions, Department of Explosives Supply, Storey's-gate, Westminster, S.W.1, and marked "E.G.S."

GOB FIRES IN NATAL.*

By J. E. VAUGHAN and F. A. STEART.

In pillar-and-stall workings gob-fires are more difficult to deal with than in longwall workings; for the reason that in longwall workings the fire can often be dug out, which is not possible with the pillar-and-stall method—the one practised in Natal. A gob-fire is often a very difficult and treacherous thing to deal with, because no one can say what is going on in the goaf, and an explosion may occur at any moment. The fire generates its own gas, and if air is getting into the goaf, it may be only a matter of time until an explosive mixture is produced. This mixture gradually diffuses towards the incandescent mass, and an explosion occurs.

In the early part of 1912, a fire occurred at the No. 1 pit of the Natal Navigation Colliery. Firedamp had not been observed in this pit for years, and the workings were wet. Whilst the fire was being built off, an explosion occurred, fortunately unattended by loss of life, and the flame was seen by eye-witnesses to extend 400 ft. from the goaf edge. Another very serious danger accompanying such fires is the almost invariable presence of carbon monoxide, which very often cannot be detected, except by its physical effects, and these, if not fatal, sometimes upset one's health for months. It can be said that carbon monoxide can be detected by carbon monoxide detectors, or, better still, by a mouse or small bird, but on one occasion in Natal an exploring party nearly lost their lives by relying on the chemical detector (palladous chloride), which did not re-act to the carbon monoxide. On another occasion, a small bird was taken underground and remained unaffected when the exploring party were badly upset. The explanation for this was that the carbon monoxide was lying near the roof, and the bird was being carried near the floor, so that while the man was breathing carbon monoxide, the bird in the lower atmosphere was escaping. The authors have found that the only way to examine a fire area with comparative safety is to go with the fresh air, and to retrace one's steps immediately any of the party feel increased palpitation of the heart or trembling in the knees.

In some cases where doubts have been expressed as to whether a gob-fire was developing, because there were no indications of carbon monoxide being present, analyses of air samples taken under the goaf edge have given valuable information. The following analyses illustrate this, and were made with the Haldane apparatus in the authors' office in Dundee as soon as possible after the samples had been taken:—

ANALYSIS I.

	Per cent.
Oxygen	16.72
Carbon dioxide	0.86
Methane	0.17
Nitrogen (by difference)	82.25

With this low percentage of oxygen, an ordinary light would not burn, not, however, due to the amount of carbon dioxide present, but to the excess of nitrogen—and this is usually the case with all samples of black-damp in Natal. Although no products of distillation are shown in the analysis, it is of importance as showing that oxidation of the coal is rapidly taking place. This analysis is typical of the first stage in the development of a gob-fire.

ANALYSIS II.

	Per cent.
Oxygen	19.45
Carbon dioxide	0.4
Methane	1.65
Hydrogen	0.32
Nitrogen (by difference)	78.17

This shows a further stage in the progress of a fire, in which hydrogen is being evolved, but no carbon monoxide is detected by analysis.

ANALYSIS III.

	Per cent.
Oxygen	12.58
Carbon dioxide	3.78
Carbon monoxide	2.44
Methane	4.12
Hydrogen	2.38
Nitrogen (by difference)	74.7

This sample was taken by inserting the bottle right into the goaf. This shows the fire in an advanced stage of development, and also the necessity for having efficient ventilation. Naturally, no one could exist in an atmosphere of this description.

The first gob-fire in Natal occurred at the St. George's Colliery in 1903, and in the Mines Department Report for that year it was pointed out that, as a large percentage of coal in the future would be produced by pillar extraction, gob-fires should be anticipated and provided against as far as possible.

The Coal Seams.

In the Hatting Spruit district the two coal seams, known as the "Top" and "Bottom" seams respectively, are situated in close proximity to each other. The Top seam varies in thickness from 2 ft. to 4 ft., and is overlain by a fairly thick bed of micaceous shale. The Bottom seam averages about 5 ft. 6 in. in thickness, and is separated from the Top seam by 3 ft. to 6 ft. of sandstone and sandy micaceous shale. Both seams are generally of very good quality, and the calorific value is about the same. On account of the difficulties presented from a mining point of view by the seams being so close together, and partly on account of the thinness of the Top seam, up to a few years ago no serious attempt had been made to work the latter, except at one colliery—St. George's—where a considerable amount of coal has been extracted from it.

In each case where spontaneous combustion has taken place, it has been the Top seam, which has been the source of the trouble, and when the position of affairs is studied it is not surprising that this should be so.

* *Journal of the Chemical, Metallurgical, and Mining Society of South Africa.*

A reference to the section in the accompanying drawing will illustrate the position more clearly. It will be seen that as the pillars in the Bottom seam are extracted and timbers are drawn, the Top seam falls in large blocks into the goaf, and is ultimately crushed and ground to powder by the falling roof, so that when once spontaneous combustion has been set up the fire is constantly being fed by fresh falls of coal from the Top seam as the extraction of pillars proceeds in the Bottom seam. Thus the conditions are almost ideal for keeping the fire alive.

Causes of Spontaneous Combustion.

Some colliery managers consider that the Top seam is only liable to spontaneous combustion when, by the proximity of dikes or overlying or underlying igneous sheets, the coal has been rendered anthracitic, and the occurrence of gob-fires at the St. George's Colliery in localities where the Top seam is said to be slightly anthracitic seems to support that view, although it is difficult to understand why the mere fact of the coal being of such a nature should cause it to be more liable to spontaneous heating than the more bituminous coal.

Although in many cases fires have started in semi-anthracitic areas, on most occasions they have broken out in bituminous coal, and the last one, which occurred quite recently, took place in an area which was 1,200 ft. from the nearest dike, and that a small one. The volatile constituents in the coal were 20 per cent. In England, gob-fires are most prevalent in the bituminous coal fields, such as those of Yorkshire and the Midlands, and do not occur in the South Wales coal fields, where anthracite and semi-bituminous seams are worked. The authors are inclined to think that the reason fires have occurred in semi-anthracitic areas in Natal is because pillar extraction has, as a rule, been started from a dike, or burnt coal. The heating up has been very gradual, but eventually a fire has broken out. Had the pillars been extracted in a bituminous section of the mine, the fire would probably have started just the same. As an instance of this slow heating, at the Glencoe Colliery in January 1912, a temperature in the goaf of 87 degs. Fahr. was noticed, with a little blackdamp accompanying it. The temperature at this same spot was carefully watched, and

substance can be detected, there must be at least that temperature somewhere in the goaf.

The third stage is that of incandescence, which is usually accompanied by smoke, and the fire itself, if near the goaf edge, may then become visible. Where the seat of the fire is a considerable distance from the goaf edge, the various stages of development may succeed each other rapidly without any great increase of temperature being noticeable in the working faces. As soon as the benzene smell is detected, announcing that distillation has commenced, steps must at once be taken to isolate the affected area as far as possible, and prevent the products of distillation and combustion from reaching any working section of the mine, as the deadly carbon monoxide is also a product of a later stage of the combustion. Fresh air must also be excluded from the neighbourhood of the fire, because much of the gas distilled from the coal is inflammable. Where blackdamp is present, the inflammable gases in the atmosphere at the goaf edge are often difficult to detect, as the "cap" on the flame of the safety lamp is partly obscured by the blackdamp present. By careful observation, however, a cap can generally be detected with a good lamp. Such an atmosphere, on account of the presence of the blackdamp, would be regarded by most miners as quite safe from the standpoint of inflammability, yet the mixture when diluted with fresh air may rapidly become explosive, and if the gob-fire has reached the incandescent stage, the explosive mixture may find its way to the fire and become ignited. Hence the necessity of using every means for the prevention of access of fresh air to the seat of the fire.

Dealing with Outbreaks.

Two methods have been employed to deal with gob-fires in Natal:—

(1) By surrounding the affected area with substantial brick or stone stoppings, so as to exclude access of fresh air, and afterwards leaving intact a double line of coal pillars to prevent any disturbance of the stoppings when pillar extraction has again commenced on the outside of the barrier.

(2) The second method is that of extracting the coal as rapidly as possible from the pillars in the area in front of the outbreak, and letting down the roof with the idea of excluding air from the fire by the fallen

they should be as small as reasonably possible, one pillar of coal saved will pay for many stoppings.

(2) The Top seam should be extracted where reasonably possible.

(3) Every effort should be made to leave as little timber and coal as possible in the goaf.

(4) Any rise in temperature above 70 degs. should be looked on with suspicion. Thermometers should be placed at the goaf edges, and if any further increase in temperature occurs, steps for completely isolating the section in a few hours should be taken.

(5) As soon as the benzene smell can be detected, the section should be completely isolated.

(6) Stoppings should be of brick and cement, as it is impossible to get any other kind really airtight. If the roof is broken or moving, the ground should be closely timbered up to the stoppings.

There has often been much controversy as to whether the building off operations should commence on the intake or return sides. Generally speaking, the authors advocate building off the return side first, because if operations are commenced on the intake side, when the return side is reached the fumes are frequently so bad as to make the building off extremely difficult. If building can proceed from both sides at the same time, this is the best method to adopt, but no two fires are alike; therefore, no hard and fast rule can be laid down, and each case must be considered on its own merits.

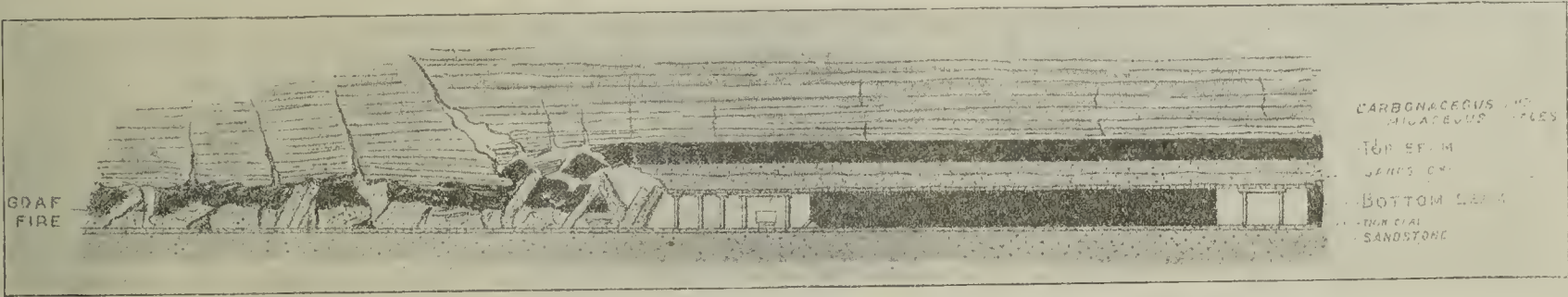
(7) A good travelling way should be provided round the stoppings, which should be examined daily; and two persons should go together in case foul air is met.

(8) Pillars should be extracted as rapidly as possible, and when the section is finished it should be built off at once, thus preventing the risk of a fire starting, and enabling the ventilation current to be diverted elsewhere.

(9) Loose coal should not be allowed to remain in the old workings, as on two occasions in recent years fires have occurred from this cause.

These remarks and suggestions may seem obvious to many people, but much coal and many days of anxiety to mine officials would have been saved had the methods thus briefly sketched out been adopted when gob-fires first appeared in Natal.

In conclusion, it will be realised that once the fire



SECTION SHOWING HOW A GOB FIRE IS CONSTANTLY BEING FED WITH COAL FROM THE TOP SEAM.

rose slowly to 97 degs. Fahr. in May 1913, when a fire broke out. In one case a fire occurred although the temperature at the goaf edge never rose above 75 degs. Fahr.

The cause of spontaneous heating is probably due to the combination of mechanical and chemical action. The Top seam, as already noted, is continually being crushed in the goaf by the falling roof and general subsidence. Oxidation is thus greatly facilitated, and heat evolved. If sufficient moisture be present, further chemical action with resultant heat is probably produced, on account of the presence of sulphides. As the temperature rises, the absorption of oxygen by the crushed coal becomes more rapid, and blackdamp is given off in large quantities as a consequence, which in time makes its appearance at the goaf edge in the working places.

It is noteworthy that in those Natal collieries in which spontaneous combustion has occurred, blackdamp has usually been observed in the vicinity of the goaf for some time before any considerable rise in temperature has been noticed. The appearance of blackdamp in pillar extraction workings should, therefore, be always regarded with suspicion as indicating that somewhere in the goaf oxidation is taking place at a rapid rate, and that the first stage in the development of the gob-fire is proceeding. If the fallen roof is a good conductor of heat, the heat may be conducted away almost as fast as it is generated, in which case a fire will not take place. The roof of the Top seam is often composed of micaceous and bituminous shale, of a much lower conductivity than sandstone. Where this is so, the heat is probably not carried off as quickly as it is generated, the temperature continues to rise, and the second stage is soon reached, when distillation of the coal commences. This stage is noticed at once by the peculiar smell which accompanies it, and which is chiefly due to the benzene vapour which is being distilled off.

The following analysis of gas, evolved from the coal of the St. George's Colliery, made by Dr. R. V. Wheeler, is of great interest as showing the gases which are given off from the distillation of the coal at 900 degs. Cent.:—

	Per cent.
Benzene	2.00
Carbon dioxide	0.70
Acetylene	0.10
Ethylene	2.05
Carbon monoxide	10.30
Hydrogen	62.05
Methane	19.40
Ethane	3.45
	100.00

When it is remembered that benzene is distilled off at a temperature in the neighbourhood of 600 degs. Cent., it may be assumed that, when the smell of this

goaf. This method, however, may be said to involve some risk, for the following reasons. In the first place, because the goaf cannot be said to fall evenly or to close up completely on the extraction of pillars. It is therefore impossible by this means to be certain of excluding air from fire. In the second place, if a section, in which this method is being used, is afterwards suspended or abandoned, the fire (which probably has never been extinguished) may work its way to the front by feeding on the fallen Top seam, and may still have to be reckoned with. For these reasons, the method cannot be recommended, and is now never employed.

The best method of dealing with spontaneous combustion in those districts of Natal where the upper and lower seams are so close as to render gob-fires probable, is for every colliery to anticipate such occurrences and lay-out the pillar working accordingly, i.e., on the panel system. By this means each district is divided from the other by a solid barrier, and is ventilated by a separate intake and return airway, independent of any other district, so that a fire occurring in one district or panel would not affect any other district, and, if necessary, the entrance to a district can, as a last resort, be quickly sealed up. A system of panels can, of course, be more readily planned when a colliery is being newly opened out, but in the older collieries the system can be arranged to some extent by taking advantage of the natural dyke barriers which exist in every colliery, and by building strong brick stoppings in addition, so as to form artificial barriers in districts where pillars are about to be extracted.

Prevention.

In those districts in Natal where the Top seam is situated a considerable distance above the Bottom seam, spontaneous combustion is less likely to occur, but where the seams are situated as in the Hatting Spruit district, so long as the Top seam is left and is being wasted in the goaf, gob-fires must be expected to occur from time to time. The best remedy for the evil in that district is, therefore, extraction of the Top seam wherever practicable.

The authors cannot too strongly urge upon managers and directors the necessity, where a mine is not laid out in small panels, of building off areas in which pillars are being extracted into small panels, provided with doors, so that, should a fire break out, the doors can be closed at once, and the area completely built off in a few hours. This may cost a little, but any pillar of coal saved is something, and much coal has been lost in the past which would have been saved had small panels been formed.

Conclusions.

The authors wish to conclude with a brief summary of some general notes, which are founded on actual, and sometimes painful, experiences in Natal:—

(1) Before pillar extraction is commenced, the section should be converted into a panel or panels, and

gets beyond control the pit is lost for a long time, and great difficulty and expense will be incurred in recovering it. Take, for instance, a colliery (and there are several such in Natal) in which three or four fire areas exist and have been walled off. Should an explosion occur in such a pit, stoppings round the fire will be blown down, the fires will break out afresh, and in all probability the pit will be lost for ever. The authors cannot help thinking that the dangers of fires are not fully realised by some people. To deal with gas is a comparatively simple matter, but to cope with a fire, which has got beyond the initial stages is perhaps the most dangerous and difficult operation in mining.

DEVELOPMENTS ON TEES-SIDE.

Establishment of more large and important works on Tees-side was foreshadowed this week when at a meeting of the Tees Commission, held at Middlesbrough, the general manager (Mr. John H. Amos) reported that with reference to a minute passed at a previous meeting of the Commission he had had several interviews in London with the Right Hon. Lord Furness, with the result that the terms and conditions of H.M. Commissioner of Works and the Tees Commissioners in connection with the sale of the whole of the unsold reclaimed land at Haverton Hill, on the north bank of the Tees, opposite Middlesbrough, had been accepted by his lordship. As the result of a recent survey, the land had been found to contain 52 acres, with a river frontage of 1,550 lineal ft. The site was required by Lord Furness for the purposes of a shipbuilding yard, dry docks and engineering works; and berths would be laid down for the construction and launching of vessels of heavy tonnage. His lordship's advisers were of opinion that the area of the plot of reclaimed land referred to was not sufficient for the purposes required, and, therefore, at the desire of Lord Furness and the Tees Commissioners, he (Mr. Amos) approached the Ecclesiastical Commissioners, and after somewhat lengthy negotiations arranged for the sale to Lord Furness of a further site, the property of the Ecclesiastical Commissioners, of 33 acres and a frontage to the river of 940 lineal ft., immediately adjacent to the reclaimed land, upon the same terms and conditions as those embodied in the sale by the Crown and the Tees Commissioners. The total area of land purchased at Haverton Hill by Lord Furness was thus 85 acres, with a frontage to the river of 2,490 lineal ft. The chairman (Sir Hugh Bell, Bart.) mentioned that the land sold was the last parcel of any magnitude of reclaimed land which the Commissioners had had for disposal, and at the same time he reminded them of the possibility of carrying out further work of reclamation on the north bank and on the lower reaches of the River Tees. He congratulated Lord Furness on his purchase. The Commissioners agreed to write Lord Furness, tendering best wishes for the success of the enterprise on which he had embarked.

NEW TYPE OF AMERICAN TIPPLE.*

The preparation of bituminous coal has, during the few years, received much intelligent attention and from engineers. The coal tippie has been improved in design and equipment, and its arrangement has been made flexible so that it can meet the changing conditions of mining and the varying demands of the market.

The inclined shaker screen and the apron picking table used in conjunction with it, have in a great many new installations been superseded by horizontal equipment that serves both for screening and picking. This equipment has many advantages, such as lower dumping point, a reduction in the number of units required in the preparation of the coal, and simplified tippie construction. But there are a number of disadvantages.

Engineers in the United States and elsewhere have for years sought to convey and screen coal on horizontally reciprocating troughs, but nowhere with entire success. The aim is to avoid costly and cumbersome mechanisms or drive heads requiring massive foundations or supporting structures, because these provisions increase the cost of installation and maintenance, and are further objectionable because of their position near the shaft. Moreover, the practice of carrying the larger sizes of coal almost the full length of the screening surface is objectionable. The lump coal in particular traverses the entire length of screen. In the passage of this coarse coal the smaller material is crushed

entirely free from the mixed nut and slack, which have dropped through the bar openings. It is gently conveyed on to the horizontal cross picking table and loading boom, where it is picked and then gently lowered into the car without breakage.

This picking table and boom is operated with a similar mechanism to that driving the shaker screens, but is of lighter construction. The nut and slack which fall through the bar screen drop on to the lower deck of the upper screen. For removing the slack from the nut this lower deck is provided with from 14 to 20 ft. of slack perforations, preferably of the lip-screen type. The slack falls upon the lower section of the screen, which is provided with blank plates. This conveys the coal back to the slack track, which is located directly below the driving mechanism of the screens.

The nut coal which passes over the slack perforations is conveyed forward and delivered on to a picking table and loading boom identical with that described for the lump. A removable plate is provided over the lump boom so as to allow the passage of the lump on to the lower deck for mixing with the nut.

By this arrangement almost any combination of mixtures can be made. Furthermore, the larger sizes are saved from breakage by not having to pass over the smaller perforations. Thus, for instance, the lump does not pass over the perforations for screening out the slack. Moreover, when four sizes are made, the egg coal is saved from much breakage. The picking table may also be provided with perforations and with a second deck, so as to screen out the slack when run-of-mine is picked and loaded. In this case the bar screen will be covered with blank plates.

Furthermore, by this system of screening, the efficiency of the screens is greatly increased, as the capacity of any screen is based upon the effective screening area for the slack coal. In this system the screening area is relieved of the lump and egg sizes which otherwise would largely cover the perforations. Hence, the capacity of the screen is thereby increased, although its length is materially decreased. The old method of screening away the small sizes first necessitated a screen from 16 to 20 ft. longer than is needed with this system. The long screen made it essential to erect a building and supporting structure of corresponding length, and yet the effective screening area was materially lowered.

With this system rescreening is entirely unnecessary, as the larger sizes after screening pass over smooth surfaces with practically no drop where breakage can occur. The pickings are thrown into a refuse conveyor, which is a narrow trough rigidly fastened to and made a part of the lower screen, from which it receives the same conveying motion. Thus the refuse is conveyed back to the refuse chute, which is located in direct line with the rock chute that receives the rock from the mine. The feeder hopper is provided with a flap gate for discharging weighed run-of-mine into the local-trade chute. This chute also has a gate for passing the run-of-mine direct to the slack track without operation of the shaker-screen equipment. Some

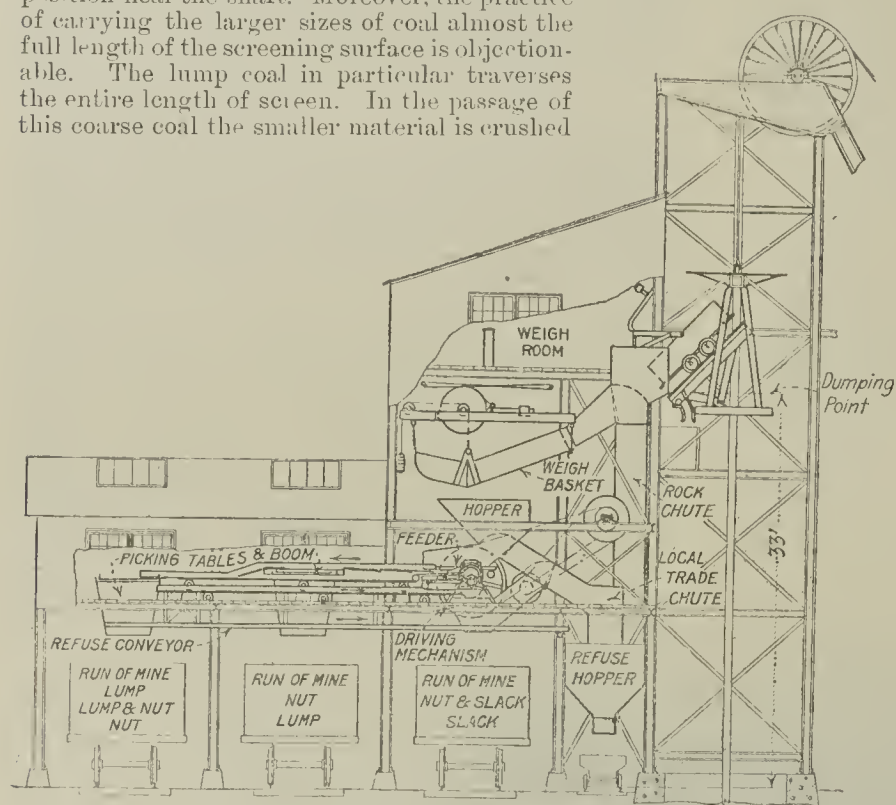


FIG. 1.—SIDE ELEVATION.

under the rolling or screening action of the larger. Furthermore, the presence of the larger coal makes effective picking difficult, and the screening surface has a reduced effectiveness because the larger sizes interfere with the screening action.

The demand for a carefully cleaned and graded product is not just now so pressing as in the past, but the companies that are building tipples are preparing for the time when only those which are well equipped will be able to meet the fierce competition.

With these ideas in view, the tippie illustrated here-with has been designed by Jacobsen and Schraeder, Chicago. Fig. 1 is a side elevation, whilst fig. 2 shows the tippie adapted to a crossover dump. The coal is hoisted in the regular way on the self-dumping cage and dumped into the chute, which delivers the coal directly to a weigh basket with a minimum of breakage. After the coal is weighed it is dumped in the feeder hopper, from which it is fed at a uniform rate on to the shaker screens.

These consist of one upper and one lower screen operating in opposite directions, both being of substantially equal weight. Consequently the reaction of one is entirely absorbed by the reaction of the other. Thus the need for heavy foundations is eliminated and the vibrations in the structure are reduced to a minimum.

The operating mechanism for imparting the reciprocatory motion to the screens consists of one continuous straight shaft on which are oppositely mounted two pairs of ordinary eccentrics, each pair operating one section of the screen. A uniformly rotating power-driven differential flywheel pulley imparts to the shaft a motion which is slow at first and then gradually accelerates toward the end of the stroke, then quickly reverses and slows up toward the end of the return stroke. This ensures a continuous travel of the coal at a speed suitable for screening and picking. The eccentric which operates the reciprocating feeder is also mounted on this same shaft and thus imparts to the feeder plate the same irregular reciprocating motion which gives that part a suitable self-cleaning action.

Thus the installation of an independent feeder shaft with its bearings, supports and drive pulley is saved. The arrangement has the advantages enjoyed both by the apron type and by the old-style reciprocating feeder, and it has none of their inherent disadvantages.

The coal which is delivered from the feeder on to the upper horizontal shaker screen, passes over a bar screen which is made in two sections about 4 ft. long with a step of 4 in. at the section to turn the coal as it passes. The openings between the bars may be 1 in. to 6 in., as required. The material that has passed over these bars is

* Coal Age.

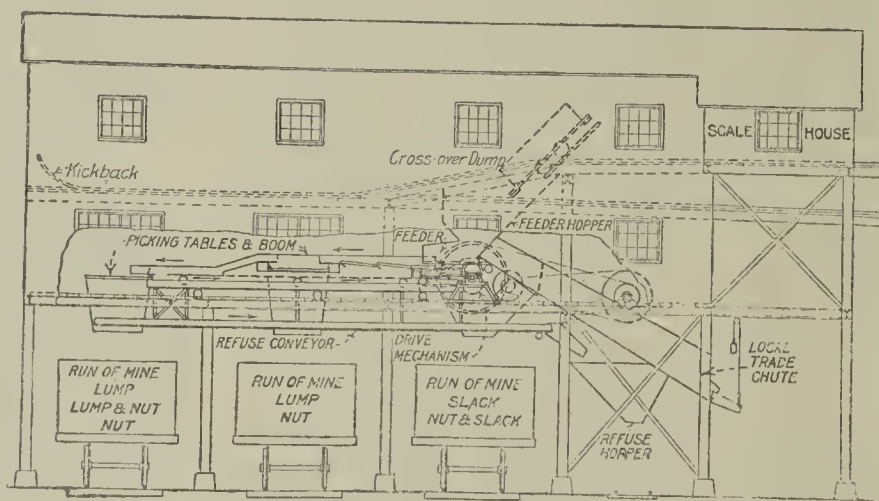


FIG. 2.—TIPPLE ADAPTED TO CROSS-OVER DUMP.

of the advantages obtained from this tippie design and system are: A low dumping point; a tippie structure 16 to 20 ft. shorter, occupying less ground space; smaller foundations, a self-cleaning reciprocating feeder; an efficient shaker screen; a higher yield of all larger sizes; elimination of rescreening equipment; greater facilities for loading and mixing the various sizes; a desirable and satisfactory refuse and rock disposal. Summarised, these advantages give a better product at a minimum cost.

Chrome Ore.—The Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Regulations and all other powers thereunto enabling him, hereby orders that no person shall as from August 31 until further notice purchase or take delivery of chrome ore of any grade except under and in accordance with the terms of a permit issued under the authority of the Minister of Munitions; and further that no person shall as from the above date until further notice sell, supply, or deliver chrome ore of any grade except to the holder and in accordance with the terms of such a permit to purchase or take delivery as aforesaid. All applications for a permit in connection with the above Order should be addressed to the Director of Materials (Reference AM2/FWH), Ministry of Munitions, Hotel Victoria, Northumberland-avenue, W.C. 2.

REPORT OF THE COMMITTEE OF COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

The second annual report issued by the new Research Department—which under all the disadvantages of the strain of war and the shortage of workers is trying to provide a permanent basis for research in this country and to co-operate with similar attempts in the Dominions—indicates three ways of organising industrial research. The simplest is the case where a single firm can work out a problem and itself fully exploit the results. In most cases, however, problems of industrial research will concern many firms, sometimes many industries, and will require the expenditure of large sums of money and the co-operation of many workers for long periods of time. But if successful, the results will be of immense value.

Most individual firms cannot undertake this long and costly process; yet why should the State pay for the whole cost of winning new knowledge which will be valuable to business men? It is hoped that the way out of this dilemma will be found by the establishment of "trade research associations," to be constituted, as needed, for each industry or group of industries, and on which are to be represented, when possible, capital, management, science, and labour. These associations will be aided out of the million grant, to be administered by the Department, for that express purpose. One association is just about to be constituted for the cotton industry; and others are being brought into existence for the wool, flax, shale oil, and photographic industries.

There are also many cases where the problem is so complex, or else so immediately concerns the consumer rather than the producer, that co-operation between manufacturing firms is not possible. This is obviously the case with fuel. Hence the establishment of the Fuel Research Board, which, under the direction of Sir George Beilby, will itself conduct research. So, too, with the problems of fire-resisting materials, and the determination of standards and constants. All this is direct work for the whole community, acting through its special organ of research. It is interesting in this connection that the Royal Society has recently negotiated with the Department the handing over of the financial responsibility for the conduct of the National Physical Laboratory, where investigations of national importance are constantly going on.

The main lines of policy of the new Department are being slowly worked out. But it is also not neglecting immediately pressing problems. In glass, for instance, a great deal has been already done—three completely new kinds of optical glass have been discovered by Prof. Jackson. A research on light alloys (aluminium, zinc, copper) will be of the utmost importance for the future of aeronautics. A new hard porcelain from purely British materials has already been produced. Researches into the recovery of tin are expected to save the Cornish tin industry £30,000 a year. A large number of other researches are being aided or carried out by the Department.

At a considerable number of universities researches, aided or initiated by the Department, are now in progress. At the universities, too, the future research workers receive their training; and 36 (who would otherwise have drifted into immediately remunerative work) were aided by grants from the Department in 1916-17.

The report also refers to the altered attitude of manufacturers and men of business towards the claims of research and education, and reiterates the conviction that a sure advance in industrial science can only be made when the field of work is adequately surveyed beforehand, and an organised plan of attack worked out.

Below are various extracts from the report of the Advisory Council dealing with matters of more immediate interest.

The Fuel Research Board.

The investigations conducted at the National Physical Laboratory belong to this class, but by far the most fundamental work initiated during this year, so far as the industrial aspect of the Council's labours are concerned, has been the appointment by the Committee of Council of a Director of Fuel Research, with a Fuel Research Board to assist him in laying his plans.

The question of researches bearing on coal and its uses had been before the Council in various relations since the beginning of 1916. Definite applications for grants had been received from professional societies and from research workers at universities. A committee of the British Association appointed to promote fuel economy had also approached the Council with a view to applying for a grant, and it became apparent at this early stage that the great range and importance of research into fuel called for treatment in a comprehensive way. A memorandum on researches bearing on coal and its uses was accordingly prepared in May 1916 at the request of the Council and with the assistance of Sir Richard Redmayne (Chief Inspector of Mines under the Home Office).

In July 1916 the Reconstruction Committee appointed a Sub-Committee on Coal Conservation, and the Council accordingly referred to that Sub-Committee for their observations six researches that had been proposed to the Council.

The Coal Conservation Sub-Committee, in a letter dated August 11, replying to this reference, raised the question of their relations with the Advisory Council and the manner in which "co-operation between the two bodies can best be assured." They also urged the importance and immediate necessity of arranging for a chemical survey of the coal fields. The letter continued: "It appears to my Committee to be essential to the most economical use of our coal in this country and to the most advantageous marketing of it abroad that there should be available a collection of reliable data giving the chemical analyses of all our different coals. Further, it seems to be essential that these analyses should be prepared upon a uniform basis so as to be readily comparable. My Committee are of opinion that it will be necessary to go even further than this, and to collect data not merely as to the chemical composition of the coal, but as to how the coal will behave under a fur-

nance test, and upon its relative suitability to various processes, e.g., coking, metallurgical, steam raising, etc." This letter led to a conference in September between representatives of the Coal Conservation Sub-Committee and of the Advisory Council, at which the relations between the Sub-Committee and the Council were discussed, and also the question of how to make the best use of the services of the British Association Committee on Fuel Economy. The conference agreed that the Advisory Council should be responsible for the organisation and conduct of all research bearing upon coal, whether initiated by the Coal Conservation Sub-Committee or not.

The conference with the Coal Conservation Sub-Committee was followed by another with representatives of the British Association Committee on Fuel Economy. It was proposed that the Advisory Council should establish a Standing Committee on Fuel to advise them as to proposals for research into the uses of fuel, and it was suggested that the membership of the new Committee should be in a large measure identical with that of the executive of the British Association Committee. The Council accordingly appointed a small Sub-Committee on November 3 "to consider the constitution, personnel, and terms of reference of the proposed Standing Committee on Fuel." In consultation with the chairman of the Council, and having regard in particular to the chemical survey of the coal fields of this country proposed by the Coal Conservation Sub-Committee, and to the important and difficult developments in which this survey was certain to result, the Sub-Committee reached the conclusion "that the magnitude and importance of the research work in fuel which will have to be undertaken either on the initiative of the Coal Conservation Sub-Committee of the Reconstruction Committee, or of the Council itself, makes it essential to set up machinery which will be at once both more compact and capable of more rapid action than would be possible if the ordinary procedure were adopted of reports from Standing Committees to be considered by the Advisory Council and then submitted by way of recommendation to the Committee of the Privy Council."

This finding was endorsed by the Advisory Council, and in due course by the Government, with the result that the Fuel Research Board was established with a Director immediately responsible to the Lord President and with power to expend funds placed at his disposal by the Committee of the Privy Council in accordance with a budget annually approved by that body after report by the Advisory Council on his proposed scheme of work. The Council believe that all informed opinion will rejoice at the selection of Sir George Beilby for this important post, and at his free gift of the knowledge and experience of a lifetime of scientific study and manufacture to the national pursuit of an enquiry that he has made peculiarly his own. The other members of the Board are the Hon. Sir Charles Parsons, K.C.B., F.R.S., Sir Richard Redmayne, K.C.B., and Mr. Richard Threlfall, F.R.S. On the establishment of the Board, the services of Prof. Bone, F.R.S., of the Imperial College, were retained with the consent of the College Governors as consultant to the Board. The Council understand that the British Association on Fuel Economy is prepared to place the valuable information it has collected at the disposal of the Fuel Research Board, and that the Director may anticipate the active help of its members, either in their individual or corporate capacity, as occasion may arise.

The Fuel Research Board have already presented their first report outlining their proposals for taking stock of the coal resources of each district, classifying according to their qualities the seams which are being worked or which might, in certain circumstances, be worked, and ascertaining broadly the industrial uses to which the different kinds of coal are being put. It is intended with the help of the coal owners to collect typical specimens of the coal seams of the various coal mining districts, and to examine and classify them by means of chemical and physical examination in the laboratory. On the more theoretical side it is intended to conduct investigations into the nature and origin of the various types of coal and into the chemical and physical behaviour of their constituents under the action of heat and other agents, beginning with the well-defined types of coal as they occur in commerce. Thus this side of the enquiry will be most readily kept in touch with the practical side, and the new knowledge of the scientific worker at once becomes available for practical application. This method of attack needs the establishment of suitable machinery for the supply of samples, and not less the labours of a number of scientific workers. In present circumstances progress in both directions must be slow, but so far as more urgent necessities will allow, the Director and the Board will put this plan into operation during the coming year.

Peat.

The Fuel Research Board have also had under consideration a number of proposals for the utilisation of peat, and they have been in communication with the Department of Agriculture and Technical Instruction for Ireland. That Department has for many years kept alive in Ireland an interest in peat and its possible uses, and the Board cordially responded to its advances in this matter. At the same time, the Board have not been able to ignore the experiences of the past and the failure of many schemes to attain permanent commercial success on any considerable scale. Accordingly, they have decided after consultation with the Irish Department, and with the approval of the Committee of Council, to appoint a small Committee of Enquiry to sit in Dublin, with the following terms of reference:—

To enquire into and to consider the experience already gained in Ireland in respect of the winning, preparation, and use of peat for fuel, and for other purposes, and to suggest what means shall be taken to ascertain the conditions under which in the most favourably situated localities it can be profitably won, prepared, and used, having regard to the economic conditions of Ireland; and to report to the Fuel Research Board.

The Committee will consist of Sir John Purser Griffith, M.A.I. (chairman), Prof. Hugh Ryan, D.Sc., Prof. Sidney Young, Sc.D., F.R.S., and Mr. George Fletcher, with Prof. Pierce Purcell, M.A.I., as secretary.

Other Work of the Fuel Research Board.

The appointment by the Government of a Director of Fuel Research has greatly facilitated and encouraged the co-ordination of the activities of the several Departments of State which are directly interested in the supply of fuel of different kinds and their most effective use. A considerable portion of Sir George Beilby's time has been given in consequence to the service of the Admiralty and the Ministry of Munitions, while the Board of Trade have recently sought the advice of the Fuel Research Board as to the fixing of standards of quality for town gas. The Council have always believed that the natural relation of themselves and the Department to other Government Departments would be to act as the servant of them all,

to supply accurate information and independent reports upon scientific problems submitted for investigation, and to leave to the administrative departments the duty of applying the knowledge the Council may be able to furnish. This proves to be the direction in which events are moving, and the appointment of assessors from other Departments to the Council has undoubtedly helped to bring it about.

The work of the Fuel Research Board, like that of the Provisional Committee on Research into Cotton, has been in the main preparatory. Neither body has yet done much in actual research, for they have been doing the careful thinking without which ideas are barren.

Domestic Heating.

The Council have, however, recommended that grants should be made for three pieces of research which are related to the work of the Fuel Research Board, and the Board have concurred, because they could be carried out without interfering with the general plan of operations. The first of these, initiated by the Sanitary Committee of the Manchester City Council, is being carried on at the Municipal School of Technology, and has for its objects the use of better methods of domestic heating and improvement in the ventilation of dwelling rooms. A grant has also been given to the Institution of Heating and Ventilating Engineers to enable them (a) to tabulate and print the result of five researches on domestic heating carried out at University College, London, during the past three years; (b) to carry out a research with a view to establishing coefficients of heat transmission through standard building materials, and (c) to conduct an investigation on heat transmission from radiators. The Council have invited the institution to add Dr. Lees to the Committee of Direction, and as a member of the executive committee of the National Physical Laboratory he will assist them to avoid overlapping between the work to be done at University College and that conducted for some time past at Teddington into heat transmission through building materials of a light character.

Atmospheric Pollution.

The third grant made on the advice of the Council this year in the ultimate interests of fuel research will secure the continuance of the work begun in 1912 by the Committee for the Investigation of Atmospheric Pollution. The Committee was appointed by a conference held in that year in connection with an international exhibition organised by the Coal Smoke Abatement Society, and its work has been to collect reliable data as to (i.) atmospheric pollution and the causes producing it; (ii.) its results on public health, buildings, etc.; (iii.) the value of various means of counter-acting it.

The original Committee has now been constituted a Committee of Advice to the Meteorological Office, and that office will become responsible for the expenditure of the grant and of other income available for the investigation. The grant is made subject to the condition that the number of local centres at present reporting to the central control station shall be maintained. With the consent of the President of the Local Government Board, the Council have invited Mr. W. S. Curphey, Chief Inspector of Alkali Works, to join the Committee of Advice. The collection and tabulation of careful records as to atmospheric pollution in different parts of the country should be extended after the war, and the statistics should supply in the future one of the means of gauging the work done by the Fuel Research Board in promoting methods of smokeless combustion.

Conditions in Deep and Hot Mines.

The Council laid stress in their report last year on the vital necessity of improving the health, well-being, and efficiency of the workers, and quoted Huxley's belief that "any social condition in which the development of wealth involves the misery, the physical weakness, and the degradation of the worker is absolutely and infallibly doomed to collapse." The Council are glad to notice the rapid growth of public opinion in this direction. One research aided by the Department has direct reference to the conditions of labour in mines. A grant made in November last to the Institution of Mining Engineers to enable them to investigate (a) the influence of hot and moist atmosphere on workers employed in mines, and (b) the methods to be employed for cooling and drying the atmosphere of mines, will lead, the Council hope, to an improvement in the circumstances in which a large number of miners work. It is estimated that over a third of the 287,000,000 tons of coal produced annually in this country before the war was obtained from deep mines. An improvement in the working conditions in these mines will affect the health of many thousands of men and boys, and should greatly increase the total output. The experimental work of the research is being carried out in Dr. John Haldane's laboratory in Oxford, and in other suitable laboratories. The underground observation is in charge of selected mining engineers and chemists. The whole cost of this research is for the moment borne by the Committee of Council, but the Council have recommended this "as an interim measure pending the establishment of more satisfactory arrangements," since they think the mine owners may reasonably be expected to bear a very substantial part of the cost of such investigations as these. The Council are glad to learn that since the grant was made, the principal coal owners have been considering the establishment of a National Association for Research, which could undertake this and other researches affecting the industry, and will welcome proposals in this direction, which will supplement and articulate with the closely related work of the Fuel Research Board.

Mine Rescue Apparatus.

The Council have also undertaken a research, with the approval of the Committee of Council, having for its object the production of standard types of apparatus for mine rescue work. The Secretary of State for Home Affairs recently invited the Council to make this investigation in view of the unsatisfactory and sometimes fatal results obtained with some of the types of apparatus at present in use. Accordingly, they have appointed Mr. William Walker, Acting Chief Inspector of Mines under the Home Office, Mr. John Haldane, M.D., F.R.S., LL.D., and Mr. Henry Briggs, D.Sc., of the Heriot-Watt College, Edinburgh, to be a committee. The terms of reference are:—

To enquire into the types of breathing apparatus used in coal mines, and by experiment to determine the advantages, limitations, and defects of the several types of apparatus; what improvements in them are possible, whether it is advisable that the types used in mines should be standardised, and to collect evidence bearing on these points.

The Council have arranged that Dr. Fletcher, their assessor from the Medical Research Committee, shall keep their committee informed of the work upon oxygen apparatus being done by his committee, while Prof. Cadman has promised to keep them in touch with the analogous work

being done by the Trench Warfare Department and the Ministry of Munitions.

Departmental Bulletins.

The Council has also begun the issue of a "bulletin" intended to convey scientific information useful to the industries of the country, and based upon research work undertaken at the public cost. The first bulletin is a "Memorandum on the Means to be Adopted to Diminish the Decay of Timber in Coal Mines," which will be circulated to the mine owners concerned by the Controller of Coal Mines.

Refractories.

The Institution of Gas Engineers have long supported a research under Dr. Mellor into refractories, conducted at the Central School of Science and Technology at Stoke. The growth in this work has led the authorities of the school to approach the Department for aid towards the cost of a much needed extension of their laboratory for refractories. The Council view the work of Dr. Mellor in this field with sympathy, and they recognise that the problems connected with refractory materials call for greatly increased attention. Indeed, the matter is of such wide interest that a Refractories Conference has recently been summoned on the initiative of the Faraday Society, at which no less than 13 societies and bodies were represented, with a view to working out a co-ordinated scheme of attack on a national scale. The Council agree that nothing less comprehensive would be satisfactory, and they await the proposals likely to be formulated by the conference with great interest. Any scheme to be satisfactory must find a proper place not only for the work which has so long been carried on at Stoke, but also for that more recently begun with valuable results at the National Physical Laboratory, as well as for that in contemplation at Sheffield and elsewhere. This problem affords an excellent example of the need for well-considered action. Refractories are a vital necessity for many difficult laboratory investigations, and in many diverse industries. The difficulties to be overcome are too many and too varied to be adequately dealt with in one place or by a single group of workers. The need for co-operation and for the assignment of the proper work to each is obvious.

The Encouragement of Inventors.

The Council have given considerable thought during this year to the question of encouraging inventors. The problem is undoubtedly one of great importance, but it is also one of great difficulty. The cases which have come before them fall into two or possibly three classes. In the first class are patentees. In most of the cases that have come before the Council money was needed for the introduction or exploitation of the patented process or device, and when this was so the Council have informed the applicant that the Department cannot assist in the commercial exploitation of patented inventions. In any suitable cases, however, where funds were needed for working out on a full scale a process or device already patented, the Council think that they might properly recommend a grant for this purpose, since it would clearly fall within the meaning of industrial research. The second class of case is that of inventors who submit suggestions or ideas for investigation. They are advised if they wish to retain proprietary rights in their invention to obtain provisional protection before submitting details of their invention to the Department. But if an inventor is not prepared to do this, he is asked to make a full statement of his invention in confidence to a representative of the Department. His assent in writing is then obtained to the record of this statement, and before any steps are taken to conduct any research in connection with the invention, the Department consider whether they should not themselves obtain provisional protection. The suggestions made, however, are often more or less vague, and the Council have indicated their general attitude towards cases of this kind by replying that although the application for assistance does not appear to embody a proposal for research into a problem of pure or applied science, the Council are prepared to consider the matter if the applicant can formulate his suggestion as a proposal for a definite piece of scientific or industrial research. The reply goes on to add that "in suitable cases the Department are also prepared to consider applications for assistance towards researches necessary to perfect for commercial use patented or protected inventions or processes." The third class consists of the makers of vague and impracticable suggestions, whom to treat seriously would be to waste time.

The Board of Trade have recently called the attention of the Council to the question of the encouragement of inventors and, in particular, to a suggestion that any trade combinations established for the erection and equipment of laboratories for experimenting with and perfecting such inventions as may be useful to their constituent members, and receiving grants from the Government for that purpose, should be required to observe provisions framed in the interest of poor inventors. The Council have replied to the Board of Trade that the encouragement of the discoverer and inventor is a matter with which they have great sympathy. It has been emphasised repeatedly in the departmental documents, and notably in the report for 1915-1916. The Board of Trade have also been informed that the Department propose to make it a condition of their recognising trade associations for research that provision should be made in the articles of association for the results of any researches undertaken, as obtained from time to time, being communicated in the first instance to the Committee of Council, in order that, after consultation with the board of the association and any other co-operating bodies and persons, the Committee may determine in the national interest whether and, if so, to what extent and under what conditions, the results shall be made available.

This clause will enable the Department to secure, among other things, the interests of the inventor or discoverer who has done work for such an association. Moreover, the following articles have been included among the conditions of grant to research associations:—

The Committee of Council reserve to themselves the right to determine, after consultation with the board of the association and with any other co-operating bodies and persons, whether and, if so, to what extent and in what proportions the Committee of Council and the association and any other co-operating bodies and persons shall secure to themselves by patents, designs, or otherwise the ownership in the results of any investigations undertaken by the association for the benefit of the X trade or industry generally, and any benefits and profits arising therefrom.

The association will enter into agreements with the employees in a form to be approved by the Committee of Council, reserving to the association and the Committee of Council or their nominees all rights and ownership in any discoveries, inventions, designs, or other results arising in the course of research or other scientific work, but, nevertheless, the association will pay to the

making any such discovery such pecuniary... the Committee of Council, after consultation... of the association, may consider adequate... that these conditions will give the Department... powers for assisting the poor inventor... that the actual working out of a practical... will not be free from difficulty, and will need... thing. Meantime, applications made direct to... the Council will continue to be dealt with in the manner... described.

TRADES UNION CONGRESS.

(FROM OUR LABOUR CORRESPONDENT.)

The 19th annual meeting of the Trades Union Congress—the Parliament of organised Labour—was opened at Blackpool on Monday. The gathering is the largest which has ever assembled under the auspices of trades unionism, the 695 delegates representing 3,082,352 organised workers.

Mr. JOHN HILL (Newcastle), Boilermakers' Society, in his presidential address, said he hoped it had dawned upon their movement that something more than resolutions were required to obtain reforms, and that they would decide upon methods of carrying their resolutions into effect. The promotion of Bills in a House of Representatives, the majority of whom were opposed to their aims, was not a hopeful occupation, and the worn-out method of going cap-in-hand to Ministers should be buried with the battleaxes and bows and arrows of Plantagenet England. They were all agreed that there were too many resolutions and too few results, and the cry had been for concentration on one definite aim. He therefore asked them to make that aim the finding of the machinery to record their resolutions in the Statutes of the Realm. This could not be accomplished by revolution. By revolution they might only replace one set of autocrats for another, unless they had also an intelligent people who were moved by reason and not by passion. They must, therefore, agitate, educate and organise. At Birmingham last year they instructed their committee to link up their movement with the co-operative movement. Joint meetings had since been held, and as a result, they had arrived at a working agreement, which aimed at

(1) every trade unionist being a co-operator, and every co-operator being a trade unionist;

(2) our supporting co-operation industrially and politically, they to be our bankers in times of prosperity, and our lenders in times of adversity. There were boundless possibilities for this joint movement, and they asked the delegates to help them to unify trade unionism and co-operation in every city and hamlet of the United Kingdom.

The growing discontent in the workshops assumed alarming proportions this year. In May they had a rank and file movement which threatened to bring industry to a standstill. Eight Commissions of Inquiry were set up, whose labours were completed in record time. The Commissioners' reports all paid tribute to the loyalty of the workers—to the long hours they had worked, and to the fatigue and irritation they had borne. Perhaps the most important finding was that "trade union officials are distrusted." But what was the Government doing now that they had ascertained the causes of unrest in every district? Before the adjournment of Parliament they had a promise given by the new Minister of Munitions on matters concerning his own Department. Since then they had an important statement by Mr. Barnes on behalf of the War Cabinet. It would be their duty to see that these promises were fully supplemented, and thus remove the causes of unrest, so that they could reunite their class in the common national effort for international liberty and security.

Various Government Departments were now concerning themselves with schemes of after-the-war reconstruction of industry. He had studied those proposals, and he had failed to find anything useful which could be applied to his trade. On the other hand, he found much that was calculated permanently to fix some of the restrictions and disabilities which they had accepted as a war measure. If it were true that the future of our industries and our country were bound up in the proposals submitted, he should lose hope in the larger, wider, and fuller life our boys were entitled to when the war was over. What assurance was there against hundreds of thousands of munition workers and soldier heroes of all trades walking about in idleness and destitution as they had done after all previous wars? Would the Government, in peace time, use the factories they had built in war time to feed and clothe the surplus population, which capitalism had always left to starve? Would they at once proceed to build a million houses to relieve the shocking conditions revealed by the Commissioners on unrest? On these and other things, added the president, we want assurance before we accept any scheme of reconstruction. The best scheme of reconstruction will be one of our own devising—a strong and intelligent trade unionism linked with our political arm, the Labour party. If we can inspire the men and women in the workshops and in the constituencies to support these ideals we can say to the officious lawyers and huckstering bureaucrats, "Keep thine own ship, friend; we do not want thee here."

Mr. A. LAW (Bolton), Cotton Spinners, moved an instruction to the Parliamentary Committee to promote legislation at an early date to secure that superannuation and other trade union and friendly society benefits should not be taken into account in assessing an individual's pensionable income for the purpose of old age pensions.

Mr. J. H. CLERKS, moved that, whilst the Bill was before the Right Hon. George... the Congress is strongly... gratuities given to widows... and an adequate pension substi-

tuted therefor; also that the present scale of pensions should be improved upon considerably, and that the Parliamentary Committee be instructed to take the matter up with the Government with the least possible delay. He declared that a good many discharged soldiers and the widows and dependants of men killed were being badly treated, and some men had found their way into the workhouse.

Mr. JOHN HODGE, M.P., Minister of Pensions, said he had already obtained the sanction of the Chancellor of the Exchequer to an extension of the regulation relative to pensions. With regard to lads who joined the Forces in the early days of the war, there were no pre-war dependencies upon their earnings, but he had succeeded in getting the Chancellor of the Exchequer to realise that there were prospective dependants. One could not find a man more sympathetic towards those who were broken in the war than Mr. Bonar Law. A man who was totally disabled received a pension of 27s. 6d. a week, but if he could show that his wages averaged 50s. a week before the war he would have an alternative pension of 22s. 6d., bringing his pension up to his pre-war standard. If a man had earned £5 a week, between the 50s. and £5 he would get 50 per cent., bringing his pension up to £3 15s. He was not taking any credit to himself for that, because it was done by Mr. Barnes before he left the Pensions Ministry. He did not deny that no cases of hardship had arisen or that no blunders had been committed, but they must not believe all they heard. One of the last acts of Mr. George Barnes was to set up the committee which would decide, whatever any one else stated, whether a man was entitled to a pension or not. He was satisfied that no man with a just claim to a pension would be turned down by Judge Parry. The resolution was carried.

At Tuesday's morning session discussion was resumed on the resolutions calling for an improved scale of war pensions. Mr. C. G. AMMON (Fawcett Association) declared that Mr. Hodge was out of touch with what was actually happening. The facts did not justify his rosy picture of the treatment given to the maimed. It was useless for Ministers to whitewash one another and pat themselves on the back while such things were being permitted.

The resolutions were adopted.

The PRESIDENT read messages from the Russian Conference of the Soviets, and from Mr. Gompers, president of the American Federation of Labour, and the Congress then passed to the subject of the Stockholm Conference, which was raised on a special report presented by the Parliamentary Committee.

Mr. ROBERT SMILLIE (Miners' Federation), in moving the adoption of this report, said that for several weeks past the Labour movement of this country had been seriously divided on the question whether or not it was wise at this juncture to hold an international conference of representatives of the democracies of the nations at war; lifelong friends in the movement, both on its political side and on its trade union side, were sharply divided. The whole movement had been rent almost in twain, and the gutter Press had done all in its power to widen the breach. The Parliamentary Committee of the Congress could not afford to face the Congress without an effort to put before it something which might reunite the movement. The proposal now submitted was a compromise come to by men who hated compromise, but who, for the sake of the movement, had made up their minds to present to the Congress a policy on which agreement might be secured. The preamble was a matter of opinion, on which the Congress need not express any view. It said that in view of the divergence of opinion the committee had come to the conclusion that a conference at Stockholm at the present moment could not be successful. It did not say that a conference at Stockholm at the present time might not do some good—(some cheers)—it said, "could not be successful." To be fully successful it would require to lead up to a people's peace. The Parliamentary Committee were of opinion that a conference which would do that could not be secured unless something like an agreement on principles were first obtained among the Allies, and before there could be any great hopes of that it was necessary to draw the Labour movement at home into closer relationship. It was with that object that the Committee asked the Congress calmly and without bitterness to consider their recommendations. He believed that events were moving now in this country which would force the Labour movement to unite. An enormous change of opinion was taking place in the great industrial centres, and there was a longing desire on the part of the people that something should be done to secure an early peace. Men who opposed his views said they also wanted peace. He recognised the truth of their statement. It was all a question of the time to try to secure peace and the methods of securing it, and it was part of the method now recommended that the representatives of the democracies of the Allied countries should have something to present on which they were agreed before they met representatives of the Central Powers. In conclusion, Mr. Smillie appealed to Labour to close its ranks, and to get into touch with the democracies of the Allies, with a view to getting into touch ultimately—the sooner the better—with the democracies of the Central Powers, and ending the war. The capitalists, he said, were united, and the diplomats would have no objection to meeting the Huns. It would be a disgrace to the democracies of all countries if they allowed the war to be settled without having the voice of Labour heard and the impress of Labour stamped on the settlement.

The motion was seconded by Mr. WILL THORNE, M.P.

Mr. J. HAVELOCK WILSON (Sailors and Firemen) moved that the report should be referred back to the committee, but after some further discussion the closure was adopted, and his motion was rejected by 2,589,000 votes to 353,000—majority 2,236,000. The report was then adopted, the voting being—For, 2,849,000; against, 91,000; majority, 2,758,000. The result was enthusiastically received. The afternoon was devoted to the general report of the Parliamentary Committee.

Reconstruction After the War.

At Wednesday's sitting the Parliamentary Committee presented the published interim report of the Whitley Commission on Joint Standing Industrial Councils, with an accompanying letter from the secretary, Mr. C. W. BOWERMAN, M.P., suggesting that the unions should consider the report with a view to a full discussion in the Congress. Mr. E. BEVIN (Bristol Dockers) considered the question of reconstruction as so important that it was too big for the Parliamentary Committee to undertake amid the many other duties which they had to perform for the trade union movement. If members of their committee could serve on Government committees to produce these reports he suggested that it would be just as well for the Congress to set up its special commission to consider a question of such vital importance as reconstruction. He moved the appointment of a special committee of five persons to consider the whole question of reconstruction.

Councillor T. DAVIES (Middlesbrough Dockers) seconded the proposition.

Mr. ROBERT SMILLIE, Miners' Federation, a member of the Parliamentary Committee and of the Whitley Commission, said they were really face to face with the proposal that compulsory arbitration should be adopted in the last alternative for the settlement of industrial disputes. The Whitley report did not suggest that the same machinery should be adopted in all industries. The report dealt with industries which were organised on the workpeople's as well as on the employers' side. It proposed to set up machinery to enquire into, and, if possible, settle disputes before they reached the stage of a lock-out or strike. In some of the industries, such as the coal-mining industry, they had already the machinery in existence to avoid disputes. They were anxious to avoid anything in the form of compulsory arbitration. They claim that the workpeople as a last resort should have the right to strike if they failed to settle a dispute. He could not see any real good would come out of the setting up of a committee of their own for further enquiry. The real meaning of this report was, were they going to set up joint machinery to try and settle trade disputes in any industry, or would they be better off without any machinery for settling disputes? The Whitley report suggested that in the interest of the nation and the workpeople themselves they should set up joint machinery. There were thousands of disputes which might have been settled by negotiation had there been machinery for bringing the parties together.

Mr. J. R. CLYNES, M.P., General Workers' Union—another member of the Whitley Commission—hoped the Congress would give the rank and file of the trade unions a lead as to what their respective unions were to do on the subject of their relations with the employers of the country. He was not one of those who believed that people would be able to work so much harder, so that their labour would be able to pay the great cost which the war had incurred. He rejected entirely the idea of seeking to obtain a greater output by more work and longer hours by the workers. Incidentally there might be greater output, but that must be obtained by placing production on a higher level of efficiency, and not by placing a greater burden upon the backs of the workers. The Whitley report laid down that there should be means for securing to the workpeople a greater share in and responsibility for the determination and observance of the conditions under which their work was carried on. It was not merely that they were asserting the right of collective bargaining, because, in the main, they had that already. This offer was only to organised labour, and to trades and industries where organisation had reached the highest point. The unorganised trades were to be treated in a different way. The foundation of the Whitley report was a recognition of organisation as a means of adjustment of disputes and conditions of work between employers and employed. The report offered to the rank and file a chance of participating in the control of industry, which was one of their aspirations. The proposals were to establish in certain industries national councils, and in districts, district councils, which would be linked up with the national bodies and works committees, on which the workers employed would be directly represented. The more reasonable and enlightened employers typified by the Whitley Commission recognised that individual bargaining was impossible, and that collective bargaining through proper channels was essential.

Mr. J. SEXTON (Liverpool Dockers) protested against any separate treatment for non-unionists. No bargain or agreement or machinery could be accepted which made a distinction between the unionist and the non-unionist. The proper course was to compel the employer to join the combination in his trade.

Mr. FRANK HODGES (South Wales Miners) regarded the Whitley report as subversive to the aspirations and proper development of the trade union movement. The report stated that "in the interests of the community it is vital that after the war the co-operation of all classes established during the war should continue, and more especially with regard to the relations between employers and employed." The first of the terms of reference was "to make and consider suggestions for securing a permanent improvement in the relations between employers and workmen." There never could be permanent relations between employer and employed. The affirmation of this report would place on record that the Trades Congress was in favour of establishing permanent relations between employers and employed, which was contradictory to every resolution on their agenda. He hoped the Congress would agree to state that in its own ranks the Congress had men of intellectual capacity to frame its proposals for the future, and would not take blindly proposals arrived at by middle-class intellectuals and professors with two Labour men. Some of the mining districts had already rejected this report, because they had machinery in existence which would meet the exigencies of the industrial position.

Mr. HARRY GOSLING (London Watermen) suggested that the resolution should be withdrawn, and the matter left with the Parliamentary Committee, who, if necessary, could appoint a sub-committee of their own

members to deal with it, a proposal which was accepted by the Congress.

Forty-Eight Hours Week.

Mr. J. JONES (London General Workers) moved a resolution declaring that, on the termination of the war, immediate steps should be taken to reduce the working hours in all trades to 48 per week, without reduction of the standard rates of wages, and that the Parliamentary Committee press for legislation on these lines. He regarded this as one of the most practical means of solving the after-war problems.

Mr. ROBERT SMILLIE, Miners' Federation, said the miners were not prepared to accept a 48-hour week. It must be an eight hours day. The resolution was carried.

BOOK NOTICES.

Correction Tables for Thermodynamic Efficiency. By C. H. NAYLOR. 59 pp. 8½ in. x 5½ in. London: Edward Arnold; 1917. Price, 5s. net.

These tables are published for the Turbine Section, the British Electrical and Allied Manufacturers' Association (Incorporated). The author states very truly that it is not accurate to contrast test results taken under different steam conditions when comparing the thermodynamic efficiencies of steam turbines. The thermodynamic efficiency is easily calculated by the relation—

3,420 × 100

Heat drop (B.Th.U.) × Steam consumption (per kw. hour)

With the same steam turbine working under different steam conditions, the consumption will be decreased with an increase in the available heat drops, and *vice versa*, but the thermal efficiency of the turbine may be different under the two sets of conditions. For a correct comparison, it is necessary to reduce the calculated thermal efficiencies to the efficiency under standard steam conditions. These standard conditions are defined for both high- and low-pressure turbines. The tables are for the purpose of simplifying the corrections. The tables have been compiled from curves given by K. Baumann in his paper published in the *Journal of the Institution of Electrical Engineers*, vol. 48, part 213.

Heat Drop Tables: Absolute Pressures. Calculated by HERBERT MOSS. 63 pp. 8½ in. x 5½ in. London: Edward Arnold; 1917. Price, 5s. net.

These tables are based upon the system of formulæ due to Prof. H. L. Callender, and are published for the Turbine Section, the British Electrical and Allied Manufacturers' Association (Incorporated). The errors of calculation, except in certain circumstances, are believed to be nowhere greater than 0.01 British thermal unit. The values are tabulated to five significant figures. In a preface, the author gives full information respecting the use of the tables and the method of interpolation in cases where the initial superheats are not tabulated. The range of superheat given in the tables is from 0 deg. (saturated) to 300 degs. When the tables are used for the purpose of comparison with an engine test, certain corrections for barometric height are necessary, and a table is given for this purpose. The adiabatic heat drop of 1 lb. of steam is tabulated in British thermal units (1) for initially dry saturated or super-saturated steam of pressures from 50 to 400 lb. per sq. in. absolute; (2) for dry saturated steam of pressures from 14 to 19 lb. per sq. in. absolute. The final pressure range is from 27.0 to 29.1 in. of mercury vacuum, corresponding to absolute final pressures of 3.0 to 0.9 in. of mercury.

Elementary Coal Mining. By GEORGE L. KERR. Fourth Edition, revised, with over 200 illustrations. 225 pp. 7½ in. x 4½ in. London: Charles Griffin and Company Limited; 1916. Price, 3s. 6d. net.

This well-known text-book is designed to meet the requirements of students attending classes on coal mining, and of miners and others engaged in practical work. It has not been found necessary to do more than make a few alterations for this edition, owing to the very thorough revision given to the previous edition. The success of the book has been most gratifying both to the author and publishers, and it is unnecessary for us to do more than offer our congratulations upon the satisfactory result which has followed from the first publication of this book in 1902. Since that time great advances have been made in practical coal mining, and the demand for knowledge has increased in even greater proportion. There can, therefore, be no surprise at the important place which this text-book has taken amongst the numerous class of students who require an elementary work leading up to the more advanced manuals, such as Mr. Kerr's larger treatise on *Practical Coal Mining*, already in its fifth edition.

The Economic Geology of the Central Coal Field of Scotland. Price, 2s.

The Geological Survey of Scotland has recently issued a second memoir descriptive of the geology of the Central coal field of Scotland (Area No. VIII.). The area described lies on the north-western border of Lanarkshire, and includes the district around East Kilbride and a small part of the Quarter coal field. The geological interest of the district arises largely from the valuable stratigraphical evidence which it affords, and in this volume the fine series of natural sections seen on the River Calder are discussed in detail, and the material they supply used in the correlation of the principal horizons in this area with those in other parts of the Lanarkshire basin.

The memoir, which is the second of a series now in course of preparation by the Geological Survey, on this important region, can be obtained through any bookseller; from Messrs. T. Fisher Unwin Limited, 1, Adelphi-terrace, London, W.C.1, who are the sole wholesale agents to the trade outside the county of London; or from the Director-General, Ordnance Survey Office, Southampton.

Melting Points of Refractory Materials.

Mr. W. H. Barr (*Industrial Engineering*) defines the melting point of firebrick as the lowest observed temperature at which it begins to exhibit transition from a rigid towards a fluid condition. But the crushing strength cold, behaviour under load when heated, and resistance to fluxes, may also be regarded as important practical considerations. The melting points of 45 samples of firebrick, clay, bauxite, silica, magnesia, and chromite, were determined in an electric furnace, the temperatures being measured by an optical pyrometer. Common firebrick is made of clay of which the essential is $Al_2O_3 \cdot 2(SiO_2)$. According to Shepherd and Rankin, this compound cannot exist at temperatures approaching the melting point, but is decomposed into $Al_2O_3 \cdot SiO_2 - SiO_2$. All commercial silicas melt at as low as 1,600 degs. Cent., but possess so much viscosity that they do not change shape until a much higher temperature is attained. Kanelt obtained 1,750 degs. as the point at which they flowed distinctly. So the actual temperature of melting is very indefinite, but is more even with the finished silica bricks. Bauxite is an impure $Al_2O_3(OH)_3$, and when heated Al_2O_3 is formed, which melts at 2,012 degs. But neither the material nor the brick made from it was found to approach that point. A sample of the mineral melted at 1,820 degs.; the centre of the nodules sintering at 25 degs. lower; and the bauxite clay at 1,790 degs. A brand of magnesia brick melted at 2,165 degs.; and the melting point of pure MgO is doubtful, but presumably higher, as the brick was of a dark brown colour, and contained iron. Among the pure materials tested were kaolin, melting at 1,740 degs., silica at 2,010 degs., and chromite at 2,180 degs.

Potash from Blast Furnace Dust.

In the August number of the *Journal of the Board of Agriculture*, Mr. H. T. Cranfield describes experiments made in recovering potash from the flue dust from blast furnaces in the Midlands. The ironstone used contains a small percentage of potash, presumably in the form of silicates, three samples of Northamptonshire stone having given an average of 0.2 per cent. potash (K_2O). Undoubtedly potash is also present in the fuel, but few analyses appear to have been published giving the potash content of coal and coke. One or two which have been placed at Mr. Cranfield's disposal give figures ranging from 0.15 to 0.4 per cent.

The enormous heat at the base of the furnace, assisted by the action of the lime and fuel, appears to break down the potassium silicates, potassium oxide (K_2O) in the gaseous state being formed. This in turn reacts with sulphates and chlorides present, producing potassium sulphate and potassium chloride. These potash salts condense in the cooler regions, and pass up the furnace in the form of a fine dust. Owing to there not being sufficient air for complete combustion, the particles become coated with carbon, and, together with a large quantity of particles of fuel, ironstone, etc., pass over with the gases into the "down comer," or main down flue. At the bottom of this flue is a cavity which retains the greater bulk of the dust (about 75 to 85 per cent.) in the form of a coarse black powder. The finer particles, which contain the greater proportion of the potash salts, are carried on into the ovens or round boilers of the Lancashire type, where the gases, being combustible, are burnt, the heat produced being utilised in the production of steam for power purposes. The dust deposited in the ovens or round boilers is brick red in colour, and somewhat finer than the black dust. The burnt gases issuing from the ovens carry with them the finest of the dust particles, and a further portion of these collects in the various flues, the gases and probably the finest particles of dust ultimately escaping by the stack. Many of the later-deposited flue dusts are cream in colour, and very bulky. They constitute the richest source of potash.

These potash-bearing flue dusts vary enormously in colour and composition. The black dusts contain considerable amounts of insoluble ferrous compounds. Insoluble sulphides are also present. Occasionally black dusts contain soluble cyanides, sulphites, and even free alkali; these should be avoided for agricultural purposes. The red dusts are rich in ferric oxide, while many of the cream dusts contain either free lime or calcium carbonate. All are rich in silica and silicates.

The potash exists mainly as potassium sulphate, with a smaller proportion of chloride, the remainder being in an insoluble form. The availability of the latter is a subject for urgent investigation. The amount of soluble potash varies very much; in samples which Mr. Cranfield examined, the variation was between 50 and 70 per cent. of the total potash. After extracting the flue dust with hot water, evaporation of the extract yields a white residue which contains on an average 70 to 80 per cent. potassium sulphate and chloride. Sodium chloride and calcium sulphate constitute the chief impurities in this water soluble extract.

The following analyses of flue dusts will give some idea of the potash content of typical samples:—

Colour.	Water-soluble potash. Per cent.	Total (acid-soluble). Per cent.
Cream	9.25	15.89
Black	—	3.13
Red	5.92	8.50
Black	1.68	2.97
Black (burnt)	—	5.12
Black	2.01	3.73
Black	1.23	3.13
Cream	5.69	11.82
Red	4.68	7.58
Grey	5.88	12.46
Light brown	3.82	7.51
Grey	4.70	7.10

It is difficult at present to give more than a rough approximation of the total amount of potash which could be obtained from this source, but Mr. Cranfield offers tentatively the following figures, which he is at present inclined to believe rather under- than over-

estimate the quantity available:—Number of furnaces in full blast in Great Britain, 300; quantity (in tons) of flue dust produced per furnace per week—black, 20 tons; red, 5 tons; cream, 1 ton. Assuming the black to contain 2.5 per cent. potash, the red 7 per cent., and the cream 10 per cent., then 0.95 ton of potash per furnace per week would be produced. Each furnace would, therefore, yield about 50 tons of potash per annum, this giving for 300 furnaces a total annual production of 15,000 tons. Of course, this represents total potash of which all may not be available, but at least 50 per cent. of this would represent soluble potash.

Mr. Cranfield therefore considers this to be the most important source of potash yet discovered in this country. It is obvious that only a careful and thorough investigation into the whole question can result in the full benefit of these deposits being obtained for agriculture, but until arrangements can be made and plant erected for the extraction of the water-soluble potash salts, the raw flue dust might be utilised on land which must have become very deficient in potash during the past two years.

SOUTH WALES MINING TIMBER TRADE.

Foreign and Home-Grown Supplies.

The recent inclement weather has adversely influenced the foreign and native pitwood trades. The rough Channel passages have delayed arrivals from the French and Portuguese ports, while the heavy rains have hindered cutting in South Wales woods, and turned the roads into veritable quagmires. The imports of foreign mining timber for the week ending August 31 were poor, the total amounting to 7,743 loads, of which 5,460 loads went to the agents for the supply of pitwood to the Admiralty collieries. One consignment was received from Portugal, and the rest came from the French ports. The actual quantity received by consignees was as follows:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Aug. 27	T. H. Howe and Company	144
" 27	Lysberg Limited	1,800
" 27	Lysberg Limited	720
" 28	Franklin Thomas and Company	600
" 28	Morgan and Cadogan	240
" 28	F. K. Howe and Company	540
" 29	Franklin Thomas	140
" 30	Lysberg Limited	2,400
" 31	Lysberg Limited	540

Total..... 7,124

Newport and Port Talbot:—

No imports reported.

Swansea:—

Aug. 28	Not named.....	275
" 29	Do.	94
" 30	Do.	250

Total..... 619

Market prices ruled at 60s. to 61s. per ton ex ship Cardiff, an advance over the previous week of about 1s. to 2s. Scarcity of supplies was responsible for this, and the tendency was towards higher prices. The month of September will witness a further curtailment in the imports of foreign mining timber. Under the scheme of the Deputy Controller of Import Restrictions there will be a further decline of 10,000 tons in the quantity of foreign timber allowed to be imported.

The pitwood trade is now entering upon the most difficult time it has yet encountered. For with the sharp restriction in foreign imports it is naturally incumbent upon the home trade to make up the deficiency. This the home-grown trade was doing admirably, and Mr. Finlay Gibson, the secretary and chief official of the Monmouthshire and South Wales Coalowners' Pitwood Association Limited, has, in the short time the association has been in existence, accomplished great things by dint of hard and expert organising. The result of his efforts has been increased deliveries of home-grown timber to the associated collieries, which are over three-fourths of the total in the district. This has been done by ceaseless waging against the barrage of Government regulations, a speeding-up of felling, and the removal of transport difficulties during a crisis. The very heavy rains in the district, however, have greatly impeded both cutting and transport. Continuous work has been impossible, whilst the condition of the roads has made transport an even more difficult problem. This has come at a time when every effort is needed to increase the deliveries of home-grown timber in order to make up for the sharp monthly reduction in the imports of foreign pitwood. Next month the imports will be curtailed by a further 10,000 tons, and from then onwards collieries will have extreme difficulty in procuring adequate supplies, for as the winter approaches cutting will fall off. In the opinion of forest owners, the Controller of Restrictions will have to modify his scheme and allow an excess to be imported when October is reached, otherwise there may be a serious shortage of mining timber for the collieries in the South Wales district. Supplies of native timber go quickly into consumption, there is little or no reserve, and a sharp spell of bad weather, together with the further restriction of foreign imports, is liable to affect the regular working of important steam coal collieries.

Natural Gas at Pisa.—Pisa is now lit with natural gas, a large supply of good quality having been found some two miles from the town. The shortage of coal in Italy makes the discovery especially welcome.

Export of Pit Props from France.—The French exports of pit props from Bordeaux and Bayonne during the first half of the current year were as follow, the 1916 figures being given for comparison:—

	1917.	1916.	Increase.
	Tons.	Tons.	Tons.
Bordeaux.....	196,400	182,537	13,863
Bayonne	106,900	95,806	11,094

the monthly deliveries this year being:—

From—	Jan.	Feb.	March.	April.	May.	June.
Bordeaux..	23,296	37,954	27,250	35,307	35,600	36,993
Bayonne ..	12,800	14,500	19,950	27,050	13,950	18,650

CONTENTS.

ARTICLES:—	PAGE
tion of Commercial Intelligence	451
form and Colliery Assessments	452
Shipping	443
es in Natal	444
ments on Tees-side	445
New Type of American Tipple	446
Report of the Committee of Council for Scientific and Industrial Research	446
Book Notices	449
South Wales Mining Timber Trade	449
The Wholesale Coal Prices Order, 1917	456
Organisation of Commercial Intelligence	457
Automatic Safety Mine Car Cager	457
Welfare Supervisors	458
Duties of Coal Overseers	458
The Institute of Metals	458
Interconnection of Electricity Supply Systems in Lancashire and Cheshire	459
The Refractory Properties of Silica Bricks	459
Labour and Wages	462
The Freight Market	463
Open Contracts	463
Obituary	463
Abstracts of Patent Specifications Recently Accepted	464
New Patents Connected with the Coal and Iron Trades	466
Government Publications	466
Publications Received	466
LETTERS TO THE EDITORS:—	
The Discovery of Oil at Riddings Colliery	459
REPORTS OF MEETINGS:—	
Trades Union Congress	448
THE COAL AND IRON TRADES	452-456
The By-Products Trade	452
The London Coal Trade	455
The Tin-plate Trade	456
CURRENT SCIENCE AND TECHNOLOGY	449
INDIAN AND COLONIAL NOTES	456
NOTES FROM THE COAL FIELDS	460
COAL, IRON AND ENGINEERING COMPANIES	463
MISCELLANEA:—	
Coal Tar Regulations	444
Chrome Ore	446
Natural Gas at Pisa—Exports of Pit Props from France	449
Hull Coal Traffic	456
Trading with the Enemy Regulations—New South Wales Coal Mines Commandeered—Coaling Facilities at Cape Town	457
United States Coal Output in 1916	459
Alberta Coal Mines—Vacant Appointments under Factory Acts	460
Dean Forest Iron Mining	462
Iron Ore Output Bonus—State Ownership in America?—Coal Prices in Paris—Forthcoming Examination under Coal Mines Act, 1911	463
Gueret's Anglo-Brazilian Coaling Company Limited	466

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Colliery Clerk Wanted; thoroughly experienced in wages, insurance and other deductions, workmen's compensations. Good salary will be paid to competent man. State age, experience, salary required, to—**CONDUIT COLLIERY CO.,** Norton Canes, Cannock.

Confidential Clerk, ineligible for Military Service, Wanted for MANAGING DIRECTOR of large Yorkshire collieries.—Apply, giving qualifications, to Box 6821, Colliery Guardian Office, 30 & 31, Farnival-street, Holborn, London, E.C. 4.

Wanted, Colliery Manager, with first-class certificate, to take charge under general manager of a colliery with output of 1,500 tons per day. Colliery in the Midlands. Must be efficient, reliable and energetic. References and testimonials and salary required.—Address, Box 6824, Colliery Guardian Office, 30 & 31, Farnival-street, Holborn, London, E.C. 4.

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SOUTH WALES AND MONMOUTHSHIRE SCHOOL OF MINES.

TREFOREST, GLAMORGAN.

SESSION 1917-18.

The New Session commences on Tuesday, 2nd October, 1917, when students will be enrolled for Full-time Courses (extending over a period of four years) in:—

MINING ENGINEERING (Joint Mining Diploma Course).
COLLIERY ENGINEERING (Mechanical and Electrical).
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With the exception of the First Year Mining Engineering Course (which is held at the University College, Cardiff), each Session extends over a period of 6 months. During the other 6 months the students are employed at the Collieries by an arrangement of Free Apprenticeships.

For further particulars, apply to the **PRINCIPAL,** School of Mines, Treforest, Glamorgan.

COAL MINES ACT, 1911.

EXAMINATION FOR CERTIFICATES AS MANAGER AND UNDER-MANAGER, AND FOR CERTIFICATES OF QUALIFICATION AS SURVEYOR OF MINES.

An Examination for First- and Second-class Certificates of Competency as Manager and Under-Manager of Mines will be held on the 20th November, 1917, at Edinburgh, Newcastle-upon-Tyne, Sheffield, Wigan, Cardiff and Birmingham.
An Examination for Certificates of Qualification as Surveyor of Mines will be held at the same places on the 21st November.
Candidates must, on or before the 6th October, send their names, and state the district in which they are employed, to the Secretary at the Home Office, Whitehall, London, S.W., from whom all particulars can be obtained.
W. W. WARE,
Secretary to the Board for Mining Examinations.

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J. W. BAIRD AND COMPANY,
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**** For other Miscellaneous Advertisements see Last White Page.**

The Colliery Guardian

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
(At present on Active Service).

LONDON, FRIDAY, SEPTEMBER 7, 1917.

The London coal merchants have received a better supply of railborne coal during the past week, but the seaborne tonnage has been much smaller than usual. House coal orders have received better attention. Hard steam coals and kitchen cobbles are very difficult to obtain. Coke and slacks are more plentiful. The cellars of the larger houses and institutions are comfortably off for stock, so that a better proportion for the poorer neighbourhoods should be noticeable during the winter months. The Controller has issued a notice that no householder should receive more than 1 ton during September.

Northumberland and Durham report a considerable official demand, which synchronised with a very healthy inland enquiry; business has consequently been very brisk, and much more satisfactory than was recently the case.

Yorkshire and Lancashire conditions show practically no change, and pressure for all classes of fuel remains very great. Coking slacks are a brisk market, and much difficulty is experienced in meeting the demand.

Trade at Humber ports is affected by the preference given to inland requirements; a small business has passed in coal for Holland and Sweden, and in coke for Norway and Denmark.

The Midlands maintain the activity recently reported, there being no sign of any falling-off in demands from London and the south-west districts.

On account of increased enquiry for large descriptions and a better arrival of tonnage, the South Wales market shows perceptible improvement. Gas coal is in good request, but smalls are a dragging trade.

The Scotch trade shows very little, if any, improvement, and the general position of the trade is far from satisfactory. Local demands are small, and quickly satisfied, consequently difficulty is experienced in disposing of outputs, and much short time is being worked.

In Ireland demand continues good, with prices unchanged; the quantity of coal reaching Dublin has been below the average, on account of the rough channel passage. Supplies of best English coals are short, but Scotch is fairly plentiful. There is no new feature at Belfast.

The freight market is still suffering from shortage of tonnage, very little private exportation of coal being possible. At both the north-east coast and South Wales ports most of the shipments made are for French-Atlantic ports at scheduled figures. Tonnage for other destinations is in great request, and high figures are on offer.

A JOINT Memorandum by the Board of Trade and the Foreign Office has just been published as a White Commercial Paper. It deals with the future organisation of commercial intelligence in this country. It will be remembered that the Board of Trade have recently obtained the sanction of the Treasury for a wide expansion of its activities in the direction initiated by the PRIME MINISTER when he was President of the Board of Trade. The position, therefore, at present is that we have before us two more or less distinct commercial intelligence systems in working—viz., the trade commissioner scheme of the Board of Trade, and the commercial attaché scheme of the Foreign Office. Hitherto, the Board of Trade has been the sole collating and distributing agent of the information obtained from each of these sources. The difficulty has been that the Board of Trade has no control over the commercial attachés of the Foreign Office. Accordingly a committee was appointed, under the chairmanship of Lord FARINGDON, to endeavour to find a solution of this problem of dual control.

The committee failed to arrive at an agreement. Three members pinned their faith to the Foreign Office, while two members, one being the chairman, favoured the Board of Trade. This statement of the position, however, requires some amplification, for the committee was substantially in agreement with regard to the necessity of leaving the control of the commercial attachés in the hands of the Foreign Office. For this reason the majority report advocated the partial abolition of the Board of Trade Commercial Intelligence organisation, and the transference of its duties to a new trade intelligence department at the Foreign Office. It was not proposed, however, to touch that part of the Board of Trade scheme which relates to the Dominions, the Crown Colonies, or India, but merely to deprive the Board of Trade of any voice in the control of the commercial attaché. Thus there would be two separate trade intelligence departments, and the proposal to bring them together by housing them under one roof will scarcely appeal to anyone with an intimate knowledge of Government departments as a practical scheme. The minority report strongly objected to the separation of foreign and imperial trade questions, which in practice would result in endless trouble. It would be impossible to draw a clear line of demarcation between the functions of these two departments. Both foreign and Empire trade stand also in intimate association

with domestic trade, in which department the Board of Trade alone has the requisite knowledge or facilities. It would be impossible, therefore, for the Foreign Office to discharge adequately the duties of a new trade intelligence department without the assistance of the Board of Trade. Again, it must be remembered that the work of a Commercial Intelligence Department is not concerned alone with the acquisition of information. If any scheme of separation between foreign and Empire trade were adopted, it would be still more difficult to carry on the statistical work which is now done exclusively by the Board of Trade.

It is, however, satisfactory to find that a kind of *modus vivendi* between the two Government departments has been found, and an agreement has been arrived at which has been sanctioned by the War Cabinet, and may, therefore, be presumed to represent the final position of this somewhat prolonged controversy, which has been a subject of debate for the past decade in commercial and industrial circles. In the first place an enlarged Commercial Intelligence Department will be created, and will be controlled by a new Parliamentary Secretary, who will be responsible both to the President of the Board of Trade and to the Secretary of State for Foreign Affairs. The new Commercial Intelligence Department will comprise the existing Department of Commercial Intelligence of the Board of Trade, and the Foreign Trade Department of the Foreign Office. The official head of the department will be an officer appointed jointly by the Board of Trade and Foreign Office. Each of the latter will retain control in their respective spheres; thus the Board of Trade will continue to appoint and control the Trade Commissioners, and the Foreign Office will still have sole authority over the commercial attachés and the consular service, and no instructions can be issued to these except through the Secretary of State for Foreign Affairs. There is provision for a constant interchange of staff between the Department and both the Foreign Office and the Board of Trade, so that each may become thoroughly acquainted with the work of the other. There are also to be other means whereby an intimate relationship can be maintained between the different services. The effect of this will be that the new Commercial Intelligence Department will become a training ground both for commercial attachés and for trade commissioners, and in view of the community of outlook thus inculcated, with the assistance of an advisory committee of business men, it is anticipated that these proposals will be a satisfactory solution of the problem.

What it really seems to amount to is the creation of a new Commercial Intelligence Department, which will no longer be known as an appanage of the Board of Trade, but will be a quasi-independent body, with its own Parliamentary secretary. That it will be nominally under dual control need not detract from its efficiency; because, actually, the duality of jurisdiction is hidden beneath a real unification of policy.

The scheme appears to avoid in an ingenious way those matters of departmental jealousy which might otherwise have arisen at every turn. After all, it is the efficiency of the service that is of the greatest consequence. What are the functions of an organisation of this kind? This question has been fully considered by a Foreign Office Committee, whose report is given in an appendix to this memorandum. It is not a purely commercial problem, although the promotion of British trade abroad will be its first concern. Obviously, however, questions of foreign policy must arise. As this report states, there cannot be a British foreign policy in commercial matters abroad separate from the general foreign policy of the Government. There is no need to urge this point. The nation has had a recent sharp lesson upon the relations between trade and diplomacy in the case of the so-called peaceful penetration policy pursued by Germany. It can be imagined that after the war there will be a period of great difficulty in many of our oversea markets. Consuls, commercial attachés and trade commissioners will need to exercise considerable tact in their methods, and to co-ordinate their activities, in order to fulfil our commercial requirements. The practical value of the new scheme must be measured by its success in meeting these conditions.

THE COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 6.

Scotland.—Western District.

COAL.

Conditions in the Scotch coal trade show little if any improvement. Owing to the various restrictive measures in force, business is still difficult to conduct, and the general position of the trade is far from satisfactory. In the west of Scotland district the industrial demand continues steady and provides the collieries with a certain amount of regular employment, but orders from other sources are very restricted. Shipments for the week amounted to 113,546 tons, against 134,970 in the preceding week and 105,090 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	22/-25/
Ell	26/6-28/	26/6-28/	25/
Splint.....	25/-30/	25/-30/	25/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

Business in the iron trade continues to be characterised by tremendous activity in all branches, almost entirely in the production of war materials. The request for pig iron is as urgent as ever, especially for hæmatite for consumption at local steelworks. Other qualities are now very scarce, partly owing to the fact that a number of furnaces formerly making foundry or forge have been put on to basic. Prices are firm and unaltered. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Malleable iron makers are quite unable to meet the demands from private customers, even including those inclined to accept a shell discard material. Practically the entire output is being retained for war purposes. Crown iron bars are named £15 15s. to £16 per ton for export, but this class of business is almost extinct at present. Supplies of black sheets too are still meagre, and though the price is unchanged at £18 5s. per ton, much higher prices can be secured for guaranteed deliveries. The engineering trades have plenty of good orders on hand.

Scotland.—Eastern District.

COAL.

Collieries in the Lothians are finding great difficulty in disposing of their outputs. Local demands are small and quickly satisfied. Clearances for the week reached 16,957 tons, against 17,733 in the preceding week and 27,000 in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	25/
Secondary qualities.....	25/6	25/6	24/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

The situation in Fifeshire is much the same as in the Lothians, or even worse, the men only getting about three days' work in the week. Navigation sorts are in fair request, but other descriptions are rarely asked for. Shipments were 34,289 tons, against 33,148 in the preceding week and 42,523 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	40/
Unscreened do.....	24/-25/	24/-25/	30/-35/
First-class steam coal.....	28/	28/	34/-35/
Third-class do.	24/	24/	26/6-28/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/-24/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 164,792 tons, compared with 185,851 in the preceding week and 174,613 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.
Newcastle-on-Tyne.

COAL.

During the closing days of last week a considerable demand for coals arose on official account, greatly to the benefit of the mining industry. The collieries rallied at once, and as there has been no difficulty in providing requisitioned steamers, in which to carry away the cargoes needed by the Admiralty and other authorities, business has been, comparatively with recent days, very brisk. The official demand has synchronised with a very healthy inland request for fuel supplies, and altogether trade has been much more satisfactory than was recently the case. At the time of writing, the demand from both sources is being well sustained, and the pits are being plentifully provided with employment, even although the amount of business being done by private exporters is, because of the scarcity of free tonnage, practically negligible. Nevertheless, producers are endeavouring to limit the output to the present requirements, as tonnage prospects are very uncertain. The home demand is benefiting the smithy market materially, and special smithies are now quoted at up to 30s. 6d. Bunkers continue to be in very poor demand and very plentiful. All other descriptions of coal are well taken up, and the minimum scheduled prices are easily obtainable. There is not, however, such a briskness in the market as would justify any advances being asked for from neutral customers. Coke is in improved enquiry and stocks

Rating

Rating and
Assessments.

WE drew attention in a recent issue to a meeting of the Newport Trades Council at which the question of rating reform was discussed. The view was taken by Mr. MARDY JONES that the colliery companies throughout the South Wales coal field were under-assessed in comparison with dwelling houses. He said that the labour organisations had formed an association of the 400 representatives who are now on public bodies in that district in order to safeguard the interests of the wage earners. Some of these men are on the assessment committees, and it is clear that an effort will be made to redistribute the burden of the rates in order to throw a larger share upon the colliery companies. Objection was taken to the basis of assessment prevailing in Monmouthshire and in the greater part of Glamorgan, where the ratable value is usually calculated upon the long or royalty ton, which is one-ninth larger than the imperial ton. Mr. JONES maintains that the effect of this is that the colliery companies escape one-ninth of the rates they ought to pay. He adduces specific instances in which the payment of considerable sums is said to have been avoided for various reasons, amongst which he mentions the neglect of overseers to assess on the output, insufficient assessment on coal consumed in coke ovens, private agreements between the colliery companies and the assessment committees, and differences in tonnage rates where coal seams are being worked in two adjoining unions, a difference of 2d. per ton being mentioned in one case. The net result of these anomalies, he maintains, amounts to a sum between one-third and one-half a million sterling annually—a deficiency which has to be made up by the owners of other properties.

In answer to this contention, however, it must be remembered that the question of the incidence of local taxation in this country is not at all satisfactory. It would be a comparatively simple matter to bring similar charges of unequal distribution in almost any community that might be selected. There appears also to be a fundamental defect in the arguments adduced in this instance. Before the charge of under-assessment in certain cases is seriously considered, it would be necessary to ascertain in how many instances the colliery companies are over-assessed. It is only upon the net result of these two figures that a general conclusion can legitimately be drawn.

The whole difficulty of the assessment of ratable values can be traced to the multiplicity of rating authorities and the absence of any general basis of valuation. The need for valuation reform has long been urgent. As long ago as 1870 a Select Committee of the House of Commons urged the advisability of establishing such a common basis. Two years later another Select Committee called attention to the confusion and expense arising from the great variety of rates levied by different authorities, even in the same area, there being no fixed principle either in the assessment of values or permissible deductions from the gross amounts. The Royal Commission on Local Taxation in an interim report in 1889 called for an alteration in the law for the purpose of obtaining a uniform basis of valuation throughout England and Wales; and a Departmental Committee on Local Taxation, in their final report, issued in 1914, made the same recommendation, with the additional suggestion that the valuation list for each parish should be prepared annually by the Land Valuation Office.

The crux of the whole difficulty appears to be the definition of "net annual value." There has been great confusion in dealing with this question, owing to the various views which are taken as to the relation between profit and rent. Authorities on rating law maintain that rent, not profit, is the measure of ratable value. The perplexity arising from this definition is intelligible. In regard to a colliery property it is almost impossible to say what rent a hypothetical tenant would be expected to pay. The phrase "hypothetical tenant" has but little meaning in this connection. In the case of railways the Courts have decided that no tenant would be satisfied with less than 20 per cent. profit on his invested capital,

and that he would make up of the following items:—
1. Rent of capital, 10 per cent. on trade
2. Interest on capital, 10 per cent. on trade
3. Interest on capital, 10 per cent. on trade
4. Interest on capital, 10 per cent. on trade
5. Interest on capital, 10 per cent. on trade
6. Interest on capital, 10 per cent. on trade
7. Interest on capital, 10 per cent. on trade
8. Interest on capital, 10 per cent. on trade
9. Interest on capital, 10 per cent. on trade
10. Interest on capital, 10 per cent. on trade

however, it is surely not beyond the wit of man to evolve some uniform system of valuation which would be applicable in principle to every kind of property. No scheme of reform would be satisfactory which left untouched the present crude system of assessing collieries upon a tonnage basis.

The question assumes special importance in the case of public companies, because these bodies have no representation on local councils nor any voice in the expenditure of public money. Yet they are often called upon to contribute the greater part of the cost of local expenditure. The war has checked the progress of many schemes for housing, sewerage, water supply, etc., all of which will become urgent when peace returns and the Local Government Board removes the existing restrictions upon the execution of public works. Arrears will have accumulated to an extent which will entail heavy local burdens. This applies not only to South Wales, but to all the coal fields of this country. Now, therefore, more than ever, is the time to place the question of ratable values upon an equitable basis throughout the land. In connection with this question, attention may be drawn to a small brochure recently published in Cardiff—entitled, *Wigwam: a Key to Social Reform; After the War Problems*—written by WATKIN WILLIAMS, in which the author pays particular attention to the housing question. This little work is an excellent guide to the history of local taxation and the law of rating, and constitutes a useful book of reference for all who are interested in this subject.

* Published by the Educational Publishing Company Limited, Cardiff. 1s. net.

THE IRISH COAL TRADE.

THURSDAY, SEPTEMBER 6.

Dublin.

The severe gales of the past week have caused much interruption to the cross-Channel trade, and the quantity of coal coming into the port has been considerably below the average. There is no improvement with regard to the supplies of best English coals, but Scotch coal is fairly plentiful. Merchants' stocks are small at present, and demand generally continues to be good, with prices unchanged. Quotations in the city are as follow:—Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s., all less 1s. per ton discount; Scotch steam coal, 41s.; coke, 45s. per ton. Irish coals at Castlecomer collieries, co. Kilkenny, are:—Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d., all at the pithead. During the past week 50 coal vessels arrived from English, Scotch and Welsh ports, the total quantity of coal discharged upon the quays being only 17,500 tons, as compared with 31,000 tons the week previously.

Belfast.

There is no new feature in the trade this week, demand upon the whole being well kept up, with a continued shortage of the better qualities of English coal. Current quotations for household coals are as follow:—Best Arley, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Inferior qualities of Scotch steam coal are about 29s. per ton, and best qualities up to 35s. and 37s. 6d. per ton. The price of gas coke ranges from 37s. 6d. to 40s. per ton; foundry coke from 60s. to 65s. per ton for best beehive oven. Irish coal at Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton. The developments at the Ballycastle collieries are not sufficiently advanced for any accurate prices to be given.

THE BY-PRODUCTS TRADE.

Tar Products.—The position both in London and in the provinces remains quiet. Pitch is a shade firmer, and enquiries are still fairly numerous. Manufacturers are not particularly anxious to sell, and up to 47s. 6d. per ton has been paid in London for export. Provincial holders are encouraged by the shipping position. Benzol and toluol are unchanged. Solvent naphtha remains a firm market, and in spite of prospective scarcity of supplies, business has been done at only a slight advance on last week's price. Heavy naphtha is somewhat harder; and crude is steady. It is officially announced that after October 1 no person shall deal in any crude benzol, crude naphtha, or light oils containing recoverable quantities of benzol or toluol, except by licence issued by the Ministry of Munitions, and all persons engaged in the trade shall make such returns regarding their business as may from time to time be required. Average closing quotations are as follow:—Coal tar, 23s. 3d. to 28s. Pitch, east coast, 17s. to 18s.; west coast, Manchester, 17s. 6d. to 18s. 6d.; Liverpool, 17s. 6d.; Clyde, 19s. to 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 1s. 11d. to 2s. 1d. Heavy naphtha, north, 1s. 4d. to 1s. 6d. Heavy oils, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—Very few export licences were issued last month, and the little trade passing was carried out at an average of about £23 10s. per ton. The bulk of supplies still find their way to home agricultural consumption, and in view of the low prices up to the end of this month, the demand will probably become increasingly heavy as the last day approaches. For October to December delivery, the official quotations provide for an advance of 10s. per ton on the current maximum.

are small, the production being quickly absorbed at firm figures. The Norwegian State Railways want offers, this week, of 18,500 tons of best steam for delivery over October and November. Forward business is being much discussed at present, and the forward market would be brisk were there any guarantee of tonnage supplies.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	37/6-45/
Do. Tynes (Bowers, &c.) ...	29/6	29/6	35/ -40/
Secondary, Blyths	25/6	25/6	30/ -35/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/ -35/
Unscreened	23/6-25/	23/6-25/	25/ -35/
Small, Blyths	20/	20/	22/6-25/
Do. Tynes.....	18/6	18/6	21/ -22/6
Do. specials.....	20/6	20/6	25/
Other sorts:—			
Smithies.....	25/ -30/6	25/ -30/	25/ -27/6
Best gas coals (New Pelton or Holmside)	25/	25/	34/ -35/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	30/
Special gas coals	26/6-30/	26/6-30/	37/6
Unscreened bunkers, Durhams	24/ -25/	24/ -25/	22/ -26/
Do. do.			
Northumbrians	24/ -25/	24/ -25/	24/ -27/6
Coking coals	24/ -25/	24/ -25/	25/ -27/6
Do. smalls	24/ -25/	24/ -25/	22/ -24/
House coals	28/6-30/	28/6-30/	40/ -45/
Coke, foundry	42/6	42/6	40/ -45/
Do. blast-furnace	42/6	42/6	37/6-40/
Do. gas	29/ -30/	29/ -30/	33/ -35/

Sunderland.

COAL.

The coal market is dull and featureless. Spot tonnage is in rather better supply, and as most of the collieries have boats on hand, a fairly steady week's work is expected. Requisition orders are fairly good, but shipments to France are slow owing to the shortage of tonnage. Prices generally are steady and unchanged. Steams are fully held, except smalls, which are inclined to weakness. Gas coals are steady. The general request for home use of special manufacturing coals, and washed nuts and peas remain strong. The bunker market is still slow and depressed. Households are dull and easy, but coke is steady. The Norwegian State Railways are inviting immediate offers of 18,500 tons of best Blyth or Wear steam coals, shipment to be made during October and November.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	37/6
Secondary do.	23/6-25/	23/6-25/	28/ -30/
House coals:—			
Best house coals	30/	30/	37/
Ordinary do.	28/	28/	30/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	35/
South Hetton do.	28/6-30/	28/6-30/	35/
Lambton unscreened ...	24/	24/	26/
South Hetton do.	24/	24/	26/
Do. treble nuts	20/	20/	26/
Coking coals unscreened	25/	25/	24/
Do. smalls	25/	25/	23/
Smithies.....	25/	25/	24/
Peas and nuts	24/6-26/	24/6-26/	26/
Best bunkers.....	25/	25/	24/
Ordinary bunkers.....	24/	24/	23/
Coke:—			
Foundry coke	42/6	42/6	45/
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	33/

Middlesbrough-on-Tees.

COAL.

The fuel trade shows little change. A number of considerable enquiries from outside areas are reported, mostly from Scandinavia, but they do not lead to business on anything like an extensive scale. Official absorption is large, and promises to continue so. Values of coal are practically unaltered, and producers are still seeking orders at minimum rates. There is some activity in best Durham steam coals, the price of which is 20s. A moderate business is passing in gas coals, demand being chiefly for best kinds. Best Durhams are 25s., and ordinary qualities 23s. 6d. Trade in bunkers is very irregular. For unscreened Durhams the price runs from 24s. to 25s. Household coals are in better request. Coking coals continue to be fairly well taken up at rates last named. Both beehive and patent oven coals are rather quiet for shipment at 42s. 6d., but gashouse product is a little busier at round about 30s. The good demand for coke for local consumption is met by a more than ample supply. Fixed maximum rates still rule, average blastfurnace kinds still realising 28s. at the ovens, and low phosphorus sorts remaining at 30s. 6d. at the ovens.

IRON.

Home consumers of Cleveland pig iron, having made most of their arrangements for supplies under the September allocations, buying on home account is now quiet. There are some complaints of shortage of railway trucks, but distribution does not appear to have been at all seriously disorganised by the occurrence. A little more foreign business is passing, due to improvement in the tonnage situation, but with French business conducted entirely through official channels, merchants' transactions are confined to sales to Italy, and shipments to that country are now on a fairly good scale. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d., and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Pressure for delivery of east coast hematite iron shows no abatement. Needs of home consumers continue to be adequately met under careful official supervision, but when these have been satisfied little surplus is left for sales abroad. Every effort, however, is made to meet the urgent demands of our Allies. Nos. 1, 2 and 3 are 122s. 6d. for home use, and 141s. for shipment to France and Italy, the export quotation being subject to addition of the excess neutral ore freights above the agreed parity. There is rather more business passing in foreign ore at current official rates. No relaxation can be reported in pressure for delivery of finished iron

and steel. Manufacturers are kept running at full pressure to satisfy the heavy needs of the Government and of the shipyards, and facilities for transaction of ordinary commercial business are very limited indeed. Quotations for all descriptions are strong. Shipments of pig iron from the port of Middlesbrough for the month of August show an increase of 6,350 tons as compared with July clearances, the aggregate being 59,083 tons for August, and 52,733 tons for July. Of the August loadings, 57,833 tons went abroad, as against 50,788 tons in July; whilst the coastwise despatches amounted to 1,250 tons in August, as against 1,945 tons in July. Shipments of manufactured iron and steel last month were returned at 24,380 tons, of which 23,477 tons went to foreign ports and 903 tons coastwise, as against July's total of 39,510 tons, of which 37,336 tons went abroad and 2,174 tons went coastwise. August total shipments of pig iron, manufactured iron and steel were 83,463 tons, as compared with 92,243 tons in July and 81,390 tons in June.

Cumberland.

Maryport.

COAL.

The coal trade is much brisker this week, and all varieties of fuel are in better request. The revival of activity in the iron trade is already making itself felt in both the coal and coke industries, manufacturing fuel is firmer, and nearly all important users are taking increased supplies. There is a very strong enquiry for fuel for local consumption, and the home market is more active than it has been for some time. New business is coming in more freely, and the outlook on all accounts is very much brighter. The demand for all sorts for local use is keener, and requirements are now almost big enough to absorb the whole of the output. Production, however, has been rather uneven during the last week or two. One of the larger pits was idle for two shifts owing to a dispute with the pony drivers, but the remainder are all working at their fullest capacity. The surface workers who recently sent in a demand for increased wages have posted 14 days' notice to cease contracts, but it is hoped that some agreement will be reached before the notices expire. Landsale is better, and business more particularly with the rural districts is reported to be very brisk. Engine fuels are steady, and gas coal is very firm, and where it is possible, consumers are already laying in stocks for the winter. The stormy weather has interfered considerably with the shipping trade this week. Business on export account is not quite so brisk, and the demand for all sorts for Irish ports is easier. For the past few weeks it has scarcely been possible to ship all the coal that has been sent to the docks, but as the home market is now firmer, supplies are not quite so plentiful, and at the moment Irish customers are practically taking all the coal that is available. There is a fairly steady enquiry for manufacturing fuel for export, but other varieties are still rather quiet. It is expected, however, that the Irish trade will be busier towards the end of the month. During the week 14 vessels have sailed with coals, all for Irish ports, and the shipments have amounted to 2,185 tons, compared with 2,990 tons at the corresponding period of last year, or an increase of 885 tons compared with the previous week. No coal has been shipped to either Belfast or Dublin during the past fortnight, but some good cargoes have been consigned to Carrickfergus, Londonderry, Cork and Larne. Freight to all parts of Ireland are still very high. The shipments for the month have amounted to 9,375 tons, compared with 13,715 tons for July and 19,335 tons this time last year. Coke is firmer, and practically all of the by-product coke ovens in the county are again in full operation. Requirements are increasing, and the bulk of the output is being taken by iron smelters in West Cumberland. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal „ ...	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit.....	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts „	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	28/6	28/6	30/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

The hematite pig iron trade on the west coast is characterised by very great activity, and practically all the plants which were idle a fortnight ago are again in full operation. Production has not yet been restored to its former level, but several furnaces which were damped down have already been put into blast at Maryport, Workington, Cleator Moor and Distington, and one or two more will be lighted before the week end. The number in draught at present is about 25, but as supplies of local iron ore are now more abundant, it may be taken for granted that smelters will leave no stone unturned to put the remaining five into blast at the earliest possible moment. The iron ore mines in West Cumberland are now working regularly, and it is hoped that production will soon be big enough to maintain all the 30 furnaces, which were blowing before the strike, in full operation. It is believed, however, that it may be possible to do more. The men have agreed to the introduction of more labour into the mines, and if a substantial increase in the output of local iron ore can be secured, it will soon enable smelters to put more furnaces into blast. The scarcity of native ore, for many months past, has prevented smelters from increasing their output, but now that the labour trouble in the iron ore industry has been settled, there is every prospect of an immediate increase, both in the production of native ore and hematite pig iron. Several furnaces in the district are almost ready for lighting, and as soon as sufficient iron ore is available, smelters will be in a position to take a big stride forward. There is a phenomenal demand for iron, both ordinary and special brands, and requirements

more are than ever in excess of the supply. During the past few weeks approved users have been made short of iron from hand to mouth, and only the most urgent orders have been dealt with. Makers have more on hand than they can cope with for months, and no outside business is being accepted. The entire output of both special and ordinary iron is going into immediate consumption. Prices are still at the maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with special iron at 140s. per ton, and semi-special iron at 135s. per ton f.o.t. Warrants at cash are idle at 115s. per ton. The steel trade is remarkably brisk, and all the mills at both Barrow and Workington are in full swing again. Both places are still engaged on important work, and a big proportion of the output is for the Government. There is a rather better enquiry for rails. Heavy rails are quoted at from £10 17s. 6d. to £11 10s. per ton, with light sections at from £14 to £14 10s. per ton; heavy tram rails are £14 per ton, ship plates £11 10s. per ton and boiler plates £12 10s. per ton. Engineers are still very busy and most of the shops are heavily engaged on Government work. The imports of foreign iron ore for the month have amounted to 7,240 tons

South-West Lancashire.

COAL.

The position in regard to house coal at the moment is marked by extreme pressure from those districts which are to be prohibited after this week, and the demand from other consumers continues as in the recent weeks. With regard to shipping, exports—especially to France and Italy—are on an increasing scale, while bunkering requirements are fully up to the recent average. The question of supplies is becoming more difficult, and at the moment there hardly seems enough coal to go round, the heavy Government demands making the shortage more marked. Prices are, of course, as per official schedule. As regards the coastwise and cross-channel trade as much as can be spared for this branch is being taken, and more is asked for. Slacks move away as produced; any little surplus that the local holidays may cause readily finds an outlet in other directions.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/ -22/	21/ -22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/ -20/	19/ -20/	19/ -20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	*	*	23/ -24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. The condition of trade remains unaltered, very little business passing, the chief topic of conversation still being the coal transport reorganisation scheme, upon which nothing can yet be definitely reported. The demand for house coal continues, and there is a fair amount of coal being shipped on contract account. The demand for slacks is still on the easier side, owing to different holidays. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/ -23/	22/ -23/	22/ -23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/ -18/6	18/ -18/6	18/ -18/6
Furnace coal.....	17/6-18/	17/6-18/	17/ -18/
Bunker (f.o.b. Partington)	*	*	25/ -26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

IRON.

There are no new features in connection with the iron and steel trade here. Briefly the whole output, and more, is required by the Government. The Ministry of Munitions have sanctioned considerable advances in the prices of steel turnings and wrought iron scrap. It remains to be seen whether it will have the effect of bringing more on the market. All works are fully occupied with the exception of the small ironfounders.

Yorkshire and Derbyshire.

Leeds.

COAL.

The instructions issued by the Coal Controller requiring collieries to substantially increase their deliveries to London caused the market on Tuesday to be unusually animated. A notice had been issued convening a special meeting of the Yorkshire Coal Exchange, with a view to entering a protest against the diversion of supplies from local and provincial markets to London to such an extent as to create in the former places a pronounced shortage of coal. The response was a large attendance, those present unanimously resolving to draw the serious attention of the Coal Controller to the effects upon Yorkshire centres and the provinces generally of his instructions that so large a quantity of coal should be sent to London, and, while sympathising with the Coal Controller in his difficulties and offering to loyally help him all they could, the meeting urged that the claims of the provinces should receive the Coal Controller's careful consideration. Much of the feeling of concern to which this resolution gave expression is due to the state of ignorance which prevails as to the Coal Controller's intentions, and there are indications that an announcement as to how long the diversion of supplies will last would do something to relieve the situation. At present, while coal producers are under instructions to send as much as four times the usual tonnage to London for an indefinite period, there are complaints that depots in towns even within a comparatively short distance of the collieries are without coal, with horses and delivery staffs idle in consequence. The demand generally was already greater than the collieries were able to supply, and stocks are practically

...ent anywhere. Whether or not as a result of the ...ment of supplies, the question of empty wagons, ...been satisfactory for several weeks past, is ...a difficulty, there being a recurrence of delays on ...neys. London factors and merchants were ...ented on the market, and they reported ...g off in the demand for house coal. While rail- ...quantities are heavily increased, only restricted ...supplies are being sent coastwise to London from the ...Humber ports, the bulk of the shipments being from ...Goole. There is a great outcry of shortage from the ...south-western counties, and it is expected that strong ...representations will be made to the Coal Controller from ...this district also. In West Riding markets, the demand for ...house coal is considerably beyond the ability of merchants ...to cope with, owing to the disturbance of deliveries indicated ...above. Pit prices, largely nominal, are unchanged:—Haigh ...Moor selected, 21s. to 22s.; Silkstone best, 20s. to 21s.; Silk- ...stone house, 18s. to 19s.; other qualities, 17s. to 18s. With ...the shortening days, there is a call for extra supplies of ...gas coal, which are given only with great difficulty. Gas ...nuts are particularly scarce. London gas works are still ...buying in the open market when possible. As to manu- ...facturing fuel, all available supplies are needed, but ...organised distribution prevents difficulties arising. Reports ...from the chief industrial centres in the West Riding seem ...to indicate that, while supplies are more or less hard to ...mouth and there are practically no ground stocks, there ...has been sufficient up to now to keep the works going. The ...smallest steam slacks are fairly easily obtainable in com- ...parison with the scarcity of all other qualities. Coking ...slacks are still insufficient to meet the requirements, and ...the demand for washed furnace coke continues strong.

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ...	20/-21/-	20/-21/-	20/-21/-
Wallend & London best ...	19/-20/-	19/-20/-	19/-20/-
Silkstone best ...	19/-20/-	19/-20/-	19/-20/-
Do. house ...	17/-18/-	17/-18/-	17/-18/-
House nuts ...	16/-17/-	16/-17/-	16/-17/-
Prices f.o.b. Hull:—			
Haigh Moor best ...	23/-24/-	23/-24/-	23/-24/-
Silkstone best ...	22/-23/-	22/-23/-	22/-23/-
Do. house ...	20/-21/-	20/-21/-	20/-21/-
Other qualities ...	19/-20/-	19/-20/-	19/-20/-
Gas coal:—			
Prices at pit:			
Screened gas coal ...	16/-17/-	16/-17/-	16/-17/-
Gas nuts ...	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/-16/-	15/-16/-	15/-16/-
Other sorts:—			
Prices at pit:			
Washed nuts ...	17/-18/-	17/-18/-	17/-18/-
Large double-screened engine nuts ...	16/-17/-	16/-17/-	16/-17/-
Small nuts ...	15/-16/-	15/-16/-	15/-16/-
Rough unscreened engine coal ...	15/-16/-	15/-16/-	15/-16/-
Best rough slacks ...	14/-15/-	14/-15/-	14/-15/-
Small do. ...	12/-13/-	12/-13/-	12/-13/-
Coking smalls ...	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke ...	25/8	25/8	25/8

Barnsley.

COAL.

Conditions change but little with regard to all classes of fuel, and business still continues to be got through, attendant with no little difficulty. The trouble still is to procure a larger output, but there is little hope indeed of this being effected, and calculations have to be made on that basis. Orders from the Controller are still of a varied character, and whatever local ideas may be, based on long experience of the adequacy of the tonnage sent in various directions, it is of no avail, and tonnage has still to be forwarded. Particularly is this the case with the London supply. Collieries which have hitherto done no business with the Metropolis are now included in the schedule for forwarding fuel, and the question of supplies to normal markets is now engaging very close anxiety. The pressure hitherto almost entirely related to house coal, now the supply of gas fuel is much to the forefront, but the position of collieries cannot be altered and consumers are directing their energy to the authorities. The demand for steam coal from the district is of an enormous description. Greater attention is now being paid to the shipment of large steams to the Allied countries, and the demands on behalf of the Admiralty are equally extensive. On home account there is also a big tonnage required, but with the preferential claims to be first satisfied home consumers are finding a shortage of various grades of fuel. The position is such that any class of coal has to be accepted, and with a general scarcity the effect is bound to be felt. The demand for steam nuts in particular for the munition firms and other engineering concerns is again of a maximum character, and all descriptions of small manufacturing fuel are difficult to find. The position is much the same in regard to gas coal, with the concerns urged to carbonise the largest tonnage possible to produce essential by-products, and collieries are pressed to give more extensive deliveries, though there is great difficulty in forwarding the contract supplies arranged for. The search for coking slacks is again very brisk, and it is only with the greatest difficulty that anything like an adequate supply can be obtained to keep the ovens in something like full operation. The pressure for furnace coke varies but little on the whole, and the extensive production is readily disposed of. Prices are still largely of a nominal character.

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone ...	20/-22/-	20/-22/-	20/-22/-
Best Barnsley softs ...	18/6-19/-	18/6-19/-	18/6-19/-
Secondary do. ...	17/-17/6	17/-17/6	17/-17/6
Best house nuts ...	16/-17/-	16/-17/-	16/-17/-
Secondary do. ...	15/6-16/-	15/6-16/-	15/6-16/-
Steam coals:—			
Best hard coals ...	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do. ...	16/6-17/6	16/6-17/6	16/6-17/6
Best wa. ...	16/3-16/6	16/3-16/6	16/3-16/6
...	15/6-16/3	15/6-16/3	15/6-16/3
...	12/6-13/-	12/6-13/-	12/6-13/-
...	10/6-11/-	10/6-11/-	10/6-11/-
...	16/6-17/-	16/6-17/-	16/6-17/6
...	15/6-16/-	15/6-16/-	15/6-16/-
...	16/-	16/-	16/-
...	25/8	25/8	25/8

Hull.

COAL.

The great strain upon the output of Yorkshire and Derbyshire coal continues, and there seems little doubt that the quantity now being sent by rail to London is prejudicing shipment from the Humber ports. Inland requirements according to the Coal Controller's dictum have preference, and there are only certain sorts the War Trade Department allows for export, and even of these the quantities are limited. Some business is, however, being done with neutrals, Holland and Sweden taking coal, and Norway and Denmark coke, but, generally speaking, licences come to hand very slowly, though of late rather less difficult to obtain. If restrictions were less onerous much more might be done, because neutrals are crying out for fuel and are prepared to pay more than scheduled minimum prices in order to obtain supplies. Meanwhile shipments to France are about recent average and account for the bulk of the export from the Humber, official and Admiralty requirements being next in volume.

Chesterfield.

COAL.

There is an active demand for house coal, and customers are anxiously enquiring for increased supplies. Orders are coming to hand freely. Other classes of fuel are in equally strong demand. Fuel for the large steel works of Sheffield is in urgent request. For this purpose coal will continue to be supplied from this district under the new redistribution scheme. Cobbles and nuts for gas-producers are much sought after, but difficult to find. Slack for boiler firing is in fair demand, but supplies are rather more plentiful. Railway companies are pressing for good deliveries of locomotive fuel. The recent holidays at the collieries have interfered with the regular deliveries. Gas coal is in active demand. The export trade presents no new feature. The demand is very strong, but supplies of coal are short of exporters' requirements. The bulk of current shipments are for French ports. There is no change in the coke market, which maintains a firm tone. The full production of the ovens is readily absorbed. Coking fuel is in short supply.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals ...	17/-	17/-	17/-
Secondary do. ...	16/6	16/6	16/6
Cobbles ...	16/-	16/-	16/-
Nuts ...	15/-	15/-	15/-
Slack ...	12/6	12/6	12/6

IRON.

Every branch of the iron trade continues in a state of great activity. Pig iron and finished iron are in good demand, and the plant of the district is working up to its full capacity.

Nottingham.

COAL.

While the output of the pits in this county is being maintained at a fairly satisfactory level, the general demand is such that all available supplies are readily absorbed. With regard to domestic fuel, local merchants are receiving a limited tonnage in consequence of a certain percentage of the output being allotted to other districts. As a result their supplies are barely sufficient to meet current orders, which fortunately are not so numerous as a year ago, owing to many householders having obtained stocks earlier. Collieries are being pressed for full deliveries on contracts, and little attention can be given to outside orders. Much activity continues in the steam coal branch. Large steams are still in good request, while there is a heavy demand for the best grade of manufacturing fuel. Steam nuts remain a feature of the market, and the supply is not equal to the demand. Nearly all kinds of slacks are being readily purchased. Coke is in active request at top prices. As to gas coal, there is just now a more active demand, and customers are eager to secure full contract deliveries.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights ...	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals ...	18/-18/6	18/-18/6	16/6-17/6
Secondary do. ...	17/-18/-	17/-18/-	16/-16/6
Best hard coals ...	16/9-17/6	16/9-17/6	17/-17/6
Secondary do. ...	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards) ...	12/-13/-	12/-13/-	12/-13/-
Do. (second) ...	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft) ...	11/-	11/-	11/-

Leicestershire.

COAL.

All the changes which are being made have so far resulted in a great increase in the pressure in securing efficient administration. For the moment the increased call for all classes of coal for London and district holds a dominating position, and the utmost efforts are being made to further extend the deliveries. Under the existing conditions it is very difficult to see how this can be accomplished, unless there is a substantial increase in the number of miners engaged. To increase the working staffs by the introduction of miners from other centres where there is an absence of pressure is a rather complex problem, which will require very careful handling. In all the colliery villages in this district there is a marked shortage of cottages for miners,

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal ...	16/6-18/-	16/6-18/-	17/-19/-
Second, hand picked ...	15/6-16/6	15/6-16/6	15/6-17/-
Deep screened cobbles ...	16/-17/-	16/-17/-	16/6-17/6
Deep large nuts ...	16/-16/6	16/-16/6	16/-17/-
Bakers' nuts ...	15/-15/6	15/-15/6	15/-16/-
Small nuts ...	14/6-15/-	14/6-15/-	14/6-15/6
Deep breeze ...	12/9-13/6	12/9-13/6	12/9-13/6
Peas ...	12/-12/3	12/-12/3	12/-12/3
Small dust ...	6/-7/-	6/-7/-	6/-7/-
Main nuts for London kitcheners ...	13/6-14/-	13/6-14/-	13/6-14/6
Steams, best hand picked ...	14/-14/6	14/-14/6	14/-15/-
Steams, seconds ...	13/-13/6	13/-13/6	13/-14/6
Main cobbles for kitcheners ...	13/6-14/-	13/6-14/-	13/6-14/6
Main breeze ...	12/6-13/6	12/6-13/6	12/6-13/6

and already some of the men have to live six to eight miles distant from the pits where they are engaged. Even in the larger towns there is no spare cottage accommodation, and to erect hutments along country highways is a serious problem. Meanwhile London deliveries must be maintained at the highest point, and everything else, except supplies for Government works, has to give place. Country coal merchants are in a difficult position, and they have heavy arrears of orders to deal with, while there has been no opportunity of creating stocks in reserve. There is a keen demand for all classes of household as well as for main and deep cobbles and nuts. Small nuts for mechanical stokers are cleared off as fast as they come to hand. Already the domestic consumption shows signs of increase at the large centres, and there is evidence that a very serious position is at hand. There are no stocks at the collieries.

South Staffordshire, North Worcestershire and Warwickshire.

COAL.

The Order of the Coal Controller diverting house coal from the Warwickshire and Staffordshire coal fields to London has naturally come in for considerable criticism during the week. The effect of the Order is that there is now very little coal available for distribution in Birmingham and district, and the shortage will tend to become even more pronounced. The local Coal Merchants' Association is taking the matter up with the Coal Controller, and have pointed out to him how seriously his instructions are affecting the supply of this district, where the pressure for supplies is very great. Merchants who have large contracts to carry out are naturally very anxious as to the future. The chairman of the Coal Supply Committee for this district has given it as his opinion that the tension will not last more than a few weeks, but there is no official notification to that effect. Heavy demands for industrial fuel have to be satisfied for work of national importance, and there is practically nothing for the open market. The output of slacks is readily absorbed. Prices all round are unchanged. Prices at pit:—

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/-	22/-	22/-
Do. seconds deep ...	20/-	20/-	20/-
Do. best shallow ...	19/-	19/-	19/-
Do. seconds do. ...	18/-	18/-	18/-
Best hard ...	18/6	18/6	18/6
Forge coal ...	16/-	16/-	16/-
Slack ...	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/-	19/-	19/-
Do. hand-picked cobs ...	18/-	18/-	18/-
Best hard spires ...	20/-	20/-	20/-
Forge (steam) ...	16/-	16/-	16/-
D.S. nuts (steam) ...	14/6	14/6	14/6
Small (do.) ...	14/6	14/6	14/6

IRON.

A good deal of interest has been centred during the week on the new scrap Order. A week's experience is not sufficient upon which to base an opinion as to whether the new rates will ensure a steady flow of scrap to the bar mills and the steelworks, but in the main, while the prices are not considered as good as they might be, opinion is favourable. A great deal of wrought iron scrap has undoubtedly been held up, to the prejudice of the bar mills, and within the last few days a fair amount of material has been offered. The revised price for steel turnings, bringing it up to 70s., provided they are all steel, is welcomed. Previously this limit applied only to the heaviest and best turnings, the remainder being limited to £2 10s. No official announcement has been issued regarding the proposals of the Ministry of Munitions for restricting prices in the sheet trade, but apparently some figure is in possession of makers because it is declared that it is too low to permit of earning a profit, and business in black sheets is being held up accordingly. The trade in galvanised sheets had already shrunk almost to the disappearing point. A ready, active market continues for pig iron, both forge and foundry qualities, and maximum values are very firm. The output of these descriptions is becoming more restricted by reason of the greater attention being devoted to basic iron, the price of which is uniform in South Staffordshire, Derbyshire and Northamptonshire, namely 97s. 6d. a ton f.o.t. at makers' works. At the bar iron mills, too, pressure is in excess of the ability to respond, and a large proportion of the business is accordingly placed without any assurance being given with respect to delivery. In this, and in other important branches, a large part of the business is done without the intervention of the merchant, who finds that to a great extent his occupation is gone. The Government's shipping programme continues to make heavy demands on the steel works, and in the matter of plates steps are being taken to increase and facilitate output. Semis are pronouncedly scarce. There are plenty of enquiries for bars, booms, and billets, but output is absorbed for some time ahead. Discards arrive in fair quantities from South Wales. All prices, of course, are controlled. Steel strip remains uncontrolled at £17 15s. to £18. Gas strip fetches £15 10s.

Forest of Dean.

COAL.

The market for the house coals of this district has continued very firm since last writing, and the collieries are still a few weeks in arrears with many of their orders. All the pits are working at full pressure, endeavouring to cope with the extraordinary demand, but the output is totally inadequate to meet customers' requirements. The enquiry for steam and manufacturing fuel is very strong, and it is a difficult matter to give anything like satisfaction.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block ...	24/-	24/-	21/6
Forest ...	23/-	23/-	20/6
Rubble ...	23/3	23/3	20/9
Nuts ...	21/6	21/6	19/-
Rough slack ...	13/6	13/6	13/-
Steam coal:—			
Large ...	20/-21/-	20/-21/-	18/-19/-
Small ...	16/-16/6	16/-16/6	16/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE WELSH COAL AND IRON TRADES.
THURSDAY, SEPTEMBER 6.

North Wales.

Wrexham.

COAL.

There has been little alteration in the general state of trade in this district during the past week. The pits continue to work at full pressure and the output is maintained at as high a level as is possible under present circumstances. The question of better dwellings for the miners and other workers of this area, has been taken up with avidity; and at a meeting of the Wrexham District Council the medical officer reported that the number of houses required to meet the increased population and to replace houses unfit for habitation, is at least 1,700, the cost of which is estimated to be £500,000. House coal is continually in keen demand by buyers, and a good supply of merchants' wagons come to hand daily: more indeed, than the colliery people are able to load away promptly owing to the keen demand in other quarters for fuel. Gas coal remains steady, and regular supplies have been sent to gas works where contracts are placed in this area with local collieries. There is also a good demand for gas coke. A large trade has been done in steam coal: and, as usual, the larger proportion has been divided between railway companies and works under Government control; the bulk of the remainder going for shipment. It is announced that the Mersey Dock and Harbour Board propose to increase the charge for haulage of railway traffic under the agreement between the Board and the railway companies, from Liverpool, from 6d. to 9d. per ton, on and after the 17th inst. It is stated that this advance (50 per cent.) has been brought about mainly by the advances in wages which have been conceded. There has been no change in the market for slack, and a fair tonnage has been disposed of at current prices. The following is a complete list of the week's quotations.

Prices at pit.

Prices at pit f.o.b.:	Current prices.	L'st week's prices.	Last year's prices.
Best house coal	21/-23/-	21/-23/-	—
Secondary do.	20/-22/-	20/-22/-	—
Steam coal	19/-22/-	19/-22/-	—
Gas coal	19/-21/-	19/-21/-	—
Bunkers	19/-22/-	19/-22/-	—
Nuts	18/-20/-	18/-20/-	—
Slack	12/-14/6	12/-14/6	—
Gas coke (at works)	21/8-25/-	21/8-23/4	—
Prices landsale:			
Best house coal	27/6-30/-	27/6-30/-	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

Though prices are without change on the scale of the schedule fixed by the Controller, there has been more enquiry for large descriptions, and with a better arrival of tonnage the market is perceptibly improved. Small coal, however, has been a very dragging trade, and stocks have been uncommonly heavy. Gas coal has been in great request, and so also have the better descriptions of house coal, which could easily have made a better price, as buyers were eager to get supplies. Patent fuel and coke remain practically unchanged.

Prices f.o.b. cash 30 days.

Steam coals:	Current prices.	L'st week's prices.	Last year's prices.
Best Black Vein large...	30/-	30/-	44/-46/-
Western-valleys, ordin'y	29/-	29/-	44/-45/-
Best Eastern-valleys ...	29/-	29/-	43/-45/-
Secondary do.	28/-	28/-	40/-42/-
Best small coals	21/6	21/6	28/-29/-
Secondary do.	20/-	20/-	26/-28/-
Inferior do.	18/-	18/-	21/-22/-
Screenings	23/-	23/-	28/-29/-
Through coals	27/-	27/-	27/-29/-
Best washed nuts	30/-	30/-	30/-31/-
Other sorts:			
Best house coal, at pit...	33/-	33/-	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/-
Patent fuel	32/6	32/6	45/-47/6
Furnace coke	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	60/-62/6

IRON.

There is very great activity at all the local iron and steel works. At many of them the extra and improved plant which has been installed is assisting materially in the increase of output. The tin-plate trade is looking much healthier. There are better supplies of steel bars than for some time past, and the outlook is regarded as bright for the future.

Cardiff.

COAL.

Although at the commencement of the week the market exhibited a slightly brisker tendency, there has been no actual improvement, and at the time of writing the tone was as dull as ever. Hopes of better conditions were based on the anticipation that when the stormy weather abated tonnage should be arriving in larger quantities. Unfortunately these hopes had not been realised, and there is an increasing scarcity of vessels at all the local docks. The ships that have entered have all been utilised by the authorities, and there has been no free tonnage for ordinary commercial trading. Another factor which has not tended to improve the situation is that the Admiralty demands have not been quite so large, and the result is that stocks are becoming increasingly heavy, not only in the railway sidings but at the collieries. This applies more particularly to small coals, for which there is little demand, and it is feared unless an improvement takes place almost immediately, collieries will again have to resort to banking in order to release wagons for more urgent needs. Stoppages have been reported in several instances, but

these have not been serious up to the present, and there is an optimistic feeling that the existing lull is only of a temporary character. Charterings last week only amounted to 12,160 tons, against 25,200 tons in the preceding six days. Monday again was a blank day, and the fixtures on Tuesday only represented 1,150 tons, so that the general outlook is not promising. There has been a brisk demand for gas and house coals, especially the latter, and there is difficulty in maintaining supplies. It is not believed, however, that there is any real shortage, but the fact that consumers are beginning to lay in their winter stocks is creating a strain which has not been apparent during the earlier summer months. The committee appointed to deal with the classification of coals has issued instructions to colliery companies that all sales of coal are to be made at the prices given in the original schedule of June 28 last, subject to alterations and conditions agreed to by the Controller on August 10. It is stated that further recommendations have been made to the Controller with regard to additional alterations, some of which have been already agreed to and some of which are now under consideration. Notification will be given when consent or otherwise has been granted, but in the meantime the scheduled rates will remain in operation. No details are available, but it is believed that the suggested alterations deal principally with the prices of small coals. Patent fuel is plentiful, and the same applies to coke, business in both commodities being on the basis of scheduled rates. The pitwood market remains comparatively easy, owing to the difficulty of transport facilities, and current quotations are round about 60s. to 61s. per ton.

Prices f.o.b. Cardiff (except where otherwise stated).

Steam coals:	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/-	33/-	—
Superior seconds	31/6	31/6	—
Seconds	30/9	30/9	44/-45/-
Ordinary	30/-	30/-	42/-44/-
Best bunker smalls	23/-	23/-	30/6-31/6
Best ordinaries	21/6	21/6	29/-30/-
Cargo qualities	20/-	20/-	21/-25/-
Inferior smalls	18/-	18/-	20/-23/-
Best dry coals	30/-	30/-	40/-42/-
Ordinary dries	28/6	28/6	37/6-40/-
Best washed nuts	30/-	30/-	36/-38/-
Seconds	28/6	28/6	34/-36/-
Best washed peas	27/6	27/6	33/-35/-
Seconds	26/6	26/6	31/-33/-
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/-	30/-	44/-45/-
Western-valleys	29/-	29/-	42/-44/-
Eastern-valleys	29/-	29/-	41/-43/-
Inferior do.	28/-	28/-	39/-41/-
Bituminous coals:			
Best house coals (at pit)	33/-	33/-	25/-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	42/-45/-
Through-and-through	—	—	34/-35/-
Small	26/-	26/-	30/-32/6
No. 2 Rhondda—			
Large	27/-	27/-	36/-37/6
Through-and-through	25/-	25/-	29/-31/-
Small	20/-	20/-	24/-25/-
Best patent fuel	30/-	32/6	45/-47/6
Seconds	30/-	30/-	43/-45/-
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	52/-57/6
Pitwood (ex-ship)	59/-61/-	59/-61/-	44/-45/-

* Nominal.

IRON.

The heavy demand for all classes of iron and steel for war purposes continues unabated, and both the blast furnaces and the rolling mills are producing maximum outputs. Tin-plate makers are pressing for their allotted supplies, but war work takes precedence, and they have to be content with what is left. In such conditions they are not anxious to undertake new business, and with satisfactory order books the general position is a comparatively comfortable one, provided the supplies of raw material can be maintained. The official prices came into operation at the beginning of the month, and are on the basis of 30s. per box net f.o.b. makers' works for I C 14 x 20 x 112 sheets by 108 lb. These rates are subject to a sliding scale arrangement, whereby if the price of tin exceeds £240 there shall be an advance of 1½d. per box for every £5 increase, and should the value recede below £240 the same rate of reduction shall also apply. Forterne plates the quotation is to be 28s., and the ratio of advance or reduction is on the basis of a rise or fall of £20 in the cost of tin. Shipments last week amounted to 7,649 boxes, whilst receipts from works totalled 18,136 boxes. Stocks in hand have thus increased to 54,648 boxes, compared with 44,161 boxes in the preceding week and 101,052 boxes at the corresponding date of last year. The galvanised sheet trade is unchanged. Spelter remains at £54 per ton. In all other departments works are fully engaged, and prices in every case are nominal.

Swansea.

COAL.

Tonnage arrivals over the week-end were not as heavy as expected, but there are good prospects of an increasing number of vessels being available in the next few days. Anthracite coals were in good request, especially machine-broken sizes, which being heavily booked, were difficult to obtain. Culm and duff were quiet and plentiful. Steam coals were well sought after, although supplies, especially of smalls, were ample. Bituminous coals were scarce.

Llanelli.

COAL.

The tonnage position is interfering with the position of steam coals, and throughs and smalls are irregular, with stocks of the lower grades accumulating. Large steams are in good demand, and there is a big inland call for best kinds, particularly from areas to which deliveries are prohibited after the 8th inst. Anthracite large kinds are steady, and there is a satisfactory demand for all qualities. Machine-made sorts are very firm, and beans and nuts scarce. Cobbles are also firm, but culm and duff are both easy, and stocks on the heavy side. Manufacturing coals are strong, with practical all supplies taken by local works. House coals have a good demand, and there are no spare parcels offering.

Prices f.o.b.

	Current prices.	L'st week prices.	
Best malting anthracite...	30/-	30/-	—
Seconds	29/-	29/-	28/-29/-
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	26/6-27/6
Machine-made cobbles	42/6	42/6	39/-41/-
Seconds	41/-	41/-	—
Thirds	39/-	39/-	—
Red Vein cobbles	26/-	26/-	—
Machine-made nuts	42/6	42/6	—
Seconds	41/-	41/-	—
Thirds	39/-	39/-	—
Red Vein nuts	36/-	36/-	—
Machine - broken beans (best)	35/-	35/-	30/-32/-
Seconds	31/-	31/-	—
Thirds	33/-	33/-	—
Red Vein beans	31/-	31/-	—
Peas (all qualities)	20/-	20/-	22/-23/-
Rubbly culm	13/-	13/-	15/-15/6
Red Vein culm	11/-	11/-	—
Breakers duff	8/-	8/-	—
Billy duff	6/6	6/6	5/-5/6
Steam:			
Best large steam	30/-	30/-	34/6-36/-
Seconds	27/-	27/-	—
Cargo through	23/6	23/6	—
Seconds	22/-	22/-	—
Bunkers through	23/6	23/6	27/6-31/6
Smalls	19/-	19/-	20/-22/-
Second smalls	17/-	17/-	—
Bituminous:			
Bituminous through	27/-	27/-	—
Smalls	24/-	24/-	—
Gas through	23/6	23/6	—
Gas smalls	21/-	21/-	—
Coke-oven coke	—	—	24/6-26/6

THE LONDON COAL TRADE.

THURSDAY, SEPTEMBER 6.

The pressure for coal supplies on the London market continues very firm, and at some of the depots a better supply by rail is reported. The delivery trade is very strong, and whilst this is the case, the merchants find it increasingly difficult to land any stock on the ground. Very little free coal is offering, and although the attendance on the London Exchange was marked by a steady increase, the buying and selling was confined to very small limits. Colliery representatives are confining all operations to the fulfilment of contract quantities, and factors are keenly anxious to overtake the orders on their books, so that very little coal has been for open sale. Greater care is evinced by all the sellers to keep the selling price within the limits of the Price of Coal (Limitation) Act, and in some cases a printed notice appears on the advice note that it is mutually understood that sales can only be recognised which point to the coal going direct into the user's actual delivery trade, and not for re-factoring. Merchants still report an unusually large number of orders on hand unexecuted, but the loaders and carmen are working strenuously to fulfil as many orders as possible whilst the warm weather lasts; and in a few cases, especially in the South of London depots, the arrivals of loaded wagons have not been sufficient to keep the horses and vans fully employed. As a whole, however, a better tonnage has been received, and the additional supply has been a great boon. This applies more particularly to household qualities. Hard steam coal and kitcheners cobbles are very scarce, and the railway companies are said to be heavy buyers. Bakers' nuts are slightly more plentiful, and slacks are also freely offered, but have comparatively few buyers. Coke is reported to be gaining ground in many of the households and large institutions in London. Seaborne supplies have been fairly steady, but not so heavy as during the past few weeks, and only 13 contract cargoes were returned as entering the Port of London for Monday's market, and 29 for Wednesday. In the freight market, chartering has been very slow, as so few vessels are offering, but steamers and sailing boats are quickly taken up whenever offered. During the week the freights have been fixed at 18s. from the Tync to London, and 17s. to 17s. 6d. from the Humber to London. A small quantity of emergency coal is still coming forward into the London area, but nothing like the quantity anticipated. The new scheme of coal allocation from the nearest coal fields to the points where the coal is actually consumed has given rise to a great number of complaints, as the quality of coal offered in substitution is in many cases quite unsuitable for the purposes required. Notwithstanding the shortage of coal at all the various depots, it must be conceded that the cellars of the bulk of the householders in London are better supplied with stock than has ever been known before at this season of the year. The Coal Controller has been very busy during the week in conferring with the provincial retail coal merchants, as well as the London traders, in an endeavour to regulate the retail prices and the proper distribution of the available quantities, but the main difficulty arises from the fact of the coal supply falling so far short of the demand. Happily, an increased quantity of Nottingham and Derbyshire coal has been brought forward by rail, but the falling off of Yorkshire and Durham coal has been most marked. The date of the alteration has been fixed for September 8, but long before that date an appreciable diminution has been effected, and the railway companies are preventing their wagons from being sent to all long distance stations. Under the household coal distribution Order, the price of coal will be fixed, but the Controller recognises that where the sacks of coal have to be delivered at higher floors it may be necessary to fix a definite higher charge. In some cases in the Midlands, the colliery managers have had to put aside many pressing local orders owing to the urgent messages from the Controller to divert supplies to London. This has been felt by many to be a great hardship for the provincial trade, and country customers are feeling the pinch, but it ought to tend to a betterment for London. The Coal Controller has set himself to see that small consumers who have no storage accommodation can get a fair supply during the winter. He also notified the trade that, with a view to providing all bona fide orders for coal outstanding, and to ensure a reserve of coal to be established on the depots and wharves, they should not, during the month of September, accept orders for household coal in quantities exceeding one ton on behalf of one consumer and in respect of an ordinary dwelling house. The scheme of allowances under the household coal distribution Order comes into effect on October 1.

and this instruction is intended to deal with the intervening period, and to prevent abuse until the proper arrangements are determined.

Mr. J. H. Dinham, Fawcus and Company's Report.

1. AUGUST 31.—The enquiry for seaborne house coal continued good to-day, but the supplies coming forward were not equal to the demand at present, and no sales were reported. Cargoes, 24.

2. MONDAY, SEPTEMBER 3.—Seaborne house coal was again in good demand to-day, but the supply was very short, and no sales were reported. Cargoes, 13.

3. WEDNESDAY, SEPTEMBER 5.—There was a good enquiry for seaborne house coal at to-day's market, but supplies were very short, and no sales reported. Cargoes, 29.

THE WHOLESALE COAL PRICES ORDER, 1917.

In exercise of the powers conferred upon them by Regulations 2(F) to 2(J) of the Defence of the Realm Regulations and of all other powers enabling them in that behalf, the Board of Trade hereby order as follows:—

1. The price at which a factor or merchant may sell coal in railway wagon or barge load or cargo to a consumer or to a retail coal merchant for re-sale by him from depot or wharf or railway siding by retail to consumers or to hawkers or small dealers, shall, except as hereunder provided, not exceed the pit price chargeable by the owner of the mine at which the coal was produced, or in the case of washed fuel, the price chargeable for the fuel at the washery by the owner of the fuel by whom, or on whose behalf it was washed, in addition to the actual cost of transport (in which cost no charge shall be made by the seller of the coal in respect of office expenses, salaries or other overhead charges or loss in handling) by more than the following amounts:—(a) Coal purchased by railway companies in Great Britain for consumption on locomotives, 3d. per ton; (b) coal purchased by railway companies in Great Britain for other purposes, 6d. per ton; (c) coal consumed in national factories, 6d. per ton; (d) coal consumed in gas and electric supply undertakings in Great Britain, 9d. per ton; (e) coal sold to retail merchants in Great Britain for re-sale by them from depot or wharf or railway siding by retail to consumers or to hawkers and small dealers, 1s. per ton; (f) all other coal, including all coal sold for consumption in Ireland, 1s. 3d. per ton, except that where coal sold direct to a consumer not having rail or wharf accommodation, who makes his own cartage arrangements, is delivered in railway wagon by the factor or merchant in quantities less than 30 tons, the amount chargeable in addition to the price at pit or washery and the transport charges as above defined shall be 2s. per ton unless the consumer has ordered not less than 500 tons of the coal in question for delivery over the following 12 months. Provided that:—(i.) Where coal is dealt with by more than one factor or merchant before reaching the consumer or retail merchant, the above amounts of 3d., 6d., 9d., 1s., 1s. 3d., or 2s. per ton respectively shall be divisible between the different factors and merchants, and each seller, except in the case of the final sale to the consumer or retail merchant, shall at the time of the sale inform the purchaser how much of the above amounts is included in the price, in order that the maximum price may not be exceeded. (ii.) In the case of washed fuel, where loss of weight in transit is borne by the factor or merchant, a charge may be made by the factor or merchant in respect of such loss by way of addition to the price per ton at which the fuel is sold to the consumer, not exceeding in any case 2 per cent. of such price. (iii.) Where the seller himself provides water transport, otherwise than by the charter of a ship subsequent to the date of this Order, the transport charges shall not exceed the rate current at the date of this Order. (iv.) Where payment is not made by the consumer or retail merchant before the date on which payment is due to the original owner of the coal or within 30 days of delivery of the coal, whichever is the later, the factor or wholesale merchant may make a reasonable charge in respect of credit to the consumer or retail merchant. Provided also that the maximum charges specified in this article, including the transport charges, may be increased or reduced by the Board of Trade, either (a) generally, or (b) as respects any particular class of business, or (c) as respects the business of any individual factor, merchant or consumer, or (d) as respects an individual contract or sale.

2. All contracts for the purchase or sale of coal in the United Kingdom under which deliveries were being made or were due prior to September 10, 1917, are hereby abrogated, provided that notwithstanding such abrogation, the seller shall, subject to any instructions which have been or may be given by or on behalf of the Controller of Coal Mines under the Coal Transport Order, 1917, or otherwise, continue to deliver to the purchaser, and the purchaser shall continue to receive, the coal during the period of the currency of the contract, and under the conditions and at the rates specified thereunder, unless otherwise agreed by both parties, and the price charged as from September 10 shall not exceed the price chargeable under the contract in accordance with the provisions of the Price of Coal (Limitation) Act, and of this Order; provided also that in no case shall the price be increased without the consent of the Controller of Coal Mines for the time being appointed by the Board of Trade hereinafter referred to as the Controller. Any party to such contract may apply to the Controller for the variation of or relief against any term or condition of such contract, and the Controller shall be heard and determined by him in the manner as any question may arise under article 6 of this Order, and that the provisions of article 2 shall apply accordingly.

3. If any person to whom coal is delivered by any amount, the price to be

paid by any person to whom the coal is delivered in pursuance of any subsidiary contract shall be reduced by an equivalent amount unless the Controller otherwise orders.

4. This Order shall not apply to any sale of coal for export or any sale of coal for the manufacture of patent fuel for export or any sale of coal to be used on any ship.

5. No person shall sell or buy or offer to sell or buy any coal at a price exceeding the maximum price hereby fixed.

6. Where any dispute or difference arises between two or more factors or merchants as to the division of the amounts referred to in sub-paragraph (i.) of article 1 of this Order, such dispute or difference shall be referred to the Controller. The Controller on such reference shall consider the cases of the respective parties and take their evidence in such manner as he shall deem most convenient, but shall give each party an opportunity of knowing and answering his opponent's case. If the Controller deems it desirable to hear the parties *viva voce*, he may appoint a person to hear the evidence and arguments and report to him. The decision of the Controller shall be final and binding on all parties to the reference, and the Arbitration Act, 1889, shall not apply thereto.

7. If any person acts in contravention of this Order, or aids or abets any other person in doing anything in contravention of this Order, that person is guilty of a summary offence against the Defence of the Realm Regulations, and if such person is a corporation or company every director and officer of the corporation or company is guilty of the like offence, unless he proves that the contravention took place without his knowledge or consent.

8. The Controller shall be responsible to, and is hereby authorised by the Board of Trade to take all measures that are needed to give effect to this Order. He may suspend from time to time and for any period, and in any district or part of a district the operation of all or any of the articles of this Order or parts thereof as he thinks fit, and may restore such operation. He may make such rules and issue such instructions under this Order as may be necessary to give effect to its provisions, and such rules and instructions shall be deemed to be part of this Order, and shall have the same effect as if they had been included in this Order.

9. (a) This Order may be cited as the Wholesale Coal Prices Order, 1917; and (b) shall take effect as from September 10, 1917.

INDIAN AND COLONIAL NOTES.

Africa.

South African Bunkering Trade.—Durban during last year fully maintained its position as the leading bunkering port in South Africa, the tonnage trimmed into bunkers increasing from 930,687 tons in 1915 to 1,519,182 tons for 1916. When it is remembered that the last half of the year witnessed the imposition of a surcharge of 6s. per ton of 2,000 lb. on the railway rate for bunkering coal to all the South African ports, this marked increase is all the more satisfactory, especially in view of the fact that for the preceding three years the tonnage bunkered had remained practically stationary in the neighbourhood of a million tons. The diversion of shipping from the Suez route *via* the Cape of Good Hope was doubtless in a large degree responsible for the increase, as naturally the superior quality of Natal coal for marine purposes was certain to make Durban the principal coaling port for vessels previously in the habit of using Welsh or Australian coal. So far, during the present year this improvement has been well maintained, and it is evident that the installation of the new coaling plant at Durban, which more than doubled the coaling capacity of the port, was not taken in hand a bit too soon. At Cape Town, the tonnage bunkered in 1916 also constituted a record, the total reaching 605,658 tons, as compared with 365,717 tons for the previous year, which was likewise a record. The bunkering trade at Table Bay has previously been of small dimensions, but owing to the before-mentioned diversion of Far East shipping from the Canal to the Cape, the tonnage bunkered nearly doubled last year. Towards this tonnage Natal only contributed 224,281 tons, almost entirely by rail; whilst for the first time in the history of the port the Transvaal collieries bunkered more than Natal at Table Bay, the respective totals being 371,174 tons and 224,281 tons. Five years ago the Transvaal collieries only bunkered 694 tons at Cape Town. This marked improvement may be attributed to the lowering of the railway rate from the Transvaal coal fields to the Table Bay docks, and to the cultivation of the bunkering trade by the Transvaal Coal Owners' Association. There is little difference between the prices charged for bunker coal at Durban and Cape Town. At the former the prices run from 25s. to 30s., and at Cape Town from 28s. 6d. to 32s. 6d. per long ton. These prices are similar to those charged in normal times for imported coal for bunkering purposes, which for the last 10 years has been but little used for bunkering at the different South African ports. The greatest drawback to the bunkering coal trade at the Table Bay docks is the complete absence of a mechanical coaling plant, the present methods being crude in the extreme. If the bunkering trade warrants it, after the war the loading facilities at the port will probably be raised to the standard of those existing at Lourenço Marques. The bunkering trade at Delagoa Bay also showed a marked improvement last year, for much the same reasons as at Durban and Table Bay docks. In the year 1915 the tonnage bunkered at Delagoa Bay only reached 134,265 tons, but last year the total was 345,912 tons. This port has never done a heavy bunkering trade, but thanks to a steady export coal trade, the tonnage handled at the docks compares favourably with that dealt with at Table Bay docks, although it is much less than that bunkered at Durban. Delagoa Bay, however, possesses an up-to-date coaling plant, and its prospects of building up a good export coal trade after the war are decidedly encouraging. The coal bunkered at the other ports of the Union of South Africa did not show much change last year, the tonnage only increasing from 4,470 tons in 1915 to 6,950 tons last year, made up as follows: Mossel Bay, 3,571 tons; Port Elizabeth, 3,243 tons; and East London, 136 tons. Taken on the whole, however, the tonnage of coal bunkered at the Union ports and Delagoa Bay was exceedingly satisfactory, totalling as it did 2,467,499 tons last year, as compared

with 1,414,355 tons in 1915, being a combined increase for the different ports of not less than 1,053,144 tons.

Australia.

Victoria: Brown Coal Deposits.—The following is a synopsis of the report drawn up by the Brown Coal Sectional Committee of the Institute of Victorian Industries, relative to the utilisation of the Victorian brown coal deposits, of which mention has already been made in these columns (*Colliery Guardian*, April 13, 1917, p. 728):—Brown coal uses: (1) To supply electrical power to Melbourne and other parts of the State; (2) briquette making for household and other requirements; (3) producer gas, town gas, tar and its derivatives, ammonia, and coke.—Power production: The Melbourne City Council and Melbourne Electric Supply Company can at present supply a maximum of 28,000 horse-power. Requirement in 1925 (estimated from normal increase), 120,000 horse-power. This estimate is for Melbourne alone, and does not allow for new industries made possible by cheap power. Electrolytic treatment of zinc concentrates may absorb 200,000 horse-power.—Costs: Newcastle slack coal costs 20s. per ton. Estimated cost of Morwell coal, 2s. 3d. per ton at mine. Morwell coal, with 40 per cent. moisture, has 0.416 the heat value of Newcastle coal. Electrical energy produced at Morwell by 5s. 5d. worth of brown coal equals amount produced in Melbourne from 20s. worth of Newcastle coal, and can be transmitted to town at about half the fuel cost of the latter. Victoria pays 10s. more per ton for black coal than New South Wales. The electrical power scheme will remove this handicap.—Briquetting: Morwell briquettes need no binder, and can be produced at from 11s. to 13s. per ton. They can be sold to householders in Melbourne and suburbs at about 24s. per ton, as against 24s. 6d. for wood, 32s. 6d. for coke, and 35s. for black coal. Estimated cost of single-press plant, £15,000 to £20,000.—The recommendations of the committee are that immediate State action be taken—(1) To confirm estimates in regard to public power requirements, and the best means of satisfying these by electrical energy generated from brown coal; (2) to decide what authority shall do the work, and when; (3) to obtain estimates of the cost of (a) 50,000 kw. plant at Morwell, and of similar plant at Altona, with transmission line, etc., in each case; (b) opening up workings at Morwell, and equipping them to produce coal for a 50,000 kw. power station, and to supply 120 tons of briquettes a day; (c) a briquetting plant, starting with a one-press unit of 60 tons a day capacity, with arrangements for ultimate expansion to six or seven presses; (4) that two experts should be sent abroad immediately to investigate latest power plant practice, and equipment necessary to secure full utilisation of Victorian brown coal resources. The Cabinet has decided to at once place supplies of brown coal at the disposal of the public. The Premier stated recently that the Government had little, if any, doubt about the soundness of the proposition to develop electricity at Morwell as a State enterprise, and supply it to the public for various purposes, as advised by the Cabinet Sub-Committee and the Victorian Institute of Industries, but action would be deferred until the experts who were being appointed had made their report upon that advice. On the question of supplying the fuel for domestic purposes, the Premier said the Cabinet believed that, without much capital expenditure or loss to the State, brown coal could be sold at a price that would lessen the cost of fuel to householders. Brown coal with 40 per cent. moisture has over two-fifths of the heating value of black coal, and is rather better than firewood. As a household fuel, two tons of brown coal will probably give greater service than one ton of black coal, and one ton of brown coal should be at least equal to one ton of firewood. Delivered at the house for 15s. a ton (the price fixed officially) in ton lots, and at up to 4s. 6d. for ½-ton lots (equal to 18s. per ton), brown coal would, it is believed, be a much cheaper fuel for many household purposes than anything else on the market. In addition, brown coal would relieve to some slight extent the present stringency in shipping freightage.

Canada.

Nova Scotia's Coal Output.—Out of a total production of coal in Canada during 1916 of 14,483,395 tons, the province of Nova Scotia contributed 6,469,472 tons, as compared with 6,379,463 tons in the preceding 12 months. The sales for the same period were 5,933,710 tons. The residue is consumed by the collieries and the miners. The great bulk of the output is contributed by the Dominion Coal Company, which last year worked 15 pits. The production by the various companies was as follows:—Dominion Coal Company, 4,369,626 tons; Nova Scotia Steel and Coal Company, 601,717 tons; Acadia Coal Company, 404,973 tons; Cumberland Railway and Coal Company, 370,866 tons; Inverness Railway and Coal Company, 278,821 tons; Maritime Coal Company, 201,915 tons; Inter-Colonial Coal Company, 138,705 tons; Minudie Coal Company, 62,479 tons; Bras d'Or Coal Company, 50,740 tons; Sydney Coal Company, 4,970 tons; Milford Colliery Company, 4,509 tons; Provincial Mining Company, 3,169 tons; Eastern Coal Company, 2,338; Atlantic Coal Company, 1,644 tons. In addition to coal, 5,121 tons of sulphate of ammonia were also produced. There was a marked increase in the production of iron and steel. The iron is mainly obtained from the Wabana mine, in Bell Island. The total imports for the year amounted to 795,066 tons. The production of pig was 429,615 short tons, compared with 295,868 short tons in the previous year; and that of steel ingots 502,106 tons, compared with 369,210 tons. Corresponding increases also were shown in the production of limestone and coke, which totalled 514,574 and 669,478 short tons respectively.

THE TIN-PLATE TRADE.

Liverpool.

The new schedule of maximum prices issued last week is not giving unbounded satisfaction to everybody. The makers complain that the official maximum price for cokes, viz., 30s. basis f.o.t. at works, is not high enough, and merchants do not consider the 2 per cent. profit allowed them is sufficient. Business is very quiet; it is difficult to get works to quote at all, they are all so heavily booked and behind with deliveries. All orders must now be accompanied with a certificate giving the Ministry of Munitions' permit reference number.

Hull Coal Traffic.—The coal traffic through the port of Hull during August decreased by 50,781 tons compared with August of last year. The official monthly returns show that 247,462 tons were imported to Hull last month, compared with 298,243 tons in August last year. For the period January-August 1917 the imports totalled 1,936,382 tons, against 2,212,732 tons for the corresponding period last year—a decrease of 276,350 tons.

ORGANISATION OF COMMERCIAL INTELLIGENCE.

The memorandum issued by the Board of Trade and the Foreign Office with respect to the future organisation of commercial intelligence states that it is clear that after the war the demands upon the Government for the collection and diffusion of commercial intelligence for the benefit of the trade of the United Kingdom are likely to be very much greater than in the past. Both the Board of Trade and the Foreign Office have for some time past been maturing plans for developing and improving the official arrangements for commercial intelligence so far as they fall within their scope. The Board of Trade have obtained the sanction of the Treasury for a large development of the Department of Commercial Intelligence and for a wide expansion of the system of trade commissioners within the Empire, which was originally established by the present Prime Minister when President of the Board of Trade. The Foreign Office have also elaborated schemes for strengthening and developing the commercial attaché and consular services and of increasing their utility to British trade.

Some difficulties, however, have arisen in defining and adjusting the limits of responsibility of the Foreign Office and Board of Trade with respect to the collection and distribution of commercial intelligence obtained through the medium of the commercial attachés and

diplomatic service, so far as these matters are not dealt with by the consular or other departments of the Foreign Office, and also matters concerning the personnel of the Foreign Office and of the above services who may be temporarily attached to the department, and any matters arising out of the work of the department involving questions of foreign policy. All instructions issued to commercial attachés or other diplomatic or consular officers will be issued in the name of the Secretary of State for Foreign Affairs. On all other matters the responsibility will lie with the Board of Trade.

The Commercial Intelligence Department will eventually comprise the existing Department of Commercial Intelligence of the Board of Trade and the Foreign Trade Department of the Foreign Office; and will take over such of the staff and records of the War Trade Intelligence and Statistical Departments as may be available and required.

The official head of the department will be an officer appointed jointly by the President of the Board of Trade and the Secretary of State for Foreign Affairs, working under the new Parliamentary Secretary. The appointment and control of the trade commissioners within the Empire will, as at present, rest with the Board of Trade, and the appointment and control of the commercial attachés and consular service with the Foreign Office, but the work of the new department will comprise all matters dealing with commercial intelligence, and, so far as is necessary for that purpose,

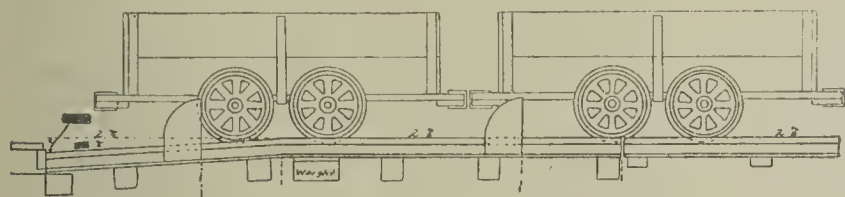


FIG. 1.—ELEVATION SHOWING KNUCKLE.

consuls in foreign countries. Under the system which has existed hitherto, the Department of Commercial Intelligence of the Board of Trade has been the centre for the collation and dissemination of commercial intelligence, whether received from H.M. trade commissioners and trade correspondents within the Empire or from H.M. diplomatic and consular officers in foreign countries. These latter, however, are under the administration and control of the Foreign Office, and some inconvenience has been caused by the duality of direction thus involved. With a view to the solution of these difficulties, a committee was appointed last January by the Secretary of State for Foreign Affairs and the President of the Board of Trade, consisting of Lord Faringdon as chairman, Mr. Dudley Docker, president of the Federation of British Industries, Mr. Pennefather, M.P., representing the Association of Chambers of Commerce of the United Kingdom, Sir William Clark, of the Board of Trade, and Mr. Wellesley, of the Foreign Office. The committee, however, failed to come to a unanimous agreement. Their reports are appended to this memorandum.

There were, in effect, two main questions submitted to the Committee. The first was whether the Foreign Office or the Board of Trade should control the commercial intelligence service abroad, which is supplied by the commercial attachés. Upon the first point all the members of the Committee were in substantial agreement that the control of the commercial attachés should be left to the Foreign Office, acting in close consultation with the Board of Trade as regards instructions and appointments, and that both this service and the consular service should be enlarged and improved. In order that the latter recommendation may be carried into effect with the least possible delay, a committee on which the Treasury and the Board of Trade are represented, together with representatives of the Association of Chambers of Commerce and Federation of British Industries, has been appointed by the Foreign Office to consider what changes are desirable in the allocation of posts and rates of pay of the commercial attachés and consular services, and has already made considerable progress. If the Treasury approve of the arrangements recommended, a second committee will immediately proceed to select the personnel necessary.

The second question was whether the work of collating and distributing commercial intelligence from foreign countries among the commercial community in this country should continue to be performed by the Department of Commercial Intelligence of the Board of Trade or should be dealt with by a department to be created at the Foreign Office. Upon the second point the committee were not in agreement. The chairman and the representative of the Board of Trade were in favour of the former course, while the majority of the committee favoured the work being done by the Foreign Office.

The whole question has been further considered by the two departments concerned in the light of these reports, and the scheme which is set forth below has been worked out in agreement between the President of the Board of Trade and the Secretary of State for Foreign Affairs, and has been sanctioned by the War Cabinet.

An enlarged Commercial Intelligence Department will be created on a scale adequate to meet the reasonable requirements of British trade after the war. Parliamentary control over the department will be exercised through a new Parliamentary Secretary, who will occupy the position both of Additional Parliamentary Secretary at the Board of Trade, and also of Additional Parliamentary Under-Secretary for Foreign Affairs. This Parliamentary Secretary will be responsible to the President of the Board of Trade for all matters within the competence of that department, and responsible to the Secretary of State for Foreign Affairs for all matters concerning the Foreign Office. By matters concerning the Foreign Office is meant all questions concerning the direction and organisation of the commercial attaché and consular services and the commercial work of officers of these services, and of the

it will give directions to the overseas services and make the necessary arrangements for keeping them in close touch with the commercial classes in this country.

There will be a constant interchange of staff between the department and both the Foreign Office and the Board of Trade, so that members of those departments may be thoroughly acquainted with the work. Opportunity will be given to diplomats and consuls in training to serve for a period in the department. It will also draw personnel from the commercial attaché and consular services, and from men of outside business experience. In the same way officers of the

trade commissioner service will be trained in the department and will be attached to it from time to time.

The department will be assisted by an advisory committee of business men, and it is hoped that it will be possible to arrange for a sub-committee of this committee to meet at frequent intervals in order to advise the department on its current work.

It is believed that these proposals afford a satisfactory solution of a problem which for some years past has been urged on the attention of H.M. Government by the commercial and industrial community. Their criticisms have been especially directed against the quality of the existing system under which, while the direction of the commercial attaché and consular service rests with the Foreign Office, the utilisation of the fruits of their commercial work lies with the Board of Trade. Under the new scheme the direction of the commercial work of the foreign services and the distribution of the intelligence collected by them will be dealt with by a single department, and as the same department will also direct the trade commissioner service within the Empire, uniformity of policy will be secured in respect of overseas trade as a whole.

Trading with the Enemy Regulations.—The Controller of the Foreign Trade Department has published a new list of additions to the statutory list of firms of enemy nationality or enemy association with whom persons in the United Kingdom are forbidden to trade. Copies of this list can be obtained at a trifling cost from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C.

New South Wales Coal Mines Commandeered.—Owing to the strike of miners in the State, the Government has commandeered all coal mines by Proclamation, and has called for volunteers to work the mines. The Proclamation guarantees that only mines which are perfectly safe will be opened, and that work will be carried out under the direction of experts; also that protection and accommodation will be provided, and award rates paid. Arrangements are already completed to work six collieries, and volunteer labour is being offered freely. Crews have been secured for colliers chartered by the Government, and regular supplies of coal have been commandeered.

AUTOMATIC SAFETY MINE CAR CAGER.*

By N. L. HARMON.

The automatic safety mine car cager illustrated in the accompanying sketches is built on 11 or 16 in. rails, and all parts are beneath the surface, with the exception of the horns on the outside of the rail. These are provided with buffer springs to absorb the shock and prevent damage to wheels, axles, and cars. The cager is located at the shaft bottom directly in front of the sump. The operation depends upon gravity and the action of the cage. As the cage descends, it depresses the lever attached to the rocker shaft, which causes the shaft to rotate, thus opening the forward pair of horns and closing the rear pair, at the same time raising the weight. Thus, with a trip of cars standing against the forward horns of the cage, the cage as it lands at the bottom opens the front horns and closes the rear horns, holding the trip in check and permitting the front car to pass on to the cage, where the automatic stop spots and holds the car in position. As the cage rises, its weight is taken off the lever, and the weight no longer supported, falls, closing the front horns and opening the rear horns, permitting the whole trip to advance one car length.

Three different styles of automatic stops are employed, so that it is possible to adapt them to any type of cage. They are independent of the cager, but

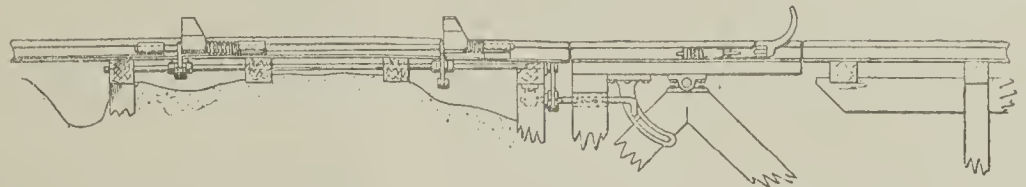


FIG. 2.—AUTOMATIC FEED ARRANGEMENT AT MINE TIPPLE.

form an important part of the working system, and with the cager form a complete machine. In one style of stop, the landing of the cage opens the blocks on the cage, releasing the empty car. The loaded car entering the cage displaces the empty car, which thereby places the automatic stop in the correct position to take proper care of the loaded car.

Two machines enable the cars to be caged with great rapidity, thus increasing the output. The Superior Coal Company, of Gillespie, Illinois, hoisted 5,502 tons in eight hours, using 1,556 mine cars. The American Coal Mining Company, of Bicknell, Indiana, hoisted

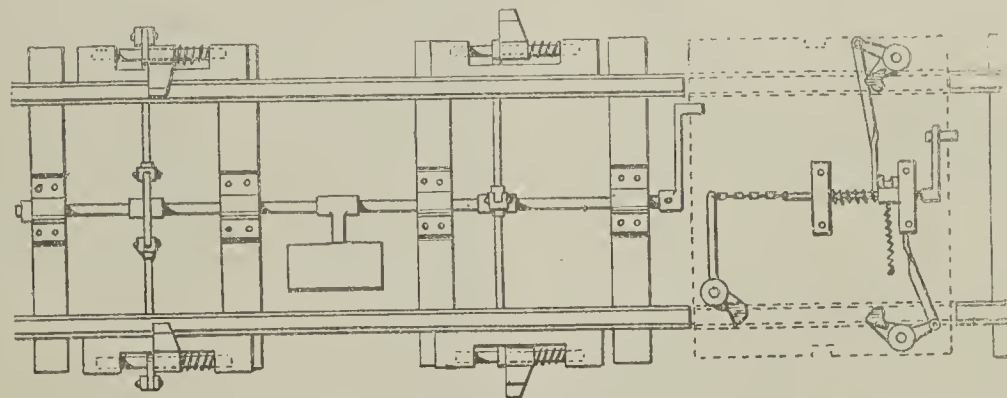


FIG. 3.—PLAN OF AUTOMATIC FEED AT SHAFT.

5,048 tons in eight hours, as compared with the previous average daily record of 4,595 tons. It hoisted as many as 18 cars in five minutes, lifting them 564 ft.

These machines reduce operating expenses by requiring fewer men at the landing, prevent expensive delays caused by cars getting into the sump, and keep men away from the shaft and so protect them from the dangers attendant on the falling of coal.

The grade required is about 4 per cent. for the length of the machine, and, beyond that, just enough so that the cars will move by their own weight. The surface bend in the rails, fig. 1, is a clever feature, providing the required grade where needed. The front wheels stand just over the knuckle, ensuring the instant and rapid travel of the car as soon as it is released.

The machines can be installed and used with success in any shaft mine where the grade is about as stated. They are made in three different weights to suit the requirements of different mines.

The automatic mine car feeders, figs. 2 and 3, are used with equal advantage at tipples. The feeder is here actuated by the dump. It may be installed either in front of the scales or between the scales and the dump. In case a cross-over dump is not used, the feeder may be actuated by a hand lever, which is always under the control of the dumper.

The Clinchfield Coal Corporation, of Dante, Virginia, is handling at the present time an enormous trip of heavy cars back of the feeder.

The time required to instal an automatic cager is short, and need not interfere with the operation of the mine for any length of time. Many have been installed where the mine was idle but one working day. The Mining Safety Device Company, of Bowerstown, Ohio, manufactures these automatic cagers and feeders.

* Coal Age.

Coaling Facilities at Cape Town.—In his report for 1916 on the Railways and Harbours of South Africa, the general manager comments upon the increase in the number of vessels bunkering at Cape Town, and states that the port continues to attract vessels in large numbers for bunkering purposes, consideration will have to be given to the provision of mechanical coaling appliances there. Existing arrangements are primitive and expensive, but with proper equipment the cost of bunkering at Cape Town could be cheapened and brought within a more reasonable margin of the charges at Durban.

WELFARE SUPERVISORS.

The Ashley Committee has issued a report on the selection and training of Welfare Supervisors in Factories and Workshops, in which it expresses the view that a large part of the general social study already in existence at the University of London (Faculty of Economics) and in the social study schools connected with the universities of Birmingham, Bristol, Glasgow, Leeds and Liverpool, and in contemplation at the universities of Manchester, Sheffield, Edinburgh, Belfast and elsewhere, should be included as an obligatory part of any training course for Welfare workers, and that it is not desirable, now that the emergency demand for Welfare supervisors has been satisfied, to establish special short courses for such workers, limited to what are deemed to be the particular requirements of their future duties and unconnected with any more general intellectual and practical preparation. The better plan is to arrange programmes of study and training which should include both general elements (i.e., elements desirable in the training of all who propose to enter upon social work of any kind) and special elements (i.e., elements desirable in the training for particular kinds of work—e.g., factory supervision). The method of combining the two elements in one programme would depend somewhat on local facilities. Some part of the special work might be advantageously spread over the whole course of study; on the other hand, it would probably be well to postpone a large part of the special work to the last few months.

But whatever may be the most satisfactory grouping of the several courses of lectures and opportunities for practical experience within the course, the Committee desire to lay stress on the great value of the more general elements. Candidates for Welfare positions require a general as well as a special social training, for many reasons. Most of them need a general mental discipline. They need to acquire or strengthen the power of continuous thought, the sense of cause and effect, the ability to distinguish essentials from non-essentials. The value of such mental qualities in Welfare work, as in all other careers, must be evident. Further, they will be all the better for a general training, because their duties are not likely to be of permanent interest or performed with zest, unless they have some idea of the place of their particular task in industrial and social life in general. Even their immediate duties will be the better discharged if they are acquainted with other existing social agencies and with the machinery of central and local government, which directly touches the lives of the people, and if also, in the intimacy of student life during the course of training, they have learnt something of the interests and points of view of other social workers.

Lastly, it is essential to the future progress of Welfare work that the Welfare worker should be capable of dealing in a broad and enlightened spirit with a number of complex subjects. Experience has shown that the employer in many cases looks to the Welfare supervisor for assistance, among other problems in the selection of suitable workers, in questions of, technical education, in the question of the relation of fatigue to efficiency, and in questions of labour organisation. The Welfare worker who is to do his or her duty satisfactorily requires a thorough preliminary groundwork of social knowledge such as is given in the university social study courses. A short intensive course in Welfare work might enable the student to master the actual technique of Welfare work, but would fail to give such an all-round training as would qualify the student for the increased responsibility which is likely to fall upon the Welfare supervisor as the work develops. At the same time, the Committee is fully conscious that there is a considerable amount of specialised knowledge which is indispensable for the Welfare supervisor, and the following suggestions are put forward with the object of adapting the existing general social study courses to the special needs of Welfare supervisors.

Course of Training Suggested.

The suggested course of training falls in three main divisions, namely: Lectures and class teaching; visits of observation; practical work.

Lectures and Class Teaching.—In the opinion of the Committee a considerable part of the already existing subjects of instruction given in social study courses should form an essential part of the training of a Welfare supervisor, such as industrial history, with special reference to the last 150 years; outlines of social economics and of local government; and modern institutions, such as trade unionism, the co-operative movement, profit sharing, conciliation and arbitration, employment exchanges, etc., and the elements of social philosophy or social psychology or social theory. Lectures upon problems of childhood and adolescence (including the work of care committees, after-care committees, juvenile advisory committees, and work among juvenile offenders and mentally defective children), should also be of value to the Welfare supervisor. The study both of sanitation and hygiene and of industrial law is already included in the existing social training courses, but these would have to be considerably expanded on lines suggested in a draft scheme submitted by the Welfare department of the Ministry of Munitions, to meet the special needs of Welfare supervisors. Under sanitation and hygiene more attention should be paid to problems of personal health, industrial diseases and venereal disease. Every Welfare worker should be given an adequate grounding in matters of health by a qualified expert. Industrial law, including some knowledge of factory legislation, of the Trade Boards Act, the National Insurance Act, the Workmen's Compensation Act, the Truck Acts, etc., would have to be dealt with at greater length to suit the special needs of the Welfare supervisor.

Subjects, suggested as necessary for the training of the Welfare supervisor, should be included in the training of a factory and the training of Welfare supervisors.

Visits of Observation.—Special visits of observation to the general organisation of the factory, and to the relations of managers and foremen, the

principal types of production and the methods of remuneration (including time work, piece work, bonus systems, etc.), record keeping; and also to the relation of factory organisation to problems of apprenticeship and continuation school education. In view of forthcoming legislation, special attention should be paid to educational problems in relation to the factory.

The Special Duties of Welfare Supervisors.—The teaching should be given by persons with knowledge of Welfare work in practice, including always some who are actually engaged upon the work. The teaching should cover, besides the obvious duties of a Welfare supervisor, such subjects as canteen management, recreation and housing facilities.

Visits of Observation.—In connection with university social study courses, visits of observation are also organised with the object of securing that the student has more than a text-book acquaintance with such agencies in social life as:—Municipal government, especially with regard to public health, housing, education, etc.; the administration of justice in police courts, children's courts, etc.; the conditions of factory life and the administration of industrial law, etc.; school life, elementary, continuation, technical and secondary; the administration of the poor law; the work done by hospitals, convalescent homes, sanatoria, and the operation of the Insurance Acts; employment exchanges and unemployment insurance. These visits are supplementary to and explanatory of the lectures, and will be of value to the future Welfare supervisor, as affording a living realisation of the various social agencies in any large town.

Practical Work.—This may be divided into two sections; the first of which aims at giving the student an acquaintance with normal working-class life. This object can only be achieved by the active co-operation of working men and women and by the opportunities afforded by them for the student to be present at meetings and discussions of such bodies as the Workers' Educational Association, the adult school, and the Women's Co-operative Guild. For younger students, provident and rent collecting has been found of service. The majority of students take part in the work of boys' and girls' clubs, or boy scouts and girl guides, and in this work they should have sufficient responsibility given them to enable them to control sections of boys' or girls' clubs, and to handle numbers of children in a play centre. The second section includes a training in administration in connection with such social agencies as Citizens' Committees, Guilds of Help, Councils of Social Welfare, the Charity Organisation Society, Care and After Care Committees, and Juvenile Advisory Committees, as well as with Day Nurseries and Infant Welfare Centres. The aim is to give the student not only practical experience of office and committee work and routine, but also a first-hand acquaintance with problems of relief, sickness and unemployment.

Part of such experience will be as helpful for future Welfare supervisors as for other social students, but more special training should be added. To obtain a post in Welfare work it is in most cases necessary to have a "first aid" certificate, and this requirement should be borne in mind by those responsible for planning such courses. Students should also have some practical experience such as might be gained in working with a trained nurse or in an out-patients' department or dispensary. Visits should be arranged to factories in which Welfare work is carried out, as well as canteens; and students should, where possible, work under a Welfare supervisor in order to gain an inner acquaintance with the problems. They should also, where possible, gain some actual experience of life as wage-earners in a factory, in many cases by getting employment for a short time either before or after their training.

Length of Training.

The period of training should be at least one full academic year (October to July), partly devoted to such portions of the general social study course as have been stated above to be necessary and the rest to the specialised training. This applies to graduates of universities or people of a mature age, and already equipped with a considerable previous experience of social work. Younger people, or those without academic training or practical experience, could hardly obtain the certificate or diploma under two years, and this period should be required in such cases.

It is recommended that bursaries or scholarships should be provided for the maintenance and for the payment of the fees of those who are unable to bear the cost. It is of importance that welfare supervisors should not be drawn exclusively from one class, and that opportunity should be given to those already working in factories to qualify themselves for this work. The Government might place at the disposal of the various universities concerned a sum of money to enable them to provide bursaries for such students.

Co-operation of Employers and Workpeople in Connection with Training for Welfare Work.

Special advisory committees—either sub-committees of existing advisory committees or independent bodies—might with advantage be set up in connection with the training for Welfare supervision, containing additional representatives of employers and workpeople.

The Canal Control Committee, in a letter to municipalities, emphasise the importance of making the greatest possible use of canals for transport.

The supplement to the *Board of Trade Journal* of September 6 contains complete lists of articles which, according to the latest information received by the Board of Trade, are prohibited to be exported from Norway, Portugal, Russia, Spain, Sweden, and Switzerland. The supplement also contains a reprint of the United Kingdom contraband list in its present form. Copies may be obtained at a cost of 3d. (3½d. post free) either from any bookseller, or from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2.

DUTIES OF COAL OVERSEERS.

The duties of local authorities in connection with the administration of the Household Coal Distribution Order, 1917, are explained in a report which Mr. Leslie Gordon (town clerk) has presented to the Hammersmith Borough Council.

Chief Duties of Local Authority.—To appoint a representative as coal overseer; open local office to deal with questions arising out of the Order; give public notice of overseer and office; provide, with the consent of Coal Controller, reserve stocks of coal; check requisitions for over 2 cwt. of coal, and license coal retainers other than registered coal merchants.

Chief Duties of Local Coal Overseer.—Report to Controller upon requirements for storing, handling and retailing coal, and submit recommendations for improvement, including establishment of reserve stocks by local authority; make record of auxiliary means of storing, handling, &c., of coal; provide for safe custody of reserve stocks provided by local authority and use such stocks for supply in quantities not exceeding 2 cwt., as required by Coal Controller or coal merchants' supervisor; take steps to secure proper supply of coal to licensed retailers; report as to storage and delivery of coal to flats or tenements which contain 25 separate occupiers; deal with complaints from consumers or licensed coal retailers (the complainant may appeal to Coal Controller); co-operate with coal merchants' supervisor, particularly in dealing with failure to deliver coal in any particular street or locality and the direction to a registered coal merchant or licensed retailer to carry out deliveries; certify corrections in requisitions for coal and notify merchant and consumer; with aid of local authority, prevent requisitions being placed with more than one merchant; arrange, where necessary, with coal merchants' supervisor for transfer of requisitions to another merchant; arrange, where necessary, for cancellation of old and substitution of new requisition, particularly in cases of removal within the district, which must be notified; deal with failure on part of merchant to execute an order within a reasonable time, and issue directions and instructions to licensed coal retailers with regard to delivery of coal within certain streets or localities.

In connection with certain points raised by the Borough Council, the Coal Controller has informed them that as large a supply of coal as possible is being brought into London, and that it is now provided under the Order that reserve stocks of coal shall be established by the coal merchants by a given date; that the provision of a stock of coal in London during the month of April shall not be lost sight of, but it is not proposed to extend the winter allowance until the end of April; the price of coal will be fixed, and it will be an offence for carmen to require a higher price for coal than the fixed price to any consumer. It may later be necessary to add a definite higher charge in respect of coal to be delivered to upper floors; the Controller has arranged with the Director of Recruiting that, as far as possible, all men still remaining in the London coal trade shall be exempt from military service; the Controller considers that for effective executive action it is essential that the duties placed on the local authority by the Order should be executed by some definite official who will, of course, be subject to the direction of any committee the council might set up, provided such supervision did not conflict with the discharge of his duties under the Order and in accordance with the directions of the Coal Controller.

With regard to the administration of the Order in the borough the town clerk has reported upon the desirability, in order to avoid duplication of staff and work, of the administration of the Coal Order being carried out in close contact with the organisation required for carrying out the Food Controller's orders, and has expressed the opinion that the registers required in connection with the Coal Order and the work of the Food Committee should be closely connected with the existing National Register. The General Purposes Committee has accordingly instructed the town clerk to arrange for a section of the large hall to be used as the local coal office under the Order. It is proposed that the council itself shall act as the local coal overseer. All communications relating to coal will be addressed to the town clerk and dealt with by him or through the various departments of the council as circumstances require. An emergency scheme, to come into force automatically in the borough upon there being a shortage of coal, is being drafted, and it is proposed that each member of the council shall undertake to investigate complaints of shortage or non-delivery in his own particular ward and send reports upon his investigations to the town hall. By this means a reliable organisation would be at the disposal of the council, which would effectively deal with an emergency position from time to time.

THE INSTITUTE OF METALS.

The annual autumn meeting of the Institute of Metals will be held on Wednesday, September 19, in the rooms of the Chemical Society, Burlington House, Piccadilly, W. 1, at 4 p.m. The papers to be read include: "Further Notes on a High-Temperature Thermostat," by Messrs. J. L. Houghton, M.Sc., and D. Hanson, M.Sc.; "Principles and Methods of a New System of Gas Firing," by Mr. A. C. Ionides; and "Fuel Economy Possibilities in Brass Melting Furnaces," by Mr. L. C. Harvey. In connection with Mr. Ionides' paper, a demonstration of a new system of furnace heating will be given. Invitations to be present at the meeting can be obtained by non-members of the Institute of Metals on application being made to Mr. G. Shaw Scott, M.Sc., secretary and editor, 36, Victoria-street, S.W. 1. So great is the present interest in metallurgical matters that the membership of the institute has increased, we are informed, since January 1 last by over 30 per cent.

INTERCONNECTION OF ELECTRICITY SUPPLY SYSTEMS IN LANCASHIRE AND CHESHIRE.

An interim report, presented by the Committee for the Interconnection of the Lancashire and Cheshire Electricity Supply Systems in September 1916 to the supply authorities and the Board of Trade, formed the basis of the conference held in the Council Chamber of the Town Hall, Manchester, on March 2, 1917, which was presided over by Mr. G. H. Roberts, M.P., Parliamentary Secretary to the Board of Trade. That conference revealed a striking degree of unanimity with the principles set out in the interim report, and as a result of the invitation extended by Mr. Roberts to the conference, the Committee has worked out the essential details of a scheme, which are embodied in the second report, a copy of which has now reached us.

The proposal now put forward is that a Joint Board representing the local authority and company interests should be established. The local authorities are to be represented on the board in proportion to population, and the companies on a basis of capital outlay. Recognising the disadvantages that would accrue from too large an administrative body, the Committee proposes that the Joint Board should be divided into district boards, the members of which should be those representing the undertakings corresponding to certain groups.

Group A is to consist of Eccles, Manchester, Middleton, Salford, Stretford, Swinton, and Pendlebury, and the Trafford Power Company. The combined populations amount to 1,090,000 persons, and the representatives of the board would total 23. Group B is to be made up of Atherton, Bolton, Bury, Farnworth, Heywood, Hindley, Leigh, Littleboro', Radcliffe, Rochdale, Turton, Wigan, the Lancashire Electric Power Company, and the South Lancashire Tramways Company. The populations are a total of 612,000, and the group would have 33 representatives. Group C is to include Ashton, Oldham, Stalybridge, Stockport, and the Glossop Electric Supply Company. In this case the total population affected is 414,000, and there would be 14 representatives. Finally, group D comprises Accrington, Bacup, Blackburn, Burnley, Colne, Darwen, Haslingden, Nelson and Rawtenstall, with their populations totalling 463,000. It would have 20 representatives.

Each district board is to elect a chairman from amongst its own members, and the engineer of each undertaking is to be entitled to attend the meetings of the respective district boards.

A central executive of 20 members is to be elected from the district boards on the following basis:—

	Population.	Representatives.
Group A	1,090,000	23
" B	612,000	33
" C	414,000	14
" D	463,000	20
Lancashire Elec. Power Co.*	—	2

*This is in addition to this company's representation on District Group B, which may carry with it a seat on the central executive.

The central executive is to elect a chairman from amongst its own members.

The Powers of the Proposed Joint Board.

It is suggested that the Joint Board should be empowered amongst other things:—(1) To co-ordinate and prescribe the running hours of the existing generating stations in such a way as to yield the most economical operating conditions. (2) To determine the basis of charges to be made between the various authorities constituting the Joint Board for bulk supplies, standby supplies and reciprocal supplies. (3) To allocate all charges against revenue account arising out of the expenditure of moneys on linking-up mains, transformers, and such other works as may be required for inter-connecting purposes. (4) To act in an advisory capacity as regards all proposals for future extensions of generating plant and linking-up mains, transformers, and such other works as may be required for inter-connecting purposes that may be put forward from time to time by one or other of the several authorities direct to the proper Government tribunal. (5) To empower the Joint Board to make working arrangements between the power companies and the local authorities, and between one local authority and another, for the use of the existing mains, and with reference to the laying of new linking-up mains within the areas of the several undertakings participating in the joint scheme of operation, and in such other areas as it may be found necessary to lay linking-up mains. (6) To invest the authorities constituting the Joint Board with compulsory powers to obtain wayleaves for electric mains and overhead lines; to lay mains in undedicated streets; to erect overhead lines crossing public roads; to make regulations regarding all technical matters affecting linking-up mains, transformers, and such other works as may be required for inter-connecting purposes in order to secure uniformity and reliability of supply, &c. The authorities constituting the joint board are, further, to be empowered to enter into agreements with any authority, company, or person for bulk supplies, standby supplies, or reciprocal supplies. The committee does not propose to invest the joint board with any financial powers to raise capital from time to time. In this respect the present proposals differ from those set forth in the interim report, which contemplated the raising of capital for purely interconnecting works, e.g., linking-up mains and transformers, &c. On further consideration the Committee has come to the conclusion that under existing conditions there are no material advantages to be gained in relieving each undertaking of its statutory obligation to raise the necessary capital for interconnecting mains extensions within its own area, provided always that the report is initiated or approved by the Joint Board, the important point being the correct allocation of this expenditure between participating authorities.

The report then proceeds to discuss the following matters:—"The Basis for Determining the Charges for Electricity Supplies," and "The Basis for Allocating

the Capital Charges on Interconnecting Mains, Transformers and Switchgear against the Revenue Accounts of the Participating Authorities." It then makes various miscellaneous provisions, among which we notice the following:—"The Committee cannot refrain, however, from giving expression to the opinion that the practice of making profits for the purpose of handing over substantial grants in aid of local rates is detrimental to the interests of an adequate and economical supply of electricity, particularly for industrial purposes." On the other hand, it lays stress on the necessity of making adequate provision for depreciation and obsolescence of plant.

The Committee's principal recommendations on interconnection are as follow:—(a) As a preliminary step it is essential that a scheme of interconnecting the power stations of certain of the existing electrical undertakings in Lancashire and Cheshire should be at once proceeded with; (b) that the proper authority to control this movement would be a local joint board, on which local authority and company interests are represented in the manner set forth in the foregoing report; (c) that the existing rights of all electrical undertakings as distributors should be observed within their statutory areas; (d) any undertaking adversely affected financially by reason of the co-ordination of the inter-connected power stations should be reimbursed by the participating authorities. The report also deals with "The Conferment of Additional Powers upon the Joint Board as regards the Establishment and Control of all Future and Existing Power Stations and High-Pressure Transmission Lines"; and "The Relation of the Joint Board to the Existing Government Departments, or to any New Electricity Tribunal that may hereafter be set up"; but does not come to a unanimous decision on these matters.

LETTERS TO THE EDITORS.

The Editors are not responsible either for the statements made, or the opinions expressed by correspondents.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

As replies to questions are only given by way of published answers to correspondents, and not by letter, stamped addressed envelopes are not required to be sent.

THE DISCOVERY OF OIL AT RIDDINGS COLLIERY.

SIRS,—As mentioned in the *Colliery Guardian* of August 24 and 31, the oil was discovered 70 years ago, and in two years ran dry (and since then no evidence of oil has been met with in the district). Within the past 40 years, oil and water have been pumped from in-bye workings into the shaft sump, lifted to the surface, and run into a settling tank, from which the water was drained, the oil being then run into barrels. After the abandonment of pumping, oil was got by skimming directly from the surface of the standing water in the pit, the writer having been the last person to fill oil in this manner previous to the closing down of the mine, about the year 1888. There is not the slightest doubt but that oil would be found in the abandoned mine at the present day, though not in payable quantity for keeping open.

This was at the New Deeps pit (probably 1 mile distant from the Old Deeps pit), the workings of which were connected.

September 1, 1917.

United States Coal Output in 1916.—A statement just issued by the United States Geological Survey of the production of coal last year, shows that there was a considerable increase as compared with 1915. The total output was 590,098,200 net tons, as against 581,619,500 net tons, an advance of 8,478,700 tons, or over 11 per cent. All the producing States registered a larger yield, with the exception of Nevada, Iowa, New Mexico, Oklahoma, South Dakota, and Texas, but in none of these was the decline serious. The anthracite output of Pennsylvania also recorded a decrease. Of the total production, 502,519,700 tons, as compared with 442,624,400 tons, was bituminous, and 87,578,500 tons, as against 88,995,100 tons, was anthracite. The following States produced over 5,000,000 tons, the figures for 1915 being added for purposes of comparison (net tons in each case):—Alabama, 18,086,197 (14,927,937); Colorado, 10,484,237 (8,624,980); Illinois, 66,195,336 (58,829,576); Indiana, 20,093,528 (17,006,152); Iowa, 7,260,800 (7,614,143); Kansas, 6,881,455 (6,824,474); Kentucky, 25,393,997 (21,361,674); Ohio, 34,728,219 (22,434,691); Pennsylvania (bituminous), 170,295,424 (157,955,137); Pennsylvania (anthracite), 87,578,493 (88,995,061); Tennessee, 6,137,449 (5,730,361); Virginia, 9,707,474 (8,122,596); West Virginia, 86,460,127 (77,184,069); Wyoming, 7,910,647 (6,554,028). The number of miners employed in 1916 was 721,000, and the average number of days worked was 235; in 1915 the number of men engaged was 734,000, and the average number of days worked was 209. From figures compiled by the Geological Survey, it appears that the railroads consumed about 25 per cent. of the total output, represented by 136,000,000 tons of bituminous and 6,735,000 tons of anthracite. In addition, they used 23,000 tons of coke. The proportion was about the same as in 1915. The increase in the quantity of bituminous coal used in 1916 was 14,000,000 tons, which was 11.5 per cent. more than in 1915. The increase in the consumption of anthracite was but 535,000 tons, or 8.5 per cent. There was an increase in railroad consumption of nearly 4,000,000 tons of coal from Illinois, about 2,800,000 tons from Ohio, and of 4,800,000 tons from West Virginia. The quantity of coal from Pennsylvania used by the railroads decreased nearly 3,000,000 tons. The quantity of bituminous coal used by the railroads in the eastern district increased from 56,500,000 tons to 62,700,000 tons, or 11 per cent. The increase in the southern district was from 22,000,000 tons to 23,300,000 tons, or 5.1 per cent., and in the western district from 43,500,000 to 50,000,000 tons, or 15 per cent. The total quantity of bituminous coal used was about 27 per cent. of the total production, as against 28 per cent. in 1915. The Pennsylvania anthracite used by the railroads in 1916 was 7.7 per cent. of the total anthracite output.

THE REFRACTORY PROPERTIES OF SILICA BRICKS.

By H. H. LE CHATELIER and B. BOGERT.

The use of silica bricks in the construction of furnaces has enabled firing by the Siemens' system of regenerated heat to be widely employed. Furnace arches of clay bricks could not support such high temperatures, and would soon collapse. Up to the present, however, no satisfactory explanation of this superiority of silica over clay has been forthcoming; but the authors' recent experiments on the refractory properties of clay foreshadow the elucidation of the problem.

Clay bricks begin to soften between 1,300 degs. and 1,400 degs. Cent., and, therefore, cannot stand any higher temperature without giving way progressively. The higher the temperature the more quickly do they soften, behaving like vitreous material, and having no well-defined point of fusion—simply a wide range of fusibility. The assumed fusing point of pure kaolinite—viz., 1,780 degs. Cent.—is identical with that of quartz, and being determined in the same way by Seger cones, corresponds in reality to the rapid weakening of the matter, under a load equal to the weight of the test-piece itself—that is to say, of 10 kilogs. per sq. cm. The collapse of kaolin occurs with the same velocity, but at 400 degs. lower.

In explaining the divergent behaviour of clay and silica, it might be assumed that the latter fuses at a definite point without previously softening, and therefore independently of the pressure. The authors' experiments fully confirm this idea. When a small cylinder of clay is subjected to a crushing stress at about 1,500 degs. Cent. it first spreads in the shape of a barrel, and then flattens out like a cake with rounded edges, without showing any sign of fracture. After cooling, the mass retains all its primary hardness. On the other hand, with silica, the first application of pressure produces no appreciable effect, but, as the pressure is gradually increasing, the test-piece breaks abruptly, exhibiting cones of fracture such as are found in compression tests of all hard materials, and the fragments do not renite in cooling. The force required to produce this fracture decreases with the rise of temperature.

The following table is a summary of the results of the experiments on a good silica brick of American make ("Star" brand). The resistances to crushing are expressed in kilogrammes per square centimetre:—

TABLE I.

Temperature. Degr. Cent.	Resistance. Kilogs.	Temperature. Degr. Cent.	Resistance. Kilogs.
15	170	1,200	85
520	158	1,320	62
670	150	1,460	50
800	139	1,540	37
950	125	1,600	30
1,050	120		

These figures correspond to a crushing strength of 12 kilos at 1,700 degs. Cent. (the ordinary temperature of steel furnaces), and are equal to nearly 10 times the stress the bricks have to support in the furnace arch, therefore the stability of the arch is assured.

This mechanical resistance, maintained up to high temperatures, is a peculiar feature of silica bricks. It is absent not only in clay bricks, but also in magnesia bricks, the essential constituent, of which magnesia is still less fusible than silica.

These differences can be accounted for as follow: Both bricks contain basic oxides foreign to the principal refractory matter. These oxides—alumina, lime, iron oxide, alkalis, &c.—give rise, in every case, to fusible compounds which liquify at about 1,200 degs. Cent. In the case of magnesia, the solid gains float in the molten magma and easily slip over each other, like those of wet sand. Silica, on the contrary, at least in well-baked bricks, forms a continuous network, in the pores of which the molten mass lodges in the same way that water does in the pores of pumice stone, without diminishing its mechanical resistance. The formation of this network—a result of the recrystallisation of the silica—is due to the divergent solubilities of the different allotropic varieties of silica. Quartz, unstable at a high temperature, dissolves in the molten magma and recrystallises, first in the form of chrysotolite and then as tridymite. This recrystallisation of silica and the subsequent formation of the indeformable network require thorough baking at a particular temperature. Bricks insufficiently baked, and with the network yet unformed, are composed of grains of quartz floating in the molten mass; they are plastic like clay or magnesia bricks. It is well known in practice that unbaked bricks are fusible and useless.

When a good silica brick is heated, its resistance, however, diminishes with the rise in temperature, inasmuch as the solubility of the silica increases with the temperature and a progressive dissolution of the crystalline network ensues which tends to disaggregate it and even destroy it completely. This effect will be the more gradual according as the network is better developed, a condition on which, above everything else, the quality of silica bricks depend. To study the factors producing the rigidity of the network is therefore of great importance; and the present researches were made with the object of shedding light on the subject. The chief factors to be considered are:—The proportion of the fluxes; the actual temperature of the brick (in baking); the proper formation of the network; and the disaggregation of the network by subsequent expansion.

Proportion of Oxide Fluxes.—The authors analysed bricks which had given complete satisfaction in use. The results, shown in table II., give the percentage of the basic oxides, and the total weight of the sulphates obtained by the action of hydro-fluoric acid followed by evaporation to dryness after the addition of hydro-fluoric acid.

TABLE II.

Brick.	Al ² O ³ .	Fe ² O ³ .	CaO.	MgO.	Total.
Star	0.94	0.15	1.79	0.50	3.38
Assailly	2.72	1.30	0.20	0.25	4.47
G. I.	1.02	0.60	1.48	0.00	3.10

* Paper presented to the Académie des Sciences, Paris.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Miners and Merthyr New Technical Scheme—Liability for Colliery Subsidence to be Tested in Court—Arranging House Coal Supplies—Miners' Opposition to Income Tax: Threat of Non-Payment—Coal Resources of Abertillery Area.

The gift which Mr. Seymour Berry, director of several South Wales colliery companies, has made to Merthyr is being substantially endorsed in the locality. Mr. Berry gave £10,000 for establishing a technical institute which will include mining instruction for the borough of Merthyr, and the Merthyr Trades and Labour Council have now decided that a minimum sum of £3,000 shall be raised in order to further Mr. Berry's scheme by providing scholarships, etc.

The question of liability in respect of subsidences at Abertillery was advanced a further step by a meeting of leaseholders and other ratepayers held at the Institute, the intention being to promote a test case as to the responsibility for damage to property in the district. A scheme had been prepared for contributions to the fund which is to be raised, this being based on the ratable value of different properties. It was stated in the meeting that a register of leaseholders had been prepared, showing 1,644 persons, the property having ratable value of £50,935, but it was assumed that one-fourth of the possible amount of contributions could not be obtained. The scheme was drafted upon this assumption, and also upon a further assumption that it would not do to impose contributions strictly upon ratable value, otherwise some of the larger owners would refuse on account of the large sums asked from them. It had therefore been decided to recommend a minimum contribution of 5s. in the £; properties having ratable value from £1 to £20, 6d. in the £; £20 to £50, 5d.; £50 to £100, 4d.; £100 and over, 3d. It is estimated that the amount collected will reach £900.

Intimation has been made by Mr. Finlay Gibson, secretary of the South Wales Coal and Coke Supplies Committee, that after September 8 those merchants and consumers obtaining supplies of coal from collieries in South Wales and Monmouthshire will be advised as to particular collieries from which they will be supplied in substitution for coals hitherto imported from prohibited areas. Mr. Gibson points out that his committee is merely a district official authority instructed to give effect to the provisions of the transport re-organisation scheme under the direction of the Controller, and it is in that capacity, and in that capacity alone, he has acted in acquiring information concerning sales affected by the Order; in obtaining substitute coals; and in issuing the allocation certificates which have been received by colliery companies, factors, etc., during the past few days. The surplus coals in South Wales are only steam and for manufacturing, and there is an actual shortage of house coals to meet the requirements of consumers. Therefore it will be impossible for the committee to arrange supply of house coal to the other counties. But the colliery companies have been requested to supply, as substitutes, coals of bituminous nature approximating as nearly as possible to those used for household purposes.

At a meeting of the Llanely Domestic Coal Supply Committee, protest was made against the Controller having consulted coal merchants in the first instance. It was stated in the course of the meeting that a suggestion had been made for the local authorities to stock about 300 tons of coal, not to trade with, but as a supply in case of need; but this suggestion had been dropped. In the course of the proceedings it was further announced that the price of coal would be 10s. per ton additional to the price of 1913 and 1914.

Capt. T. S. Richards, who is the son of Mr. T. Richards, M.P., secretary of the Federation, has been awarded the Military Cross for gallantry on the field. He led the Rhondda miners over the Pilmem Ridge a month ago, when the Kaiser's "Cockchafers" were badly beaten, and some hundreds of prisoners taken. Before enlistment, Capt. Richards was in the service of the Ebbw Vale Company. He has two brothers also in the Army.

Remarkable evidence of the extent to which coal stealing prevails was afforded in a case at Aberavon, when seven women were summoned for trespassing on the Great Western Railway. A policeman saw them going from the line with boxes of coal, and one of the women told him that if he had been a bit earlier he would have "caught hundreds." The prosecuting solicitor said that if it were not for the fact that the husbands of four of the defendants were soldiers, they would have been charged with stealing the coal, instead of only for trespassing on the line. A fine of 10s. each was imposed.

The Monmouthshire Eastern Valley district of miners have rejected the proposal that executive delegates to ordinary and general meetings should be paid out of the district funds. Payment would continue as hitherto to be met from lodge funds.

The difficulties under which the tin-plate trade labours at the present time have been stated over and over again. Whether in respect of supply of steel or of other requirements, the industry has been carried on in very onerous circumstances. It is to be noted that these difficulties are manifest in the market price of the product, for this has now become as high as 47s. per box for qualities which before the war sold at 13s. The Minister of Munitions has now fixed a maximum price of 30s. per box for tin-plate, and 28s. per box forterne-plate. Demand is far ahead of supply at the present time, and in every direction consumers are resorting to substitutes. As showing the condition of things, and the extent to which America is profiting by the shortage in South Wales production, it may be mentioned that sales have taken place across the Atlantic at 73s. per box, and even higher sums have been refused for large orders.

The Western Valley miners are very anxious to secure the establishment of a county court in Abertillery, and thus avoid the necessity of attending the court at Tredegar, which is across the mountain, and entails a round-about railway journey. The miners' agent reported to the monthly meeting of the Western Valleys district on Monday that he had submitted their claim to representatives of the District Council, pointing out that there was heavy compensation work connected with the district coming before the county court, and that the present arrangement involved hardship on widows and other dependants who had to go to Tredegar, which was very difficult of access.

With regard to the payment of income tax by miners, opposition to which is concurrent with the general demand for an addition of one-fourth to the present earnings of all the Federationists, it is stated that the object of the movement is to have the old figure of £160 restored as the limit of exemption. The reason put forward is the reduced

purchasing power of money; and a veiled threat is made that unless the £160 limit be re-introduced they will refuse to pay the tax. The Welsh Industrial Commissioners favoured the change, and the action being taken by the South Wales miners through conferences and by resolutions at the different lodge and district meetings furnishes further evidence of the feeling of the men on this question. The Chancellor of the Exchequer has, however, given a reply which is described by local leaders as altogether unsatisfactory, he having stated only that he will consult his colleagues. Mr. Vernon Hartshorn, who was one of the Industrial Commissioners, takes a very firm stand on the question. He states: "It is useless for workmen to have advance in wages for the sole purpose of meeting the increased cost of living, and then to have that increased wage taken from them in the form of income tax. The whole of this difference does not bring in more than about £8,000,000 per annum, and if the concession demanded by the Federation were conceded, it is a portion of that amount which will be forfeited by the Exchequer." And, he adds, the Government will do well to follow the advice tendered them by the leaders of the men, "who know what will happen if the advice is rejected."

Considerable difficulty has been experienced during the past few days because shortage of shipping has prevented prompt clearance of wagons, and the collieries have been seriously hampered through the difficulty of continuing work.

To bring about organisation of the local house coal delivery during the coming winter, a representative of the Coal Controller (Maj. Gilbert) has visited Cardiff, and consulted with the local food and fuel committee, as well as with the president and secretary of the Cardiff Coal Factors' Association. During the consultation, Maj. Gilbert urged the need of economy in the use of house coal. He stated that the Controller relied upon merchants making sufficient provision to supply coal to the poorer classes during the winter, and the president of the association said they were fully alive to this necessity, and would obey any instructions issued by the committee.

Col. W. C. Wright, who is one of the directors of Baldwins Limited, and has other connections with the staple industries of South Wales, has been appointed Controller of Iron and Steel Production, in place of Sir John Hunter.

A colliery labourer was fined £1 at Bridgend on Saturday for exploding gelignite in a public place. The man, who worked at Coytrahen Colliery, had taken home a ball of gelignite with 9 in. of fuse and a detonator which he found in a stall at the colliery; and he afterwards exploded the gelignite near his home "for fun." After lighting the fuse, he flung the charge into the air; it fell against a wall and blew out some bricks and occasioned other damage.

Corpl. Davies, of Nantymoel, formerly a miner at the Wyndham Colliery, was recommended for the Victoria Cross for what one of the officers of his regiment describes as "wonderful work in capturing single-handed an enemy gun which three of his comrades had been shot in attempting to reach." Unfortunately, Corpl. Davies has died in hospital overseas, after serving both in the Dardanelles, in Egypt, and on the Western Front.

It is stated in the report of the Fernhill Collieries that war allowances to an amount exceeding £2,000 have been paid during the year to dependants of workmen who are serving with the Forces. It is also stated that Lord Rhondda, having accepted office in the Government, resigned his directorship in December last.

An inquest has been held concerning a singular accident at Nine Mile Point Colliery. It was stated in evidence that the clothes of the deceased collier must have been caught in the fan at the side of the pit. There was plenty of space, only five men being in the cage, which would hold 20. No accident of this kind had ever before occurred. Apparently no one actually witnessed what happened to the man. A verdict of "Accidental death" was returned. Another accident was enquired into by the coroner at Blaenavon. Two men were employed on slag bunkers by the washery, and one of them, on receiving intimation, left the bunker, but the deceased did not follow as he was expected to. Later on, when the washery was in operation, his shovel passed through the shoot, and one of his legs was afterwards seen. On further examination the body was found. Here, again, a verdict of "Accidental death" was returned.

The members of the Pontypool Urban District Council are in sympathy with miners who have to walk long distances to their work at the various collieries of the district, and have caused a communication to be sent to the divisional superintendent of the Great Western Railway Company, requesting that a rail motor service should be run immediately to the Crumlin Valleys Colliery. It is for the Abersychan Council now to ask for a similar service to the Tirpentwys Colliery.

Nathan Seal, a Bargoed fireman, was charged at Ebbw Vale on Thursday of last week with stealing £15 worth of brass fittings and lead, the property of the Powell Duffryn Company at Aberbargoed; and Isaac Bratt, greengrocer, was charged with receiving the valuable metal. Both men were fined £25 and £5 5s. costs each.

As a result of the excellent support of the local labour forces, assisted by colliery and iron works proprietors, a huge overdraft at the bank was recently wiped out by the officers of the Pontypool and District Hospital. The institution is now in an enviable position. It is stated to be the only one free of debt in the United Kingdom, whilst, at the same time, it has £290 in hand on the current account, and a £500 gift for a motor ambulance.

At a meeting organised by the Blaenavon (Monmouthshire) branch of the National Amalgamated Union of Enginemen, Firemen, Mechanics, and Electrical Workers, on Saturday evening, Mr. Isaac J. Hayward was presented with a roll-top desk in celebration of his appointment as president of the union.

Pontypool Trades and Labour Council is demanding that Labour should be fairly represented on local Food Control Committees, and that no person should be a member who was likely to have financial interests in the work of such committees. Similar action has been taken at Abertillery, Tredegar, and other districts in Monmouthshire.

The people responsible for the system of paying out wages at the Varteg Deep Black Vein Colliery, Monmouthshire, were mildly rebuked at the Pontypool Police Court on Wednesday of last week, where a collier, named Reginald Whittington (20), of Garndiffaith, was charged with stealing two pay tickets and £8 16s. 9d., belonging to the colliery company on August 24. Evidence was given that two pay tickets relating to the earnings of men were not applied for at the usual time. They were placed under a book and subsequently missed. No officer of the company had issued them, and witnesses declared they must have been stolen from the office. Defendant was seen loitering about the office for two hours on the day in question; later he handed to a cashier a ticket for which he received money.

The "Star" brick had the highest resistance. The brick was one which had done duty for a whole of a gas flue at a steel foundry. It was specimen that the authors observed for transformation of quartz into tridymite protracted heating. Brick G.I. was of and considered one of the best produced. To these figures, good silica bricks contain from 3 to 5 per cent. of basic oxides, the proportion of sulphates varying between 8 and 14 per cent. The ratio of the oxides to that of the sulphates necessarily changes with the nature of the bases; but as their relative proportions generally lie between rather restricted limits it may be said that the weight of the oxides is a fairly constant fraction of that of the sulphates—say, 35 per cent. on an average. This method of determining the sulphates is quickly performed, and gives an idea of the composition of a silica brick.

Temperature.—The temperature at which the brick is fired depends entirely on the use for which it is intended. In steel furnaces it has to withstand a temperature of 1,700 degs. Cent.; and bricks of the foregoing composition, if well made, will do this. Then again, silica bricks are used in coke ovens, the temperature of which is lower. For this purpose the proportion of basic oxides may be at least doubled, a circumstance which facilitates the manufacture of the bricks.

Formation of the Network.—This is the most delicate part of the manufacturing process. To develop the network the brick must be kept for some time at a certain temperature so to encourage and preserve the fluidity of the molten magma. Experience seems to indicate for this purpose prolonged heating (several days) at a temperature of 1,450 degs. Cent., or thereabouts. This temperature should be lower than that at which the quartz in use is rapidly transformed into cristobalite direct. The network is formed solely from such parts of the silica as recrystallise from temporary solution in the molten mass. Finally, all other conditions being equal, the larger the amount of fine and very fine quartz in the mixture, the quicker and more complete will be the crystallisation. Nevertheless, a certain quantity of coarse grains should be present, to prevent the formation of cracks, which are liable to occur when the materials are of a uniform degree of fineness.

Disaggregation of the Network.—If, after baking, some of the quartz grains have remained untransformed by the heat, and the brick be then re-heated at a temperature high enough for the rapid transformation of the quartz, the expansion which accompanies this change will break the network and spoil the brick. Moreover, the pressure to which it is subjected when in the arch prevents lateral expansion and spalling ensues, the brick crumbling away, so that an arch that should have lasted for months may be destroyed in a few days. This defect is at once the most serious, and the most frequent to be found in faulty silica bricks. Under normal manufacturing conditions the same expansion takes place at the transformation point of the coarse grains of silica, only a thin external layer of the grains being dissolved, but the inconvenience is not the same, because under these conditions the brick can expand in every direction, and the phenomenon is gradual enough to allow the network to reform where it may have broken. Nevertheless, this unavoidable phenomenon tends to diminish, in a marked degree, the mechanical resistance of the brick.

The following table gives the results of experiment with bricks, placed at the authors' disposal by the Arsenal, the Ruelle Foundry, and the Guérigny Armour Plate Works, together with information concerning their behaviour when in use. Determinations were made of the proportion of sulphates, the real and apparent densities, and the resistances to crushing at definite loads (in kilogrammes per square centimetre) at certain fixed temperatures and predetermined periods of heating.

TABLE III.

Bricks.	Behaviour in use.	Sulphates.	Density.		Resistance.		
			Abso.	Appar.	Degs. Cent.	Min.	R.
				lute.			
				ent.			
G. I.	Very good	8.40	2.33	1.88	1,600	5	33
					1,600	60	30
					1,600	60	41
R. B.	Very good	13.1	2.35	1.60	1,600	60	62
					1,600	60	9.5
R. L.	Very good	14.3	2.40	1.85	1,600	5	41
					1,600	60	25
					1,600	60	21
G. A.	Good	14.0	2.40	1.77	1,600	60	21
					1,600	60	21
D.	Good	8.4	2.45	1.73	1,600	5	55
					1,600	60	20
G. A. 1	Very bad	14.5	2.46	1.80	1,600	60	4.4
					1,600	60	4.4
R. F.	Very good	13.7	2.48	1.84	1,600	5	17
					1,600	60	2
G. A. 2	Very bad	12.8	2.48	1.78	1,600	60	5
					1,600	60	5
G. M.	Medium	9.5	2.53	1.84	1,600	5	17
					1,600	60	2
R. L.	Bad (split)	9.75	2.56	1.94	1,600	5	18
					1,600	60	4.5
S. G.	Bad (fused)	25.0	2.56	1.73	1,500	60	22
					1,600	60	22
Assailly	Very good	13.6	2.30	1.92	1,600	60	90
Star	Very good	9.06	2.33	1.66	1,600	5	170

Two practical conclusions may be drawn from these results: (1) All good bricks acquire, after an hour's heating at 160 degs. Cent., a crushing strength equal, at least, to 10 kilogs. per sq. cm.; (2) Prolonged heating at this temperature affects them but little, whereas the converse is the case with inferior bricks.

tions have been resumed at the Jasper Park Collieries.

Factory Acts.—The Chief Magistrate has appointed as assessors for the Factory and Workshop Acts (Lancaster) and Wotton-

In committing defendant to six weeks' imprisonment, the presiding magistrate remarked that he and his colleagues thought the system of paying at this colliery was a little bit old-fashioned.

Northumberland and Durham.

Workmen's Compensation Act—Durham Miners' Association's Agent—Care of Pit Ponies: Magistrate's Warning.

The members of the New Delaval lodge of the Northumberland Miners' Association having passed, in haste, a resolution adverse to the executive committee for its alleged pacifist tendencies, calling upon the executive to resign, has repented at leisure, and, by 80 votes to 4, has rescinded the resolution.

The lodges of the Durham Miners' Association have decided, by 362 votes to 271, not to appoint at present another agent in succession to the late Ald. Wm. House, president and compensation agent, who died recently.

Miss Maud Bruce, who has been awarded the Medal of the Order of the British Empire, for the presence of mind she displayed on the occasion of a fire in a munition works in which she was employed, is the daughter of a Coundon miner.

Discussing the new Compensation Act for workmen, Mr. T. Foster, of the compensation department of the Durham Miners' Association, does not think the measure goes far enough. "My experience is," he says, "that it is the married man with the family that is feeling the pinch, and it would have been much better to have given him 30s. per week, even if it meant that the single man had to remain at 20s. maximum. There is no reason why a distinction should not be made now. A distinction was made in fatal cases because of larger responsibilities. It should apply in non-fatal cases also. It is a serious omission that the increased benefit does not apply to old Act cases, i.e., the cases of men who received their injuries between 1897 and 1907. There is much dissatisfaction that nothing is done for men on light work. As the new Act is only to apply to the period of the war and six months afterwards, it afforded a glorious opportunity of trying the system of paying from the date of accident, instead of a man having to be off a clear fortnight before he can get a fortnight's compensation. I am quite certain it would pay both men and employers, and, if the fortnight's clause was inserted in the 1906 Act through the influence of the insurance companies, I think it is our turn to say that it should be deleted. At some collieries men have to wait a month before getting any compensation paid to them. Another class of man hard hit is he who applies for State insurance benefit pending the settlement of his compensation claim. Some approved societies carry out the spirit of the Act, but I fear that the majority do not."

Matthew Rutherford, 27, miner at Hetton Colliery, neglected to return a pit pony to the stables, leaving the animal to find its own way from the workings. The result was that, during its roundabout journey, it was knocked over and killed by a two-ton set of tubs of coal in motion. Rutherford said he thought the pony would be able to look after itself. For his neglect, the Bishop Auckland magistrates fined him £2, with the alternative of a month's imprisonment. The chairman remarked that common humanity demanded that due care should be taken of such animals.

Mr. J. R. Elliott, manager of Plashetts Colliery, has been appointed temporary second-lieutenant of the 4th Battalion of the Northumberland Volunteer Regiment, a large contingent of which he has raised from amongst the Plashetts miners.

Part of the estate of the late Mr. William Smith, including a building used as a cinema theatre, has been bought by the East Hetton miners as a site for the erection of aged miners' homes.

At the inquest touching the death of Joseph Lamb, 43, hewer, the fatality to whom, at Seaham Colliery, was reported in these notes last week, it was stated that there were 18 in. of band between the seam in which deceased was working and the Low Main seam beneath. A "bowk," resulting from the liberation of gas collected in the lower seam, caused an upheaval of the floor for a distance of about 20 yds. The force of the explosion apparently threw Lamb against the coal face, and when he was reached, over 17 hours after the accident, he was found dead with his neck broken and his head badly injured. The explosion had blocked the passage to the coal face, and it was necessary to drive a fresh road along the side of the "jenkin" for about 20 yds. in order to reach him. Mr. Silas S. Cowley, assistant under-manager, who gave these particulars to the coroner, informed Mr. Poole, H.M. inspector of mines, that similar accidents on a smaller scale had happened before, but none so large as that. He did not know of any precautions that could be taken against such disasters. A verdict of "Accidental death" was returned.

Temp. Capt. E. B. Gwyther, Welsh Regiment, who has been awarded the Military Cross, served his apprenticeship as a mining engineer under Mr. W. O. Tate, M.E., Usworth Colliery.

Cumberland.

Sir John Randles, M.P., presided over the annual meeting of the Workington Iron and Steel Company at Workington on Friday of last week, and, in the course of his statement, said that in many respects they had had a record year. Their output had never been equalled. Whilst the amount available for the shareholders remains substantially the same, the profits made—but which are repayable to the Government as excess profits—are greater than ever before. Since the war commenced, throughout the whole of their undertakings they had had no strike by the workmen. Since a few weeks ago the Government took over the mines, their mine employees, along with the rest, had been on strike owing to a dispute with the Ministry of Munitions, but they were now at work again. It was not yet clear to him that Government officials could manage large industrial undertakings better than men who have had a life-time's training in their own particular employment. During the year there had been rumours or hints at combinations or amalgamations. There was nothing definite in prospect, but suggestions and proposals have been put forward in this direction. If ever anything is seriously contemplated affecting that company, the shareholders would be informed at the earliest possible moment. In the iron and steel trade large combinations will probably be the order of the day. A small concern will have poor prospects in the world contest that must come for predominance in so important an industry. It was not easy to forecast the future.

The statutory annual meeting of Vivian's Boring and Exploration Company Limited was held at Whitehaven on Thursday of last week. Mr. R. F. Miller, the liquidator, in his customary report to the shareholders, stated that he had returned 5s. per share out of the profits of the year, and that the paid-up capital now stands at £18,000 represented by working capital, and investments to the amount

of £3,375, plant and diamonds making up the balance of £14,625. The report also mentioned a special purchase of a derelict German plant at a cost of £1,500. Under the heading of increased activity, the report states: The urgent demand of the Ministry of Munitions for an increase in the output of hematite iron ore has reacted favourably upon the company, many of the leading mining firms of the district having placed contracts for borings, and others are in prospect. No effort is being spared to co-operate with the mine owners in meeting the wishes of the Ministry, and in view of the unquestionable importance of its work the Ministry has recognised the company as a protected firm. Several borings for coal are also in progress in various parts of the country.

Yorkshire.

The honour which the King has bestowed upon Miss Violet Markham (Mrs. Carruthers), by conferring upon her a Companionship of Honour, has given general gratification. The late Sir Arthur Markham's sister is well-known in the Yorkshire coal field, particularly in the Doncaster district, having always taken a close personal interest in the social welfare of the workers and their families in connection with the Markham Collieries. This was notably the case in regard to the famous model village at Woodlands, where Miss Markham's name was a household word, and where her influence is felt to this day. At Chesterfield also she has done splendid work.

There was a large and representative gathering at the Council School, Woodlands, including many officials of the Brodsworth Main Colliery, last week-end, when Corpl. Brown, a stretcher bearer in the K.O.Y.L.I., and who, before the war, worked at Brodsworth pit, received the Military Medal at the hands of Squire Thellusson, of Brodsworth Hall. Brown was a colliery ambulance man before the war, and won his distinction for going to the succour of a badly wounded man, and coolly tending him in full view of the Germans, and under a most galling fire, until he could be got in.

A special sub-committee reported to the Horsforth (near Leeds) District Council last week on its enquiry as to providing a supply of coal for residents in emergency during the winter. The Council had already taken certain steps before receiving the letter from the Local Government Board. They had found difficulties in the way of storing and retailing coal as a Council, and had communicated with the local coal merchants, who had undertaken to do what they could in the matter. The clerk mentioned that the provision of a reserve supply was made difficult, owing to the collieries having rationed the dealers. It had been a condition in many cases where local authorities had bought coal and stored it that an undertaking be given that the coal would not be retailed except in emergency. It would be seen that the Council might purchase coal, but they might not be able to sell it. The steps already taken by the special committee were confirmed by the Council.

It was reported to the Shipley District Council on Tuesday of last week that the Finance Committee had been visited by Mr. W. Brindley, of the Coal Controller's Department, who put forward the Controller's proposal that local authorities should arrange with local merchants for sufficient coal to be available during the winter for the use of the poor who cannot stock now. It was pointed out that the Shipley Gas Department has already entered into an agreement for the purchase of 1,000 tons of coal which was suitable for domestic use, but was intended for the production of gas in the event of the ordinary gas coal being short. If this were not required for gas, it would be available to the public. Mr. Brindley suggested that this should be definitely set aside for the public, but was told that it would depend on the gas works requirements. He was assured, however, that a local committee will be formed and communication be opened with the local merchants.

Ripon City Gas Committee has decided to purchase 200 tons of coal for supplying to the poor during the winter. Arrangements are being made for its storage and distribution, but the committee has not yet decided whether it will attempt to deliver it or not. They are not, it was announced to the City Council last week, wishful to supply in lots of more than 1 cwt., because the people who can afford to buy larger quantities ought to be storing now.

Lancashire and Cheshire.

Briquette Plant for Manchester—Coal Gas for Motor-Driven Vehicles—Tramway Facilities for Walkden Miners—Manchester Winter Coal Supplies.

The Manchester Corporation Gas Committee have decided to establish plant for making briquettes from coke breeze. There was a great demand for these briquettes in Manchester and surrounding districts last winter.

Additional buildings for compressed air machinery are being built at the Wharton Hall Colliery.

The Bolton Corporation Electricity Committee have, at the request of the Coal Controller, granted their electrical engineer (Mr. W. J. H. Wood) permission to co-operate with Mr. J. A. Robertson as local representatives for the South Lancashire and Cheshire districts, with a view to securing economy in the consumption of coal.

The question of coal storage is now exciting more and more attention amongst municipal authorities all over Lancashire and Cheshire than ever was known before, there being a general opinion prevalent that coal is going to be almost as scarce as radium during the coming winter. As a result of this anxiety, coal supplies committees are being feverishly formed in scores of towns and urban townships to look after the coal supplies. Interviewed at the beginning of this week, officials of the Lancashire and Cheshire Coal Owners' Association did not share the opinion that there was going to be any marked scarcity of coal this coming winter.

The reassuring statement was made last week by Ald. W. Kay (chairman of the Manchester Corporation Gas Department) that there is no fear of a serious shortage of coal in Manchester during the coming winter. There is at present a scarcity, owing to people getting into a panic and purchasing large stocks, but the shortage is only temporary, and will soon right itself. At the same time, the output from some of the big Lancashire collieries is steady and plentiful, but Manchester is not getting as much as it ought. Ald. Kay is chairman of the special committee in Manchester dealing with the coal supply for winter, and it is believed that there will be ample supplies for all.

A trade correspondent says Manchester is about to resort to coal gas in place of petrol for motor-driven vehicles. The local Gas Committee had the matter before them last Friday (31st ult.), when Mr. Price, the superintendent, reported that experiments in Blackpool on char-a-banc haulage had been most successful. In Manchester it is proposed to adopt the system chiefly for commercial motors, and a company has been formed to supply gas bags and cylinders and to fit them to suitable vehicles. The committee last Friday adopted a scheme for supplying gas at

4d. per 100 cu. ft., and for providing special charging stations in various parts of the city and surrounding districts. Enquiries show that the system is being most expeditiously carried out, and it is expected that the system will expand.

There is now an increasing output from the Clifton and Kersley Coal Company's Tasker's Lane Colliery, Kersley, which stood derelict for many years after being worked by Messrs. Seowcroft. In addition to their pits in Clifton and Kersley localities, which have been working for over half a century, and one (the Wet Earth pit) for over 100 years, the Clifton and Kersley Coal Company have big collieries in the Outwood (Radcliffe) and Astley (Green neighbourhoods). The last-named are entirely new collieries.

The South Lancashire Tramways Company have provided extra ears for the accommodation of colliery workers in the Walkden and adjoining coal fields, where there are more men now employed in the mines than was the case in pre-war days. The concession is keenly appreciated by the miners.

Colliers employed at certain pits in the Manchester and Bolton areas have now a fixed time for breakfast—from 10.20 to 10.40. At Lord Ellesmere's collieries, where this rule is in operation, the men start work at 7 o'clock and finish at 3.

Amongst the most enthusiastic war vegetable growers in the township of Worsley, near Manchester, are scores of coal miners. They are competing to-morrow (Saturday) for prizes offered by Lord Ellesmere at a show to be held in the Walkden Town Hall.

The Midlands.

An unexpected situation has arisen in Warwickshire and Staffordshire through the new instructions received from the Coal Controller. The new conditions have been created by the resolution of the Controller to increase the output of domestic coal available for the London market, and they are occasioning important changes at certain of the Warwickshire and South Staffordshire house coal collieries. Instructions have been received that, until further advice, deliveries of coal are to cease to local consumers, and a diversion is to be made to London. The new Order appears to have been quite unexpected, and created considerable confusion. The formal instruction from the Controller intimates that it is desirable to regularise the flow of house coal to London to a greater extent than at present. The tonnage required to be delivered per week per colliery is then specified, and the circular continues: "This is to be the minimum weight to be despatched in any one week, and no reduction in this quantity should be permitted, unless by reason of special circumstances. In the latter case, however, it is to be understood the quantity required to make up the minimum is to be despatched the following week, in addition to the minimum quantity for the latter week." Thus it is clear that agitation to relieve the London householders has had its effect upon the Controller.

The Warwickshire coal masters have been considerably disturbed by the Controller's new Order, and state that while it is reasonable that London should receive special attention, to shift the difficulty from the Metropolis to the country was a doubtful expedient. What is wanted, in the opinion of the Warwickshire owners, is a proper allocation of supplies all round. Another remedy would be to endeavour to increase the output. It is by the men possible under the Eight Hours Act to insist in times of emergency upon longer hours being worked, and this ought to be done as one way of making good the coal shortage. Six days a week at the pits instead of five should be enforced.

Coal merchants have been even more upset than the coal owners, and Birmingham factors fear an early coal famine if the Order is continued. The cessation of domestic supplies into Birmingham, where there are practically no stocks at merchants' wharves, will probably cause previous difficulties to become acute. Factors have got into communication with the Department, enquiring if there is no alternative to the instructions. One leading Warwickshire merchant firm wrote: "It will mean that the Warwickshire colliery companies' provincial house coal trade is to be stopped. We cannot think it is your intention to treat the provincial trade so unjustly, and possibly your instructions have been issued under some misapprehension. If the instructions have to stand, it means, too, that merchants' country trade is brought to a stop, and we shall have to advise customers that we cannot deliver." The official reply to this letter states that it has been found necessary to increase the supplies of coal to London, and that "at present it is not possible to alter this decision." The nature of this reply has caused considerable disaffection amongst merchants.

Kent.

At Tilmanstone Colliery last week, over 2,700 tons of coal were raised, and at Snowdown Colliery there was about an equal output.

The accounts presented at the annual meeting of the East Kent Light Railways Company showed that the expenditure on the railways, which were principally built for dealing with the colliery traffic, had been £242,937. The capital raised has been £240,508, so that there is an adverse balance of £2,429. It is estimated that £10,000 will be spent on construction during this year, and that a further £162,062 will be required to complete the undertaking. A portion of the line was opened for traffic last October, and traffic receipts on this amounted to £898, whilst the working expenses were £759. After paying the company's obligations to Lord Greville, there was 6s. 4d. to carry forward. The chairman (Mr. A. Loring), speaking of the financial position, reminded the meeting that the debenture holders agreed to suspension of their interest until six months after the termination of the war. The accruing interest now amounted to £12 10s. each debenture. He promised that the directors would continue to do their best to meet the situation by the introduction of fresh capital. The report was adopted, and it was decided to apply to the Board of Trade for a new order reviving the company's powers for the compulsory purchase of land and the completion of the line. This would extend the time by three years for land purchase and five years for completing the railway.

Messrs. George Thomas (Dover) and Arthur Wells (Canterbury) are the first directors (unpaid) of the Tilmanstone Building Syndicate, which has been formed for the purpose of erecting miners' houses near the Tilmanstone Colliery. Messrs. Thomas and Wells are directors of the colliery.

Scotland.

Burntisland Coal Shipments—Improving Business—Serving Dundee's Coal Supplies—Lanarkshire Coal Monthly Conference.

Mr. John Callender, secretary of the Lothian Coal Company Limited, who during the last 35 years has been one of the principal figures in the coal exchanges of the country has retired, and is succeeded by Mr. James C. Murray

He finds time to take a large share in the public life of the district. He is chairman of the Newbattle School Board, member of the Newbattle Parish Council, and he is also a member of the Midlothian.

The output of Scotch coal is gradually improving. In the week ended August 25 the shipments amounted to 1,773,553 tons, a decrease of 1,935,694 tons as compared with the corresponding period of 1916. From the Clyde the tonnage is 3,320,107 tons; from the Fife ports, 812,655 tons; and from the Forth, 640,791 tons.

Owing to the termination of the lease, operations have ceased at Mossbank Colliery, Newhouse, owned by Messrs. Horn (Glasgow) Limited. The plant is being offered for sale this week.

Owing to a fault in the borehole which conveys the packing material underground, the system of hydraulic stowing at Dysart Collieries is temporarily suspended. It appears that the tubes with which the hole was lined have worn, and the worn parts have caved in and closed the hole.

The question of conserving coal supplies came before the Committee of Dundee Town Council on Monday. The local Coal Committee asked the authorities to earmark 1,000 tons of coal at the gas works, and to place the coal at their disposal as an emergency measure during the winter. This coal, it was explained, should not be used except on the instructions of the Coal Committee, with the consent of the Controller of Coal Mines, and if used should be restricted for household purposes, and sold at the price paid by the Town Council at the pit mouth, plus transport and storage charges. It was decided to give effect to the request.

The Lanarkshire Miners' Union has passed a resolution calling upon the Scottish mine workers to take such immediate steps as will compel the Government to fix maximum prices for the necessities of the people, with due regard to the purchasing power of the workers.

Burntisland coal shipments last week formed the second best weekly return for the current year. The amount shipped was 15,150 tons, as against 18,610 tons in the corresponding week last year, and an increase of fully 2,000 tons on the preceding week.

At the monthly conference of the Lanarkshire Miners' Union the following resolution was carried unanimously: "That this conference of delegates of the Lanarkshire Miners' Union views with alarm the increasing cost of living, and calls upon the executive of the Scottish Mine Workers' Union to take such immediate steps as will compel the Government to fix maximum prices for the necessities of the people, with due regard to the purchasing power of the workers."

LABOUR AND WAGES.

South Wales and Monmouthshire.

The mine examiners of South Wales, on Saturday, gave a month's notice to terminate contracts. Their demand is for "recognition" by the employers of the South Wales and Monmouthshire Colliery Examiners' Association, and also that uniform rates of pay shall be established throughout the whole coal field. In certain areas only a fortnight's notice is necessary, and in these cases the men have withheld the intimation so that the contracts will terminate at the same time as those who gave a month's notice. There are about 4,000 members in the association, but inasmuch as this trade union does not include firemen at all the collieries, the whole of the coal field is not affected. In several undertakings—notably the larger, such as the Ocean, Powell Duffryn, Nixons, and others—the firemen are not members of the association, and therefore do not join in this demand which is being made.

With regard to the demand made by the Colliery Examiners' Association that their union should be recognised, Mr. T. Morgan, their secretary, has issued a statement in which he sets forth on their behalf a demand for collective treatment. He rejects the suggestion that each company should deal separately with their firemen in respect to wages and conditions, and states "The firemen are sick of it, and the method must be changed. We have an association which is recognised by every Government department, and like all other mine employees we must be dealt with collectively through our association in all matters of general concern; and in local matters when our members have any grievance, if they fail to agree with their own management, they must be given the right to call in their representative on their behalf." He states that the weekly rate of wages now varies from £3 12s. 6d. to £4 16s., and that the firemen seek a uniform rate.

With regard to the meeting of the colliery examiners, Mr. Finlay Gibson, secretary of the Coalowners' Association, states that consideration of the claims of firemen, is a matter for the colliery companies, and not for the Coalowners' Association, the latter, as such, having no power to deal with it. The firemen occupy the position of colliery officials; and the practice has been for the companies themselves to arrange independently the terms and conditions of employment, objection being felt to the association intervening between them and their staffs.

The Dockers' Union having made application for advance in wages to men discharging timber cargoes in Barry Dock, the Committee on Production has issued an award which grants the men 1s. a day increase. This is in addition to 2s. added to their wage rate since the war commenced.

The executive council of Colliery Enginemen and Stokers submitted, on Tuesday, their application for 25 per cent. war bonus, an eight-hour shift for all men in the mechanical department, and for overtime payment. But the coal owners' representatives could not make the concessions desired. They, however, made request that further information should be given to the wages committee upon the question of overtime. It is understood that the matter will now be referred by the local association to the Enginemen's National Federation.

The miners of Tredegar district, in their monthly meeting at Blackpool, had under consideration an outstanding dispute as to the price list for a seam of coal worked with coal-cutting machines and conveyor. The matter in dispute was as to how many helpers should be employed by one principal. The men held that one helper was enough, whilst the colliery management desired to have three. The meeting resolved that the question should go to the Federation executive, in order that they might determine the point. It was further reported that an award had been made by the Federation and Hartsorn on the question of the minimum wage claims. The award will put an end to disputes. As regards employment insurance, the contribution of the craftsmen being kept back, it was decided to refer the matter to the Federation executive to consider the question of what class of workmen should be included in the payment.

The Pontypridd and Rhondda district of miners were informed on Monday that better wages had been gained for pumpmen and stokers at the Llanharry iron ore mines. There was, however, a serious matter in respect to substitution men at work, who contended that they were not supposed to join the Federation.—A circular was read from the Ministry of Labour with reference to the appointment of advisory committees in order to assist the Minister through the employment exchanges, especially later on when demobilisation takes place. The meeting appointed three representatives, including Mr. Ben Davies (their agent).

The Federation is again approaching the Conciliation Board, with an application that Friday shall be pay-day instead of Saturday. This practice prevails at certain collieries, and it is desired to make it the general rule. The employers do not see their way to establish this as the general rule, but will consider any individual cases of hardship.

The practice of approaching the Committee on Production, Board of Trade, and others, by sections of the men who have grievances, is becoming more pronounced; and occasionally the deputations are jointly representative, employers being also present. From Cilely collieries representatives of workmen have interviewed Sir George Askwith, and presented their claim for percentage to be paid them on the cutting price, because of the change from naked lights to electrical.—A joint deputation has waited upon the Committee on Production as to the increase in the price list which is sought by workmen at the by-products installation of Risca Colliery.—Another development in the way of deputations was that of the Maesteg miners, who visited the Central Medical Board in London to submit their case against the taking away of more medical men for Army service, three doctors having already gone from the district, and there being a prospect of a further withdrawal. They submitted that there would not be proper attention to civilians in the district if the number of local doctors was further restricted. In addition to seeing the Central Medical Board, the deputation called also upon the Coal Controller. The matter is one in which only the War Office can give a decision.

Several delegates at a meeting of the Blaenavon Trades and Labour Council, on Monday evening, complained of the irregularity and poor quality of the supply of house coal to employees of the Blaenavon Company Limited. It was alleged against the company that the quantity of small and slag unfairly outweighed the amount of large coal, and that the execution of orders lodged by the workmen was long overdue. One delegate stated that at a special screen on the Forge side mixed coal was tipped into trucks marked "house coal." The meeting was of opinion that if the practice was allowed to continue, the consumers would not get a fair proportion of large coal of good quality, and it was decided to write to Mr. Jolly, one of the company's chief representatives, acquainting him of the complaints. It may be added that when the Trades Council raised similar complaints a few months ago, Mr. Jolly provided a batch of motor lorries to expedite the deliveries.

The Eastern Valley District of Miners, Monmouthshire, has thrown out a resolution moved by a Blaenavon lodge representative, that all district executive members should be paid out of district funds, and not by their lodges, for attending ordinary and special district meetings. On the motion of the Llanerch and Blaenserchan lodges, the same district has adopted a resolution that in future when any particular dispute arises over a price list, the section of mines affected should be isolated by the men, and that the other miners employed in the particular seam continue to work and support them.

A special meeting of the Eastern Valley Miners' District, Monmouthshire, was held on Monday evening *in camera*. It is understood that among the matters discussed was the price list which has led to a dispute and stoppage of work at the Elled Colliery, Pontnewydd, and that it was decided, after a long discussion, to again defer the question of advocating a South Wales strike in order to expedite a settlement.

North of England.

The executive committee of the Durham Miners' Association is asking the lodges to make a return, one of the most comprehensive that the association has ever requested, of the basis wages of all classes of workers in and about the mines. The compilation will involve considerable work in view of the very many different classes, especially of youths, at the collieries. The return is being sought with a view to an application which the association intends to make to the coal owners for an increase in the minimum wage rates.

Discussing the question of the better distribution of employment amongst local collieries, Mr. Matthew Tate, one of the oldest Northumberland miners, suggests that the custom of teeming over the heap in slack times should be more generally adopted. By this method, he says, three or four days more work per fortnight might be got and it would be easier of working than the scheme of allocation. He states that, in his experience, he has seen stacks of coal that would amount to not less than 30,000 tons which had been so teemed.

The Durham coalowners have made the following concessions in respect of applications put forward by the Durham Deputies' Mutual Aid Association: That when the collieries are idle, or deputies are working at what is known as back-bye work, which at present is over a shilling below face rates, face rates shall be paid for all shifts worked; that deputies shall be paid additional for wet working, the allowance for such work to be for "top water" threepence and "bottom water" twopence, per shift; and that, in future all shifts worked on Sundays be six hours instead of as at present, where many collieries throughout the county work eight hours.

The executive committee of the Northumberland Miners' Association is invoking the intervention of the Coal Controller in regard to a dispute at Newbiggin Colliery, arising out of the dismissal of a man. The Coal Owners' Association has declined to meet the executive on the point, a circumstance at which the executive expresses surprise and disappointment, "as such a refusal is a violation of the understanding arrived at with the Prime Minister when he was Minister of Munitions, to have recognised machinery in all districts for the settlement of all disputes, so as to prevent any danger of stoppages at collieries. In face of this refusal by the coal owners of Northumberland, we will be under the painful necessity of dealing in our own way with other colliery disputes arising from time to time."

Mr. A. J. Ashton, K.C., who was appointed by the Chief Industrial Commissioner to deal with the claims of the Tees-side coal trimmers employed by lighter owners, has awarded the trimmers an immediate advance of 3d. per ton on ordinary and 4d. per ton on new work. On the point of overtime,

he has decided that none shall be paid in respect of any steamer which starts bunkering before 4.30 p.m., but the tonnage and a-half rate shall be paid until the finish of the job in respect of any steamer which starts bunkering after 4.30 p.m. The increases and the overtime allowances are to be treated and understood as war rates caused by and dependent upon the abnormal conditions of living brought about by the war.

Federated Area.

At meetings of colliery surface workers held on Monday night in the Manchester, Bolton and Leigh areas, it was stated that their application for increased pay and shorter hours was being pushed forward, and it was confidently expected that their agitation would bring forth good fruit. As a result of active propaganda work there had recently been a considerable accession of new members to the ranks of the trade union surface workers.

Notwithstanding the appeals of the Coal Controller and their own leaders, some hundreds of miners engaged in the Black Country declined to withdraw their notices and resume work on Monday as requested. The consequence was that many of the pits were put to play. The men handed in notices for a 25 per cent. advance, and some of these expired on Saturday last, while others run out this week end. The request of the Coal Controller to the executive council of the Federated area to meet him on the matter led to an appeal for the withdrawal of all notices, in spite of which the unofficial strike has been declared.

The colliers who have been on strike in the Old Hill district of South Staffordshire have been strongly advised by the local agent to resume work. He announced the receipt of a telegram from the Coal Controller, stating that if the men were on strike without permission and against the advice of the recognised leaders, he would be compelled to advise the Government to take immediate action in the matter. On patriotic grounds Mr. Edwards appealed to the men to resume work and await the decision of the Controller. The meeting was of a stormy character, but eventually a resolution was passed adhering to the demand for the full advance of 25 per cent., but agreeing to resume their employment on the day-to-day contract system until the decision of the Government Controller is announced.

Scotland.

Udston Collieries, Hamilton, have been idle for several days because of a demand on the part of the drawers for an advance of 1s. per day. The drawers have decided to resume work pending the adjustment of the claim between the manager and the union representatives.

In a tonnage rates dispute at Frankfield Collieries, Shettleston, the firm have agreed to advance the rates by 5d. per ton.

The dispute at Milnwood Colliery, Bellshill, is now settled. The company have agreed to restore the old explosives until certain necessary work has been carried out.

A difficulty has been encountered at Wheatrigg Colliery, Kilmaurs, Ayrshire, in regard to a drawing scale, which was thought to have been settled two or three months ago. Acting under advice from the union, the men are to continue at work until the Committee on Production has been informed of the situation.

At Bardsykes Colliery, Blantyre, the men in the Humph coal seam complain that they are unable to earn fair wages. The executive of the Lanarkshire Miners' Union have authorised the men in the places which are affected in this way to cease work.

At Birsie Knowe and Dockra ironstone pits, Barkip, Ayrshire, claims are being pressed by the underground firemen, roadsmen, charmen and labourers for an increase of wages. The Government are to be asked to intervene so as to prevent a stoppage.

Scottish colliery enginemen are to lodge strike notices with coal and shale owners without further delay. This decision was come to almost unanimously at a special delegate meeting of the Scottish Colliery Enginemen's Association, held in the Christian Institute, Glasgow. This dispute has arisen in consequence of the refusal by the coal owners in the first place, and later by the Coal Controller, to grant a claim put forward by the enginemen for a war bonus of 1s. per shift. The strike notices were signed, and put in the hands of Mr. Robert Shirkie secretary of the association. The strike will begin 14 days after the notices are handed in.

For some time past there has been considerable complaint from the miners in a large number of the Fife collieries regarding the wages they are able to earn. It is alleged there has been a tendency on the part of the management to fix rates at such a point as made it impossible for the men to earn their standard wage, with the result that they had to be "made up." To such an extent had this system been adopted, that the union have taken the matter in hand.

The tradesmen and surface workers employed at the Kely Collieries, who are nearly all members of the Fife Miners' Union, have asked the officials to lodge a claim on their behalf for an increase on their wages and an eight hours' day.

At Knowton Colliery the men employed in one of the seams complain about a long extension of their drawing roads, for which they say no increase on their ton rate has been given. The management refuse to grant an increase, and would not come to terms about a scale. The men ceased work as a result.

The miners of Valleyfield Colliery were idle on Thursday of last week as a protest against the action of the management in putting extra duties upon a discharged soldier employed on the surface. Mr. W. Adamson, M.P., general secretary of the Miners' Union, had an interview with the management, as a result of which an undertaking was given that the question of duties would be adjusted.

Iron, Steel and Engineering Trades.

The "Middlesbrough Monthly Circular" of Messrs. Hanson, Brown and Co. Ltd., states that, during August, two furnaces, one on Cleveland and the other on hematite pig iron, had been blown out for the purpose of effecting urgent repairs. The total number of furnaces in blast in the north-east of England is 75, of which 34 are on Cleveland, 27 on hematite and 14 on special kinds of iron. A hematite furnace had to be blown out for repairs in July, so that the production during the past two months has been reduced by the output of three furnaces.

Dean Forest Iron Mining.—Saturday last at the Speech House, Dean Forest, witnessed the formalities associated with the grant from the Office of Woods to the free miners of two gales of iron ore. The properties are situated just above Parkend, on the Forest line of railway. It is understood the free miners will sell immediately, and that the buyers will forthwith develop the property.

THE FREIGHT MARKET.

Whilst there is a very brisk demand for tonnage for Allied and neutral destinations, outward chartering continues to be conducted on very attenuated lines, by reason of the shortage of tonnage. At the north-east coast, the coal mining industry is being considerably helped by the excellent request on official account, and by the good enquiry for home consumption. Very little private exportation of coal is possible, however, on account of the dearth of free tonnage. Most of the shipments made are for French Atlantic ports at scheduled figures. The coasting market is much firmer, London having been twice done at 17s., and once at 18s. The rate for Gibraltar, which stood at 85s. a week ago, has made a sensational advance, one vessel having been taken up at 95s., and another at 97s. 6d. Gothenburg has again been done at 200 kr. The latter figure is the current quotation for any good Norwegian port from the Tyne, whilst there is no doubt that the recent rate of 207½ kr. for Stockholm could be repeated without difficulty. Portugal is inclined to harden, with Lisbon quoted at 90s., and Oporto at 100s. The Spanish Mediterranean has Barcelona still at 220s. Port Said continues to be listed at 165s. At South Wales, chartering has been exclusively confined to fixtures for French ports at scheduled rates, although tonnage for other destinations is much sought, and very high figures are on offer.

Homewards, the River Plate is dull, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. Coal tonnage for Virginia loading for the Plate is in good demand at 125s., with up to 33 dols. offered for Rio discharge. Wheat freights are quoted at about 30s. from Northern Range to the United Kingdom, with from 30s. to 32s. 6d. for France discharge, and 35s. for Italy. For Gulf loading, 32s. 6d. for French discharge, and 35s. Mediterranean, are asked. On net form, Northern Range to France is listed at 250s. for neutral vessels, an advance of 30s. on the week. At the Far East, Madras Coast to Marseilles with kernels continues quoted at 500s. Bombay to West Italy is mentioned at 400s. Saigon to French Atlantic with rice is firm, at 500s. Burmah to the United Kingdom is steady, at 480s. Mediterranean ore and phosphate ports continue to enquire for a good deal of tonnage, although Alexandria is quiet.

Tyne to Bordeaux, 3,750, 78s., neutral; Dunkirk, 800, 45s., coke; Gibraltar, 4,400, 95s.; 5,000, 97s. 6d.; Gothenburg, 2,000, 200 kr.; London, 1,500, 17s., twice done; 1,100, 18s.; Rouen, 1,935, 74s. 3d., coke, neutral; and Treport, 650 and 350, 46s., coke.

Cardiff to Brest, 1,100, 45s., neutral; Bordeaux, 2,000, 69s., neutral; Cherbourg, 160, 130s., sail; Caen, 1,100 and 1,300, 46s. 6d., neutral; Havre, 1,900 and 2,000, 45s. 9d., neutral; Rouen, 1,500, 25s. 3d., patent fuel; and St. Malo, 500, 45s., coke.

Swansea to Trouville, 875 and 800, 48s., neutral; 1,100, 46s. 6d., neutral; Caen, 950 and 1,100, 46s. 6d., neutral; 700, 47s. 6d., neutral; 700 and 900, 48s., neutral; Rouen, 850 and 800, 50s. 3d., neutral; and Havre, 3,000, 44s. 3d., neutral.

Newport to Bordeaux, 3,500, 69s., neutral; Caen, 1,100 and 1,300, 46s. 6d., neutral.

Neath Abbey to Honfleur, 450, 48s., neutral.

Mersey to Gibraltar, 4,000, 87s. 6d., neutral.

Port Talbot to Rouen, 1,600, 25s. 3d., patent fuel.

LATER.—Since the foregoing was written, a 4,500-ton steamer has been fixed for Tyne loading to Barcelona at 215s., and a 6,500-ton vessel for Blyth or Hull loading for Gibraltar at 100s. The latter rate is the highest ever paid for Gibraltar.

COAL, IRON AND ENGINEERING COMPANIES.
REPORTS AND DIVIDENDS.

Bolckow, Vaughan and Company Limited.—A final dividend of 8½ per cent. on the ordinary shares is proposed, making 12 per cent. for the past year. The ordinary shares received 11 per cent. for 1915-16, 6 per cent. for each of the two preceding years, and 10 per cent. for 1912-13.

Clyde Valley Electrical Power Limited.—An interim dividend of 1½ per cent. actual on the ordinary shares, free of tax, is announced.

Fernhill Collieries Limited.—The report for the year ended June 30 last states that the net profit, after deduction of debenture interest and provision for excess profits duty, is £43,359; the balance brought forward was £28,601, making £71,961. The directors recommend a dividend of 20 per cent. on the ordinary shares (free of tax), carrying forward £44,961.

Lincoln Wagon and Engine Company Limited.—The directors have declared an interim dividend at the rate of 7 per cent. per annum, less tax.

Manvers Main Collieries Limited.—The usual dividend has been declared on the preference shares, less tax, and a final dividend of 2s. 6d. per share, free of tax, on the ordinary shares, making, with the interim dividend, a distribution of 20 per cent. for the year.

Scottish Iron and Steel Company Limited.—An interim dividend of 5 per cent. per annum, less tax, payable on October 1, is proposed. Last year no interim dividend was paid, but 4 per cent. was declared for the year.

NEW COMPANIES.

Coal Carbonising Parent Syndicate Limited.—Private company. Registered August 28. To carry on business as manufacturers, engineers, contractors in all kinds of chemicals, etc. Capital, £2,000. Subscribers: E. Hill and C. A. Rahenbury.

Engineering Components Limited.—Private company. Registered office, Remo Works, Roselyn-crescent, Wealdstone, Middlesex. Registered August 30. To acquire and carry on the business of manufacturing engineers. Capital, £7,500. Directors to be appointed by the subscribers. Subscribers: Mabel Ellen Hardiman and Olive Nora Brooks.

Gravesend Smelting and Refining Company Limited.—Private company. Registered office, 2, Gresham-buildings, Basinghall-street, E.C.2. Registered August 30. Nature of business indicated by title. Capital, £2,000. Directors to be appointed by the subscribers. Subscribers: L. H. Chambers, D. A. Harber, W. R. Wildeidge, and two others.

Kirkheaton Colliery Company Limited.—Private company. Registered office, Exchange-buildings, King-street, Newcastle-upon-Tyne. Registered August 18. Nature of business indicated by title. Capital, £17,000. Directors: R. D. Shafto, A. T. Storer, and J. Bartlett.

Permanent Mesh Gear Limited.—Private company. Registered office, 116, Fore-street, London, E.C.2. Registered August 28. To carry on the business of iron founders, mechanical engineers, etc. Capital, £6,700. Directors: A. T. Collier, W. J. Nicholson, W. H. Newman, and A. Reynolds.

Stokes Castings Limited.—Private company. Registered office, Union Foundry, Mansfield, Notts. Registered August 29. To carry on the business of founders, mechanical and consulting engineers, etc. Capital, £6,000. Directors: F. W. Stokes, R. L. Ashley, A. M. Stokes, and three others.

Watercraft Detachable Power Installations Limited.—Private company. Registered August 29. To carry on the business or businesses of manufacturing, purchasing, or otherwise acquiring, making, or building engines and power plant of all kinds, etc. Capital, £20,000. Directors: E. W. Reid, T. H. Coggins, and A. E. Hooke.

Ynyslas Colliery Company Limited.—Private company. Registered August 31. Nature of business indicated by title. Capital, £10,000. Directors: G. T. Lewis and J. Davies.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ANDOVER, SEPTEMBER 10.—Coal for the Guardians. Forms of the clerk, 31, High-street, Andover.

BICTON HEATH (NEAR SHREWSBURY), SEPTEMBER 17.—Coke, etc., to the Salop County and Wenlock Borough Lunatic Asylum for three months from October 1 next. Tenders to the Visiting Committee.

BLACKBURN, SEPTEMBER 18.—Coal for the Guardians. Forms at the Union Offices, Cardwell-place.

BLANDFORD, SEPTEMBER 15.—Coal and coke, etc.; also for haulage of same from Blandford Station to the Workhouse. Tenders to the Master's House at the Workhouse.

BRADFORD, SEPTEMBER 13.—Coal for the Guardians. Forms at the Offices, 22, Manor-row.

BROMLEY, SEPTEMBER 18.—Coal for the Guardians. Tenders to the clerk.

BURNLEY, SEPTEMBER 18.—Coal for the Guardians. Forms of the clerk, Union Offices.

CARMARTHEN, SEPTEMBER 13.—Coal for the Guardians. Forms of the clerk, 7, Hall-street.

CHICHESTER, SEPTEMBER 17.—Coal and coke for the Guardians. Forms at the office of the clerk.

DEWSBURY, SEPTEMBER 13.—Coal for the Guardians of the Dewsbury Union. Forms at the office of the clerk.

DROMORE WEST (IRELAND), SEPTEMBER 11.—40 tons best screened coal for the Guardians. Tenders to the clerk, Board-room, Dromore West.

DUNMOW (ESSEX), SEPTEMBER 11.—Coal and coke for the Guardians. Forms at the office of the clerk.

EDGWARE (MIDDLESEX), SEPTEMBER 13.—Coal for the Guardians of the Hendon Union. Forms at the office of the clerk, Edgware.

EDMONTON, SEPTEMBER 12.—1,500 tons of household coal for the Edmonton Urban District Council. Forms may be obtained of the engineer, Town Hall, Edmonton.

HARDINGSTONE (NORTHAMPTON), SEPTEMBER 10.—Coal for the Guardians of Hardingstone Union. Forms of the clerk, 2, St. Giles'-square, Northampton.

HOLBEACH, SEPTEMBER 12.—Coal for the Guardians. Tenders to the Workhouse.

HOLLINGBOURN (MAIDSTONE), SEPTEMBER 27.—Coal and coke for the Guardians of Hollingbourn Union. Forms of the clerk, 33, Earl-street, Maidstone, or master of Workhouse.

LANCASTER, SEPTEMBER 18.—Coal for the Guardians; also slack. Forms at the office of the clerk, 5, Dalton-square.

LANCHESTER, SEPTEMBER 12.—Coal for the Guardians. Forms of the clerk.

LICHFIELD (STAFFORDSHIRE), SEPTEMBER 13.—Coal for the Guardians. Forms of the clerk, 6, Breadmarket-street, Lichfield.

LONDON, E., SEPTEMBER 13.—For the supply of coke to the London Hospital, Whitechapel-road, E. Forms at the steward's office at the Hospital.

LONDON, E., SEPTEMBER 19.—Coal and coke for the Poplar Board of Guardians. Forms of the clerk, Upper North-street, Poplar, E.

LONDON, S.W., SEPTEMBER 12.—Coal and coke for nine months for the Receiver of the Metropolitan Police District. Forms may be obtained from the office of the Receiver, New Scotland Yard, S.W. 1.

LONDON, S.W., SEPTEMBER 19.—Coal for the Guardians of the Westminster Union. Forms at the offices of the clerk, Prince's-row, Buckingham Palace-road, S.W. 1.

MACCLESFIELD, SEPTEMBER 10.—Coal for the Guardians. Forms of the assistant clerk, Union Offices, Macclesfield.

MANCHESTER, SEPTEMBER 15.—House and burgie coal for a period of six months from October 1, 1917, for the Sanitary Committee. Forms from Public Health Office, Civic Buildings, Mount-street, Manchester.

MARTLEY (WORCESTERSHIRE), SEPTEMBER 13.—Coal for the Guardians of Martley Union. Forms at the office of the deputy clerk, 14, Foregate-street, Worcester.

NEWPORT (ISLE OF WIGHT), SEPTEMBER 13.—Fuel for the Isle of Wight County Council. Particulars from the clerk to the Council, Newport.

NEWPORT (MON.), SEPTEMBER 11.—Steam coal for the Guardians. Tenders to the clerk.

NORTHWICH, SEPTEMBER 13.—Coal for the Guardians. Forms at the office of the clerk.

OLDHAM, SEPTEMBER 17.—Coal for the Guardians. Forms of the master of the Poor Law Institution.

PLYMOUTH.—Coal and coke for the Guardians. Forms at the office of the clerk, Workhouse, Grecianbank-road, Plymouth.

PONTELAND, SEPTEMBER 12.—Coal for the Guardians of Ponteland Union. Forms of the master of Workhouse.

REIGATE, SEPTEMBER 12.—Coal for six and 12 months for the Town Council. Forms from the electrical engineer, at the Electricity Works.

SCARBOROUGH, SEPTEMBER 13.—Coal and coke for the Guardians. Forms of the master of the Workhouse.

SLOUGH, SEPTEMBER 10.—For supply of good furnace, house coal, and coke for six months from September 16 for the Royal British Orphan Schools, Slough. Tenders to the secretary at the Offices, 27, Clement's-lane, London, E.C.

STAINES, SEPTEMBER 13.—Coal and coke for the Guardians of the Staines Union. Forms to be sent to the clerk's office, Ashford.

STOCKPORT, SEPTEMBER 17.—Coal for the Guardians. Tenders to the clerk, Union Offices, Shaw Heath.

STOCKTON-ON-TES, SEPTEMBER 11.—Coal for the Guardians. Tenders to the clerk to the Guardians.

TICEHURST, SEPTEMBER 12.—Coal and coke for the Guardians of Ticehurst Union. Tenders to the clerk, Union Offices, Wadhurst.

UPPINGHAM.—Coal to the Uppingham Auxiliary Hospital—20 tons a month household coal, seven tons a month steam coal delivered at Uppingham Station. Replies to Commandant, Auxiliary Hospital.

WALSALL, SEPTEMBER 13.—Coal, slack, and coke for the Guardians. Forms at the office of the clerk, 29, Leicester-street.

WARRINGTON, SEPTEMBER 19.—Coal and slack for the Guardians. Forms of the clerk, Bewsey-chambers, Warrington.

WELLINGBOROUGH, SEPTEMBER 11.—Coal and coke for the Guardians. Forms of the clerk.

WEST MALLING (KENT), SEPTEMBER 19.—Coal for the Guardians of the Malling Union. Forms of the clerk.

WEYMOUTH, SEPTEMBER 10.—Coal for the Guardians. Tenders to the Union House, 1, Wyke-road, Weymouth.

WINDSOR, SEPTEMBER 10.—Coal and coke for the Guardians. Tenders to the clerk's office, 3, Sheet-street.

WOKINGHAM, SEPTEMBER 10.—Coal for the Guardians. Tenders to the clerk, Workhouse, Wokingham.

WOLVERHAMPTON, SEPTEMBER 18.—Coal, slack, and coke for the Guardians. Forms at the office of the clerk, Poor Law Offices.

The date given is the latest upon which tenders can be received.

OBITUARY.

One of the best known men of the London Coal Exchange and most regular attendant passed away suddenly on Wednesday morning from heart failure, in the person of Mr. A. G. Dawbarn, of 60, Gracechurch-street, London, E.C.

Mr. Thomas Evans, who had been manager of Powell's Tillery Colliery for the past nine or 10 years, died suddenly on Tuesday. Whilst at work he had received the news of his father's death in the Rhondda Valley, and was hurrying home to catch a train. He collapsed in the garden, after having climbed a steep bank in front of his house, the cause of death being heart failure. He was 55 years of age, and previously occupied the position of manager at Llwynypia Collieries under the late Mr. Archibald Hood.

The death is announced on August 19 of Mr. Harry Clifton Adams, vice-president of the Westmoreland Coal Company, Philadelphia. Mr. Adams was a graduate of the class of 1880, University of Pennsylvania; became connected with the Westmoreland Coal Company in 1881; elected secretary in 1886; and in 1892 was elected vice-president in charge of sales. Mr. Adams was a recognised authority on gas coal, and wrote various papers on the gas coals of the United States.

The death has occurred of Mr. Thomas Aisbett, who was a "marra" with Mr. Thomas Burt when both were miners at Bebside. Mr. Aisbett, who was 72 years of age, worked at Bebside for over 50 years.

Mr. William Patterson Ruddock, ship broker and coal exporter, of Newcastle, has died at the age of about 40 years.

The death is announced of Mr. Thomas Gwilliam, Coleford, colliery and iron mine owner, in the Forest of Dean. He had been in ill-health for nearly a year. Whilst transacting business at an auction sale on Friday of last week, he had a seizure, from which he did not recover. He was the owner of the Folley Colliery, and also director of the Robin Hood and High Meadow iron mines.

The death is reported, in action, of Capt. Hamilton, Royal Engineers, formerly assistant manager of Lochgelly Iron and Coal Company Limited.

Iron Ore Output Bonus.—Following the negotiations between the Furness Miners' Union and the Ministry of Munitions, the miners have agreed, by ballot at Dalton, to accept an immediate war bonus of 1s. per shift above and below ground, and 6d. per shift to lads under 16. A bonus of 1s. per week is to be paid to all workers for every 200 tons of increased production of iron ore above the present output. These advances represent 6s. per week, in addition to the bonus on tonnage raised on the increased output being so strongly urged by the directors of steel production.

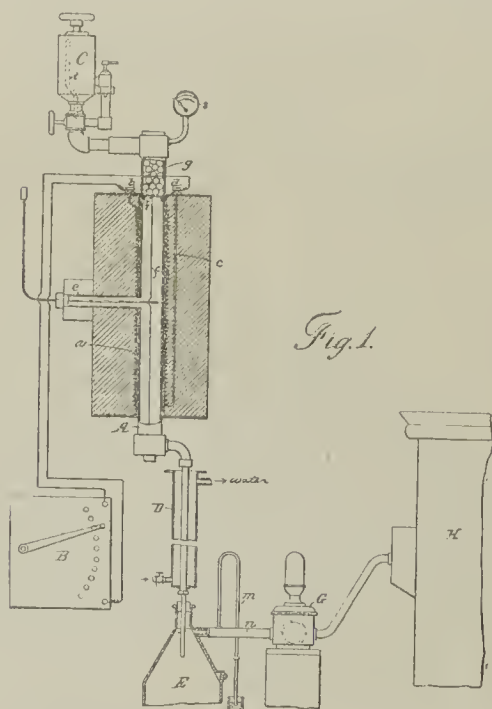
State Ownership in America?—President Wilson is said to be contemplating the purchase and operation of the Virginian Railway, primarily a coal-carrying road, and also the purchase of an extensive area of coal fields in Kentucky which can be made accessible by a short extension of the Virginian Railway, in order to secure an ample and cheap supply of coal for the United States Navy. It is claimed that Government ownership of the Virginian Railway and the coal fields would ensure an abundance of coal, and effect a saving of £400,000 annually.

Coal Prices in Paris.—By a Regulation in force since the 1st inst., coal for domestic purposes can now be purchased only by municipal tickets, and at the following fixed rates:—Flaming coal, 110 fr. per ton (5½ fr. per sack of 50 kilograms); anthracite, 130 fr. per ton (6-50 fr. per 50 kilograms), d/d. A reduction of 9 fr. is allowed on coal taken direct from the wharf. The price of coal for central heating, supplementary allowance coal, and briquettes will be fixed later. Anthracite, being scarce, will probably not be available after September. Measures are being taken to increase the output of briquettes and ovoids.

Forthcoming Examination Under Coal Mines Act, 1911.—An examination for first- and second-class certificates of competency as manager and under-manager of coal mines will be held on November 20, 1917, at Edinburgh, Newcastle-upon-Tyne, Sheffield, Wigan, Cardiff, and Bristol. An examination for certificates of qualification as surveyors of mines will be held at the same place on November 21. Candidates must, on or before October 1, send their names, and state the district in which they are employed, to the Secretary at the Home Office, Whitehall, London, S.W. 1, from whom all particulars can be obtained.

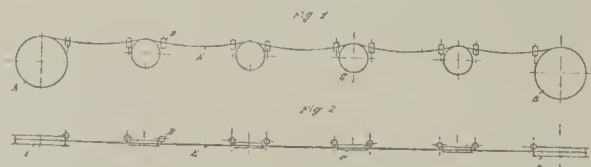
ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

1915). *Method of Converting Heavy Hydrocarbons into Light Hydrocarbons*. F. B. Dehn, Broad Sanctuary, Westminster, London, S.W. (Communicated by the Hydrocarbon Company, 2205, Oliver Building, Pittsburgh, Pennsylvania, U.S.A.)—This invention relates to an improved method of converting heavy hydrocarbons or those having a high boiling point into light hydrocarbons having a low boiling point. The accompanying drawing shows a simple form of apparatus adapted to the practice of this invention. In order to heat the retort A, any suitable means may be employed, as, for example, a resistance wire wrapping *a* enveloping the gas generating tube A, and suitably insulated therefrom. One end of the resistance coil is connected to a binding post *b*, and the other end through a conducting rod *c* to the binding post *d*. A rheostat B is provided for controlling and regulating the current supply to the coil in accordance with the heat effects desired. Midway of the tube A is located the branch *e*, through which is inserted a suitable pyrometer couple whereby the temperature prevailing within the generator may be read from an appropriate instrument. A supporting rod *f* provided at its top with a disc *f'* having a series of perforations serves to support a small quantity of refractory filling material *g* (as, for instance, steel balls) located in the upper portion of the generating tube A and within the same, the functions of this filling material being to afford an efficient spreading surface for the vaporisation of the material treated. The liquid is supplied to the top of the generator A above the filling material *g* from a suitable source of supply, as, for instance, the feeding cup or receptacle C. The pressure in the upper part of the feed cup or receptacle is equalised with that in the tube A through an equalising pipe *t* communicating at its lower



end with the tube A, and at the other end above the level of the oil in the feed cup C. The generating tube A may also be provided with a suitable gauge *s* to indicate the pressure prevailing therein. At its lower end, the generating tube A discharges through a condenser D into a receptacle E for the collection of fluid condensates. The gaseous products evolved during the operation are continuously withdrawn through the pipe *n* by means of a vacuum pump G, which, in turn, discharges them into a gas holder H, as shown, or, if necessary, through a scrubber or purifier before reaching the gas holder. The operation of the invention in the form of the apparatus shown is as follows: When the generating tube A and the filling material *g* contained therein have attained the appropriate temperature, the oil is permitted to enter the generating tube A, where it spreads over the filling material, and is gasified. In the meantime, the vacuum pump G has been set in operation, and draws the gases downward into the cracking zone of the generating tube A, whereupon these gases are immediately cracked. The products of the cracking are withdrawn by the vacuum pump G from the cracking zone before opportunity is afforded for polymerisation or decomposition of the hydrocarbon gases and their place is taken by gases from the zone of filling material *g* above. In this manner and continuously the hydrocarbon gases, as quickly as they form, are withdrawn, and after passing through the condenser and receiver for the removal of the condensable vapours, solids, etc., are forwarded through the vacuum pump G to the gas holder. For general purposes, and with apparatus of the kind and relative dimensions indicated in the drawing, a temperature of approximately 900 degs. Cent. is appropriate and sufficient. (Four claims.)

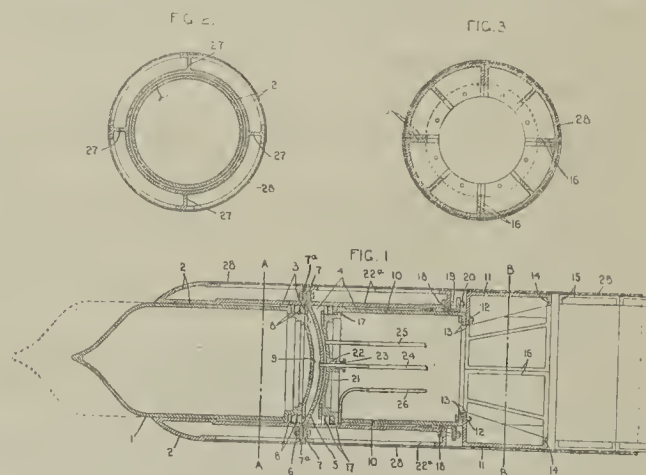
103998. *Improvements in Rope Haulage Systems*. Compagnie Générale Electrique, Rue Oberlin, Nancy, Meurthe and Moselle, France.—This invention relates to a haulage system comprising a tractor cable pulled by capstans, and running around special rollers disposed in such manner that they permit the use of a slightly stretched cable, and such that, on the other hand, the passage of the connecting ropes of the vehicles drawn thereby is automatically effected, this



passage otherwise being independent of the form of the rollers and of the mode of securing the connecting rope to the tractor. Figs. 1 and 2 show respectively in elevation and in plan a diagrammatic view of the whole of a haulage installation. The tractor cable E, which is wound at one extremity around a winding pulley or drum A, and at the other around a regulating pulley or drum B balanced by a counter-weight if necessary, rolls around rollers C, which are generally cylindrical, and is maintained on these rollers by the rollers D, which may be single or of variable form and inclination. If the direction of alignment of the rollers is changed, a supplementary supporting roller

is disposed at the point of change of direction of the cable, and that when the angle formed by a change of direction is convex and very acute a single supporting roller is sufficient, but in such a case this roller should include a neck. Where the cable is an endless cable, a second series of rollers placed beneath the first series will support the return flight, which could be utilised for haulage in the opposite direction. (Twelve claims.)

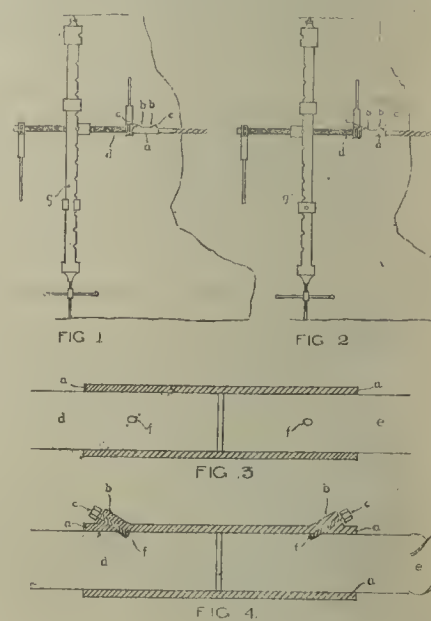
107631. *Improvements in Underground Tunnelling, Boring, and Shaft Sinking*. B. Mott, 9, Idlesleigh-mansions, Caxton-street, Westminster, S.W.—This invention relates to an improved apparatus for forming underground tunnels, shafts, or the like. Fig. 1 is a longitudinal sectional elevation of one embodiment of tunnelling apparatus; fig. 2 is a transverse section on line A—A; and fig. 3 is a transverse section on line B—B of fig. 1. Referring to the drawings, 1 and 2 are concentrically arranged pushers or tunnelling rams, the smaller diameter pusher 1 being, as shown, slidably arranged within the forward portion of the outer and larger diameter pusher 2. The forward or nose end of the smaller pusher 1, when in the normal or non-operated position shown, preferably projects a suitable distance beyond the forward end of the larger pusher 2. These pushers 1 and 2 are, as shown, hollow castings, preferably of steel, and the larger pusher 2 is divided midway or about midway of its length into two chambers or cavities 3 and 4 by a partition or wall 5 which, in the example shown, is formed integrally with the rear portion 22^a of the pusher 2. As shown, the larger pusher 2 is made up of two sections or portions (each of which may be a single casting, as shown, or may be built up of suitable segmental castings bolted or otherwise secured together) secured together by means of bolts 6 passing through flanges 7, 7^a on the adjacent ends of the sections. The forward ends of the pushers 1 and 2 are of suitable pointed form, for instance, as shown in fig. 1, and this end of the pusher 2 may have inner and outer walls, as shown, or this end of the pusher 2 and the nose end of pusher 1 may be made solid if required. Between the inner or rear end of the pusher 1, which end, as shown, is of reduced diameter, and the inside of the larger pusher 2 suitable packing rings 8 are placed. 9 is a dished cover plate suitably secured, for instance, by means of bolts, to the rear end of the pusher 1. 10 is a cylindrical abutment or ram slidably mounted within the chamber 4 in the rear portion 22^a of the pusher 2, and 11 is a hollow cylindrical abutment member suitably secured to the rear end of the said ram 10, for instance by means of the bolts 12, passing through the annular flanges 13 on the parts. The rear end of the abutment 11, which is preferably provided with an annular flange 14, is, in the working of the apparatus, adapted to bear or abut against the adjacent tunnel ring or liner 15, which may be of the usual or any suitable construction, for instance, cast iron or steel rings, which may be built up of a suitable number of segmental castings secured together in the usual or any suitable manner. The abutment member 11 is built up of a suitable number of segmental castings, which may be secured together by bolts (not shown) passing through the webs or longitudinal ribs 16 on adjacent segments. 17 are suitable packing rings interposed between the reduced diameter forward end of the ram 10 and the inside of the pusher 2, and 18 is a suitable packing gland interposed between the outside of the ram 10, adjacent its rear end, and the inside of the pusher 2, the diameter of which at this portion is, as shown, slightly increased. The gland 18 is adjustable by means of studs 19, in the rear end of the pusher 2 and nuts 20. The application and use of such packing rings will be well understood by engineers dealing with hydraulic power apparatus. Clearance is provided between the inside of the larger pusher 2 and the outside of the smaller pusher 1 and between the outside of the ram 10 and the inside of the larger pusher. The forward end of the abutment or ram 10 is closed by a dished head or plate 21 formed integrally with the body of the ram, and on the inner side of this plate 21 a suitable gland box or casing 22 is formed in which a packing gland



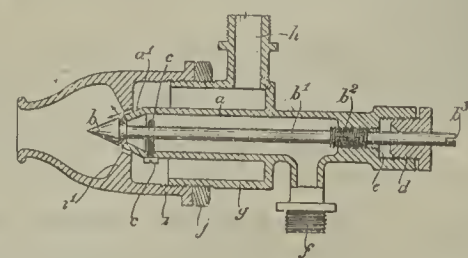
23 is fitted for the purpose hereinafter mentioned. 24, 25, and 26 are portions of the pipes through which the pressure fluid is admitted to and exhausted from the pressure areas or spaces of the apparatus as hereinafter described, the forward end of the pipe 24 being secured in a hole in the partition wall 5 of the larger pusher 2 and being arranged to slide in the gland 23 as the said pusher is moved forward. The forward end of the pipe 25 is secured in a hole in the plate 21 forming the head or forward end of the ram 10, so as to deliver the pressure fluid to the space between this head and the partition wall 5 of the pusher 2. The pipe 26, as shown, is secured at its forward end in a hole in the side or wall of the ram 10, so as to deliver the pressure fluid to the annular space between the ram 10 and the inside of the pusher 2. 27 are flanged or T-shaped ribs or projections formed longitudinally on the pusher 2, and 28 is an outer casing or "skin," which may be made of sheet steel (for instance, steel plates riveted or otherwise suitably secured together so as to form a cylindrical casing) which is secured to the exterior of the pusher 2, for instance by means of bolts or rivets. The casing 28 embraces and is supported by the flanges or T-heads of the ribs 27, to which the casing may be suitably secured. Assuming the apparatus to be in proper position within the usual shaft provided for the commencement of tunnelling operations, and the parts of the apparatus in the positions shown in fig. 1, on the admission of the pressure fluid, through pipe 24, to the portion of the chamber 3 or space between the plate 9 or inner end of the pusher 1 and the wall 5, the pusher 1 will be forced forward the required distance out of the pusher 2, for instance, as indicated by the dotted lines in fig. 1, whereby the earth will be displaced on all sides by the pusher 1, thus forming a bore or section of tunnel corresponding in diameter to that of the smaller pusher 1. On the completion of this operation, the

pressure fluid is exhausted (through pipe 24) from the above-mentioned space or chamber 3, and fluid pressure is then admitted, through pipe 25, to the portion of the chamber 4 or space between the partition wall 5 of pusher 2 and the head 21 of ram 10, whereby the larger diameter pusher 2 is forced forward and displaces the earth on all sides of said pusher, thus enlarging the bore or diameter of the tunnel section formed by the forward movement of the pusher 1, as above described. When the pusher 2 has been forced forward the required distance (for instance, so that the pushers 1 and 2 are again in the same positions relatively to each other, as shown in full lines in fig. 1) the pressure fluid is exhausted, through pipe 25, from the above-mentioned space or portion of chamber 4. During the above-mentioned forward movements of the pushers 1 and 2, the right hand or rear end of the abutment member 11 will bear against the tunnel ring or liner 15, or against some other suitable abutment. The above described operations having been completed, it is necessary to advance the ram 10 and abutment member 11 so that they again occupy the position shown in fig. 1 relative to the pushers 1 and 2. This is effected by admitting pressure fluid, through pipe 26, to the annular space between the ram 10 and the inside of the pusher 2, and when the ram 10 and abutment member have been so advanced another tunnel ring or liner 15 is placed in position in the usual manner. The operations above described are repeated until the required length of tunnel is constructed. If desired, the closing head or plate 9 on the inner end of the pusher 1 might be omitted, in which case the pressure fluid would enter and completely fill the hollow pusher 1. (Five claims.)

107679. *Improved Socket for Miners' Drilling Machines*. E. Edwards, Gwyn-villa, Pen-y-groes; and D. Richards, 3, Caemelyn-terrace, Pen-y-groes, Llandudno, Carmarthenshire.—This invention relates to an improved socket for miners' drilling machines for the withdrawal of bent or stuck drills. The socket is of the same internal diameter, thickness, and length as the ordinary sockets, with projections threaded obliquely to receive threaded steel bolts, with hexagonal heads, so that when tightened the aforesaid bolts are received into sunk slots in the driver and drill of the aforesaid miners' drilling machines. This invention is hereinafter described with reference to the accompanying drawing, which is an elevation and detail drawing of an ordinary miner's drilling machine with the improved socket applied thereto. In the construction of the invention, a socket *a*, of the same internal diameter, thickness, and length as the ordinary sockets is adapted with projections *b* thereon threaded obliquely to receive threaded steel bolts *c* with hexagonal heads. The driver *d* and drill *e* are sunk obliquely *f*, to receive the aforesaid bolts. The bolts *c* are tightened and boring commenced. Should the drill *e* come in contact with any hard mineral, it is diverted, with the result that the drill *e* is slightly bent, entailing many hours labour in its withdrawal. Now, with this improved socket *a* the bolts *c* are loosened, the socket *a* taken off, drilling stand *g* reversed, socket *a* is re-tightened by means of the bolts *c*, and the withdrawal of the bent or stuck drills is conducted in exactly the same manner as the boring is conducted. (One claim.)



107665. *Improvements in Liquid Fuel Burners*. H. N. Davis and W. R. Twigg, both of the Diamond Foundry, Luton.—This invention relates to improvements in the construction of liquid fuel burners of the kind comprising an inner tubular nozzle member having a frusto-conical end, an outer tubular member, a nozzle adjustable on said outer tubular member to co-operate with the frusto-conical end, and an axially adjustable valve member of conical or other form for co-operation with the outlet opening in the inner tubular nozzle member. The accompanying drawing illustrates the improved liquid fuel burner in sectional elevation. The inner tubular nozzle member *a* is arranged to deliver its fuel in a forward and outward direction, whilst the steam or air is delivered in a forward and inward or converging direction, as indicated by the arrows. To this end the inner tubular nozzle member *a* is formed with a frusto-conical end *a'* and with a tapering or outwardly flared exit opening for the fuel, which opening is adapted to be varied as to size by means of a shaped extension piece or valve member *b* of diamond conical or other suitable form, which is adjustable in relation to the end of the said inner nozzle member *a*. Preferably the aforesaid extension piece or valve member *b* is mounted upon a stem *b'*, which is guided axially within the inner tube *a* by suitable means, such as by set screws *c*, and screw-threaded at



*b*² near its outer end, where it engages with a correspondingly screw-threaded bore at the outer end of the tube *a*. The extreme outer end of the valve spindle *b*¹ passes out through a gland *d* and stuffing box *e* to provide a tight joint, and in order to effect the rotation of the spindle *b*¹ and the adjustment of the valve, its end is provided with a transverse notch *b*³ to receive a screwdriver, or alternatively with a worm and worm wheel or equivalent reducing gear to render possible still finer adjustment of the flow of fuel. The fuel enters the inner tubular member *a* by means of a screwed nipple or the like *f* provided at a convenient portion of said member, and it may be supplied thereto at any desired pressure from a few inches head upwards. The body portion of the outer tubular member

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs, 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

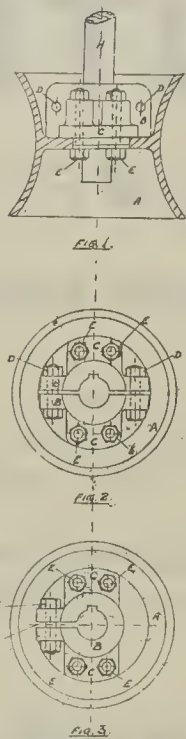
47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

7, to which the air or steam is adapted to enter by means of a screwed nipple or the like *h*, is preferably formed or shown in one piece with the body of the inner member *a*. At its forward end it is externally threaded to receive a suitably shaped nozzle *i*, which is mounted thereon, and adapted to be fixed in position by means of a lock nut *j*. At its rear portion the adjustable nozzle is formed with a central perforated diaphragm *k*, through which the frusto-conical end *a'* of the inner tubular member *a* is adapted to project. The perforation in the diaphragm *k* is tapered in cross section, as shown, so as to enable it to conform more or less to the tapering exterior *a'* of the inner tubular member *a*. Thus, as the nozzle *i* is screwed on or off the body portion *g*, a corresponding variation will be made in the size of the annular orifice between the edge of the diaphragm *k* and the tapering end *a'* of the inner tubular member *a*, thus enabling the air or steam supply to be regulated at will to suit any given conditions or the kind of fuel supplied. Where air is used in the burner, it is preferably used at a pressure of at least 5 lb. to the sq. in. It will thus be understood that the stream of fuel will be intersected by the stream of air or steam, and thereby thoroughly atomised and delivered in any suitable form of jet according to the kind of nozzle *i* employed. (Two claims.)

107715. *Improvements in Mounting Winding Drums.* R. Roger, of Robert Roger and Company Limited, West-row, Stockton-on-Tees.—The object of this invention is to simplify the method of fixing on or removing from their shafts the winding drums of steam cargo winches, commonly known as whipping and warping drums. To accomplish this object, two suitable pieces are provided designed to be fit and secured to a shaft by means of bolts or studs and forming a boss in halves, flanged at one end for being fit and bolted to a ring flange formed on the inside of a winding drum, which is subject to wear and to require periodical renewal. As an alternative arrangement the boss may be made in one piece with a slit in one side so arranged as to nip the shaft by means of bolts or studs. In order that the invention may be readily understood, the accompanying drawings show fig. 1 a sectional elevation, fig. 2 an end view of same, and fig. 3 an end view of the alternative arrangement. The same reference letters refer to similar parts in each figure. A is the winding drum, B, B constitute the boss which is in halves secured together by means of bolts D, D. The said boss has flanges C, C at one end of each half to which the winding drum is secured by means of the bolts E, E, E, E. As an alternative, the boss B may be made in one piece, with a slit F at one side, as shown on fig. 3. The complete drum, when mounted on and secured to a shaft shown at H, may have the part A (which is subject to wear and to require periodic renewal) removed by releasing the bolts E, E, E, E, leaving the boss in halves on the shaft, unless it is required to remove it, when the bolts D, D must be released. (One claim.)



107734. *Improvements in Rock Drills.* G. Constantinesco, the Haddon Engineering Works, Honey-pot-lane, Alperton, Middlesex; and W. Haddon, 132, Salisbury-square, Fleet-street, London, E.C.—The present invention relates to rock drills adapted to be driven by alternating currents produced in liquid columns. In the accompanying drawings, fig. 1 is a longitudinal section of one type of rock drill according to the invention; fig. 2 is a sectional end elevation on the line 14—14, fig. 1; fig. 3 is a detail section of part of the drill casing; fig. 4 is a sectional elevation on the line 16—16, fig. 3; fig. 5 is an end elevation of the drill casing with the rear cover removed; fig. 6 is a plan of the portion of the casing illustrated in fig. 3; and fig. 7 is a sectional elevation on the line 19—19, fig. 3. The drill casing is mounted in guides in a cradle 30, along which it is fed forward by the feed screw 31. The drill bit 32 is held by a spring collet 33 in the chuck 34, which is formed in one with the piston 35. The piston 35 slides in bearing 36 in casing, carrying a cup-shaped spring abutment 37 having an outwardly projecting flange 38, so that it forms an abutment for the two springs 39, 40, which are adapted to hold the piston in a mean position about which it can oscillate. The springs are of such strength that the piston is in equilibrium under their action, and the mean pressure in the wave transmission line in the position which it occupies at the moment the blow is struck

piece 47 with internal key ways to fit splines 48 on the end of the piston. The end of the ratchet piece is provided with face teeth adapted to engage with face teeth on the rotor ratchet piece 49, which carries a pin 50 engaging with a Scotch yoke 51 on a piston 52 pressed inwards by a spring 53, and subject to the liquid impulses in the wave transmission line. The oscillations of the liquid in the wave transmission line are thus transmitted to the piston 35 to give it a reciprocating movement, and also give an oscillating movement to the rotor ratchet piece, thus intermittently rotating the drill in one direction. A spring 56 is provided to keep the two ratchet pieces in engagement with each other. (Two claims.)

107746. *Improvements in Coal Elevating Mechanism.* J. Proctor Limited and A. Holden, both of Hammerton-street Iron Works, Burnley.—This invention relates to coal or like elevating mechanism of the type described in the Specification of Patent No. 23799/06, and in particular to the connecting rod which governs the movements of the ram therein. Fig. 1 is a side elevation of the part of the apparatus to which this invention relates, omitting the coal bunker and its appurtenances, and showing the oil bath in section; fig. 2 is a rear elevation. The reference numeral 1 indicates the framework of the machine generally, 2 the main shaft or an extension thereof, 3 the elevator casing, 4 the ram shaft on which are mounted the lever 5 and ram finger 6 (fig. 2), the latter engaging a recess in the underside of the ram (not shown). In the lever 5 are a series of holes 7, through any one of which can be passed a pin for adjustably securing to the said lever the connecting rod 8. Pivoted at 9 is the clog lever having in its upper arm 10 a slot 11, and on its lower arm 12 a cam surface 13. A double tappet 14 on the rotary shaft 2 engages this cam surface, and imparts to the clog lever a rocking movement. Working through guide brackets 15 on the elevator casing is the traverse regulating rod 16, which can be raised and lowered by means of the screw 17 and wheel 18. The lower part 16a of this rod 16 below the joint 16b is linked to the rod 8 by means of a pin 19 passing freely through the slot 11 in the clog lever. The numeral 20 indicates the oil bath, through the wall of which the clog lever enters, and at every oscillation on the return stroke dips into the oil. It will be obvious that when the wheel 18 is operated to lift the rod 16 the pin 19 will be moved further up the slot 11, that is, further from the axis or fulcrum 9 of the clog lever, and thereby the stroke

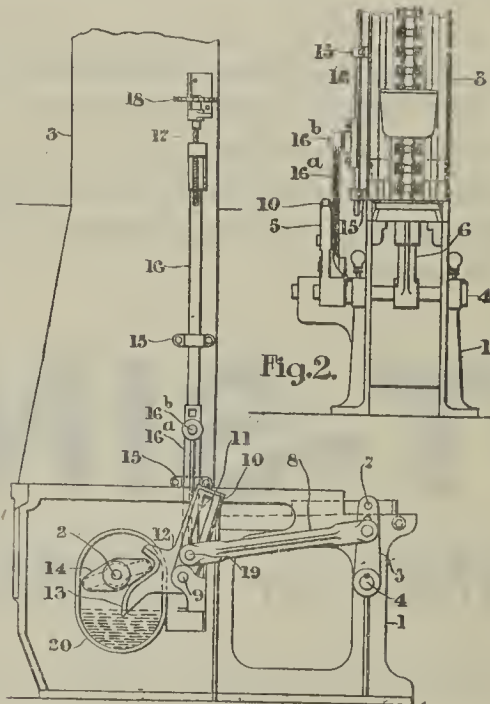


Fig. 1.

of the rod 8 will be increased, thus increasing the are through which the ram shaft 4 and ram finger 6 oscillate, and that the length of stroke of the ram can thus be regulated. (Three claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Adams, H. E. F. Goold. Internal combustion engines. (12477)
 Antrobus, W. Utilisation of water power and regulating flow. (12442)
 Balanced Engine Syndicate. Internal combustion engines. (12286)
 Barrett, L. T. G. Tool holder for pneumatic hammers, etc. (12573)
 Bennis, A. W. Internal combustion engines. (12256)
 British Thomson-Houston Company (General Electric Company). Power systems. (12276)
 British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Control systems for electric motors. (12478)
 British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Phase converters for polyphase distributing systems. (12479)
 British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Phase balancers for polyphase distributing systems. (12480)
 Cajender, D. Pulverising stones, etc. (12440)
 Craymer, H. J. Unloading or discharging devices. (12529)
 Didier, J. L. Internal combustion engines. (12434)
 Emery, T., and Orlebar, B. O. C. Fire lighters, and process of manufacturing same. (12307)
 Evans, L. Portable cranes of the jib type. (12585)
 Farrer, F. H. Internal combustion engines. (12369)
 Frewen, E. J. Process for treatment of peat, etc. (12385)
 Funck, G. Internal combustion engines. (12369)
 Gardner, L. Hydrocarbon burners. (12288)
 Green, H. Automatic grab. (12252)
 Halliwell, F. L. Level indicator or clinometer. (12521)
 Hayes, W. H. Internal combustion engines. (12337)
 Heyl, G. E. Compound liquid fuels. (12588)
 Kerr, R. P. Internal combustion engines. (12286)

- Knight, J. Internal combustion engines of two or four stroke cycle, etc. (12331)
 Krupp Akt.-Ges. Grusonwerk, F. Treatment of ores. (12590)
 Marshall, C. F. D. Internal combustion engines. (12477)
 Mills, J. C. Clinometer. (12532)
 Nitrogen Products and Carbide Company, and Perkin, F. M. Destructive distillation of carbonaceous materials to increase aromatic by-products thereof. (12350)
 Ross, J. S. Automatic grab. (12252)
 Scott, B. D. Internal combustion engine. (12312)
 Scott, R. Machinery for saving driving power. (12457)
 Simkiss, J. Oiling apparatus for lubricating axles of colliery tubs, etc. (12459)
 Singer, L. Process for removal of tarry matter from ammonium salts. (12547)
 Singer, L. Removal of sulphuric acid, tarry substances, etc., from gases. (12549)
 Smith, C. H. Briquettes, and method of making same. (12433)
 Spina, E. Lanzerotti. Internal combustion engines. (12407)
 Still, W. J. Multi-cylinder internal combustion engines. (12485)
 Still, W. J. Two-cycle internal combustion engines. (12486)
 Still, W. J. Steam engines and turbines. (12543)
 Stirling, D. E. Tube joint attachments for superheaters, etc. (12343)
 Tate, W. H. Internal combustion engine. (12312)
 Tillotson Manufacturing Company. Fuel mixers. (12424)
 Villiers Engineering Company. Internal combustion engines. (12369)

Complete Specifications Accepted.

(To be published on September 20.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 11973. Marvin, C. J. Apparatus for generating gas. (108889)
 12037. Halkett, R. Liquid fuel burner. (108895)
 12147. British Thomson-Houston Company (General Electric Company). Electric furnaces. (108902)
 12270. Neil, J. Firing doors of steam boiler furnaces. (108905)
 12596. Thomas, R. B., Thomas, H. S., and Davies, W. R. Additions to machinery or apparatus employed in the manufacture of tin-plates and sheets and other like metal-coated plates or sheets. (108910)
 12655. Holehouse, W. H. Boiler and other furnaces. (108912)
 13854. Thomas, L. L. Method of developing power, and rotary motor or apparatus therefor. (108933)
 14077. Bibby, H. Belts for conveyors and the like. (108936)
 14193. Chillington Tool Company and Nettleton, L. Improvements in gas furnaces with a view to the preservation of the burner pipes used therewith. (108939)
 15155. Flood, G. A. Superheaters for steam generators. (108952)
 15324. Jennings, A. L. Machinery or apparatus for washing coke, breeze, and the like. (108955)
 15890. Hartnell, G. T. Liquid fuel vaporiser. (108966)
 16680. Chivers, J., Roberts, W., and Lewis, D. Door fastener applicable for colliery trams. (108979)
 17128. Gray, T. F., and Jupe, E. J. Steam superheaters. (108984)
 17250. Cherry, L. B. Treatment of hydrocarbons for the production of other hydrocarbons of different specific gravity and boiling point. (104330)
 17648. Capron, F. Production of neutral sulphate of ammonia. (108990)
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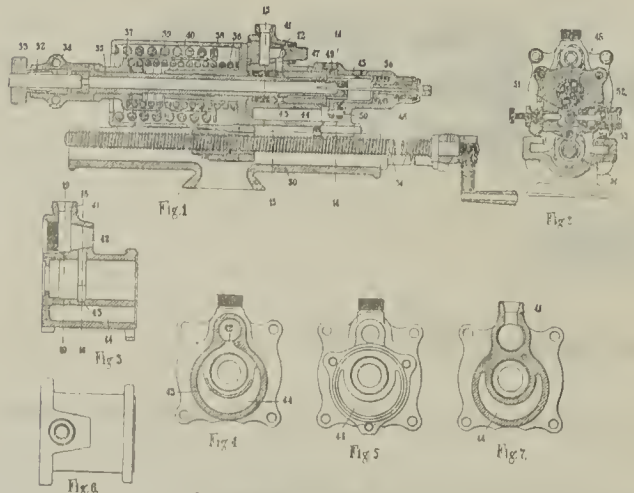
*** Any of the following publications may be obtained on application at this office at the price named **post free**.

Annual Colonial Reports: (No. 924). Wei-hai-wei Report for 1916 (for Report for 1915 see No. 885). Dated August 1917. (London: Published by H. M. Stationery Office). Price 1d. net.

PUBLICATIONS RECEIVED.

"The Elements of Coal Mining," by Daniel Burns, M.I.M.E. (Edward Arnold, 41 and 43, Maddox-street, London, W.), price 3s. 6d. net.; "The Swedish Chamber of Commerce for the United Kingdom Year Book, 1916," containing the 10th Annual Report of the Council and the Transactions of the year 1916, etc.; "Journal published by the Swedish Chamber of Commerce for the United Kingdom" (Vol. 9, No. 8), August 31, 1917.

Gueret's Anglo-Brazilian Coaling Company Limited.—With the approval of the Board of Trade, the trading name of Messrs. Amaral, Sutherland and Company Limited has been changed to that of Gueret's Anglo-Brazilian Coaling Company Limited. No alteration of the constitution of the board or the company's articles of association is involved, but it is contemplated that after the war there will be a considerable expansion in the firm's activities in the South American trade. Mr. T. J. Callaghan, J.P., is chairman and managing director, and the Hon. Lady Mackworth is a member of the board. Mr. W. E. Hughes acts as secretary and manager of the head office at Cardiff.



when drilling. The wave transmission line is connected to the inlet 41, and the whole of the space behind the piston is filled with liquid, which passes through the passage 42 to the annular groove 43, from which it can pass to the space 44, and so to the back of the piston. The piston is hollow, and has at its rear end an aperture 45 covered over a conically shaped needle 46 which is allowed through this aperture, and the piston, whence it passes down the bore of the drill, and is used for spraying out the boring. At the rear of the piston there is mounted a ratchet

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The Oxidisable Constituents of Coal: Part I.*

By J. IVON GRAHAM, B.A., B.Sc., and JAMES HILL, M.Sc.

As part of the general study of the spontaneous combustion of coal, previous researches carried out at this laboratory have dealt mainly with the problem of the absorption of oxygen by samples from different seams and different parts of the same seam, and quantitative measurements under varying conditions have been made. The heating effect of this absorption, and the quantitative determination of the gaseous oxidation products have also been measured. Very little is, however, so far known as to the nature of the substance or substances present in coal, responsible for this oxidation. This is not to be wondered at, considering the complex nature of the coal conglomerate and the difficulty that has been experienced in obtaining tangible results by the ordinary methods of chemical attack.

The methods hitherto employed in the investigation of the nature of the constituents of coal have followed two main lines:—

- (1) The extraction of coal by solvents; and
- (2) The distillation of coal under varying conditions of temperature and pressure.

Both these methods have led to valuable results being obtained and a considerable amount of light being thrown on the question of the composition of coal.

The pioneer experiments in connection with the extraction of coal were carried out by Prof. P. Phillips Bedson and his collaborators about 20 years ago, and some of the results of their interesting investigations were communicated in a paper read before the North of England Institute of Mining and Mechanical Engineers, in which the superiority of pyridine over other solvents was clearly demonstrated.

More recently, Dr. R. V. Wheeler and his co-workers† at the Government Experimental Station at Eskmeals have carried out a large number of experiments on the extraction of coal with solvents, and as a result of their investigations conclude that the coal conglomerate may be resolved by means of pyridine and chloroform into two distinct portions:—(1) That portion soluble in both pyridine and chloroform, which they term the *resinic portion*; and (2) that portion insoluble in chloroform and only slightly soluble in pyridine, which they term the *cellulosic portion*. They state that the former, on exposure to air, undergoes some form of oxidation, which exerts photo-chemical action on a sensitised plate. A review of the literature of the subject also gives the impression that the pyridine extract from coal is readily oxidisable. There appears, however, to be little in the way of definite experimental evidence to support this view, and as the extraction in every case has evidently been carried out without due precautions being taken to prevent oxidation of the coal, there is no doubt that a considerable quantity of oxygen must have been absorbed during extraction. It seemed strongly desirable, therefore, that the extraction of coal with pyridine should be performed in an inert atmosphere, and that the relative oxidisability of the extract and residue, as compared with that of the coal before treatment with pyridine, should be thoroughly examined.

Most workers are agreed that a certain amount of combination of the pyridine with the coal substance occurs during extraction, from the fact that, on analysis, both the extract and residue contained more nitrogen than the coal before extraction, in spite of every effort to remove all trace of pyridine. As it seemed probable that this combination would occur less readily at low temperatures than at high, the authors decided to carry out, in the first place, a series of extractions of coal with pyridine at the lowest temperature consistent with a satisfactory extraction, and in an inert atmosphere.

The following method of extraction has therefore been employed, and the relative oxidisability of the different portions carefully determined in the manner subsequently described.

Method of Extraction.

Fig. 1 shows the general arrangement of the extraction apparatus. This consists simply of a Soxhlet extraction apparatus, suitably modified so as to allow

the extraction to be carried out at a low pressure in an atmosphere of nitrogen. The extraction vessel B, of about 250 c.c. capacity, is fitted to the litre flask A by a ground joint, the worm condenser C being connected to B in a like manner. A is placed in an electric heater packed with asbestos, the temperature of which can be regulated. The top of C is closed with a rubber bung carrying a tube which is sealed on to a manometer tube D and a tap E, the latter being further connected to a three-way tap F, by which communication may be made to a water suction pump or to the nitrogen supply. The two ground glass joints and the rubber joint at the top of C are fitted with mercury seals to render them perfectly airtight. Some difficulty was at first experienced in devising a suitable arrangement for containing the coal in the extraction vessel, it being impossible to use an ordinary paper thimble, owing to the narrow neck of the extractor. A piece of filter paper, placed at the bottom of the extraction chamber, and covered with a pad of glass wool was tried, a plug of glass wool being also placed in the end of the siphon tube, but this arrangement did not prevent particles of coal being carried over into the flask during siphoning. Eventually a pad of asbestos fibre, well pressed down and moistened with pyridine, was placed in the bottom of

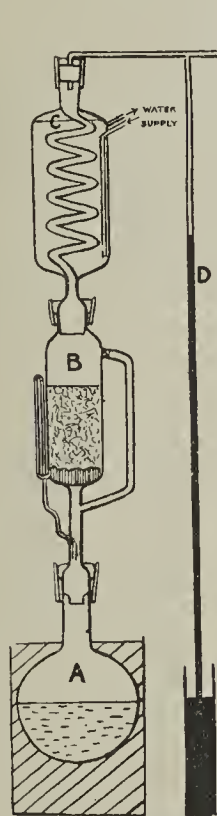


FIG. 1.—EXTRACTION APPARATUS.

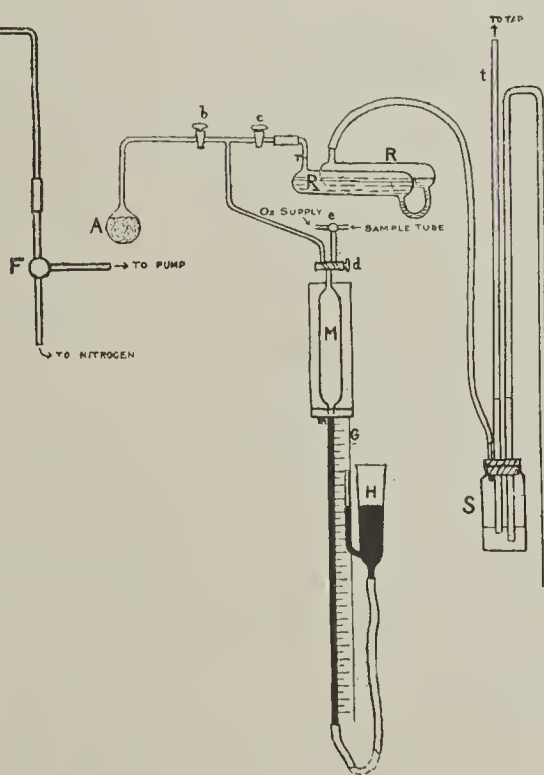


FIG. 2.—OXIDATION APPARATUS.

the extractor, giving satisfactory results. A further difficulty was met with in the fact that the coal swelled to a marked degree, and caked together on coming into contact with pyridine, so that some experience was necessary before it was discovered how much coal the apparatus would deal with, and how to prevent it caking. Two experiments may be mentioned here, showing the avidity with which coal takes up pyridine. In one case, some finely-ground dried coal was placed on a clock glass in a vacuum desiccator over pyridine; it was found that the coal absorbed so much pyridine that it swelled up and crept over the edge of the clock glass. In the other case, a sample of dry coal dust, ground to pass a sieve having 200 meshes to the linear inch, was placed in a glass bottle and exposed to pyridine vapour at a temperature of 30 degs. Cent. It was found that the coal absorbed fully its own weight of pyridine, though the vapour pressure of pyridine at this temperature is only approximately equal to 30 mm. of mercury. It was eventually found that the coal did not cake if it was thoroughly soaked with pyridine on first being placed in the extractor, and if it was not ground to too great a degree of fineness. Coal ground to pass a 90-mesh sieve was found to work satisfactorily, but anything finer than this was not permissible when using as much as 100 grms. of coal dust. It was thought possible that the rubber bung at the top of C might be acted on by pyridine vapour, but very little action took place, if any at all. The coal, together with some pyridine, having been placed in the extractor, the latter fitted to the flask A (which contained the bulk of the pyridine) and the condenser C, and connected to the gauge, as shown in fig. 1, the apparatus was first exhausted as completely as possible by the water suction pump, and then connected by the three-way tap to the nitrogen supply, and filled with nitrogen, which was allowed to pass through alkaline pyrogallic acid, so as to absorb any trace of oxygen

that might be present. This process of exhaustion and washing out with nitrogen was repeated a second time. The nitrogen was then pumped out, and the extraction carried on at a pressure of about 60 mm. (at which pressure the boiling point of pyridine is about 55 degs. Cent.) for a period of about three weeks. In this way oxygen was totally excluded from the extraction apparatus, and as far as possible all subsequent operations were carried on in an atmosphere of nitrogen. The coal used for extraction in each case was Barnsley softs dried *in vacuo* at 100 degs. Cent. Re-distilled pyridine boiling between 112 and 117 degs. Cent. was employed. The process of extraction was carried on until the pyridine coming away from the coal was almost colourless. The temperature of the coal during extraction was approximately 40 degs. Cent.

In the first extraction, 150 grms. of coal, ground to pass a 10-mesh sieve, was extracted with 450 c.c. of pyridine for four weeks, the extract obtained amounting to 10 per cent. of the original coal. In the second extraction, 100 grms. of coal, ground to pass a 30-mesh sieve, was extracted with 500 c.c. of pyridine for three weeks, 15 per cent. of extract being obtained. In the third extraction, 100 grms. of coal, ground to pass a 90-mesh sieve, was extracted with 650 c.c. of pyridine for 17 days, 10 per cent. of extract being obtained; the residue from this extraction was subsequently further extracted with 500 c.c. of pyridine, an extra 4 per cent. of extract resulting.

After the extraction was finished, the residue, in position in the extractor, was heated *in vacuo* in an electric bath, and as much pyridine as possible distilled off. It was then easily removed from the extraction vessel, quickly ground up to a fine dust, placed in a flask and heated for a period of several days on the water bath in a current of nitrogen. In this way it was obtained free from all but a very small amount of pyridine.

The extract from the first extraction was heated *in vacuo* in an electric bath, so as to distil off some of the pyridine, and the remaining solution was then poured into cold, previously boiled, water containing enough hydrochloric acid to neutralise all the pyridine. The extract was thus precipitated as a brown powder, which was quickly filtered off, well washed with cold, previously boiled, water, and dried in a current of nitrogen at 100 degs. Cent. in an electric heater. In subsequent extractions, the whole of the pyridine solution was poured into the acid solution without previous distillation, this method of treatment being found to be quicker and quite as satisfactory. The extract thus obtained appears to be completely free from pyridine.

As thus obtained, the extract was found to be a very light, dry, chocolate-brown powder. The residue was a dull, greyish-black powder, somewhat similar in appearance to finely-ground coke.

The Absorption of Oxygen.

The oxidation of the original coal and the portions soluble and insoluble respectively in pyridine, has been carried out at both 30 and 90 degs. Cent., at the latter temperature measurements of the absorption being made both in air and in an atmosphere containing approximately 90 per cent. oxygen.

For the oxidation in a current of air, the method described by Mr. T. F. Winnill in Part I. of the series of papers on "The Absorption of Oxygen by Coal,"* and subsequently used in most of the work at the Doncaster Coal Owners' Research Laboratory on the oxidation of coal, has again been employed.

The above method of oxidation is, however, only satisfactory when it is convenient to employ not less than 100 grms. of the material under examination, for oxidations at a temperature of 30 degs. Cent., although only about one-tenth of this quantity is required when the oxidation is carried out at 90 degs. Cent.

Since the quantity of extract obtained from the coal only amounted to about 15 grms.—it being found expedient, for reasons already mentioned, not to use more than 100 grms. of fine coal in the Soxhlet extraction apparatus—a different method of oxidation has been adopted. The apparatus employed is shown in fig. 2, and is similar in some respects to that used by Mr. Winnill to measure the total absorption of oxygen by Barnsley Hard coal. The dried sample of coal, extract, or residue, was weighed into a small flask A. The latter was then quickly sealed on to the remainder of the apparatus at a, and then completely evacuated, the tap b turned, and the apparatus then fixed in position so that A was completely immersed in the thermostat working at 30 or 90 degs. Cent., as the case might be.

All the gas present in the apparatus could be pumped out and accurately measured by means of the measuring vessel M (the volume of which was determined) and the mercury reservoir H. For measurement, the gas withdrawn from the apparatus could be passed through the three-way tap c, and the sample tube for subsequent analysis. The vessel A is also used for admitting a measured quantity of oxygen sample to the apparatus. M is surrounded by

* Trans. Inst. M. E., 1913-1914, vol. xlvii, p. 563.

* Abstract of paper read before the Institution of Mining Engineers at Newcastle, September 14, 1917.

† Trans. Chem. Soc., 1913, vol. ciii., p. 1704; 1916, vol. cix., p. 707.

jacket, the temperature of which is noted. The gas is pumped out or admitting gas to the apparatus. The apparatus is connected to a glass reservoir R^1 (see fig. 2) containing concentrated sulphuric acid. The pressure in R^1 is noted when the reservoir is full of gas and when empty is very small.

As it was found that the gases in A and R would not thoroughly mix by diffusion alone, the siphon arrangement depicted in fig. 2 was devised. This consists of a wide mouth glass bottle S fitted with a rubber bung, through which pass three glass tubes. Two of these are about 3 in. in diameter and about 2½ ft. high—one straight, open at the top and bottom, and reaching to within an inch of the bottom of the bottle—the other reaching to half an inch of the latter and bent at the top to form a siphon tube, the end of which leads into a sink. The third tube through the rubber

mark, the pressure of the sample measured on the gauge G and the temperature of the water jacket noted. The oxygen sample was then transferred to R and the tap d closed, b was opened, and the oxygen admitted into the flask A. When levelling the sulphuric acid in R to the mark r , the "siphon mixer" was always turned off so that the acid was levelled with the pressure in R equal to atmospheric. After the admission of the oxygen sample to R and A, the water stream down t was again turned on, and the siphon allowed to work continuously while oxidation was going on. After a definite period of time, the gas in R was withdrawn, the sulphuric acid in R being brought to the mark r , the tap c closed, and the remainder of the gas in A and connections pumped out, measured, and analysed. A fresh measured quantity of oxygen sample was again admitted as before, and the oxidation allowed to proceed for a second period.

Knowing the volume of oxygen sample added, the percentage of oxygen in this sample, and also the volume of gases pumped out and the oxygen content of the latter, the amount of oxygen absorbed by the material in A was readily ascertained. From these results, the average rate of absorption per definite weight per hour was calculated. This, then, was the average rate of absorption after a time given by the number of hours from the commencement of oxidation plus half the number of hours of the period of oxidation.

Properties of Extract.

As already mentioned, this consisted of a light chocolate-brown powder, which, on gently warming, darkened and appeared to melt. It was partially soluble in caustic soda, but practically insoluble in strong ammonia. On grinding up in an agate mortar, a peculiar crackling sound was usually produced, the material adhered to the fingers very readily, and, in general, appeared to be possessed of resinous properties. On extraction with chloroform for 48 hours, a highly fluorescent solution was obtained. On evaporation of the chloroform solution, and thoroughly drying the extract, it was found that from 35 to 40 per cent. of the original pyridine extract was soluble in chloroform. The dried chloroform extract softened when placed in a steam oven. The ultimate analyses of the pyridine extract showed an increase in the carbon and hydrogen, and also in the sulphur, as compared with the original coal. The extract was very rich in volatile matter, and gave only a slight amount of ash on burning. It will be noticed that the nitrogen was practically the same as that in the untreated coal.

Properties of Residue Insoluble in Pyridine.

This black coke-like substance retained pyridine exceedingly tenaciously. As analyses show, the nitrogen content was always higher than that of the original coal. Whether this was due to incomplete removal of the pyridine as such, or to some definite combination of the pyridine with the coal substance, is a question that for the present remains unanswered. The ultimate analyses showed that the residue contained slightly less carbon and hydrogen than the original coal.

The curves given in figs. 3, 4, and 5 demonstrate very clearly, on the one hand, that the extract in every case, shows practically no absorption of oxygen, and, on the other, that a weight of the residue equal in quantity to that present in 100 grms. of the original coal shows practically the same absorption as the 100 grms. of coal, and this is true for oxidation at 30 degs. as well as at 90 degs. Cent. and for oxidation in air and in an atmosphere containing approximately 70 and 90 per cent. of oxygen.

The case where the oxidation took place at 30 degs. Cent. seems at first glance to be an exception, in that it appears to oxidise more readily than the original coal. This residue, however, was not completely dried before oxidation, and even after 115 hours' exposure to the dry atmosphere in the oxidation apparatus still contained 1.95 per cent. of moisture. This oxidation curve is therefore not strictly comparable with the other curves for oxidation at 30 degs. Cent. Since it has been shown by one of the authors* that moisture considerably accelerates the rate of oxidation of coal, the presence of moisture is therefore the most probable explanation of the increased absorption of oxygen in this case over that of the original coal.

The portion of the coal substance soluble in pyridine at about 40 degs. Cent. cannot therefore be responsible for the spontaneous combustion of coal. These results are very remarkable, and appear to be considerably at variance with the opinion of the other investigators alluded to at the beginning of this paper.

The interesting fact that photo-chemical action is exerted by coal on a sensitised plate was first recorded by W. J. Russell.† Clark and Wheeler have shown that in the case of their extraction with pyridine and chloroform of a sample of coal from the Silkstone seam, the portion soluble in both these solvents has a much more pronounced effect upon a photographic plate than the original coal, and that the residue insoluble in these solvents has practically no action. Since the authors' experiments have, however, definitely shown that in the case of the extract obtained from Barnsley softs under the conditions already described, practically no oxidation occurs, and since the extract appears

to be very similar in other respects to that of Clark and Wheeler, it was decided to test on a sensitised plate, the action of the coal, extract, and residue obtained in the authors' experiments. A small quantity (approximately 0.2 gm.) of extract, was placed on a plate, side by side with equal quantities of the original coal and the residue after extraction, the plate being then carefully wrapped up, placed in a light-tight box, and kept at a temperature of 40 to 50 degs. Cent. for a period of about 20 hours.

Upon development, it was found that the extract had produced very little action on the sensitised film, whilst the coal and the residue both showed a marked effect. A repetition of this test gave the same effect. This result suggested several possibilities, so that further experiments were tried in the same direction. It seemed possible that the photographic effects were produced by some specific substance, which was present in the extract of Clark and Wheeler, but not in that obtained by the authors, since not only was the temperature of extraction higher than that used in the extractions described in this paper, but also no precautions were apparently taken to prevent oxidation occurring during the extraction process. Further tests were therefore made which showed definitely that the cause of photo-chemical action in the case of Barnsley softs is not extracted by pyridine. It was still possible that this action might be due to oxidation. If, however, this effect is directly connected with the main oxidation shown by coals in general, it seemed reasonable to suppose that lignite, a highly oxidisable substance, should affect a photographic plate to a much greater degree than anthracite, for example, which is almost unoxidisable at low tempera-

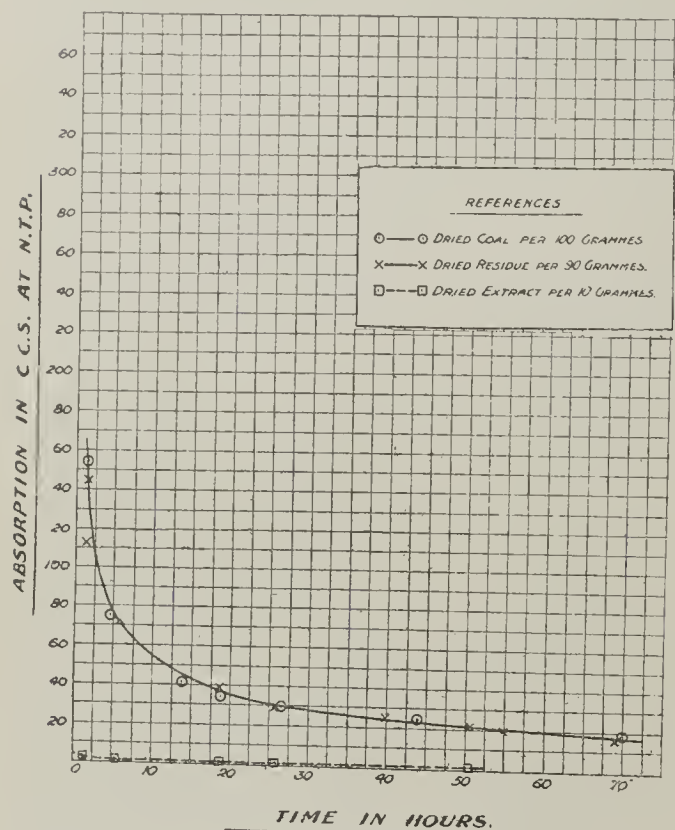


FIG. 3.—OXIDATION AT 90 DEGS. CENT. IN AIR.

bung is connected to R. A gentle continuous stream of water is allowed to run down the tube t , and as soon as the level in S reaches the bottom of this tube, the pressure in S (and also in R^1) begins to rise above atmospheric. The level of sulphuric acid in R is consequently depressed, and a small quantity of the sample in R is forced through the connecting tubes into A. When the water level in T rises above the bend of S, the water, of course, siphons rapidly over from S into the sink, until finally air rushes down t and the pressure in S and also in R^1 again become atmospheric. The levels of the sulphuric acid in R and R^1 consequently readjust themselves, and a small quantity of gas passes back from the flask A into the reservoir. The result of analysing samples taken direct from A and from R showed that this method of

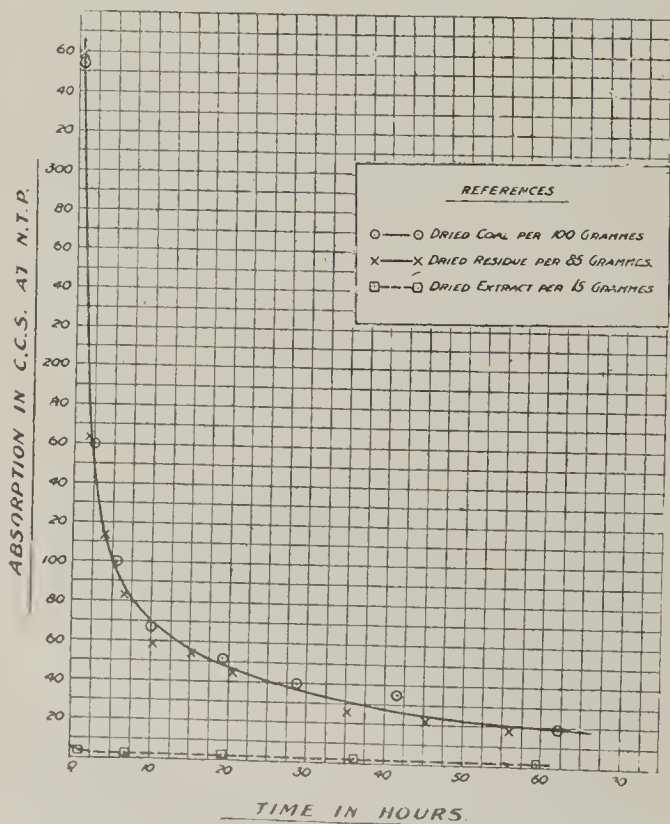


FIG. 4.—OXIDATION AT 90 DEGS. CENT. IN ATMOSPHERE CONTAINING ABOUT 90 PER CENT. OF OXYGEN

stirring up the gases between A and R is very effective. The average pressure in A and R is, of course, increased by this method, and consequently the partial pressure of the oxygen in the oxidising atmosphere is correspondingly altered. As the conditions are, however, the same for the samples examined, this difference does not affect the comparative results obtained from the different samples examined.

After the gas had been pumped out all the gas from A and the connections d to c and R was again admitted, the oxygen sample, the portion brought to the mark r , being left filled with the sulphuric acid. The tap c was then closed, and the connections d and d were completely evacuated. The gas in A and R was then gradually admitted with the oxygen sample to the gradu-

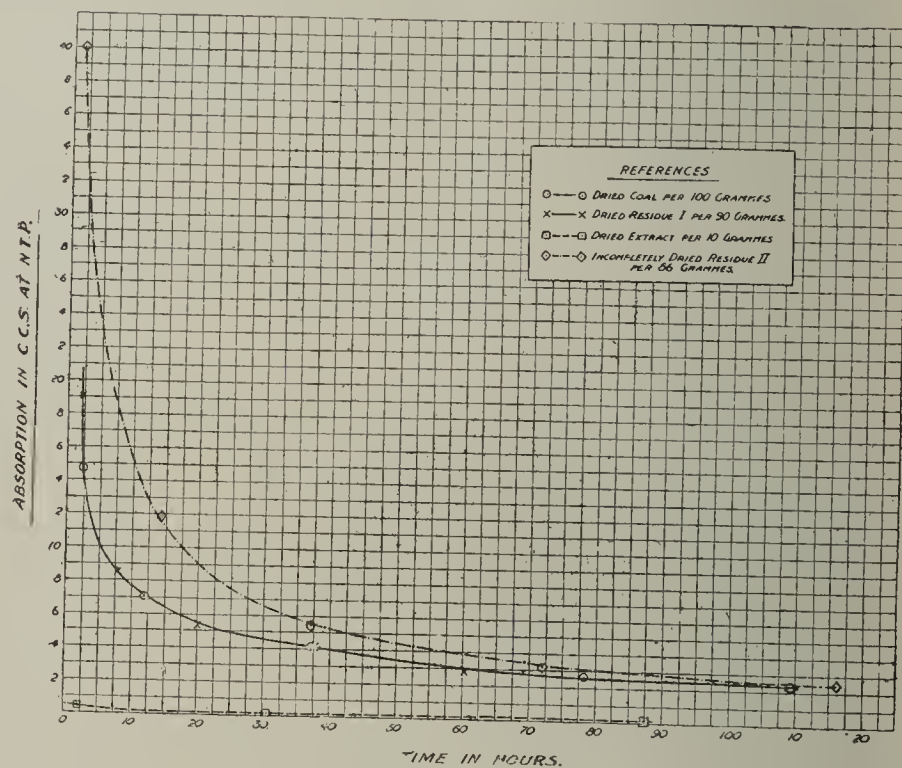


FIG. 5.—OXIDATION AT 30 DEGS. CENT. IN ATMOSPHERE CONTAINING ABOUT 70 PER CENT. OF OXYGEN.

tures. Comparative effects of fresh, unoxidised samples of anthracite, lignite, and Barnsley soft coal showed that lignite gave practically no effect, whilst anthracite approximated to the Barnsley softs. It seemed clear, therefore, that this photo-chemical action had little to do with the property of oxygen absorption, at all events, in so far as the main oxidation is concerned. The property of affecting a sensitised plate is destroyed when the coal is partially or completely coked.

Work on the extraction of coals by pyridine and other solvents, with special reference to oxidation, is being continued. A solvent which, from tentative experiments, appears to promise well, is found in ortho-chlorophenol. One of the chief advantages of this solvent is the fact that its presence can be easily detected.

The authors clearly recognise that the work described in this paper forms only a very small portion of that necessary before a thorough knowledge is obtained of the substances in coal responsible for the absorption of oxygen. It appears to them, however, that the results obtained are of sufficient interest to warrant publication at this stage. They believe that investigations carried out on these lines should help considerably in extending our knowledge of the nature of coal, and by so doing, materially assist in the development of processes for a more economic utilisation of the national coal supplies.

Coal Cards in Berlin.—The new system of coal cards came into force in Berlin last week. The cards are arranged in five groups according to the number of rooms to be heated, and each card contains 60 detachable tickets. In the first place, not more than 2 cwt. of coal will be supplied to any card-holder, and no coal may be sold to persons who, according to the recent census, have stored 2 cwt. or more. The largest amount of coal covered by any coal card is 1½ tons, and any private stores of coal in excess of that amount are liable to confiscation, and may not be consumed meanwhile.

Lead Taken Over.—The Minister of Munitions gives notice that he takes possession of all pig lead, whether virgin or re-melted, old and scrap lead, and lead residues, now or hereafter situated in the United Kingdom, with the exception of (a) such lead as may be in the possession of or due under an existing lawful contract in writing for future delivery to a manufacturer for use in such manufacturer's own works, and (b) lead specially excepted under his written authority. The lead of which possession is taken will be paid for by the Minister of Munitions on delivery, as to virgin pig lead at the prices specified in a schedule, and as to re-melted, old and scrap lead, and lead residues upon terms which will be communicated to the owners.

* *Trans. Inst. M. E.*, 1914-1915, vol. xlviii, p. 521.
† *Proc. Roy. Soc.*, 1908, vol. lxxx, p. 376.

AMERICAN NOTES.*

By SAMUEL DEAN.

Whilst it is somewhat difficult to write anything that is entirely new on American coal mining methods and conditions, the author is of opinion that there is scope for British mining engineers to compare results and report progress now that American methods are gaining in popularity throughout the British Empire.

The American employer still continues to demand even greater production per man. As the war progresses, the labour shortage is becoming more acute. Labour's demands for increased wages are making dangerous inroads on profits. It is doubtless true that during the past 30 years the majority of employers have bent all their energy towards the development of new machines. Competition has been based largely on machinery. Labour has been counted as a fixed quantity. The mistake has been in not realising fully the undeveloped ability and power of men.

Thousands of employers pay little or no attention to the health of their employees. In mining villages in the western part of America good drinking water is frequently not obtainable, and residents live largely on canned food. Stomach sickness is exceedingly prevalent, and there is much loss of time and low efficiency on that account. Advice or treatment obtained from local village doctors is generally of little value.

Life insurance companies have long advocated the need of periodical medical examination of persons not considered sick, and have even urged that provision should be made by the State for the free examination of persons unable to bear the necessary expense. The time may come when the value of a human life to the State will be appreciated sufficiently by legislators to lead them to provide laboratories and corps of experts for the free examination of indigent citizens.

The universal cry at present is for more workmen on the one hand and for more wages on the other. It is agreed that, if a great industrial conflict is to be avoided after the world war is over, both capital and labour must see the situation in its true light. The interests of both are identical, and neither can succeed permanently without the other. The only chance for either lies in securing greater production per man.

The Bonus System.

The paying of bonuses to workmen has, for several years, produced remarkable results in factories and steel works. Mr. Charles M. Schwab, in a little book entitled "Succeeding With What You Have," has explained the wonderful success of his bonus methods at Bethlehem. Only recently, however, has the system been tried, to any extent, in connection with the coal mining industry. The following method has been in operation at the mines belonging to a coal mining company in Colorado since January 1, 1917:—

The bonus is paid to employees, both miners and company men (day wage men and salaried officials) on each fortnightly pay-roll, for an increase in the average tons of coal produced per day for each mine on the pay-roll.

METHODS OF ARRIVING AT THE BONUS.

	Bonus	
	to each miner on his total tonnage	to each company man on his total earnings.
The average for each miner on the pay-roll, for each day the mine worked, for the four months period ending November 30th, 1916, was... 5.45 tons.		
	Tons.	Cents (1d.).
Bonus shown opposite each item will apply when the average for each miner on the pay-roll for each day the miner works is:—		P. cent.
	5.55 to 5.74	1
	5.75 to 5.94	2
	5.95 to 6.14	3
	6.15 to 6.34	4
	6.35 to 6.54	5
	6.55 to 6.74	6

Method of Computation.

(1) A count was made of the miners or hewers who worked two days or more during each half-month pay-roll. An average of these eight periods gave the average number of men employed during the four months.

(2) A count was made of the number of days the mine worked, excluding Sundays.

(3) The production of the mine was taken for the four months after deducting all company coal and coal produced on Sundays.

(4) After multiplying the average number of miners on the roll by the number of days worked, this product was divided into the production for the four months, the result being the average tonnage for each miner on the pay-roll for each day that the mine worked.

As will be observed, an increase in cents per ton applies to each miner and an increase in percentage to each company man for an increase average production for each miner. The bonus applies to all workmen and officials, whether employed underground or on the surface, with the exception of the mine superintendent.

The employers pointed out that several times during the four-month period a considerable tonnage had been produced in excess of the average, and it therefore put the bonus within reach of the men if they did no better than they had done during some of these periods. They further pointed out that on account of the average being based on the average number of men on the pay-roll (not on the men producing coal daily, as was the usual method), and being further based on the number of days worked by the mine, there would be a possibility for the men to increase the output per miner from three directions, namely—(1) if the miner worked more days per week; (2) if his efficiency could be increased and he sent out more coal when he did work; and (3) by the smooth and continuous operation of the mine, which enabled the company men to assist in the increase in output; by additional care, etc., towards preventing accidents to machinery or tracks, and the avoidance of any interruptions that might interfere with the production. It

was assumed that the company men would look after this latter part of the business, and no delays or stoppages of any nature, outside of full day, were considered in arriving at the average for each miner, and would not be considered in arriving at the average for computing the bonus.

The principal object of the introduction of this system was to prevent, as far as possible, absenteeism. Assuming that at a certain mine there are 340 miners and fillers employed, and that 300 of these men work, on an average, every day: if the average production per man per shift is seven tons, the average for all men (miners and fillers) on the pay-roll is only 6.17 tons, so that those men who are entitled to the bonus are prevented from receiving it by the men who are idle.

Contrary to an opinion which is quite prevalent, there is an attitude among miners in districts in America in which unions exist that causes them to attempt to limit the earnings of their fellow miners. Prohibiting hewers from entering their places on idle days often results in as much inconvenience as preventing them from driving a main slope or an advance heading that is much needed. When widening an entry for the purpose of making a parting, the mine foreman, in order to rush the job through, will frequently arrange that the men doing this work shall have a constant supply of empty cars available, and as full price is paid for the coal hewed off the side, and it is very easily mined, the men could earn from £3 to £4 a day. But if they should do so, they would be fined by their organisation for accepting more cars than the other miners.

In one instance, the men who loaded too much coal at a new parting were compelled to remain idle for two days, because the labour agreement prevented the mine foreman from employing new men in their places.

The great lack of co-operation between the union miner and the employer is shown by the frequency with which the miners lie idle in a body at every possible excuse. During the busy season, 300 miners were idle one day on account of the death of a man who had belonged to the union three years previously. Only five of the 300 attended the funeral; the rest merely loafed. To a certain extent, the tendency of the United Mine Workers of America is towards a dead level of equality.

Large Capacity Mine Cars.

On this point, Mr. Rowland B. Gascoyne, of Johannesburg, in a communication to *Coal Age*, has endeavoured to show, by quoting some figures from the annual report of the Inspector of Mines for the Middelburg district of the Transvaal, that: (1) the thickness of the seam was the most important factor governing results; (2) hardness of the coal and character of the roof came next; (3) inclination of the seam followed; and (4) under normal mining conditions the size of the mine car came last.

In order to show the fallacy of Mr. Gascoyne's reasoning, the author compares the respective results under heads (1) and (3). Assuming a seam to be 12 ft. thick, lying level, and another seam only half that thickness, but pitching at an angle of 30 degs.: it is safe to say that the output per man would be 50 per cent. more in the 6 ft. seam than in the 12 ft. seam, because the coal would fall away from the face, in the breasts driven up the pitch, and would be loaded at the neck of the shoots into large cars attached to locomotives in the levels below. Putters or drivers would not be necessary. The hewer would not have to shovel coal into cars. He would be independent of delays and stoppages, because he would have a large area of shoot to fill which would become a reservoir of coal drawn off at the bottom in quantities governed by the car capacity and haulage speed.

Mr. Gascoyne did not describe the methods of haulage in South Africa, or the type of mine car. In new mining countries, where the coal seams lie level, or nearly so, and are of considerable thickness, as found in the Transvaal and India, the latest American methods could be employed with abundant success.

Scientific Colliery Management.

"Scientific management" and "efficiency methods" are now considered necessary in all factories and workshops of any importance in America, but they are only employed by a few of the modern coal mining concerns. There is nothing new about scientific management, which embraces time and motion studies, profit-sharing, bonuses, etc., but it is sufficiently new to afford the "old timer" the opportunity of proclaiming that it cannot be applied to coal mining.

Mr. A. J. Reef has dealt with the question, and has pointed out that the laying of a room switch on an entry is an oft-repeated operation, and so worth considering. How long does it take a track layer and helper to lay one? Some managers may know. How long ought it to take them to lay one? Probably very few managers or under-managers know, because the conditions are variable. The men may have to cut a rail to admit the frog, or they may not; they may have to carry their tools half a mile to the job or not; they may have to wait for materials to be delivered or not. It is a question open for discussion whether laying a room switch is a standard operation or not. Mr. Reef describes a standard operation as follows:—

The first step in labour-saving management is to make it one. Lay the main line track so that the joints will come right for the room frogs. This will of itself partly standardise the laying of the entry track. Give the track layer a schedule, when he reports for orders in the morning, to cover his work for the day, so that there is a minimum of moving between jobs. Knowing how much moving there is to be done, a definite time allowance for it can be made. See to it that the extra driver on the preceding day or night shift has hauled to the same schedule of places the track materials needed at each. Then so far as the variables mentioned are concerned, the laying of that room switch is a standard operation. Then begin a time-and-motion study, and decide and formulate in writing the best method of doing it. Determine a reasonable time to do it by this method; teach your track

layer the method until it becomes a habit. Make a schedule for him for the day based on the time, and the moves to be made, and, by the bonus payment for performance according to the schedule, keep him up to such performance. An attendant mental advantage is here manifest. The workman, of course, cannot expect to equal that schedule and obtain his bonus unless conditions are up to standard, and a spur to the management to keep them so is thereby automatically provided.

Time-and-motion studies could be made of all the different phases of datal work and standard times determined from which schedules of daily tasks could be made up and bonus rates arranged.

Mr. R. Dawson Hall has pointed out that the value of *team work* is undoubtedly not sufficiently realised to-day by a large number of general managers or mining agents. There are managers and under-managers who spend many years of their lives expecting nothing but unpleasantness and complaints. The idea of co-operation is not sufficiently inculcated. It can be observed in different parts of the world how invariably the influence, either for good or bad, of the man in principal authority affects every man on the pay-roll, even down to the trapper boy.

Demands upon us are greater to-day than they have ever been. We have no more time or energy than our forefathers, and to meet demands we must take short cuts. Personal efficiency is considered to be physical and mental ability that finds and takes the best, easiest and quickest way to the objects desired.

Room-and-Pillar Mining Methods.

The room-and-pillar method of mining is the most economical in America, that is to say, coal can be produced at less cost by that method than by any other.

The author has never seen an explanation of the reason why the bord-and-pillar system is used in the county of Durham in preference to longwall. Longwall is universally employed in some parts of England regardless of conditions. In many instances in America where longwall has been tried, the dead work cost has been prohibitive, and much difficulty has been experienced in holding the roof behind the faces. In the majority of room-and-pillar mines, the cost of dead work is small, the roads do not have to be continually brushed or ripped, the cost of pack building is avoided, chocks are not necessary, and as 95 per cent. of the coal can be recovered in such mines, it is difficult to understand why the longwall method is employed in certain countries or districts. The packing of the goaf, as generally done in longwall mines, does not prevent damage to the surface. One can see—say, in the neighbourhood of Wigan—where large areas have subsided and artificial lakes have been formed.

Longwall v. Roof-and-Pillar.

The author earnestly suggests a discussion of longwall *versus* room-and-pillar working. He has for many years endeavoured to obtain intelligent comparisons of the two methods from mining engineers of some eminence, but so far without success. Room-and-pillar methods are generally employed in Australia, Africa, and Canada, and the discussion will be valuable to members resident in those countries.

When working coal on the lower side of the shaft, or from the outcrop, by the room-and-pillar method, a pair of slopes are driven down directly on the full dip of the seam. The main hoisting slope is generally about 10 ft. wide, inside the timbers, and the track is laid a little either to the right or to the left of the centre line, so as to allow clearance for a travelling way on one side. (In some States, the law demands a separate travelling way that is not used for haulage purposes.) At certain intervals, usually about every 1,200 ft., pairs of level headings or entries are turned off from the main slope to the right or left. At intervals of 600 to 1,000 ft., pairs of cross entries are driven up the pitch off the level entries, and the rooms are turned both to the right and the left of the cross entries. The pairs of level entries and cross entries are usually 9 ft. wide, with a 50 ft. pillar between them.

Room widths, and the thickness of the pillar between rooms, vary considerably, these dimensions being governed by local custom and the results of experiments of the more modern type of mine manager. In the past the pillars were frequently too small, and large areas of coal were lost through "weight," "creep," or "squeeze." The prime object of leaving small pillars between rooms was the mistaken notion that expense was saved by reducing the length of the narrow crosscuts or breakthroughs provided for ventilation, and for the driving of which yardage has generally to be paid. Frequently, lack of face supervision allows the miner to drive the room too wide, thus reducing the width of the pillar. Generally, the thicker the seam and the greater its depth, the wider must be the pillars and the less the room widths; certain coals, however, deteriorate when exposed, and the pillars must be larger than with harder coals.

It is very common to turn the rooms off the cross entries at "45 ft. centres"; the room "necks" are driven in 15 to 30 ft., and then the room is widened out to 18 ft. This leaves a pillar between the room 27 ft. wide, and a large pillar to protect the entry.

There is a formula—based on the thickness of the seam, the depth from the surface, and the crushing strength of the coal—for the purpose of computing the desirable pillar thickness, but, like many other formulae, the author has never heard of anyone using it. Some concerns aim to extract a third of the available coal in the first or whole working. The outbye rib of the room is continued straight up to the face, and the room is widened on its inbye side. The coal in the room is laid along the straight rib, and the work of extracting the pillars begins as soon as the pillars are driven to their destination, a distance of 500 ft. When rooms are driven over 300 ft. in length, the width of the pillar must be increased in proportion to the work of recovering the pillar coal is facilitated by "splitting" the pillar, beginning at the far end. The author has seen large areas of pillar coal in 6 ft.

* From a paper presented to the annual general meeting of the Institution of Mining Engineers.

is recovered without loss; and packing, chock or other dead work, has not been necessary that are exceedingly dangerous, and cause of valuable coal where the correct method is used. As Mr. Sam Mavor has stated, "the badness of a roof is generally the measure of the skill with which it is managed."

It is comparative that each pillar face should be kept an equal and proper distance in advance of its neighbour, that the work of pillar extraction should begin at the proper time, and be not delayed, and that the rate of retreat in the pillars should be in correct relation to the rate of advance in the whole workings.

Scientific Management in West Virginia.

The officials of the mines of the United States Coal and Coke Company in West Virginia have perhaps employed the most scientific methods of colliery management in America, and have carried out different series of time studies extending over long periods. They threw to the winds all old "practical" ideas that had come down from the past, and broke entirely new ground. They made thousands of observations of motions, which were checked, tabulated, and plotted, and drew numerous plans or projections of different panel methods. They decided upon the most economical width for rooms. They concentrated the lay-outs of the mine workings in order to reduce the expenditure of labour to a minimum. If a driver is "gathering" with a mule—that is, "mule putting" coal from the coal face to the flat or parting—they know, taking into account the distance and gradients of the roads over which he travels, what standard quantity of coal he should deliver to the flat per shift. They also know what two men should be able to do if they are gathering with a storage battery locomotive (electric storage battery locomotives are now used in gassy mines in Pennsylvania, and have the approval of the State mine inspectors where safety lamps are used exclusively).

They have covered all the motions that are made from the coal face, along the haulage roads, and until the coal is delivered into the railway cars. Published figures from one of their mines show that fillers spent 47 per cent. of their time loading coal, and 12 per cent. waiting for empties; further, that fillers had frequently loaded 35 short tons per man per eight-hour shift, and that the average per filler for one year was 16 tons per shift in a seam approximately 6 ft. thick.

These officials strive constantly to prevent lost motion, and to discover the "easiest way" for each employee to do his work. They do not permit the

AERIAL DUMPING ROPEWAY AT BALCONIE COLLIERY.

The question of dealing on the surface with *débris* got in mining coal is one which often receives only slight consideration. Whilst every endeavour should be made to stow this *débris* underground in the goaf, there is generally a large percentage which can be more cheaply brought to the surface and deposited there. Very often the hauling of this waste material from the various points underground to the surface, forms an important item in the cost of working, and in numerous instances this cost is greatly increased by the method of dealing with the material on the surface. At some collieries the dumping of *débris* cannot be effected in the immediate vicinity of the pit mouth, and the question whether a gangway, railway or aerial ropeway is to be used must be considered at the start. Other collieries, again, though fortunate enough to have ground available at the pit mouth, are in time faced with the question of either taking in more ground, which may be detached, or of raising the height of the bing. This latter point was the question which had to be considered by the Balconie Colliery Company, Fife, some four years ago, the dumping ground at the Julian pit (situated at Thornton Junction on the North British Railway system), being shallow and of restricted area. The lines of the railway company prevented extension to the north, while pit works were a hindrance on the south. After careful consideration of the situation the company decided to instal a system of aerial ropeway transmission with the idea of heightening and extending the bing in an easterly direction. Fig. 1 gives a view of the general arrangement of the system adopted. Principally in the main this type of ropeway consists of two steel wire cables $1\frac{1}{2}$ in. diameter, stretched parallel for a distance of about 700 ft. to a terminus upright mast of about 130 ft. in height, which mast is securely fastened by stay wires. Fastened to these $1\frac{1}{2}$ in. cables is an arrangement of carrier rails on which a cage, capable of holding a tub of *débris*, is conveyed to any desired point of the system. A section through the ropes and rails is shown in fig. 2. The cage receives its load at the loading dock, and is conveyed to and from the dumping ground by two $\frac{3}{4}$ in. diameter ropes, on much the same principle as a main-and-tail rope system of haulage. On the rail ropes at any desired point is fixed a rack which engages toothed wheels on the cage when it arrives at that point, and this action tilts the tub on the cage and so deposits its load. The haulage gear, which

SINKING THROUGH WET STRATA AT GREAT DEPTHS.*

By H. MÜLLER.

Since it is becoming imperative in mining operations to open up deposits at increasingly greater depths, the cover rock is always a source of more or less difficulty, according to its character. The type now to be considered is that in which the upper strata are solid and fairly dry, whilst water under heavy pressure is encountered lower down. An instance of this kind is the Northern Rhenish-Westphalian coal basin, where very wet white marl underlies the dry Emscher marl. Triassic and dyassic strata occur between the chalk and the coal measures in the north and north-west of the basin; the bunter sandstone, in particular, contains a good deal of water besides being much broken in many places.

When water-bearing strata occur in the upper rocks, the influx can generally be dealt with by pumping from the shaft sump, and this may also be done as sinking progresses, provided the amount of water is still within the capacity of the pumping plant. When that limit is exceeded, either larger plant must be installed, or some special method of sinking must be adopted.

The deeper water-bearing zones may be traversed by means of:—(1) The petrification or cementing process; (2) by keeping the inrush under by large sinking pumps; (3) by shaft boring; or (4) by the freezing process, conducted in successive stages.

To obtain any practical comparison of these methods, it is necessary to deal with definite data, and for this purpose the sinking of a shaft through very wet zones, at a depth of between 400 and 500 metres, will be considered. The diameter of the shaft in all cases will be the same—viz., 6 m., except that in boring the shaft the inside diameter in the wet zone is reduced to 5.4 m.

Cementing Process.

When the shaft approaches the wet zone, boreholes must be kept driven in advance of the sinking, so as to prevent any sudden inrush of water. The boreholes must be fitted with a standpipe, in order that they may be closed to obviate flooding the shaft when the wet zone is reached. The depth to which the standpipes must be cemented in, and the depth of the holes themselves, will depend on the firmness of the rock and the degree of hydrostatic pressure, water under a pressure of 40 atmospheres having been known to break through over 30 ft. of bunter sandstone of medium strength.

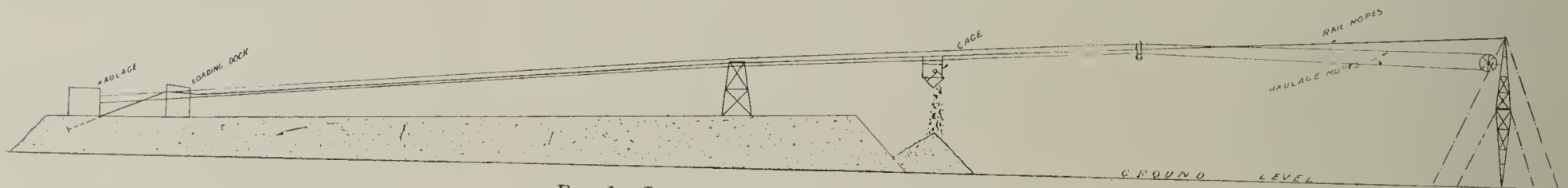


FIG. 1.—LONGITUDINAL SECTION OF ROPEWAY.

mine foremen and labourers to deviate from the plans, projections, and written instructions that have been worked out for their aid. Their plotted charts and curves show 100 per cent. efficiency in comparison with actual results.

It should be noted that the wider the room, the greater is the efficiency of the shortwall machine, because the number of fittings necessary to produce a given quantity of coal is governed by the width of the room. Wider rooms, with double tracks, permit of greater concentration, allowing two, three, or four fillers to work in a room, and enabling the drivers to supply empty cars at regular intervals.

Some Comparisons.

(1) Miners and other workers are housed better in Germany than in America, but the output per man and earnings are far higher in the latter country than in the former.

(2) When the Prussian Minister of Commerce visited the United States some years ago, he reported that Americans were "very careless about the life and health of the working classes." There is a marked tendency towards a large reduction in the accident rate in all industries to-day, caused mainly by the voluminous amount of criticism; but the country is still very careless about the health of its workers.

(3) American exporters of coal are handicapped because the tonnage of American vessels now engaged in overseas trade is less than it was 100 years ago. The very near future is expected to see a vast improvement in this direction.

(4) As the result of scientific management applied to manufacture, salesmanship, and administration, Germany has made greater proportionate gains in wealth than any other country except the United States.

(5) German prosperity has been built up on principles in many respects quite the opposite of those generally held in America.

(6) The American Government intervenes in business to prevent combination and restore competition.

(7) The German Government intervenes to prevent competition and restore combination.

(8) Socialists in Germany favour the formation of syndicates, because these make conditions of employment more stable, increase wages, and the number of men employed by expanding the industry.

(9) There is a difference between the American trust and the German syndicate. The syndicate or cartel does not destroy the small producers.

Protective tariffs are attacked on the ground that they favour the formation of trusts.

Compulsory education is advocated for the same reason.

Germany goes to school 240 days in the year, while the United States school year contains about 180 days.

Technical and commercial schools have few counterparts in America.

is motor-driven, stops automatically for the necessary length of time to allow the material to fall out, whereupon it starts the return journey and automatically stops at the loading dock, with the empty tub ready to be pulled off. The loading dock is placed conveniently to the pit mouth, and the only labour necessary is that of one man to load and unload the cage and set the haulage in motion. There is no difficulty in dealing

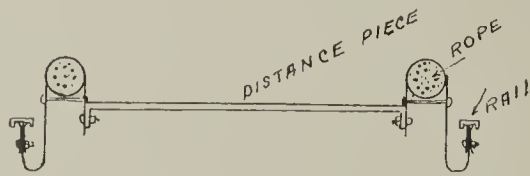


FIG. 2.—SECTION THROUGH ROPES AND RAILS.

with about 50 tubs in an hour. The output of *débris* has at times been 250 tubs in eight hours. In stormy weather, the attendant can be under cover, which is a considerable advantage over the method of running the tubs up a gangway and employing workmen to run them on rails out to the tipplers. The cost of running this system is very low compared with others. There is no extra handling of the material, as on ropeways, where it is customary to empty the tubs into a hopper and then fill from the hopper into the buckets that run on the ropeway. With the system of gangway, rails and tipplers, there is no comparison whatever. In this ropeway the management consider they have now a good dumping ground available for 30 years or more, and after that time it will merely be a question of swinging the end mast either way to get another dumping area.

Coal for Holland.—According to the *Telegraaf*, Great Britain is prepared to deliver to Holland 180,000 tons of coal per month, provided that Holland places 180,000 tons of shipping at the disposal of the Belgian Relief Commission.

Argentine's Coal Discovery.—Extensive coal deposits, which are expected to prove of great value, were discovered early in May in the vicinity of Lake Epupen, in the territory of Chubut. These deposits are of considerable thickness, and apparently lie near the surface. The fields are about 125 miles from the railroad, but provisionally a motor truck service is to be established to the railroad, and if the coal turns out to be of satisfactory quality, and deposits of sufficient extent, the railroad will be extended. This field, unfortunately, is remote not only from the railroad, but the port will be several hundred miles, perhaps 800 miles, from Buenos Ayres. It may therefore compete on about equal terms with Tierra del Fuego coal, which is twice as remote as far as the sea voyage is concerned, but quite handy to the sea. It is also more convenient in many ways to Argentine cities than the coals of the San Juan, Mendoza, and Neuquen districts, that nestle closely to the Andes.

If flooding occurs, the flow must be stopped with a concrete plug—the preparation of which, in view of the pressures in question, is a work of much trouble, time and expense.

When feeders are tapped by the boreholes, milk of lime can be forced in through the latter. As the method of doing this is well known, it need not be described in further detail. Where the water is stored in open fissures in firm rock (white marl), this method usually gives quick and satisfactory results, and is the cheapest way of sinking through rock that is suited to the process. In favourable cases fissures discharging a large flow of water have been completely filled up by the introduction of a few thousand sacks of cement.

In well cemented rock, costly cast iron tubbing is unnecessary, provided care be taken that this portion of the shaft does not settle during subsequent working. In such case a lining of ferro-concrete or combination tubbing is sufficient.

The work of cementing is more difficult when the fissures are filled by sandy or clayey materials, which have to be laboriously flushed out. For this purpose an adequate pumping plant is desirable. The best device for raising very muddy water is the Tomson skip.

The conditions are still more unfavourable when the obstructed fissures occur in very friable rock, such as loose bunter sandstone; for though the cleansed fissures can be cemented up well, the water soon begins to come through the soft rock—at first in tiny streams, but very soon in full force. With rocks of this character, large sums have frequently been expended on cementing, to no purpose. Nevertheless, even in such cases, a trial of the method is advisable, because, if successful, cheap and rapid sinking will be the result. Of course the experiment should not be continued when once it is apparent that there is no prospect of success.

The costs of sinking by this method fluctuate very considerably, ranging from a few pounds, in suitable rock, to thousands without even partial success under unfavourable conditions. The same applies equally to the time required. In favourable circumstances a few weeks will see the work at an end, whereas in difficult cases it may take years.

Hand Sinking with Large Water-Raising Appliances.

Even when it is intended to keep down the inflowing water by means of pumps, a preliminary attempt at cementing will generally be made. If it fails, then all the water must be pumped.

For the extraction of large quantities of water from great depths, the only appliances that can be considered are large buckets or electric centrifugal pumps. Steam sinking pumps are seldom used at great depths, owing to the amount of heat they give off. Lift pumps can only lift about 85 yds., and therefore, for a depth of 550 yds., at least six superimposed sets would be

* Glückauf.

required, which would be very expensive to instal and maintain, besides being cumbersome, and fixed force pumps are out of the question.

In a shaft of the diameter already mentioned, room can be found for two Tomson hoists, each consisting of two 3,000 gals. buckets. Each set can wind from 550 yds. in two minutes, so that each has a capacity of about 1,550 gals. per minute. The capacity of the second set, however, must not be rated at more than half this figure, so far as the regular work of clearing the shaft is concerned, because allowance has to be made for pumping out the sole after any cessation of work. Consequently, with two Tomson sets, about 2,000 to 2,500 gals. of water can be raised per minute in continuous operation; and this is approximately the amount handled in sinking the No. 1 shaft at Borth, where the sinking proceeded at the rate of about 30 ft. per month.

Such a shaft as the one under consideration will accommodate four electric centrifugal sinking pumps, each capable of raising 1,300-1,500 gals. per minute. From depths exceeding 330 yds., these pumps are operated in two lifts, in order that the feed pumps, which operate less economically, may have to work against only a moderate head. The two feed pumps are mounted on the shaft bottom, and the plant can perform the same duty as two Tomson apparatus.

If the influx of water increases considerably, it can no longer be kept under control by means of buckets or skips, there being insufficient room in the shaft for a third set. On the other hand, the upper centrifugal pumps can be installed in a pump chamber recessed in the shaft wall. This arrangement was adopted with success in sinking the Hattorf and Maximilian II. shafts. With four feed pumps on the shaft bottom the amount of water raised can be increased to 5,000-6,000 gals. per minute, thus enabling an influx of 3,300-4,500 gals. per minute to be kept under.

The method of dealing with permanent feeders discharging 2,200 and 3,300 gals. per minute respectively, will now be described.

In the former case, the average rate of sinking will be about 26 ft., but in the latter will barely exceed 19 ft., so that the sinking of a shaft 440-550 yds. in depth would take about 13 and 17 months respectively. Naturally, any considerable increase in the monthly rate of progress would mean a large reduction in the cost of sinking per yard, and *vice versa*.

To the time of sinking must be added that required for procuring, setting up and taking over the plant. If it is the intention, from the outset, to keep the water under control by pumping while passing through the wet zone, then the plant can be obtained and the surface portions set up before that zone is reached. With the smaller influx of water the underground portion of the plant can be installed in less than two months, and a similar period will be required for dismantling the plant when the sinking is finished. The total time needed for traversing the water-bearing zone may be taken as 17 months.

For dealing with the larger amount of water, a minimum of six months must be allowed for preparing the pump chamber, setting up the pumps and putting in the delivery pipes, with an additional two months for installing and dismantling the four feed pumps. Altogether the supplementary operations will take 10 months, thus bringing up the total time consumed in traversing the water zone to 27 months.

In the former case the total influx of water will amount to 1,235½ million gals., and the cost of raising the water from a depth of 500 yds. will be about 9½d. per 1,000 gals. by the bucket method, but only about 4½d. with centrifugal pumps, provided the power be generated on the premises, purchased current increasing the price by about 50 per cent. These figures (which are based on pre-war prices and rates of wages) include 5 per cent. interest for three years, 33 per cent. depreciation on original cost of plant, and the expense of attendance and upkeep. For the bucket system the depreciation is calculated only on the underground plant and ropes; the winding engines and air compressors are only written off to the extent of 5 per cent. per annum, as they will continue in use afterwards. Steam is estimated at 2s. 7d. per ton, including interest and depreciation on boiler plant, the cost of electric energy working out at ½d. per kw.-hour, or half the price of purchased current.

In dealing with an influx of 2,200 gals. of water per hour, the total cost of raising this with Tomson buckets would be approximately £60,000, as compared with about £27,000—£41,000 with centrifugal pumps—according as the current is generated or purchased.

The number of men required daily for the sinking is 100, apart from those in attendance on the pumping, boiler and power plants, and whose wages are included in the cost of raising the water. Sinking in very wet ground is very disagreeable for the men, who therefore get high wages, the average of which may be estimated at 7s. per day, or a total of £1,050 a month. Including this item, together with sundry expenses for tools, waterproofs, timber, blasting, light, etc., the cost of sinking, per yard run, will amount to about £800 when the water is raised by the bucket system, or £500 to £640 with centrifugal pumps.

To cope with 3,300 gals. of water per minute, the electric pumping plant will require to be twice as large, though, as the fixed pumps in the upper set are cheaper than the sinking pumps, the cost is not quite doubled. In this case, four years' interest at 5 per cent. must be allowed for, and £2,500 for the pump chamber and contingent expenses. The cost of raising 1,000 gals. will be the same as in the former case. The total volume of water to be raised will be 2,432½ million gals., and the total cost about £52,000, with generated current, and £80,000 with purchased current. With wages, etc., each yard run of sinking will cost about £850 and £1,130 respectively.

The cost of the iron tubbings is not included in the above calculations. Where the influx of water is strong the tubbings will be put in in very short segments, so that there will be a number of horizontal joints,

which will require to be kept tight at considerable and continuous trouble and expense.

Shaft Boring.

Various systems have been introduced and proposed, but only those adapted for penetrating solid rock strata will be considered; these being, moreover, restricted to the percussion systems, the latter affording the best guarantee for vertical sinking.

The oldest, most largely employed and successful system, is that of Kind-Chaudron. According to Riemers, the average rate of sinking attained in the Alexandershall shaft (Berka) averaged 3 yds. per month, including the insertion of the tubbings and all the subsidiary operations down to the resumption of boring. The monthly progress at the Friedrichshall shaft, Kochendorf, averaged 2 yds., and the cost of boring through 22 yds. totalled £11,550 without the tubbings, and after deducting the scrap value of the plant, or about £530 per yard run.

The Stockfisch and Deutscher Kaiser systems of shaft boring are magnified forms of the quick-stroke, water-flush percussion drill. In traversing soft rock the flushing water is mixed with clay so as to give it a density of 1·3 to 1·4. The method has been employed in putting down several small shafts through the cover rock in the Lower Rhine district, with good results.

In boring through hard rock at great depths, smashes of the boring rods are frequent, to prevent which various means have been proposed to ease the rods. If these be combined with some way of lessening the compression stress, together with the buckling stress set up when the bit strikes in a one-sided manner, then smashes will be considerably reduced.

In spite of numerous rod smashes, a very good record was obtained, with the Deutscher Kaiser system in sinking the Wallach No. II. shaft, a depth of 85 yds. with a diameter of 9½ ft., being bored in 12 months, an average of 7 yds. per month. The rock was flat and fairly hard bunter sandstone. The chief lining was 5-segment tubbing rings, which were put in to a depth of 370 yds. without mishap or difficulty.

For deep mining, shafts of small diameter are unsuitable, because winding has to be carried on with at least two cages. To meet these requirements and those of pumping and ventilation, a circular shaft must be at least 18 ft. in diameter, so that, to allow for 10-in. tubbing and 6-in. space between the lining and the shaft wall, the outside diameter of the shaft must be 21 ft. for the first 440 yds. Boring such a shaft will take twice as long as a 9½ ft. shaft, and therefore the rate of advance will fall to 3½ yds. per month, for though it is technically possible to construct bits of the larger size which would exert the same force, per unit area of the shaft bottom, as the smaller size, a conservative estimate of the rate of advance is preferable.

The boring of a shaft to 440-550 yards in depth will take about 31 months, and six months may be allowed for concreting and making the lining watertight, with two months for the preliminary operations before boring, thus bringing the total time up to 39 months, which is equivalent to nearly three yards per month.

In boring the Wallach II. shaft, 35 men and officials were required, but 40 may be taken as the average, the wages bill, working 25 days a month, being £11,700 for the sinking. If the changing of the bits be effected by mechanical means, instead of by hand labour, the wages bill will be lower.

The cost of material for a shaft of the above dimensions being unknown, the figures for the Kind-Chaudron system may be taken as a basis. Riemer gives the cost of the plant, including erection, dismantling, buildings, derrick, second motion for the cable, rent of tools, bonuses, general expenses, etc., as £7,750 for boring, the Friedrichshall shaft. In the other systems there would be the additional cost of the flushing pumps, and the string of hollow rods would be very expensive, and the cost of hire and maintenance would be considerably increased, so that the total may be estimated at £20,000. Allowing £3,300 for contingencies, the boring through 100 yds. of water-bearing strata would entail a total outlay of £35,000, or £350 per yard run.

Another type of shaft-boring apparatus is that devised by W. Wolski, in which the percussion motor is suspended on the stationary rods, just above the bit, the rods serving to supply the hydraulic motor and also the flushing water. This system, which reduces the risk of rod smashes to a minimum, does not appear to have yet been employed in practice.

Shaft boring is preferably restricted to strata in which the dip is only moderately steep, it being difficult to bore a shaft straight in steep strata of hard rock, and still more so when the hardness fluctuates, the bit tending to follow the line of the softer rock. It is, however, not impossible to straighten out a bored shaft, which has deviated from the vertical, by means of a specially constructed reaming bit.

The thickness of metal in the tubbings at a depth of 550 yds. will be slightly over 7 in. The rings may be in one piece (without ribs), 5 ft. high, 10 in. thick. A ring of these dimensions weighs about 42 tons, and will displace about 41 tons of water. As the shaft will be full of thick flushing mixture (density 1·4), the displacement will be nearly 57½ tons, so that the lowering will be performed without difficulty.

The tubbing cylinder of the bored shaft has no horizontal joints to be kept tight—a considerable advantage in view of the difficulty of keeping these joints staunch against a pressure of 50 atmospheres in intake shafts. The tubbing lining is almost always in very good condition, because it is put together above ground and can be carefully caulked on the outside.

(To be continued).

RETAIL COAL PRICES ORDER.

The Board of Trade, under date September 10, 1917, has issued the following Order regulating the retail prices of coal:—

1. The price at which coal delivered by road vehicle from a depot or wharf or railway siding in lots of 1 ton or over may be sold shall, subject to the provisions of Article 13 of this Order, not exceed by more than 1s. per ton the price of the coal delivered at the depot or wharf or railway siding in addition to the actual cost of handling and delivery, such cost to include depot and other expenses, but not interest charges or salaries to owners, partners or directors of the business; provided that:—

(i) Where a merchant sells under the same description and at the same price coals of which the prices delivered at the depot or wharf or railway siding are different, the price under this article shall not exceed the average price delivered at the depot or wharf or railway siding of the whole of the coal in question with the additions herein or hereinafter mentioned.

(ii) Where a coal merchant deals in articles other than coal in the course of his business charges common to the sale of coal and other parts of business are to be fairly apportioned in determining working costs for the purpose of this article.

(iii) The exclusion of salaries to owners, partners, or directors from working costs shall not apply to reasonable remuneration to such owners, partners, or directors in respect of manual labour or clerical work performed by them.

2. The price of coal sold or delivered in smaller lots than 1 ton from a road vehicle shall not exceed by more than 2s. per ton the maximum selling price in the same district for sales of the same description of coal in lots of 1 ton or over from road vehicles as prescribed by Article 1 of this Order.

3. The price of coal delivered from a depot, wharf or railway siding to dealers' shops shall be less than the prices provided in Article 1 of this Order by 6d. per ton or such other amount as may be approved by the local authority.

4. The price of coal sold at depots or wharves or railway sidings to hawkers and dealers in less than 8 tons shall be less than the prices provided in Article 1 of this Order by 3s. per ton or such other amount as may be approved by the local authority.

5. The price of coal sold in quantities of 2 cwt. or less at dealers' shops shall not exceed by more than 1d. per cwt. the maximum selling price in the same district for similar quantities sold from road vehicles as authorised by Article 2 of this Order.

6. The prices for quantities of coal less than 1 cwt. shall be at the same rate to the nearest farthing as the price per cwt. Fractions of a farthing to be charged as a farthing.

7. The maximum price of coal sold in small quantities to consumers from depot or wharf or railway siding shall be 2d. per cwt. less than the maximum price in the same district for smaller lots than 1 ton sold from road vehicles as provided by Article 2 of this Order.

8. The foregoing maximum prices are for cash on delivery, and if credit be taken a reasonable charge may be made therefor; provided that such charge shall not exceed such amount as may be approved by the local authority.

9. It shall be the duty of all coal merchants to supply the local authority, as defined herein, for the district or districts in which their places of business are situated, or in which coal is sold or delivered by them with such information as may be required by the local authority for the purpose of ascertaining whether the retail prices of house coal sold in bulk or in small quantities in their area comply with the requirements of this Order.

10. (a) Every local authority, as defined herein shall, after consultation with the coal merchants in their area, publish in the local press and in such other manner as may appear to the local authority to be desirable lists showing the prices chargeable under this Order for the various classes of coal sold in the district for household purposes.

(b) The local authority may by publication in the manner prescribed herein withdraw or vary any or all of the prices published by them under this Article.

11. The local authority may appoint a committee consisting of members of the local authority and may delegate subject to such conditions as they may think fit to such committee all or any of their functions under this Order.

12. For the purposes of this Order the term "local authority" means:—

In England and Wales the Council of every Municipal Borough, Urban District and Rural District, including the Council of the Isles of Scilly.

In Scotland in a County the County Council and in a Royal, Parliamentary or Police Burgh, the Town Council.

In Ireland the Council of every County Borough, Borough and Urban District, the Town Commissioners of every Town not being an Urban District, and the Council of every Rural District.

13. The publication of retail prices of house coal by a local authority in the manner prescribed by Article 10 of the Order shall, so long as the prices are not withdrawn or varied as provided therein, be conclusive evidence that such prices comply with the provisions of this Order.

14. (a) No person in charge of a vehicle for sale coal in quantities not exceeding 2 cwt. shall sell or offer for sale such coal unless there shall be affixed on prominent and conspicuous parts of such vehicle so as to be visible on both sides thereof, metal tablets on which shall be clearly marked in a permanent manner in a figure or figures of at least 3 in. length the price per hundredweight at which the coal is offered for sale, and such persons shall not alter,

South Africa's Record Coal Output.—The coal output for May is returned at 942,001 tons, of the value of £292,375, an increase on April of 128,000 tons, and in value £39,901. This constitutes a record for the Union. The Transvaal produced 593,720 tons, an increase of 73,847; the Cape 724 tons, a decrease of 32; the Free State 77,382 tons, an increase of 9,301; and Natal 270,175 tons, an increase of 45,154 tons.

CURRENT SCIENCE AND TECHNOLOGY.

or remove or exchange such figure or figures, the place of loading or at the office of his

person in charge of a vehicle to which is affixed a metal tablet as aforesaid, shall, on a sale of any such coal, charge to the purchaser any price greater than that marked on the said metal tablet.

Provided that this Article shall not apply to the area of any County Council in Scotland or of any Rural District Council in England or Wales or Ireland except as regards any part of the area to which the local authority may, with the approval of the Controller of Coal Mines, by order apply it.

15. (a) No person being the owner or occupier or in charge of a shop or premises where coal is sold or kept or exposed for sale in quantities not exceeding 2 cwt. shall sell or offer for sale such coal unless there shall be exhibited in some conspicuous place in the shop or premises where coal is sold or kept or exposed for sale a notice on which shall be clearly printed in figures at least one and three-eighths of an inch in length and half an inch in width the price per 112 lb., 56 lb., 28 lb., 14 lb. and 7 lb. at which coal is offered for sale, and no person shall alter, deface, or remove such notice except at the commencement of each day upon which such shop or premises shall be open for the sale of coal.

(b) No person being the owner or occupier or in charge of a shop or premises where coal is sold or kept or exposed for sale in which shop or premises is affixed a notice as aforesaid shall, on a sale of any such coal, charge to the purchaser any price greater than that marked on the said notice.

16. No person shall sell or buy or offer to sell or buy by retail coal of any description (a) at a price exceeding the permitted maximum price on the occasion of such a sale of coal of the same description, or (b) under other descriptions than those specified in the lists of prices published by the local authority as provided in Article 10 of this Order.

17. If any person acts in contravention of this Order or aids or abets any other person in doing anything in contravention of this Order that person is guilty of a summary offence against the Defence of the Realm Regulations, and if such person is a corporation or company every director and officer of the corporation or company is guilty of the like offence unless he proves that the contravention took place without his knowledge or consent.

18. Articles 1 to 13 of this Order shall not apply to such part of the area of any local authority as is for the time being subject to the provisions of the Household Coal Distribution Order, 1917, made by the Board of Trade on the 10th August, 1917.

19. The Controller of Coal Mines for the time being appointed by the Board of Trade shall be responsible to and is hereby authorised by the Board of Trade to take all measures that are needed to give effect to this Order.

He may suspend from time to time and for any period and in any district or part of a district the operation of all or any of the articles of this Order or parts thereof as he thinks fit, and may restore such operation.

He may make such rules and issue such instructions under this Order as may be necessary to give effect to its provisions, and such rules and instructions shall be deemed to be part of this Order and shall have the same effect as if they had been included in this Order.

20. This Order may be cited as the Retail Coal Prices Order, 1917.

NORTH STAFFORDSHIRE INSTITUTE OF MINING ENGINEERS.

A general meeting of the North Staffordshire Institute of Mining Engineers was held on Monday evening at the Mining School, Stoke-on-Trent, the PRESIDENT (Mr. J. Gregory) occupying the chair.

Mr. R. G. Jenkinson, Newcastle, Staffordshire, was elected a student.

Mr. T. YATES (hon. secretary) presented the accounts for the past year. The credit balance brought forward was £92 4s., which had been increased by the year's working to £155 1s. 7d., out of which, however, a call of £40 by the Institution of Mining Engineers had to be met. The building fund amounted at the commencement of the year to £650 17s. 2d., and this had been increased by interest to £667 1s. 5d.

The present officers were all re-nominated for election at the forthcoming annual meeting, with the addition of the following nominees for the council: Messrs. W. Barber, E. P. Turner, and W. G. Peasegood.

The PRESIDENT offered a cordial welcome to Mr. A. R. Sawyer, who was to read a paper on "The South Rand Gold Field." Some years ago, said the president, Mr. Sawyer was resident in the North Staffordshire district as inspector of mines. Of late years he had been engaged in South Africa, and members would recall the paper he read to the institute some five years ago on "The New Rand Gold Field." The members heartily wished him entire success in his undertaking.

Mr. A. R. Sawyer, after reciprocating the kindly feelings expressed by the president, read his paper on "The South Rand Gold Field," this being a continuation of a paper on the same subject read before the Institution of Mining Engineers in 1904.

Canadian Steel Company's Coal and Iron Properties.—The Steel Company of Canada, in co-operation with American interests, proposes to acquire certain ore and coal lands in an advantageous location in the north-western part of the province of Ontario, from which such of its supply as is necessary may be drawn. Hitherto the company has obtained its supply of raw material, although it has been engaged in the steel trade of having the construction of a considerable plant at Hamilton, Ontario. The Steel Company of Canada is a large domestic steel corporation without coal reserves.

The Quenching of Coke.

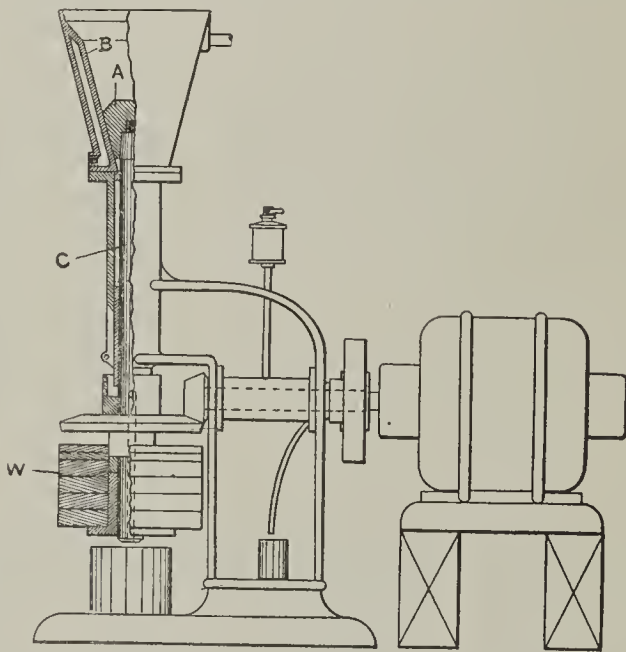
According to *Stahl und Eisen* (abstracted in *Gas World*), coke quenching experiments have been carried out at the Technical High School, Breslau, in the following manner:—Single pieces of coke were heated to 950 degs. Cent. in an electric muffle furnace, and immediately after the removal of the coke from the furnace the thermo-element was put into a 70 mm. deep hole, bored in the coke. The maximum temperature was recorded by the galvanometer in a few seconds. The exterior of the piece required 30 to 40 seconds to cool; the interior almost as many minutes. From the table it is seen that the more porous the coke the quicker it cools, and the larger the piece the more slow the cooling. A piece of Saxon coke of the same origin as the one mentioned in the table, but of greater weight (240 grms.) and similar length, required 27 minutes instead of 18 minutes for complete cooling.

Origin of the coke.	Weight of sample. Grm.	Length of sample. Cm.	Specific gravity.		Percentages by volume.		Cooling period in minutes.
			Apparent.	Actual.	Coke substance.	Pore space.	
Rheinland ...	190 ...	12 ...	0.97 ...	1.98 ...	49.0 ...	51.0 ...	25
Westphalia ...	192 ...	13 ...	0.89 ...	1.92 ...	46.3 ...	53.7 ...	27
Saar district ...	195 ...	15 ...	0.87 ...	1.91 ...	45.5 ...	54.5 ...	27
Lower Silesia ...	185 ...	12 ...	1.01 ...	1.72 ...	58.9 ...	41.1 ...	23.5
Upper Silesia ...	189 ...	15 ...	1.05 ...	1.79 ...	58.6 ...	41.4 ...	28
Saxony ...	185 ...	14 ...	0.75 ...	1.70 ...	44.0 ...	55.9 ...	18

Testing Lubricating Oils.

Messrs. H. K. Moore and G. A. Richter (*Metalurgical and Chemical Engineering*) describes the lubricating oil tester shown in the illustration. It consists essentially of the bearing cone A, which is rotated within the conical sleeve B, the desired pressure being maintained by a suspended weight W on the shaft C. The machine is operated by means of a $\frac{1}{2}$ horse-power direct-current motor through a gear drive. The conical sleeve is made high enough to use cones of different size, and is jacketed in order to maintain any desired temperature, either high or low, at the bearing surface, and also to provide means for bringing the temperature of the bearing to any selected temperature just previous to each successive run in a series.

The power consumption or friction during the operation is measured by means of ammeter and voltmeter. Knowing the efficiency of the motor, the results obtained by using different lubricating oils in the conical bearing become directly comparable. This comparison may also be realised by operating each time with a predetermined power input. The motor bearings and gear drive are kept lubricated with a large excess of the same lubricant all the time, and thus this factor is practically eliminated.



Provision is made for several different methods of testing. The revolving cone is furnished with a spiral feeding groove through which the oil may be brought to the bearing surface. The shaft supporting the weights is hollow, and allows the oil after feeding through the bearing groove to travel down to a small oil pump, which pumps the oil back into the conical bearing, thus completing the cycle. During this operation the desired readings are taken. If the temperature rise of the bearing is of essential importance, a thermometer is suspended in the excess oil over the bearing. Where the power consumption is the determining factor, the input in watts is plotted against time. In this way the "durability" or "breaking down" qualities of the oil may be studied. If the specific case of lubrication which is being duplicated assumes a given constant temperature, this temperature may be realised by the jacket about the bearing. Moreover, the speed, pressure of bearing, and material of the bearing may be varied at will to suit the case in question.

A second method which may be employed in testing the oil consists in eliminating the oil pump and dropping the lubricant on to the bearing as needed. The oil is regulated by keeping the power input below a predetermined limit, and the oil per hour is thus obtained. In carrying out such a test, the lower end of the oil groove in the bearing is first plugged so as to keep the oil from escaping through the groove. A drop of oil is added to the dry bearing, and the machine started. When the electrical instruments show the predetermined maximum power input, another drop is added, and the machine allowed to

continue to operate until the same maximum power input is registered. The consumption of lubricant per unit time is the basis of comparison.

A third method which may be used in testing the lubricant is to plug the lower end of the groove as before, start the machine without the circulating oil pump, add a certain amount (3 c.c.) of oil to the bearing, and record the power input each minute. The machine is allowed to run until a maximum allowable power input is reached, and the power is plotted against time. By studying such a curve one can obtain valuable information regarding the internal friction (power consumption) and also the durability of the oils in question. The authors, for the most part, have employed the last-mentioned method of using the machine, although the other methods were also used to advantage.

Raising Steam from Peat.

Tests on the value of peat fuel for the generation of steam are described by Mr. John Blizard in *Bulletin No. 17* of the Canadian Department of Mines. There were six main tests—three with a Babcock and Wilcox marine type water tube boiler, and three with an internally fired boiler of the portable locomotive type, a seventh being made on the water tube boiler in order to determine the total combustible gases in the flue gases. The peat fuel, made by the Anrep process, was rather low in moisture content (16 to 20 per cent.), and therefore, in estimating the steaming properties of a peat from the results obtained in the tests, allowance should be made for a moisture content equal to that of the peat fuel usually put on the market.

The results of the six main tests are summarised below:—

	Water-tube boiler.			Fire-tube boiler.		
	1.	2.	3.	4.	5.	6.
Net calorific value of the fuel as fired, B.Th.U. per lb.	7,490...	7,490...	6,990...	7,130...	6,970...	7,110
Peat fired per hour, lb.	476...	586...	569...	160...	214...	341
Peat fired per sq. ft. of grate surface, per hour, lb.	20.5...	15.5...	15.0...	17.7...	23.8...	37.9
Equivalent evaporation per hour from & at 212 degs. F., lb.	1,950...	2,322...	2,250...	621...	802...	1,054
Equivalent evaporation per hour, per sq. ft. of heating surface, lb.	2.88...	3.43...	3.32...	2.89...	3.73...	4.9
Lb. of dry flue gas per lb. of peat ...	12.4...	9.8...	11.1...	9.8...	9.1...	6.5
Temperature in flue leaving boiler, deg. F.	720...	760...	715...	690...	690...	750
Equivalent evaporation from and at 212 degs. F. per lb. of peat fired, lb.	4.10...	3.96...	3.95...	3.89...	3.74...	3.09
Thermal efficiency of boiler furnace and grate, based on the net calorific value, per cent.	53.1...	51.3...	54.8...	52.9...	52.1...	42.2

Apart from test No. 6, the efficiencies of the tests do not vary by more than $3\frac{1}{2}$ per cent.; and the performance of the smaller fire tube boiler compares favourably with that of the larger water tube boiler at low rates of steaming. The performance of the fire tube boiler at full load (test No. 6) was, however, very poor, owing to the escape of unburnt gases through having too small a firebox.

Corrugated type grate bars were employed in tests Nos. 1 and 3, whilst in No. 2 straight bars were used. The grate areas were also altered during the tests on the water tube boilers; in No. 1 test the width was 4 ft. 9 $\frac{1}{2}$ in. and the length 4 ft. 10 in., whereas in Nos. 2 and 3 the width was 6 ft. 9 $\frac{1}{2}$ in. and the length 5 ft. 7 in., the grate surface (excluding dead plate) being thus increased from 23.2 sq. ft. to 37.9 sq. ft. The best results were obtained with a large grate and small air space, and a fuel consumption of 15 lb. per square foot per hour. The corrugated bars in tests Nos. 1 and 3, with $\frac{1}{4}$ in. air spaces between the bars, were better than the bars used in No. 2, in which $\frac{1}{2}$ in. air spaces were used; but the loss due to combustible escaping in the refuse could be reduced by using bars with a greater facility for permitting ash to fall through them than was possessed by the corrugated type, and with a smaller air space than that possessed by the bars with the larger air space. The low efficiency in all three trials is attributed partly to the superheated steam in the flue gas, caused by the high ratio of hydrogen content to calorific value. The total losses due to dry flue gas compare not unfavourably with those for other fuels, though the loss due to carbon monoxide is high. The total loss due to unburnt gases is so high as to warrant a large and specially constructed combustion chamber, in order to ensure more complete combustion with peat fuel.

The tests show that, under unfavourable conditions, peat fuel can be economically utilised for the production of power by means of steam. In order to compete, peat fuel must be delivered to the plant at a cost lower than that of good steam coal equivalent in heating value. The fact that peat fuel is much more bulky than coal must not be lost sight of. Hence, the storage of a sufficient quantity of peat fuel for the continuous operation of a power plant without disastrous interruption becomes a problem of great importance, which must be solved before the economy resulting from the use of this low-grade fuel can be realised.

Brazilian Coal Developments.—The work of sinking the Wenceslao Braz shaft has actively commenced at the Leao Coal Mines, Rio Grande do Sul. This new shaft will have a depth of 130 m., and promises to yield 15,000,000 tons from a seam 4 m. thick. Boring operations proceed by night and day, with the aid of powerful compressed air machinery from the United States. A railway line connects the mine with San Jeronimo, and is exclusively intended for coal transport. The line will be opened to traffic in November.

PIT PRICE OF COAL.

The following instructions (dated September 6, 1917) have been issued by the Controller of Coal Mines regarding the pit price of coal for consumption in the United Kingdom:—

1. An instruction has already been issued to collieries prohibiting the sale of coal for consumption in the United Kingdom, except at the maximum prices under the Price of Coal (Limitation) Act—(Part 1 of the Directions of June 28).

2. This instruction does not mean that the highest price which a colliery company obtained for a particular description of coal in the year ended June 30, 1914, is to form the basis for all future sales of the same description of coal, but merely that the price at which any sale is hereafter made shall exceed by the standard amount under the Price of Coal (Limitation) Act the price under a corresponding sale made on the corresponding date (or as near thereto as having regard to the course of business may be practicable) in the year ended June 30, 1914. In the case of sales under contract, comparison is to be made with a similar contract made on the corresponding date (or as near thereto as having regard to the course of business may be practicable) in the year ended June 30, 1914, not with a contract made before July 1, 1913, for delivery during the year ended June 30, 1914.

3. While it is not necessary in determining the corresponding price under the Price of Coal (Limitation) Act that in every case comparison should be made with sales to the same buyer, still, it is clear that similarity of description, quantities, and conditions would more likely be found in the contract with the same buyer for a similar purpose and approximately on the same date in the corresponding period.

4. Where a buyer is asked to pay a price based not on his own purchase at the corresponding time in the year ended June 30, 1914, but on a sale to another buyer, he may request to be furnished with such particulars of this sale (date, quantity and description of coal, and pit price) as will enable him to ascertain that it corresponds with the sale to himself.

5. No colliery shall:—(a) Refuse to renew a contract for the purpose of obtaining a better price elsewhere; (b) alter the conditions of supply (e.g., free coal instead of contract) for the purpose of obtaining a higher price.

6. Where coal is diverted from one district to another the price chargeable to the new customer is to be based on the prices which the supplying colliery is entitled to charge for the same description of coal in the new district, these being determined by reference to corresponding sales in that district on the corresponding date, or as near thereto as having regard to the course of business may be practicable, during the 12 months ended June 30, 1914, in accordance with the Price of Coal (Limitation) Act and these instructions.

7. Prices of washed fuel for inland consumption are to be regarded as subject to limitation, as in the case of prices of coal prepared by other processes, such as screening, picking, breaking, etc. (a) Where the coal is washed by the colliery producing it, the price is to be the corresponding price in the year ended June 30, 1914, with the addition of the standard amount applicable to the colliery under the Price of Coal (Limitation) Act. (b) If there is no such basis at the colliery, reference must be made to prices charged by other collieries in the district for similar fuel in the year ended June 30, 1914. (c) In cases to which neither of the above methods can be applied (e.g., where unwashed coal is conveyed to a washery from collieries under different ownership at a distance), the prices at the washery must not exceed those corresponding to the legal price of the unwashed coal at the pit's mouth, together with the actual cost of transport and reasonable charges for washing, such charges to include loss of weight in washing, cost of washing operations, and reasonable profit thereon.

8. The fact that a purchaser has offered to pay a price in excess of that authorised by the Price of Coal (Limitation) Act is no excuse for an infringement of the Act or of these instructions.

The following is the text of the letter sent out by the Coal Controller in connection with the above instructions:—

Board of Trade (Coal Mines Department),
8, Richmond-terrace, Whitehall,
London, S.W. 1,
September 6, 1917.

Gentlemen,—

Coal Prices.

In view of the considerable diversions of coal which will take place under the operation of the Coal Transport Re-organisation Scheme, I think it necessary to issue definite instructions to the collieries in regard to certain questions as to prices which have from time to time been the subject of disputes between sellers and purchasers.

I do not suggest that any charge of profiteering can with reason be made against the great body of coal owners in the kingdom. Complaints have, doubtless, been made that the prices authorised by the Price of Coal (Limitation) Act have been exceeded in certain cases, and from enquiries which have been made, I think there is some foundation for this complaint, but where the excess complained of is small, I think it is very probable that the difference between the coal owner and the purchaser arises from the different constructions which have *bona fide* been placed upon the provisions of the Act.

There are cases, however, which this explanation does not justify, and where the amount charged is in excess of what, upon any construction of the Act, can be justified. Where such cases have been brought before me, I have dealt with them, and I am prepared to deal with any cases of such a kind which may be submitted to me in the future, but I feel that it is also necessary that the whole position in regard to colliery prices should be clearly defined with a view to avoiding disputes in future.

I do not propose to issue any official interpretation of clauses in the Act, but I feel that you will appreciate that I must take every means in my power to prevent any justification for a charge of profiteering in the coal trade whilst under my control, and, accordingly, although the number

of cases in which there is any material ground for complaint may not be large, I have decided, after consultation with the chairmen of the Coal Owners' Associations and of the District Coal and Coke Supplies Committees, that, as the introduction of the Coal Transport Re-organisation Scheme involves the cancelling of numerous contracts, all existing contracts for the sale of coal for inland consumption shall be abrogated as from September 10, and in the re-arrangement of prices, the instructions which accompany this letter shall be carried out.

As I have said above, these instructions are not to be taken as official determinations of any provisions in the Price of Coal (Limitation) Act, but as instructions to the coal owners, who are, in effect, selling fuel on behalf of the Controller of Coal Mines.

The general abrogation of contracts, apart from the effect of the Coal Transport Re-organisation Scheme, is provided for by Article 2 of the Wholesale Coal Prices Order, 1917, a copy of which is enclosed. It will be observed that it is specially provided that there shall be no interruption of deliveries, and I think that by this arrangement it will be possible to give effect to the review of prices with the minimum of inconvenience to the coal industry and to the business of the country generally.

Yours faithfully,

GUY CALTHROP.

MINERS AND RECRUITING.

A special conference of the Miners' Federation of Great Britain was held at Blackpool last Friday evening to consider the executive's scheme of recruiting of men for the Army. Mr. HERBERT SMITH (Yorkshire), vice-president, was in the chair, and there were present 160 delegates representing every mining district in Great Britain. The conference, after a protracted sitting, decided that all men who have come into the mines from other industries since August 4, 1914, of every class from A1 to C3, shall be taken out by the military authorities before any of the permanent workers of the industry are taken for military service.

This new scheme of recruiting for the Army (writes our Mining Correspondent) is of too drastic a character. The War Office require a further 20,000 men for the fighting Forces, in addition to the 20,000 who have already been obtained. It was suggested that these should be taken from single men between the ages of 18 and 25 years. The scheme on these lines did not work smoothly, as it was stated that the comb-out of men who had come into the pits was not anything like fine enough, and that the exemptions included men who were doing labouring work in the pits as a refuge from military service. The new scheme of the Miners' Federation proposes that every man who has come into the pits from other industries since August 4, 1914, irrespective of their class, shall be taken out of the pits before any more of the permanently employed men who have always worked in the industries are taken for military service. This would mean that every man from Class A to C3 would have to be taken, even though the men of the lower classes would be of no military value, and as nearly 200,000 men have come into the industry, attracted by high wages and exemption from military service, it would mean a serious dislocation of the industry.

An alternative policy would have been to limit the new recruiting scheme to Class A men without any exemption as to the work they were doing in the pits. Certainly there never was any reason for exempting trammers and fillers. The new workmen should be sufficient to provide the 20,000 more men required for the Army; but if they should fail to yield the number necessary, the scheme as adopted by the special conference is likely to be a cause of much disturbance to the coal mining industry.

INDIAN AND COLONIAL NOTES.

Africa.

Transvaal Coal Developments.—The increased demand for coal in South Africa after the war, which appears to be anticipated by those who have studied coal movements for some time past, together with the possibilities of an overseas trade of considerable dimensions as the result of the disorganisation of the trade in Europe during the last two years or so, has led to the display of considerable activity in the Transvaal coal area. To a certain extent, the open market for South African railway orders and the transfer of capital from less favourable mining centres has helped to increase the enterprise that has developed in this part of the Union. Among the latest areas to lay claim to consideration as sources of coal supply is that lying between the Springs and Bethal districts. The existence of coal measures there has, of course, been a matter of common knowledge for many years, but the inaccessibility of the field, and the somewhat indifferent results obtained in shallow boreholes, even after the railway had encouraged the commencement of exploratory work, had combined up to quite recently to retard the opening up of an area which was otherwise well situated. Lately, however, some of these boreholes have been deepened, with results that are very gratifying. Near Leslie Station, on the Johannesburg-Bethal-Breyten line, two boreholes have been put down to depths between 300 and 400 ft. One of these has struck an upper seam of coal at a depth of 315 ft., with a thickness of 3 ft.; a second seam, 6 ft. thick, was found at a depth of about 391 ft. The hole was continued for another 8 ft. 3 in., and remained in coal measures, and it is not unlikely that a third seam may be discovered in depth. The main coal is of excellent quality throughout, without shale bands, so that the operation of sorting would be reduced to a minimum, while the thickness of the seam would allow of very economical working. The shales and sandstones which overlie the coal are said to be of a kind which is not found in the Witbank, Oogies, and other coal working districts, and for this reason it is supposed that the boreholes are located in a higher horizon of the coal measures than that which prevails generally in the Transvaal coal field. Several farms have been taken up for exploratory purposes in this neighbourhood, which is about 60 miles due east of Johannesburg and midway between the Pretoria-Delagoa Bay and Johannesburg-Durban main lines of railway. If the quality of the coal which has been found in the boreholes should prove characteristic of the whole area taken in hand for exploratory purposes, a new centre of some importance should be added to the list of those which are already active and profitable producers.

Australia.

Coke and Iron in Queensland.—An industry which is likely to attain large proportions in Queensland has been given an impetus, when a consignment of 800 tons of coke was shipped for the Cloncurry district. In a statement, the Commissioner for Railways pointed out that up to the present time the whole of the mining coke supplies for North Queensland, which now amounted to approximately 60,000 tons per annum, have been obtained outside the State, and this while coking coal which is equal to any in Australia is immediately available. The Cloncurry district coke supplies, it is hoped, will be largely provided at North Ipswich, in which case a sum of approximately £75,000 per annum will be retained in Queensland. It is expected that this will be done, as several firms have entered into an agreement with some of the mining companies towards that end. The matter of shipping coke from Brisbane to Townsville was one which presented several difficulties; as a matter of fact, it was found that accommodation could not be provided by any of the shipping companies for a regular traffic to the north, and consequently the Government chartered a steamer to carry on the trade; this boat will run regularly between Brisbane and Townsville with coke supplies for the mining centres, coal for the railway department, and any other traffic which may be offering. There are large deposits of both magnetic and hematite iron in many parts, but up to the present little effort has been made to develop this potential industry in Queensland. As a proof of what can be done, the Minister for Mines has a bar of cast iron which was manufactured from ore obtained at the Biggenden mine. It would appear that the cast iron is of good quality, but no doubt complete tests will be made as to its value for general use. At Biggenden the mining carried on is for bismuth, an extremely valuable mineral, largely used for chemical purposes, and which at the present time is realising 10s. per lb. The bismuth has to be taken from the ore by means of a magnetic separator. At Mount Havelah, which is the twin hill of Mount Biggenden, there are very large deposits of hematite iron, which in the early days was used at Aldershot for flux. The iron ore at Biggenden can be manufactured into cast iron for £3 per ton, while it is valued at £9. It is interesting to note that a bar of iron was wrought in 1908 by Messrs. Heskett Brothers from ore at Mount Havelah, and converted into octagon steel. This stood the tests well, but apparently no further action on the lines of development was then taken. Another interesting point about these two mines is that watches never last any time in the mines, while a survey with theodolites will not be taken. The ore is easily obtainable, and there are good prospects for the industry. It will pay Queensland—if the percentage of the ore is good—to send the iron to Newcastle, which at the present time obtains all its supplies from South Australia.

MINERS' WAGES DEMANDS.

The executive council of the Miners' Federation of Great Britain had a conference with the Coal Controller on Wednesday on the question of a 25 per cent. increase of miners' wages all round, and yesterday (Thursday) Mr. R. Smillie, president of the Federation, had a long interview at the offices of the Controller, and communicated the considered decision of his executive on matters under review at Wednesday's conference. The proceedings were private. Sir Richard Redmayne, Adviser to the Coal Controller, was present with Mr. Calthrop.

It is stated that a delicate situation has arisen between the Coal Controller and the miners on the wages question. With the facts and figures at his disposal, the Controller has pointed out to the miners that their demand, if applied nationally, would impose a serious burden on the coal community. The South Wales miners are resolute against any compromise on the new demand. It is stated that the miners will not tolerate any additional mining cost being thrown on the consumer. They have intimated to the Controller that they do not expect any concession which may be made to be used as a reason for increasing the present fixed prices of coal.

Delegates from the National Council of Societies representing colliery workers other than miners waited upon the Coal Controller during the day. Coun. Thos. Watson (Lancashire), president of the association, introduced the deputation, which represented engineers, stokers, tradesmen, surface workers, deputies, and colliery firemen. The questions, it was pointed out, affected 90,000 workers connected with the colliery industries throughout the whole of England (with the exception of Durham and Northumberland), Scotland, and Wales.

An application was put forward for a 25 per cent. advance in wages to meet the increased cost of living, and the delegates further asked for representation on the Advisory Board of Control, and to have the same permission in organisation and negotiations with the coal owners of the country as they had in pre-war days.

The discussion lasted an hour and a half, and the proposals made were referred back to the members, to be submitted to their respective districts.

A further conference of the delegates representing the various societies will take place at the Exchange Hotel, Manchester, on Friday, September 21, to consider the final conclusions to be submitted to the Coal Controller.

Coaling Plant at Balboa.—The *Panama Canal Record* states that the new coaling plant at Balboa has been placed in regular commercial service. The sea-going suction dredger "Culcra," of the canal fleet, was coaled at the reloader wharf on July 25, and the merchant ship "Baldersby" took coal on July 27. The latter was the first commercial ship to be supplied from the new station. The stock of coal at the plant includes some which was dumped from cars for tests of the reclaiming bridge, and some unloaded from colliers in tests of the unloader. The supply is to be maintained by sending through the canal an occasional collier from the number which come to Cristobal. It is expected that Cristobal will continue to be the coaling point of the great majority of the ships coming to the canal. The Balboa plant has a normal storage capacity of 150,000 tons, and a rated capacity of delivery of 1,000 tons per hour, or 500 tons per hour from each of the two reloader towers.

CONTENTS.

	PAGE
Whitley Report	499
The Constituents of Coal: Part 1	491
American Notes	493
Aerial Dumping Ropeway at Balgonie Colliery	494
Sinking through Wet Strata at Great Depths	494
Retail Coal Prices Order	495
Pit Price of Coal	497
Miners and Recruiting	497
Miners' Wages Demands	497
Wigan Mining College	500
Local Authorities and Retail Prices of House Coal	504
Obituary	504
South Wales Mining Timber Trade	503
Labour and Wages	505
Retail Coal Prices (Scotland)	505
The Freight Market	507
Open Contracts	508
Abstracts of Patent Specifications Recently Accepted	508
New Patents Connected with the Coal and Iron Trades	512
Government Publications	512
Publications Received	512
REPORTS OF MEETINGS:—	
North Staffordshire Institute of Mining Engineers	496
Trades Union Congress	504
THE COAL AND IRON TRADES	504
The London Coal Trade	503
The By-Products Trade	503
The Tin-plate Trade	504
CURRENT SCIENCE AND TECHNOLOGY	496
INDIAN AND COLONIAL NOTES	497
NOTES FROM THE COAL FIELDS	506
COAL, IRON AND ENGINEERING COMPANIES	508
MISCELLANEA:—	
Coal Cards in Berlin—Lead Taken Over	492
Coal for Holland—Argentina's Coal Discovery	494
South Africa's Record Coal Output	495
Canadian Steel Company's Coal and Iron Properties—Brazilian Coal Developments	496
Coaling Plant at Balboa	497
Reported Coal Discovery in Italy—Fuel Economy in the United States	499
Vacancy for Certifying Surgeon	502
Canada's Winter Fuel Supplies	503
Coal for London Flats—Iron and Steel Institute	504
United States Pig Iron Production—Alaska Coal Fields Developments	505

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LONDON, FRIDAY, SEPTEMBER 14, 1917.

The tonnage coming forward into the London area is distinctly improving. The demand continues strong, and the delivery trade is still busy with unexecuted orders on hand. The new regulation that only one ton should be delivered to householders during September is handicapping all large orders, but merchants are looking forward more hopefully now to putting a fair quantity on the ground. Hard steam coals are very difficult to obtain. Gas coke is selling freely. Slacks are plentiful. Kitchen cobbles and bakers' nuts are scarce. The new scheme from the Controller's department is still the main topic of conversation.

Northumberland and Durham have continued to benefit from a succession of heavy official requirements; the inland demand has also been good, but scarcity of free tonnage has restricted individual export.

Pressure continues to be felt in Yorkshire and Derbyshire for supplies of practically every class of fuel, the demand from London showing no slackening.

Reports from the Humber indicate that the large quantities sent by rail to London have prejudiced shipments, collieries not always being able to provide coal for steamers as they come to hand. A fair amount of coal is being sent coastwise from Goole to London, but very little from Hull.

In Lancashire a good deal of confusion prevails with regard to all qualities of coal on account of the working of the Reorganisation scheme.

No new features are reported from South Wales. Tonnage has again become insufficient to cope with the business available, stocks are accumulating and stoppages becoming more numerous.

Scotch conditions are still dull and business very restricted. A little more tonnage has been available, and fair consignments have gone to Franco and Italy.

Business in Ireland continues active, with very little improvement in the arrival of supplies; the position is becoming somewhat acute in the south and west. At Belfast best households are in very short supply.

The freight market experiences no lessening in the demand for tonnage for Allied and neutral ports; there have been only a few fixtures for coke and coal to French Atlantic ports. Vessels for neutral points are in keen enquiry at very high rates, but no offers result.

The total quantity of coal and coke shipped at the Tyne Improvement Commissioners' docks and staiths from Northumberland collieries last month was 167,460 tons, making a total of 1,386,988 for the eight months. The similar shipments from Durham collieries amounted to 44,600 tons, or 283,134 tons for the eight months.

The 28th annual meeting of the Institution of Mining Engineers is being held at Newcastle to-day (Friday). A report of the proceedings will appear in our next issue.

In view of the frequency of disputes and stoppages at South Wales collieries of late, and in order to avoid the same, the Coal Conciliation Board has empowered the secretaries of the Coal Owners' Association and the Miners' Federation, Mr. Finlay Gibson, and Mr. T. C. Richards, M.P., to have matters in hand, and appoint representatives to deal with the difficulties at once without waiting for the cases to be first presented at meetings of the board.

AN Order made with reference to **Coal Prices.** wholesale coal prices appeared in our issue of last week, and we print in another column an important communication recently issued by the Controller of Coal Mines, enclosing instructions to collieries to be observed in the sale of coal. The great unrest which prevails has been attributed largely to alleged profiteering, and the Coal Controller is naturally anxious that no charge of this kind should be justifiable with reference to coal during the period of his control. We think there will be general agreement with the view expressed by the Controller in his letter of the 6th September, that no charge of profiteering can with reason be made against the great body of coalowners in the United Kingdom; and that in many cases where complaint has been made that the prices authorised by the Price of Coal (Limitation) Act have been exceeded, it has arisen from a *bonâ fide* difference of opinion as to the provisions contained in that Act. We think the Coal Controller is wise in not venturing an authoritative opinion upon the construction of doubtful sections in the Act: it is certainly not a model of legislative lucidity. But the Coal Controller is quite within his rights when he issues instructions as to the terms and conditions upon which the coal under his control is to be sold. It is, at first sight, a somewhat drastic measure to abrogate all existing contracts for the sale of inland coal, but it is difficult to see what alternative better than this action of the Controller could have been adopted which would make as complete an answer to the charge of profiteering as against coal owners. Purchasers who complain that they have, from one cause or another, been compelled to undertake to pay a higher price for their coal than the Limitation Act justifies, are now entitled, without any risk of their supplies being stopped, so far as the quantity of coal is available, to see that their contract prices are not in excess of the limitation price. Whether the complaints of profiteering in the coal trade which have reached us are well founded or not, we are not in a position to say, but they generally relate to the prices charged, not at the colliery by the producer of the coal, but by the intermediate distributor dealing with the coal between the producer and the consumer. It was a matter of surprise and complaint at the time the Limitation Act was passed that, whilst it limited the price to be charged by the coal owner, who had to undertake all the risks and expenses incident to the production of the

fuel, it left the intermediate distributor, who was under no such obligations and liabilities, without any limitation as to the price he was entitled to charge. This state of things the Coal Controller is very properly endeavouring to rectify by his Wholesale Coal Prices Order, and we hope he will be successful. We offer our congratulations to the Coal Controller on the energetic steps he has taken to make profiteering in the coal trade impossible, and to secure to consumers, large and small, that they shall be entitled to their fuel at a reasonable price.

Labour and the Whitley Report.

It will be remembered that one of the practical results of the activities of the Reconstruction Committee was the appointment of a sub-committee to consider the relations between employers and the employed. The questions which this sub-committee was instructed to consider included suggestions for securing a permanent improvement in the relations between employers and workmen, and the means for obtaining a systematic review of the same, with the object of improving future conditions. Upon this sub-committee were prominent representatives of both parties, and the coal mining industry was strongly in evidence, in the persons of Sir THOMAS RATCLIFFE-ELLIS and Mr. ROBERT SMILLIE. Mr. J. H. WHITLEY was the chairman. In their interim report, lately published as a White Paper, a scheme was propounded for the establishment for each industry, of Joint Standing Industrial Councils composed of representatives of employers and workpeople, for the purpose of considering periodically all matters affecting the progress and well-being of the trades concerned, from the point of view of the persons employed in them. The object is to ensure that both employers and employed should possess an intimate knowledge of the bearing upon each industry of the many problems that have arisen during the war. The idea is excellent, because it promises to afford the means whereby much of the friction between masters and men can possibly be avoided, and Labour would, for the first time, be brought into direct recognition as a component part of industrial life. An important feature of the scheme is the appointment of district councils, representative of the trade unions and employers' associations for the several industries, and also works committees, representative of the management and workers employed in the several works. The latter bodies would deal with such questions as the better utilisation of the practical knowledge and experience of the workpeople, the means for securing for the workpeople a greater share in the responsible management, coupled with the settlement of general principles regulating wages, and the best way to ensure the greatest possible security of earnings and employment. They would also have to consider such matters as technical education and training, industrial research, and the utilisation of inventions and improvements designed by the workmen, including, of course, improvements in processes and machinery, and any legislation affecting the several industries.

It is difficult to imagine a more complete recognition of the rights of Labour, or a fuller admission of the workers into the innermost councils of the management. It is what they have long been asking for, and the great question of the recognition of the trade unions should, under this scheme, no longer be a source of friction and dissatisfaction.

It is possible now to examine how far this plan is likely to find acceptance on the part both of employers and employed, for it has come under the critical examination both of the Employers' Parliamentary Council and the Trades Union Congress. The Employers' Parliamentary Council, whose views we will first consider, complain in the first instance that the scheme assumes that the Labour unions represent the whole of the workpeople of the country, whereas, taking the country as a whole, they represent only the minority. The obvious answer to this, however, is that the scheme is only intended to apply to particular industries in which there is already a certain degree of organisation, and the trade unions do, in a large measure, represent the men employed in those industries. Of course, the non-union question is still an acute one in many cases, and particularly in the coal mining industry. But we are inclined to think that the time has gone by when colliery strikes over this matter can any longer be of

advantage to either masters or men. In the majority of cases it is the former who are the aggressors, and, taking a broad view of the advantages of an organisation, it seems necessary to conclude that, given certain conditions, it would be well to bring together the whole of the workmen in each industry into a single organised body. But these conditions must include the essential element of political freedom for each individual worker. To force a man into a union with the obligation to subscribe to a political creed with which he is not in sympathy, would be a gross injustice, and a denial of the very elements of that freedom which is the birthright of every British working man. Under this scheme, therefore, it would be necessary for the trade unions to confine their attention to purely industrial questions. It is not to be imagined that the sub-committee contemplates that any miner, for example, should be compelled to advocate either Socialism or Syndicalism. A further difficulty peculiarly applicable to the coal mining industry, on account of the great diversity in the grades of employment, would be the question of craft, which opens up problems too wide for present consideration.

Another important point which is raised by the Employers' Parliamentary Council is the question of the binding character of agreements. This has long been a remarkably weak link in the relations between employers and the trade unions. The sub-committee endeavours to meet this difficulty by suggesting that at some later stage it may be desirable to give the sanction of law to agreements made by the trade councils. Even this, however, would be ineffectual without a repeal of the Trade Disputes Act, that unfortunate measure which has placed the unions above the law. The difficulty of providing adequate penalties for the infraction of agreements may, however, be overcome, although it is not easy to see how it can be brought about without demanding more than the trade unions are likely to agree to.

Still another criticism made by the Employers' Parliamentary Council is the question of the restoration of the trade union privileges which have been temporarily surrendered during the war. Upon this point, however, it may be possible to come to an arrangement. Prominent Labour leaders have declared that restriction of output can no longer be justified on any grounds, and it must for the present be assumed that the men will acquiesce in the surrender of such doctrines as the lessons of the war have shown to be beneficial neither to the nation, the industry nor the individual.

Coming next to the attitude of the Trades Union Congress towards these proposals, the outlook is scarcely reassuring. It is true that the Whitley report was received with a certain show of goodwill, but there was distinct evidence of mistrust and a disposition to regard it as a step towards compulsory arbitration and the prohibition of the right to strike. For this view there is not the least ground, however, in the proposals now put forward. It is true that one of the main objects of the scheme is to diminish strikes, if not to abolish the necessity for them altogether. But the means of accomplishing this end is not by the introduction of the thin edge of the wedge of compulsory arbitration, but by the infusion of the spirit of sweet reasonableness into the discussions of labour disputes. This element has hitherto often been sadly lacking on both sides. The sub-committee's scheme certainly affords an opportunity which has not hitherto been available for enabling grievances to be discussed from the point of view of the industry rather than that of the employer or the workmen. It postulates a union of interests in place of the old antagonism between Capital and Labour. It substitutes co-operation in the place of perpetual friction, and demands mutual sympathy rather than distrust. Some trade union leaders of the self-seeking type may look with suspicion upon any curtailment of their field for agitation; but, after all, the working man will probably gladly dispense with much of the fiery oratory which has hitherto served only to obscure the elementary principle that his welfare is inseparably bound up in the industry upon which he thrives.

Reported Coal Discovery in Italy.—A report is made in Rome that an important discovery of coal has been made on the Italian front in the valley of the Isonzo.

Fuel Economy in the United States.—In order to save coal, the American Fuel Administrator contemplates the abolition of the famous electric signs in Broadway and other big American thoroughfares.

WIGAN MINING COLLEGE.

Wigan and District Mining and Technical College is one of the oldest colleges of its kind in the Kingdom, dating back as it does to 1832. In that year it was founded as the Wigan Mining School, and under which name it was conducted for nearly half a century—begins its 61st session this week. At first the curriculum was confined to instruction in subjects allied to mining, but more recently provision has been made for the instruction in relation to other industries of the Wigan coal mining area. These additions have synchronised with extensive developments which have taken place in the mining department of the college—the form which the original Mining School now takes—the curriculum of the mining department now embracing day and evening classes for all types of mine officials and employees. The college premises were erected from funds amounting to upwards of £50,000, raised locally by voluntary subscriptions, Mr. Alfred Hewlett, J.P., of Haseley Manor, Warwick, who practically all his life has been prominently identified with the direction and management of the Wigan Coal and Iron Company Limited, taking an active part in the movement, which culminated in the old Mining School having the present palatial college building built for its headquarters in 1903. The college now provides advanced instruction in those branches of commerce, art, science, and technology which have application to the industries of the borough of Wigan and district, the college calendar for the session commencing this week being a bulky volume of 210 pages of interesting information. Instruction is carried on by both day and evening classes, and is for the most part arranged into systematic courses comprising classes in a number of allied subjects. At present the college provides courses in relation to the following industries of the district: Mining engineering, electrical engineering, building trades, chemical industries, metallurgy, artistic trades, and commercial occupations. The organisation also comprises a day trades school for boys who have recently left the elementary schools, and who propose later to enter some form of industrial occupation. Many firms in the area served by the college seek to promote the education and proficiency of their employees by offering to pay fees, or a portion of the fees, of their apprentices in attendance at approved courses at the college. The following firms afford facilities for attendance on the part of selected apprentices at day classes on one whole day or two half-days per week, namely: The Abram Coal Company, Bickershaw; the Astley and Tyldesley Colliery Company, Tyldesley; the Blainscough Colliery Company, Coppull; the Earl of Ellesmere's Bridgewater Collieries, Worsley; the Clifton and Kersley Coal Company; Messrs. Crompton and Shawcross, Hindley; the Garswood Colliery Company, Wigan; Messrs. Pearson and Knowles, Ince; the Pemberton Colliery Company, Pemberton; Messrs. Speakman and Sons, Leigh; Messrs. Tickle Brothers, Wigan; the Wigan Coal and Iron Company Limited; the Wigan Rolling Mills; and Messrs. William Woods and Sons, colliery proprietors, Blackrod. It is pointed out that students to whom such facilities are allowed have the advantage of being able to attend classes at a time when they are in better condition for receiving instruction than at the close of a full day's work, as well as the additional advantage of having their evenings entirely free for home study and preparation. The scholarships awarded in connection with the college now include the "Alfred Hewlett" scholarship, which is of the value of £52 per annum, and is provided by Mr. Alfred Hewlett, who was the chairman of the college governing body until 1909, this being tenable for three years at the day diploma and degree course in the mining department; the "Richard Christopher" and the "George Bradshaw" scholarships, each of the value of £50 per annum for three years and tenable at the day mining diploma and degree course; the "Peace Memorial (Trustees)" scholarship, which is of the annual value of £35, and is tenable in rotation at approved mining schools in England and Wales, and which is tenable at the Wigan College for the years 1917-1919, the annual value of the scholarship having been increased to £52 by the generosity of Mr. Alfred Hewlett, J.P.; the "Peace Memorial (Alfred Hewlett)" scholarship, provided by Mr. Alfred Hewlett, J.P., in commemoration of the late Maskell William Peace, secretary of the Mining Association of Great Britain, which is of the value of £52 per annum for three years; and the "Osbeck" scholarships, two scholarships, each of the value of £10 10s. per annum, which are offered annually by Messrs. Osbeck and Company, pit timber merchants, of Newcastle-on-Tyne, and are tenable at either the mining diploma and degree course or at the part-time day mining course, and are renewable from year to year for a period not exceeding three years. The "Knowles" gold medal is awarded annually to that student who, in the opinion of the governing body, has attained the highest success in connection with his attendance at either the part-time day mining course or an evening course in the mining department; and the "Percy Memorial" medal is awarded each year to the most successful evening student in one of the following departments of the college, taken in rotation, namely: Mining engineering, building, and commercial departments. Mr. S. C. Laws, M.A. (Cantab.), B.Sc. (Lond.), is the principal, the various heads of departments being: Mr. George Hunter, A.R.T.C., M.I.M.E. (mining and geology); Mr. J. H. B. Taylor, M.Sc., F.I.C., (electrical engineering); Mr. Haldane G. Cotsworth, A.M.I.M.E. (electrical engineering); Mr. B. Taylor, M.Sc., F.I.C., (chemical engineering); Mr. W. Steele, M.R.San.I. (mining); Mr. H. Kirtton, A.C.I.S., (mining); and Mr. Leonard T. Howells, headmaster of the art school.

THE COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 13.

Scotland.—Western District.

COAL.

Conditions in the Scotch coal trade are still dull, and business is very restricted. A little more tonnage has been available lately, and fair consignments have gone to France and Italy and certain home ports. In the west of Scotland district the chief outlet continues to be the industrial demand, supplemented by household requirements. Shipments for the week amounted to 109,145 tons against 114,510 in the preceding week and 107,123 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	20/-27/6
Ell	26/6-28/	26/6-28/	23/-25/
Splint.....	28/-30/	28/-30/	25/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The situation in the Scotch iron trade is without fresh feature. The difficulties in the way of private business are as prominent as ever, and energies are almost entirely directed towards the production of war materials. In pig iron the call for hematite from the local steel works is unabated, and the majority of the furnaces are now producing this quality, with a consequent scarcity of foundry and forge iron. Prices are firm and unchanged. Monkland and Carnbroe f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. In the malleable trade, too, the bulk of the output is on Government account, and the ordinary home and overseas turnover has gradually been reduced to very small limits. "Crown" iron bars are now quoted at the unprecedented basis of £16 net, f.o.b. at Glasgow. Ordinary black sheets are also very firm, being quoted £18 5s. and upwards for export. Operations in the engineering shops and at the shipyards are still characterised by the highest activity.

Scotland.—Eastern District.

COAL.

There is not much sign of improvement in the Lothians coal trade. Local demands are not heavy, and enquiries from other sources are few and far between. Shipments were 18,066 tons against 16,957 in the preceding week and 28,334 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	25/
Secondary qualities.....	25/6	25/6	24/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

Collieries in Fifeshire and district still experience a considerable amount of idle time, and no change for the better can be looked for while the shipping restrictions are in force. Clearances were 31,771 tons against 34,289 in the preceding week and 44,836 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	35/-37/6
Unscreened do.....	24/-25/	24/-25/	30/-32/6
First-class steam coal.....	28/	28/	30/-32/6
Third-class do.	24/	24/	25/-26/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 153,982 tons, compared with 165,756 in the preceding week and 180,293 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The considerable official requirements for coal have continued to benefit the industry during the week under review, and large shipments in requisitioned vessels have resulted therefrom. The demand for fuel for inland consumption has been very healthy throughout the week, also, with especially good results so far as manufacturing coals are concerned. Business for individual export has been sorely restricted, however, by reason of the scarcity of free tonnage. There is still a keen enquiry reported for fuel supplies for most of our neutral customers, albeit the Scandinavian request is less pressing. The net outcome of all these influences upon the market is that best gas and steam coals are well taken up for prompt loading, and that coking coals and smithies are, by reason of the large home demand, inclined to be scarce. Bunkers are dull and offering excessively. There is an active market for coke, and supplies are limited at firm figures. There is no positive scarcity so far as most descriptions of fuel are concerned, buyers with vessels ready experiencing no difficulty in covering their requirements at the minimum scheduled prices, and some qualities of coal—such, for instance, as unscreened and small steams—are very, even embarrassingly, plentiful. Pits generally are in rather fuller employment. No news is yet to hand with reference to the allotment of the Norwegian State Railways' contract for 18,500 tons of best steams for October-November delivery. Tenders of 25,000 tons of gas coals have been forwarded, in response to an enquiry from a Norwegian gasworks for supplies for delivery over the final three

months of the year. As yet, it is not known how the Coal Transport Order will affect the market, but there is a general consensus of opinion that it will result in some restriction of inland business, by reason of the limitation of the use of railway haulage, and will produce an even greater call on the small amount of steamer tonnage available for coasting transport purposes.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	37/-40/
Do. Tynes (Bowers, &c.) ...	29/6	29/6	35/-40/
Secondary, Blyths	25/6	25/6	30/-35/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/-35/
Unscreened	23/6-25/	23/6-25/	25/-35/
Small, Blyths	20/	20/	22/6
Do. Tynes.....	18/6	18/6	20/-22/6
Do. specials.....	20/6	20/6	22/6
Other sorts:—			
Smithies.....	25/-30/6	25/-30/6	25/
Best gas coals (New Pelton or Holmside) ...	25/	25/	30/-33/
Secondary gas coals (Pelaw Main or similar) ...	23/6	23/6	25/-27/6
Special gas coals	26/6-30/	26/6-30/	35/
Unscreened bunkers, Durhams	24/-25/	24/-25/	18/-24/
Do. do. Northumbrians	24/-25/	24/-25/	22/6-27/6
Coking coals	24/-25/	24/-25/	22/6-25/
Do. smalls	24/-25/	24/-25/	20/-22/6
House coals	28/6-30/	28/6-30/	40/-45/
Coke, foundry	42/6	42/6	40/-45/
Do. blast-furnace	42/6	42/6	37/6-40/
Do. gas	29/-30/	29/-30/	33/-35/

Sunderland.

COAL.

The coal trade opens very quietly this week, and presents no feature of interest. Tonnage is acutely scarce. The pits producing steam coals are fairly well supplied with boats, and are now working more regularly, although short time is still the rule at several collieries. Official requisitions are steady, and shipments to France are moderate, while neutral business is slow and unimportant. Market values remain entirely without change at the usual schedule figures. Smallsm are lifeless. Gas coals are steady, but there is no improvement in the call for bunkers. Coke is active, mostly on inland account, but stocks of gas coke are heavy, and shipping facilities are difficult to arrange. There is no news yet regarding the Norwegian State Railways order.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	32/6
Secondary do.	23/6-25/	23/6-25/	27/6
House coals:—			
Best house coals	30/	30/	35/
Ordinary do.	28/	28/	27/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	37/6
South Hetton do.	28/6-30/	28/6-30/	37/6
Lambton unscreened ...	24/	24/	23/
South Hetton do.	24/	24/	23/
Do. treble nuts	20/	20/	26/6
Coking coals unscreened	25/	25/	22/
Do. smalls	25/	25/	20/6
Smithies.....	25/	25/	22/6
Peas and nuts	24/6-26/	24/6-26/	26/6
Best bunkers.....	25/	25/	24/6
Ordinary bunkers.....	24/	24/	20/6-21/
Coke:—			
Foundry coke	42/6	42/6	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	32/6-35/

Chartering conditions have not improved, and the firm rates quoted for all ports have not resulted in many fixtures. The coasting section is firmer, 20s. having now been paid for London.

Middlesbrough-on-Tees.

COAL.

Little news is ascertainable concerning the fuel industry. Quotations for coal show little or no change, remaining generally at lowest possible figures, at which prices producers are seeking orders. Collieries are benefited by the sustained official absorption. Enquiries from neutrals are moderate, and are expected to improve. Tonnage irregularities still hamper some of the Durham gas coal collieries. Amongst the enquiries is reported one for 25,000 tons to 30,000 tons of gas coal for Norway delivered over the winter months. Best Durham gas coals stand at 25s., and seconds at 23s. 6d., whilst Wear specials are 26s. 6d. Business in bunker coals is small and erratic. Unscreened Durhams are 24s. to 25s. Special coals are in good demand on home account. Coking coals are fairly well taken up at rates last named. The position as regards coke is unaltered. Beehive and best foundry remain at 42s. 6d., and gas house product is round about 30s. Local consumption of coke continues heavy, and descriptions needed for the blast furnaces still command fixed maximum prices, notwithstanding plentiful supply, average kinds selling at 28s. at the ovens, and qualities low in phosphorus remaining at 30s. 6d. at the ovens.

IRON.

Consumers of Cleveland pig iron having completed arrangements for this month's supplies under the September allocations, very few and small home transactions are now passing, but there is rather more doing on foreign account. Scotland, in addition to heavy buying of foundry iron for this month, has purchased forge iron substantially for delivery to the end of the year. The greater part of Cleveland pig exported is still going to France, but needs of Italy are not neglected, and fairly good shipments to that country are being made, whilst a few licences have just been issued for export to Japan. Foreign trade is only limited by licences and the tonnage situation. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d.; and for shipment to France and Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Conditions in the east coast hematite branch show no change. Home consumers' requirements are still being adequately met, careful distribution under official supervision, and further negotiations for contracts are proceeding, but the

export trade is full of difficulties and perplexities. Under old contracts shipments to our Allies are receiving as prompt attention as possible, but exports are much in arrears. Nos. 1, 2 and 3 are 122s. 6d. for home use and 141s. f.o.b. for shipment to our Allies, the export quotation, however, being subject to extra charge in connection with the increased neutral foreign ore freights, and other expenses. Manufactured iron and steel works are almost exclusively engaged on production of munitions and ship-building material, and pressure for delivery is such as absorbs maximum output, so that facilities for transaction of ordinary commercial business are almost nil. Packing iron and steel have been advanced 10s., parallel now being £13 10s. and tapered £15 15s. Other quotations are unaltered.

Cumberland.

Maryport.

COAL.

The Cumberland coal trade is exceedingly brisk in all departments, and it is every way likely that the call for fuel, both for shipping and local use, will be greater than ever during the coming autumn and winter. Business in the home and export market is firmer, the pressure of demand on all accounts is growing keener, and with a full resumption of operations in the iron and steel industries in West Cumberland, local needs are now almost as large as they were in April and May. There is a strong and growing demand for all classes of fuel, and although no coal is now allowed to go over the Border, the collieries are finding it increasingly difficult to satisfy requirements to the full. There have been no stoppages at any of the pits since last Tuesday, and production is probably more satisfactory than it has been since the holidays, but it is not yet as large as it might be. The notices of the surface workers expire next Saturday, but as Sir Wm. J. Collins, who has agreed to act temporarily as neutral chairman of the Conciliation Board, will sit to-morrow (Friday) to adjudicate on the matters in dispute, the notices will, no doubt, be withdrawn before the week-end. The collieries have now more business on hand than they can cope with, supplies of all sorts are rather scarce, and at the moment they have little to offer either to outside or export consumers. With the exception of shipping, no outside business can be accepted, and no fuel of any description is now being sent out of the county by rail. House coal is in fairly steady demand, but it is scarcely as brisk as it was a week ago. There is, however, a good enquiry for best house coal, and most of the depots have quite sufficient orders booked to be going on with. All varieties of works fuel are in much stronger demand, and so long as 29 furnaces remain in blast in the district and the steel works continue in full operation, there is no fear of any diminution on this account. Manufacturing requirements are at present very large, and practically the whole of the output is earmarked for the use of important consumers in West Cumberland. All the small coal and coking fuels that can be raised throughout the Cumberland coal field, in addition to large quantities from the east coast are needed to keep all the by-product coke ovens in full operation. About 2,000 tons weekly are now being imported into West Cumberland from outside districts, and it is probable that that amount will have to be largely increased in the very near future. Locomotive fuels for home use are in firm request, and gas coal is in strong demand, both for export and home consumption, but the only stocks being sent away at present are for consumers in the district. The cross-Channel trade is more active this week, and there is a better demand for all sorts for the Irish market. Supplies for export, however, are rather scarce, and with the increased pressure in the home market, the collieries are not now in a position to deal with all the business which is being offered on export account. During the next few months local needs will no doubt absorb a big proportion of the output, but it may be taken for granted that any surplus that is left will be sent to the docks for shipment. During the week 12 vessels have sailed with coals, all for Irish ports, and the shipments have amounted to 2,320 tons, compared with 4,480 tons a year ago, or an increase of 135 tons compared with last week. The largest cargoes have been for Belfast, Londonderry, Larne and Carrickfergus. The imports have also included two good cargoes of pit timber for the local collieries. The coke industry is tremendously brisk, and all the by-product coke ovens in the county are again in full operation. The entire output is being absorbed at the West Cumberland furnaces, in addition to between 5,000 and 6,000 tons which is being regularly imported from the east coast. There is continued activity in the local by-products industry, and all the plants in the district are in full swing. Current quotations are as follow :—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal „ „	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts „ „	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. „	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	28/6	28/6	25/
Best coal for gasworks „	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

The Cumberland and North Lancashire hæmatite pig iron trade keeps very firm and brisk. The greatest activity is maintained in every department of the iron and steel industries, production is steadily increasing, and all but one of the furnaces which were in blast in July are again in full operation. As smelters are now receiving bigger deliveries of ore, two more furnaces may be put into blast within the next few weeks, and it is expected that one of the furnaces at the Harrington Ironworks will also be lighted before the end of the month. Requirements of both special and ordinary iron are still on a very extensive scale,

and the demand grows keener and more difficult to meet. Prices are easily maintained at the Government maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at cash at 115s. per ton. Special low phosphorus iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton, f.o.t. The market for ferro-manganese is very strong. All the production of both ordinary and special iron is going into immediate consumption. Important consumers in Scotland and the Midlands continue to absorb a big proportion of the special iron, and practically all the ordinary Bessemer iron is being used locally. In the steel industry all the mills are working at their fullest capacity, and none but Government orders are being executed. Steel rails, heavy sections, are from £10 17s. 6d. to £11 10s. per ton, with light sections at from £14 to £14 10s. per ton. Heavy tram rails are quoted at £14 per ton; ship plates, £11 10s. per ton, and boiler plates, £12 10s. per ton. The iron ore industry is very busy, and all the mines are working full time, and the whole of the increasing production going to smelters in Cumberland and the Furness district. Prices of all grades are quoted at the maximum. About 3,500 tons of foreign iron ore have been imported this week.

South-West Lancashire.

COAL.

There is a good deal of confusion this week with regard to all qualities of coal, as the districts that Lancashire supplied are now definitely shut off, and the new consumer is still engaged with the details and has scarcely begun to get his deliveries from his new source of supply. There is naturally a feeling of anxiety on both sides, as both owner and customer know they have been forcibly brought together, and some little time will elapse before a smooth working basis is attained. With regard to steam coal there is a good deal of enquiry at the moment, this being mainly for shipment to Allies, and fuel on offer is not sufficient to meet the demand. Bunker coal is also scarce and on the short side of steamers' requirements. Prices, best screened steam coal 27s. 6d. f.o.b. Garston (with difference in cost to less favourable points on Mersey), are fully maintained with Controller's terms. In slacks, the holiday stoppages by users are almost at an end, and, considering the extent of them, there has not been that easement of slack that might have been expected, seeing the output has not been reduced in any way, and probably from now the consumption will quickly overcome the supply.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Best	21/ -22/	21/ -22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/ -20/	19/ -20/	19/ -20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	23/ -24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. Very little business was actually done, everything being in confusion in consequence of the Coal Transport Reorganisation Scheme, and it is impossible yet to say how this will eventuate. There is still a strong demand for house coal, but slack is on the easier side.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Best	22/ -23/	22/ -23/	22/ -23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/ -18/6	18/ -18/6	18/ -18/6
Furnace coal	17/6-18/	17/6-18/	17/ -18/
Bunker (f.o.b. Partington)	—*	—*	25/ -26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

IRON.

There is nothing new to report in the iron and steel trade here. The scarcity of finished iron and steel is still undiminished and the supply forthcoming is quite inadequate to the demand. All steel and iron works are very fully occupied.

Yorkshire and Derbyshire.

Leeds.

COAL.

The representations made to the Coal Controller last week by the factors and merchants section of the Exchange at Leeds concerning the instructions to send greatly increased deliveries of coal to London have elicited from the Controller an assurance that "the requirements of the provinces are receiving most careful consideration, and will continue to do so," to which is added the suggestion that there has been considerable exaggeration of the extra quantities which have been delivered. London merchants and factors in attendance at Tuesday's market reported that, while there is a slight improvement in the position, the coal coming to hand is still insufficient to meet the current demand and to make much impression upon the arrears of orders on their books; that while in a few exceptional cases coal was being laid on the ground at the depots it was on account of the shortage of loaders, carmen and horses to deliver it to the consumers. A fair amount of coal is being sent coastwise from Goole to London, but comparatively little from Hull, the high freights limiting activity in this branch. The collieries are doing their best to conform with the distribution orders of the Controller, and are working full time and at full pressure, but the wagon supply is less satisfactory. While in the West Riding markets it cannot be said that the shortage of coal is acute, there is necessarily a good deal of disturbance of normal deliveries owing to the attention which the collieries are

forced to give to London, and the quantities of coal that merchants are reduced in proportion, with the result that they are considerably below requirements. As regards other qualities, there is very little change in the market. The consumption of gas coal is increasing, and all available supplies are needed for contract deliveries, open market transactions being very rare. The same applies generally to manufacturing fuel. Nuts, both for gas purposes and steam raising, are almost unprocureable, and furnace coke continues in heavy demand, with coking slacks very scarce. Among factors and merchants the Wholesale Coal Prices Order, issued this week, gives rise to an evident feeling of deep concern, not entirely on account of the limits placed on profits, which are viewed as not erring on the side of generosity, but also because of the cancellation of contracts, and the need to continue "working in the dark," as it is put, until the readjustment of pit prices, which is expected in regard to some qualities, has been agreed upon. The factors and merchants present on the market discussed this subject at a special meeting, and decided to form a Coal Factors' Association for Yorkshire, to be affiliated with the Inland Factors' and Wholesale Railborne Merchants' Association. In view of the unsettled position, the subjoined list of prices is given with reserve :—

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal :—			
Prices at pit (London) :			
Haigh Moor selected ...	20/ -21/	20/ -21/	20/ -21/
Wallsend & London best	19/ -20/	19/ -20/	19/ -20/
Silkstone best	19/ -20/	19/ -20/	19/ -20/
Do. house	17/ -18/	17/ -18/	17/ -18/
House nuts	16/ -17/	16/ -17/	16/ -17/
Prices f.o.b. Hull :—			
Haigh Moor best	23/ -24/	23/ -24/	23/ -24/
Silkstone best	22/ -23/	22/ -23/	22/ -23/
Do. house	20/ -21/	20/ -21/	20/ -21/
Other qualities	19/ -20/	19/ -20/	19/ -20/
Gas coal :—			
Prices at pit :			
Screened gas coal	16/ -17/	16/ -17/	16/ -17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/ -16/	15/ -16/	15/ -16/
Other sorts :—			
Prices at pit :			
Washed nuts	17/ -18/	17/ -18/	17/ -18/
Large double-screened engine nuts	16/ -17/	16/ -17/	16/ -17/
Small nuts	15/ -16/	15/ -16/	15/ -16/
Rough unscreened engine coal	15/ -16/	15/ -16/	15/ -16/
Best rough slacks	14/ -15/	14/ -15/	14/ -15/
Small do.	12/ -13/	12/ -13/	12/ -13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke :—			
Price at ovens :			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

Pressure continues to be felt for supplies of practically every class of fuel; and deliveries have perforce to be made of a variable character to carry out in any degree the orders of the Controller. The diversion of tonnage at short notice is still to be calculated upon, and, of course, alternating difficulties result as districts are affected in turn. The extensive production of steam coal in this area still causes little trouble in its disposal, but practically the reverse experience prevails, and orders cannot be satisfied. The big factor at the present time is the extensive tonnage which is called for by the Admiralty and for Government purposes, whilst keener attention continues to be paid to supplies which are needed by the Allies. Apart from this there is not much business with the neutral countries, which, however, are willing to pay higher prices than those obtained for home supplies in order to secure their requirements. The supplies of the railway companies are also of substantial bulk, and for home purposes a heavy tonnage is needed. It continues to be impossible to obtain steam nuts for other than the use of the munition factories and engineering concerns engaged on war work. In regard to small manufacturing fuel, the district control appears to work satisfactorily, although it is unavoidable that only hand-to-mouth supplies can be given, and at times there is a material shortage in the deliveries. Larger supplies of coking slacks would be welcome, and the ovens are only kept fully at work with much difficulty. In regard to gas coal, although the collieries continue to send satisfactory contract supplies, there is a strong enquiry for extra lots, and, as previously stated, some concerns are receiving the support of the authorities to obtain increased quantities. The situation with respect to house coal is still practically unaltered, and it is hoped that the representations which have been made to the Controller will enable larger deliveries to be given to ordinary and nearer markets. The pressure for increased deliveries to London, however, is unrelaxed, and in the West Riding and adjoining mining areas reduced tonnage only is possible, which cannot by any means satisfy the public demand, which is causing delay in providing stocks for the coming winter. The demand for furnace coke continues to be brisk, and the large production is inadequate to meet the present demand. Values are again of a nominal character, about as follow :—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals :—			
Best Silkstone	20/ -22/	20/ -22/	20/ -22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/ -17/6	17/ -17/6	17/ -17/6
Best house nuts	16/ -17/	16/ -17/	16/ -17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals :—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/ -11/
Gas coals :—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.

COAL.

The demand for all kinds of coal continues in excess of the supply. No "free" coal offers for export, and where neutrals succeed in getting licences their small require-

second holders, are only obtained at prices official minimum schedule up to 32s., or 2s. paid for best South Yorkshire hards for nuts. A good trade is being done in West for France, but nuts and manufacturing are obtainable for export. There can be no doubt that quantities now being sent by rail from Yorkshire to London are prejudicing shipments at the Humber ports, collieries even under the sternest pressure not always being able to provide coal for steamers as they come to hand from France. The position all round is a very stringent one, and home merchants, equally with exporters, are encountering the utmost difficulty in obtaining supplies for immediate requirements. The official return shows that in August the quantities of coal received at Hull from the collieries was 247,462 tons, against 298,242 tons in August last year, a decrease of over 50,000 tons. The total for the eight months January-August was 1,936,382 tons, against 2,212,732 tons in the corresponding period of last year.

Chesterfield.**COAL.**

A strong demand is maintained for every class of coal. Household sorts are pressingly called for London requirements. Orders from other parts of the country are coming to hand very freely, but considerable difficulty is experienced in executing them. Fuel for manufacturing purposes is in active demand. There is a great shortage of cobbles and nuts suitable for gas-producers. Steam slack is in satisfactory request and there is no accumulation of stock anywhere. Locomotive coal is urgently wanted, and gas companies continue to press for supplies of gas-making fuel. The export trade is very quiet and there is a serious shortage of supplies of steam. Steamers are delayed on this account. The coke market shows no change. A strong demand is maintained for all qualities. Coking fuel is in brisk demand.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

There is great activity all round, producers being pressed on all hands for completion of orders.

Nottingham.**COAL.**

Although the consumption of domestic fuel by householders is on a comparatively small scale in view of the favourable weather prevailing, merchants are doing a good trade, as customers are still ordering freely for winter supplies. The position, however, is less difficult than would have been the case had not a certain percentage of the public secured stocks earlier. As it is, merchants readily dispose of whatever supplies are obtainable at the collieries, and with orders outstanding there is no possibility of placing any fuel into reserve. Owners find it difficult to comply fully with contract requirements, as there are no surplus supplies at the pits, and thus much discretion is needed to apportion the daily output in accordance with the control system. For steam coal the demand remains brisk, and while the output of the pits producing this class of fuel is well maintained, owners have no difficulty in disposing of practically all grades. Slacks are going out of hand freely, and of nuts and coking sorts the supplies are on the scarce side.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/-16/6
Best hard coals.....	16/9-17/6	16/9-17/6	17/-17/6
Secondary do	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft).....	11/	11/	11/

Leicestershire.**COAL.**

With control in operation there has come a very extensive dislocation in the ordinary course of trade, and an enormous amount of additional work has been thrown on colliery managers. Under normal conditions this would be overtaken without grave inconvenience, but with depleted staffs in every department many weeks must elapse before smooth working can be reached. An enormous lot of work has been involved in clearing out of the sidings wagons belonging to owners in outside areas. Many orders of small volume have been placed which cannot be dealt with, as they involve technical difficulties in transport which would be altogether unprofitable and quite out of question. These will gradually be weeded out so as to get the total output dealt with to economise advantage to all concerned, so as to avoid confusion in dealing with wagons in the sidings. Coal merchants ordering special qualities in comparatively small quantities, even although forwarded officially in the first instance, must not expect to secure deliveries for several weeks if at all. Many offers of

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	17/-19/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-17/
Deep screened cobbles ...	16/-17/	16/-17/	16/6-17/6
Deep large nuts	16/-16/6	16/-16/6	16/-17/
Bakers' nuts	15/-15/6	15/-15/6	15/-16/
Small nuts	14/6-15/	14/6-15/	14/6-15/6
.....	12/9-13/6	12/9-13/6	12/9-13/6
.....	12/-12/3	12/-12/3	12/-12/3
.....	6/-7/	6/-7/	6/-7/
for	13/6-14/	13/6-14/	13/6-14/6
.....	14/-14/6	14/-14/6	14/-15/
.....	13/-13/6	13/-13/6	13/-14/6
.....	13/6-14/	13/6-14/	13/6-14/6
.....	12/6-13/6	12/6-13/6	12/6-13/6

business in all classes of household have to be declined. The outstanding feature is the great pressure for deliveries to London and district, and while they are maintained at the maximum there is no sign of any relief in the near future. Main and deep cobbles and nuts command great attention, while all supplies of bakers' nuts and small nuts for mechanical stokers are cleared off as fast as they come to hand. Country merchants are still very short of supplies, and the stocks at country stations have never been so low. Many wagons are waiting to be filled with any class of coal that may become available. There are no reserves of any kind at the collieries.

South Staffordshire, North Worcestershire and Warwickshire.**Birmingham.****COAL.**

The local demand for all classes of manufacturing and house coal continues on a large scale. The shortage, on the other hand, has been even more pronounced this week, as heavy drafts continue to be sent to London by the instructions of the Controller, to the prejudice of local merchants. No information has been forthcoming as to how long this drain is likely to continue, and merchants are pinning their hopes to a mild autumn to tide them over. The regulation of the charges to be made by factors and merchants is being discussed, and first impressions suggest that the new schedule will not make any difference to the public. This is the opinion of a large coal importer, who said that the real necessity was to increase production, and towards this end suggested that the miners should be asked to work nine instead of eight hours a day. This, however, the miners are not likely to do. Meantime all prices are firmly upheld, and there is practically no business in open market sales, collieries having nothing to offer. There are no reserve stocks at the works or at the wharves for use in emergencies later on, and the coal trade generally is conducted under the greatest difficulties.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

The only change to record in the iron and steel industries is a tightening of the pressure. While gratifying progress has been made in the conversion of blast furnaces to basic iron, the output of both forge and foundry descriptions is becoming unequal to the demand. The price of 97s. 6d. paid for basic iron is higher than that paid for foundry, which in Derbyshire is 92s. 6d., but makers of the latter grade do not relish the severance even although it may be temporary, of their long connection with the iron trade. For all kinds of pigs no difficulty, of course, is experienced in obtaining full rates, including forge material, large quantities of which are required for the bar mills, which are flooded with orders. It is stated that output of some of the better grades of pig iron is hampered by the poor quality of fuel which is coming forward. A huge enquiry exists for small sizes of iron for home and export. The sheet trade is in a state of uncertainty owing to the absence of official notification on the subject of the control of prices. Some makers continue to quote old prices, others have withdrawn quotations altogether. The scarcity of sheet bars has created an enormous demand for plate shearings as a substitute, and it is hinted that these shearings will also probably be controlled. As much as £11 7s. 6d. and £11 10s. has been paid for them, whereas the limit for sheet bars is £10 7s. 6d. The absence of blooms and billets for rolling down is keenly felt by steel makers. Discards are used where possible, but it is said this material does not in many cases work up so well in the finished article. Makers of steel strip quote from £17 15s. to £18, and report a slight easing of the position so far as new business is concerned. They have, however, a lot of arrears to work off, and will be glad of an opportunity to clear these.

Forest of Dean.**Lydney.****COAL.**

While there has been no important change to note in the general position, the demand for all descriptions of house coals shows a tendency to expand still further. The pits are all engaged the full six days every week but the quantity brought to bank is far below market requirements. All the steam coal producing pits are fully extended, finding it a matter of the utmost difficulty to keep pace with the needs of consumers.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	13/6	13/6	13/
Steam coal:—			
Large ..	20/-21/	20/-21/	18/-19/
Small ...	16/-16/6	16/-16/6	16/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Vacancy for Certifying Surgeon.—The Chief Inspector of Factories gives notice that an appointment as certifying surgeon under the Factory and Workshop Acts at Long Eaton (Derby) is vacant.

THE WELSH COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 13.

North Wales.**Wrexham.****COAL.**

The general demand for coal from this area has been well maintained throughout the past week, and all pits have been worked at full pressure in order to meet their commitments. Railway wagons appear to have come to hand with a certain amount of freedom. The merchants' trade in household coal is somewhat disturbed at the moment, owing to the drastic changes which are taking place consequent on the new scheme for reorganisation of the distribution of fuel. Associations of many years' standing have to be broken and new ones formed. It will, therefore, take some little time to get the thing working smoothly. Merchants are pressing for deliveries, and all that is possible is done to meet their requirements. With reference to the gas coal trade, this section appears the most steady, and it should not be long before the new contracts (in accordance with the new scheme) are in operation. Of late, gas companies have pressed for supplies, with a view to getting some stock, pending the completion of the new arrangements. Gas coke still has a ready sale, and no local works hold any appreciable stock of this commodity. Steam coal shows considerable activity, and a large quantity has been taken on account of railway locomotive contracts. The railway workers of Garston district, the centre from which the agitation for the first war bonus originated in 1915, at a mass meeting held at Garston Co-operative Hall have unanimously decided to support the agitation for an additional bonus for railway workers of 20s. per week. Firms under Government control have also taken a goodly tonnage of steam coal from this area during the week, and the shipment trade at Ellesmere Port and Birkenhead has been fairly good. It would appear that under the new scheme the bulk of the fuel required for this trade will be taken from this area. The Mersey Dock and Harbour Board have confirmed the recommendation of the traffic committee to increase the charge for haulage under the agreement between the board and the railway companies trading from Liverpool from 6d. to 9d. per ton, and the new tariff will come into operation on Monday next, September 17. The Clyde Shipping Co. Ltd. and the City of Cork Steam Packet Co. Ltd. announce that all through rates on traffic with Ireland will be advanced as from Monday next, the 17th inst. It is proposed to carry out a scheme for the construction of a floating bridge and roadway at Seacombe, similar to the existing one at Liverpool landing stage; and the Wallasey Town Council have agreed to purchase from the Dock Board a plot of 3,270 yds. of the land adjoining the site of the new shipyard, for the sum of £16,350. Slack has a steady market, and no stocks of any importance are allowed to accumulate. The following is a complete list of the week's quotations:—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit f.o.r.:—			
Best house coal	21/-23/	21/-23/	—
Secondary do.	20/-22/	20/-22/	—
Steam coal.....	19/-22/	19/-22/	—
Gas coal.....	19/-21/	19/-21/	—
Bunkers	19/-22/	19/-22/	—
Nuts	18/-20/	18/-20/	—
Slack	12/-14/6	12/-14/6	—
Gas coke (at works).....	21/8-25/	21/8-23/4	—
Prices landsale:—			
Best house coal	27/6-30/	27/6-30/	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.**Newport.****COAL.**

There is little change to report this week in the condition of the local coal market. The arrival of fresh tonnage, though of a fair quantity considering the abnormal circumstances, has not been sufficient to reduce stocks to any material extent. This is especially so in the matter of small coal, which has been still only in a very limited and dragging market. There has been a good deal of short time at many of the collieries. Wagons are in great request. Practically all the large steam coal is commandeered, and other sorts are so far controlled that there is only at present a very small proportion of the output on a free market. House coal is very scarce and in great demand at almost any figure in reason which does not too far transgress the Controller's price list. There is no change in patent fuel and coke prices.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Voin large...	30/	30/	44/-45/
Western-valleys, ordin'y	29/	29/	44/-45/
Best Eastern-valleys ...	29/	29/	44/-45/
Secondary do.	28/	28/	39/-42/
Best small coals	21/6	21/6	28/-30/
Secondary do.	20/	20/	26/-28/
Inferior do.	18/	18/	21/-22/
Screenings	23/	23/	29/-30/
Through coals	27/	27/	27/-30/
Best washed nuts.....	30/	30/	30/-32/
Other sorts:—			
Best house coal, at pit...	33/	33/	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/
Patent fuel	32/6	32/6	45/-47/6
Furnace coke.....	47/6	47/6	50/-55/
Foundry coke	47/6	47/6	60/-65/

IRON.

The output of most of the iron and steel works has been not only well maintained, but appreciably increased of late, to the very great satisfaction of the Ministry of Munitions. A much better tone prevails in the tin-plate trade, and with the supply of steel bars being more regularised, there is a considerably brighter outlook. Pitwood arrivals have been fairly well maintained since the advent of improved weather, but the market has not quite recovered. Best fir commands about 60s.

Cardiff.

COAL.

Throughout the week business has been of a humdrum character, and there have been no features of interest. Admiralty demands have been slightly heavier, and the tonnage that has come to hand has been requisitioned for executing the requirements of the authorities. The present position is far from satisfactory, and the vessels available are not nearly sufficient to cope with the business offering. Stocks are steadily accumulating, especially of small coals, and stoppages are becoming more numerous, not only in the mining valleys of Glamorgan, but in Monmouthshire also. These, however, are only of a temporary character, and work is resumed as soon as wagons are obtainable, but the position is difficult. Establishment charges have to be maintained, and outputs are diminished, with the additional disadvantage that prices are controlled and profits have been reduced almost to vanishing point. The classification list has not yet been received, and it is reported that the Controller has declined some of the suggestions put forward by the committee. This, of course, means further delay, and the feeling of dissatisfaction and irritation is increasing week by week. For household coals there is a good demand, but difficulty is already experienced over the transit facilities. Some of the dealers or factors have been told that they must take their supplies from certain collieries, and in several instances the class of fuel produced is entirely different from that which they have been accustomed to, with the result that dissatisfaction is caused all round. Some of them complain that they are losing customers, who state that, if they cannot be supplied with the description of coal they require, they will go somewhere else and get it. Argument is useless, and people will not realise that it is a case of compulsion or of necessity. Chartering last week was again very meagre, the amount of tonnage taken up being only 10,050 tons. There is a strong demand for pitwood, and supplies are on the short side. Merchants are asking as much as 61s. to 62s., but the market remains fairly steady at 58s. to 60s., the price being affected by the shortage of trucks.

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—
Superior seconds	31/6	31/6	*
Seconds	30/9	30/9	44/-46/
Ordinary	30/	30/	42/-44/
Best bunker smalls	23/	23/	30/6-31/6
Best ordinaries	21/6	21/6	29/-30/
Cargo qualities	20/	20/	24/-26/
Inferior smalls	18/	18/	20/-23/
Best dry coals	30/	30/	42/6-45/
Ordinary dries	28/6	28/6	40/-42/6
Best washed nuts	30/	30/	36/-38/
Seconds	28/6	28/6	34/-36/
Best washed peas	27/6	27/6	33/-35/
Seconds	26/6	26/6	31/-33/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	45/-46/
Western-valleys	29/	29/	43/-45/
Eastern-valleys	29/	29/	41/-43/
Inferior do.	28/	28/	39/-41/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/-26/6
Second qualities (at pit)	30/9	30/9	24/6-25/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	42/-45/
Through-and-through	—	—	34/-36/
Small	26/	26/	30/-32/6
No. 2 Rhondda—			
Large	27/	27/	36/-37/6
Through-and-through	25/	25/	29/-31/
Small	20/	20/	24/-25/
Best patent fuel	30/	30/	45/-47/6
Seconds	30/	30/	43/-45/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	52/-57/6
Pitwood (ex-ship)	58/-60/	59/-61/	44/-45/

* Nominal.

IRON.

There is no diminution in the demand for all descriptions of iron and steel, and outputs are steadily increasing week by week, thanks to the many extensions and improvements in plant that are being carried out. In the tin-plate trade there is not much doing. All transactions in "free" plates are now at an end, and the controlled prices are in operation for all descriptions. Merchants complain that the margin of 2 per cent., including brokerage, is not a fair profit, and there is talk of an agitation to increase the limitation price. Orders are plentiful and most makers are well booked ahead, but owing to the irregularity in the supply of raw material deliveries are backward. Shipments last week were only 9,946 boxes, whilst receipts from works totalled 20,558 boxes, leaving 65,260 boxes in stock, compared with 54,648 boxes the previous week and 109,463 boxes at the corresponding date of last year. There is no change in the galvanised sheet trade, and works are chiefly engaged in the production of black and painted sheets and trench plates. All quotations are nominal.

Swansea.

COAL.

There was no material alteration to report in the general condition of the anthracite coal market. Although there was not much improvement in the supply of tonnage, large coals were in firm demand, whilst machine-made sizes were difficult to procure. There was little call for culm and duff. Large steam coal was in fair request, but smalls were plentiful. Bituminous coals for inland purposes were busy.

Llanelli.

COAL.

Large anthracite qualities are in good demand, and supplies of the better grades are scarce. Machine-made qualities are very firm, and supplies of nuts and beans difficult to obtain. Culm and duff are very slow, and stocks accumulating. The tonnage position is still unsatisfactory, and throughs and small steams are, therefore, irregular. The lower grades are moving very slowly, and stocks are heavy. Large steams are holding their own, but there is likely to be a temporary easing off in the demand, owing to the Coal Controller's restrictions stopping deliveries to certain areas.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/6
Thirde	27/6	27/6	—
Red Vein large	25/6	25/6	26/6-27/6
Machine-made cobbles	42/6	42/6	39/6-42/6
Seconds	41/	41/	—
Thirde	39/	39/	—
Red Vein cobbles	36/	36/	—
Machine-made nuts	42/6	42/6	—
Seconds	41/	41/	—
Thirde	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-32/6
Seconds	34/	34/	—
Thirde	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm	13/	13/	15/-15/6
Red Vein culm	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	27/6-31/6
Small	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Small	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—
Coke-oven coke	—	—	25/6-27/6

SOUTH WALES MINING TIMBER TRADE.

For the week ending September 7 the total quantity of pitwood imported into South Wales amounted to 21,912 loads. Out of this 10,400 loads were taken by the agents for the Admiralty collieries, the balance going to the various pitwood importers. The bulk of the timber received was from the French ports, and this found a ready market at 59s. to 61s. per ton ex ship at Cardiff. Importers took their full quantities allowed by the Controller during the past month, while there is every probability of full quantities being taken before the month is out. The actual quantities imported were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Sept. 1	Montague L. Meyer	4,768
" 1	Montague L. Meyer	864
" 4	Lysberg Limited	1,200
" 4	Lysberg Limited	2,100
" 4	Lysberg Limited	1,560
" 4	Morgan and Cadogan	156
" 4	W. H. Williams and Company	140
" 4	F. R. Howe and Company	1,680
" 4	Morgan and Cadogan	1,140
" 4	Lysberg Limited	540
" 5	Morgan and Cadogan	720
" 5	Morgan and Cadogan	480
" 6	Lysberg Limited	600
" 6	Lysberg Limited	1,920
" 6	F. Marsche and Company	420
" 7	Morgan and Cadogan	144
" 7	Lysberg Limited	3,480
Total		21,912

There were no imports from either Newport, Swansea or Port Talbot.

Home-Grown Timber.

The better weather experienced has led to better deliveries of home grown wood, but the roads are still in a deplorable condition. Now that reforestation is being seriously considered, the first step will be to make provision for good roads. Imports from Ireland were fair, and there is apparently a prospect of much larger supplies being received from this country. South Wales will need a much greater quantity of home-grown pitwood during the next few months and larger supplies from Ireland are being looked forward to.

THE IRISH COAL TRADE.

THURSDAY, SEPTEMBER 13.

Dublin.

Business generally continues to be active, with very little improvement in the matter of supplies, and there is, so far, no change in prices of any of the qualities. Quotations in the city are as follow: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount. Scotch steam coal, 41s.; Welsh steam, 48s.; coke, 45s. per ton. Irish coals from the Wolf-hill Collieries, Queen's County, are: Malting coal, 46s. per ton; house, gas, and steam coal, 40s.; lime culm, 16s.; fine culm, 12s. per ton—all f.o.r. Athy, the nearest railway connection with the mines, from which a line of railway is now being constructed to connect the collieries with the Great Southern and Western line. It is stated that up to the present the members of the coal trade in Ireland have not had any further communication on the subject of the Coal Control Regulations, and there has not been any change in the existing conditions of the trade here. Difficulties in procuring an adequate supply of coal and tonnage to carry it are increasing, and in the South and West of Ireland there is a marked shortage of supplies. Should any of the new regulations come into operation at this side, it is expected that matters will work out advantageously to consumers.

Belfast.

The local trade is unchanged, a fairly good demand and short supplies of best household coals still being the chief features. Prices are all unchanged, as follow: Best Arley house coal, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Cheapest Scotch steam coal is about 29s. per ton, and best qualities up to 35s. and 37s. 6d. per ton. Gas coke ranges from 37s. 6d. to 40s. per ton; foundry coke, from 60s. to 65s. per ton for best beehive oven. Irish coal at Craighuller pits, Portrush, co. Antrim, is 14s. per ton, and 30s. per ton delivered in Belfast.

THE LONDON COAL TRADE.

THURSDAY, SEPTEMBER 13.

The London coal market has been very active during the past week. Production has been fairly well maintained, and supplies have come forward regularly, but demand is still far ahead of supply. The tone of the market is very firm, but, as sales are restricted, business is of necessity quiet for lack of coal. Colliery representatives have very little free coal to offer, and just now the whole of the districts are in the throes of the new transport scheme. Considerable uncertainty is everywhere noticeable as to how the scheme will work, but up to the present a good amount of satisfaction is felt by the fair promise of an increased tonnage for the London depots. On all sides there are rumours that special attention must be given to supplying the London district and the South, and the merchants are waiting with considerable interest to see how the new arrangements will pan out. All pit prices are unchanged. Steam coals are in active demand, and very difficult to obtain. Slacks are steady, and gas coke is gaining favour. Factories along the Thames side are very short of fuel, and pressure is brought to bear upon the Controller for a better supply of screened hard coal. The new regulation in connection with the Coal Transport Scheme came into effect on Monday last, and in many cases the new coals allocated to replace the coal originally sent will be at very much higher prices. In district No. 13, i.e., in the area represented by Devonshire and Cornwall, the nearest coal pits are not altogether suitable for house coals. The haulage will be considerably less, but the prices of the different qualities are said to be appreciably higher. So far as the London district is concerned, there is very little to complain about, as in addition to the extra supplies which are said to be coming forward, there is a prospect that the Durham coal, which was formerly sent into London by rail, will now be chosen from the Derbyshire and Nottinghamshire district, and probably some from Yorkshire. The demand for the London depots is exceedingly strong, and now that so many efforts are centred on bringing forward larger supplies to the Metropolis, the merchants are hoping to cope with the accumulation of orders already on their books, and strenuous efforts are being made to get all the house coal into the cellars before October 1, when the ration system comes into effect. The recent Order that only one ton is to be delivered to each householder during September has partially crippled the regular delivery trade for the larger houses, but it is recognised as a useful measure, and will enable everyone to participate in the limited quantities arriving. The Price of Coal (Limitation) Act also is brought into prominence, and the Controller is taking precaution that the maximum prices charged by factors, etc., are not exceeded. The Board of Trade have issued a specially-worded circular, which came into force on September 10, by which a scale of commissions allowable to factors and merchants for supplies of coal sent into railway, electric, and other works will be graduated. The attendance on the market has been very good, and the eagerness to purchase the few lots of free coal offering is very pronounced. Happily, also, additional supplies have been allocated for London to take the place of provincial areas according to the Coal Transport Scheme. In the seaborne market the tonnage has to a certain extent fallen off. For Monday's market 31 vessels were reported as entering the Thames, and 11 for Wednesday. A new agreement has just been entered into between the Amalgamated Coal Porters' Union and the London Society of Coal Merchants, which will regulate the payments to loaders and carmen at all the various wharves and depots in and around London.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, SEPTEMBER 7.—The seaborne house coal market was rather quiet to-day, with no cargoes offering for sale. Cargoes, 18.

MONDAY, SEPTEMBER 10.—Seaborne house coal was in demand to-day, but no sales were reported in consequence of the short supply. Cargoes, 31.

WEDNESDAY, SEPTEMBER 12.—There was no alteration in the seaborne house coal market to-day, the small supply available being readily disposed of, but no quotations made known. Cargoes, 11.

THE BY-PRODUCTS TRADE.

Tar Products.—Considerable interest is still maintained in the position of pitch, the London price remaining at or about 47s. 6d. per ton f.o.b. Provincial sellers are disappointed in not being able to take part in the export trade at present on account of transport and tonnage difficulties, but they are holding out for more money, maintaining that the shipping position justifies it, and that an improvement may occur at any time which will enable them to take advantage of the export business offering. Benzol remains steady; and toluol is a shade harder. Solvent naphtha is scarce. Creosote is quite nominal, some indication being awaited regarding the Government's intentions as to price for supplies to be taken over. Average quotations are as follow:—Coal tar, 23s. 3d. to 28s. Pitch, east coast, 17s. to 18s.; west coast, Manchester, 17s. 6d. to 18s. 6d.; Liverpool, 17s. 6d.; Clyde, 19s. to 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 4½d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 1s. 11d. to 2s. 1d. Heavy naphtha, north, 1s. 4d. to 1s. 6d. Heavy oils, in bulk, north, 3¾d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 4½d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The home trade in this product is decidedly brisk, every effort being made by farmers and dealers to take advantage of the current low official price. Next month the quotation automatically rises 10s. per ton. Business during the autumn and winter is expected to be very heavy—greater, in fact, than in any previous year. Practically no export trade has been done.

Canada's Winter Fuel Supplies.—The Canadian Fuel Controller is making every effort to secure large quantities of coal by water to the head of the Lakes, in order to meet the winter needs of Manitoba. The mines in Alberta and British Columbia are again operating, and the production is now reported to be 17,500 tons of coal and 700 tons of coke. This output is gradually increasing. In view of the harvesting operations, it is realised that it is impossible to get more labour at the present time, but the Fuel Controller will visit the West later with a view to mobilising labour for an increased coal production.

LOCAL AUTHORITIES AND RETAIL PRICES OF HOUSE COAL.

Addressed to town clerks and clerks of district councils, enclosing the sub-indium, the Board of Trade points out that Article 9 of the Retail Coal Prices Order* authorises local councils to request from the coal merchants in their area such information as the councils may require in order to satisfy themselves that the prices which the merchants propose to charge comply with the requirements of the Order, and that whilst in general (except in the case of seaborne coal) retail prices should not exceed the prices in operation on or about the corresponding date in the 12 months prior to the war by more than 6s. 6d. to 7s. 6d. per ton (the lower figure applying more particularly to towns in the neighbourhood of collieries), it is, however, to be understood that in certain cases the increase in pre-war prices is at the present time less than these amounts, and that in such cases there should be no increase in present levels of prices. On the other hand, in other districts an increase of more than 7s. 6d. per ton over pre-war prices may, owing to special circumstances, be justifiable.

It is suggested that councils or committees appointed by them in accordance with the Order should call a meeting of the retail coal merchants in their area, and request them to submit for the council's approval prices to come into operation on October 1, or as soon as possible thereafter. Where associations of merchants are in existence, it will be desirable for the sake of convenience to communicate with them for this purpose.

In rural areas, particularly, it will probably be convenient that a joint meeting of representatives of local authorities for a number of areas and of the merchants in those areas should be held in order to come to a uniform arrangement as to the general increase over pre-war prices to be sanctioned. The detailed schedules of prices for each district can afterwards be arranged locally with the merchants in the district. The Controller is endeavouring to make arrangements on these lines in certain areas.

If the prices submitted by the merchants do not exceed those in operation on or about the corresponding date in the 12 months prior to the war by more than the appropriate sum mentioned above, no further investigation will be necessary, but if the increase exceeds such amount the merchants should be requested to furnish details of the increases in costs in order that the reasonableness of the prices which they suggest may be verified.

It may be assumed that prices which make reasonable provision for increases in costs as indicated above comply with the requirements of Article 1 of the Order as to the margin of profit of 1s. per ton, and when such prices have been decided on, a schedule should be drawn up stating the prices for each description of coal under the various conditions of sale, and published by the local authority in the local Press. The cost of advertisement will be defrayed by the Government. Precise instructions on this point will be communicated later. A form of advertisement is suggested, but the details both as regards the descriptions of the coal and the methods of sale will vary from place to place, and in some cases it may be necessary for a local authority to approve different levels of price for different districts in their area owing to local differences in costs of distribution.

Should local authorities experience difficulty in securing the co-operation of the merchants for drawing up a schedule of prices, they should inform the Controller of Coal Mines, who will consider the question of instituting a formal local enquiry, and if the local authority are satisfied that the prices which the merchants have refused to revise are clearly in excess of the amounts that could be justified on the basis suggested above, they should furnish the Controller with full information, in order that he may consider the advisability of instituting proceedings forthwith.

When prices have been duly published by the local authority, a merchant is regarded as complying with the Order so long as his prices do not exceed those fixed by the local authority. Until such prices have been established in any locality, a merchant is liable to penalties if it is proved that the prices at which he sells do not comply with Articles 1 to 7 of the Order.

The procedure described above should be followed whether voluntary arrangements as to the limitation of coal prices are in force or not. In addition to their functions in regard to fixing prices, certain local authorities are empowered to order that the provisions as to the displaying of prices on vehicles shall apply to their area or to any part thereof. It is not intended that the provision should apply to sparsely populated areas in which the maximum prices may vary from village to village on account of differences in cartage costs, but it is suggested that in such cases the local authority arrange, if possible, for the display of the maximum prices in some conspicuous place in each village, by notice boards or hoardings in prominent positions, or, if these are not available, in the local post offices.

Memorandum.

COLLIERY PRICES.

Under the Price of Coal (Limitation) Act, 1915, the price charged by a colliery company for a particular description of coal may exceed by not more than 4s. per ton the price charged by the same colliery under a similar sale of the same coal on or about the corresponding date in the 12 months ended June 30, 1914. In the case of collieries in the Forest of Dean and Monmouth and the Forest of Dean, the price of 4s. has been increased to

CHARGES.

A colliery may charge on house coal is the Wholesale Coal Prices Order, 1917, when a merchant buys his supplies (or a

page 495 of this issue.

portion of his supplies) through factors, the increase, as compared with the pre-war charge, should not be more than 2d. or 3d. per ton.

TRANSPORT.

(a) Railborne Coal.

The only general increase in railway charges is the increase of wagon hire charges for private owners' wagons which was sanctioned by the Price of Coal (Limitation) Act, this increase varying from 2½d. per ton in the case of coal carried a distance of less than 20 miles to 7½d. per ton in the case of coal carried a distance of 150 miles or more. In general, therefore, railway transport charges will only be increased by a few pence per ton.

(b) Seaborne Coal.

In the case of seaborne coal, the freights to be regarded as legitimate are the current rates of freight as indicated in Article 2 of the Wholesale Coal Prices Order. These will generally be considerably in excess of pre-war freights.

DISTRIBUTION FROM DEPOTS.

It has been ascertained by an examination of the position in a number of localities that the increase in charges for distribution since the beginning of the war (including depot and office expenses and cartage) is in general about 2s. 6d. per ton, but in particular localities the increase may, owing to special circumstances, be greater or less than this amount.

The above particulars indicate roughly the increases in the different elements making up the retail price of railborne coal as compared with the corresponding figure for the 12 months prior to the war, but these amounts may be varied in certain cases owing to the following circumstances:—

(1) Colliery Price.

In certain cases the price charged to a merchant may exceed his pre-war price by somewhat more than 4s. per ton (or 6s. 6d. per ton in the case of collieries in South Wales and Monmouth and the Forest of Dean), owing to the colliery basing its present price not on the sale to the same merchant in the pre-war period, but on a similar sale to another purchaser at the same time at a slightly higher price. In no case, however, should the additional charge be more than a few pence per ton. Further, a merchant may be obtaining part of his supplies from different collieries from those supplying him prior to the war.

(2) Railway Transport.

If supplies are obtained from collieries nearer to or farther from the area of consumption than those supplying the merchant prior to the war, the railway rates will generally be reduced or increased accordingly.

(3) Distribution.

Generally speaking, it seems to be the case that cartage costs have increased by about 50 per cent. as compared with pre-war charges. In places where costs of cartage were high before the war owing to long haulage or hilly districts, the increase will be correspondingly high, and the sum of 2s. 6d. specified above to cover all increases in cost of distribution may be insufficient.

Board of Trade (Coal Mines Department),
8, Richmond-terrace, Whitehall, S.W. 1,
September 12, 1917.

OBITUARY.

The death is announced of Mr. W. H. Cory, brother of the late Messrs. John and Richard Cory, chiefs of the leading coal firm, Cory Brothers and Company, Cardiff. He was an uncle of Sir Clifford Cory, M.P., present head of the firm, and was 74 years of age. One of his sons is in business as a stockbroker at Cardiff.

Mr. Thomas Staley, of Auckland Park, who has died at the age of 70 years, was formerly under-manager at the Black Boy Colliery, and later held a similar position at Leasingthorne Colliery. In his time, he was a member of the executive committee of the Durham Miners' Association.

Capt. B. L. Robinson, of the Army Service Corps, whose death occurred at a sanatorium near Banchory, was the third son of the late Mr. Robert Robinson, of Howlish Hall, Bishop Auckland, for some years colliery agent to Messrs. Bolckow, Vaughan and Company Limited.

Mr. Ralph Maughan, for several years manager of Messrs. Bowes and Partners' coal depot, Jarrow, has died suddenly at Tunbridge Wells.

Pte. Alfred Hargreaves, West Yorkshire Regiment, who has died in hospital in France from fever, was the son of Mr. James Hargreaves, coal merchant, Keighley. Pte. Hargreaves assisted his father in the business up to the time of enlistment nearly two years ago. Another son, Pte. Jno. A. Hargreaves, A.S.C., is also serving.

Coal for London Flats.—In order to provide a winter supply of coal for the numerous blocks of flats or tenements in London, where there is a limited space available for storage, the Controller of Coal Mines has made a number of suggestions to the owners and managers of such dwellings where there are more than 25 families accommodated. It is suggested that one of the three following courses should be taken: (a) That the owner should himself by his servants undertake the storage and distribution of coal to his tenants or occupiers. Where this can be done it will be of most assistance. (b) That he should afford assistance and facilities to his tenants for the undertaking of this work on a co-operative basis. (c) That he should either directly himself or by means of a club or association of his tenants contract with some conveniently situated coal merchant for a regular supply delivered in some concerted manner to avoid wasteful cartage and labour. In a letter containing these suggestions, it is added that the Controller wishes to call attention to the risk of discomfort which may arise through interruptions in the regular supply of coal, and to state that whichever of the three courses referred to above is adopted, an obligation must rest upon the owner or manager of the flats or tenements to see that proper provision is made for a reserve stock of coal either on the premises or adjacent thereto. The Controller cannot agree to allow this risk to be left unprovided against. He desires therefore that the owner shall proceed to make provision of a reserve stock of coal equal to not less than 10 cwt. in respect of each separate tenant or occupier. This stock may be accumulated gradually up to the end of October. The Controller will assist in the securing of this stock through usual trade channels. It is suggested that occupiers of this class of dwelling should not apply for individual coal requisition forms at the coal merchant's pending the completion of these arrangements.

TRADES UNION CONGRESS.

(FROM OUR LABOUR CORRESPONDENT.)

The Trades Union Congress at Blackpool, on Friday, discussed the highly contentious question of a trade union organisation on the principle of industrial unions versus craft unions, which threatens to split the movement into two sections. Mr. JOHN HILL, Newcastle-on-Tyne (president), was in the chair.

Mr. G. PARKER, on behalf of the National Federation of Colliery Enginemen, Stokers, and Kindred Trades, moved a resolution protesting against the attempt of the Miners' Federation of Great Britain to compel all who worked in and about a colliery to become members of their Federation without regard to the fact that thousands of them were members of other trade unions, and pledging the Congress to assist colliery workers by all means in its power in resisting that effort of the Miners' Federation. Mr. Parker admitted that there was much to be said for and against industrial trade unionism, but this was not the time to discuss it nor was it the time for the Miners' Federation to institute methods to enforce it. The spirit of the Federation was the spirit which caused dissension and, in international affairs, wars. They were introducing a coercion which ought never to exist in the trade union movement. The colliery enginemen appealed to the Congress for fair play.

Mr. R. SMILLIE (Miners' Federation) said that it was not from any desire to secure members that the Federation were determined that all the workers in and about the mines should belong to the Federation. An organisation of nearly a million workers did not require to stir up strife to obtain a few thousand more members. They had often found, during the fighting of the last 20 years, that their strength and ability to cope with the employers was seriously interfered with because there was not a solid organisation at the collieries. Again and again they had seen the engine-winders stand at the engines and raise and lower blacklegs. The whole trade union movement would ultimately find that they could only successfully fight if they were organised on industrial lines, and all the great industries would yet be forced to have one organisation apiece. The Federation had never in any district told a member of another organisation that he must give it up and join the Federation. But they had told men in some cases that they must join the Federation. They were not Prussian in their methods. They were ready to negotiate with any organisation confined to colliery workers, but not with an organisation which embraced "kindred trades." They would be sorry if the Congress decided that they must leave it, but they were determined, whatever happened, to organise the colliery industry on industrial lines, and to get all the workers in all the mines into a solid organisation.

Mr. CLYNES, M.P., suggested that, as the differences between the two bodies were so deep, the resolution should be withdrawn and the matter left in the hands of the Parliamentary Committee.

Mr. SMILLIE refused to agree to this course. The enginemen, he said, had chosen to raise the matter in the Congress, and the miners insisted that the decision of the Congress should be taken on it.

Mr. STEPHEN WALSH, M.P., reminded the enginemen of the benefits which they derived from the work of the Federation. The eight-hour day, he said, and every bonus and wage advance during the war, had been secured by the Federation and grasped automatically by the enginemen. He added:—"We will not allow this sectionalism when the war is over. We must have genuine trade unionism."

Mr. CLYNES, who represented the General Workers' Union, repudiated the right of any organisation, however large, to dictate to the smaller unions. He deprecated the exposure of domestic quarrels to the public gaze, and reiterated his suggestion that the resolution should be withdrawn, and the Parliamentary Committee invited to act as mediator between the disputants.

After further discussion, Mr. H. GOSLING (Watermen) moved the previous question, and it was carried by 2,125,000 votes to 791,000, majority 1,334,000.

On Saturday it was announced that the elections for the new Parliamentary Committee had resulted in the appointment of the following:—F. Hall (miners), A. Onions (miners), J. Sexton (dockers), J. H. Thomas, M.P. (railwaymen), J. Hill (boilermakers), W. Thorne, M.P. (general workers), and others.

It was decided to hold next year's Congress at Derby. In conclusion a number of resolutions on various subjects were passed after little or no discussion. Among them were a proposal for the national ownership and control of land, a protest against the lowering of the income tax exemption level, and a demand for the nationalisation of canals and waterways.

THE TIN-PLATE TRADE.

Liverpool.

There is not very much interest in this market in these days of fixed prices. The enquiry during the week was only moderate, and merchants state that very little business has passed through their hands. Quite a lot of plates were again bought by the Government on Allies' account. Any orders below Class A do not stand a chance of being executed, works being so fully booked up with war specifications. Spot lots were in some demand, and it is reported by one or two merchants that they have managed to pick up parcels here and there at below the official price of 30s. basis net f.o.t. at works.

Iron and Steel Institute.—In addition to the list of papers announced in the programme of the autumn meeting (*Colliery Guardian*, August 31, page 399), Committee No. 3, for the manufacture of open-hearth steel, will present reports on "Metallurgical and Mechanical Practice in Open-Hearth Steel Works," in which British and foreign practice is compared. It has been arranged to hold a special session at 3 p.m. on Thursday, September 20, for the purpose of discussing these reports. The paper No. 6 in the original programme, by Mr. E. F. Law, on "Effect of Mass on Heat Treatment," cannot be ready in time for the meeting, and is deferred to a future occasion.

LABOUR AND WAGES.**South Wales and Monmouthshire.**

The Committee on Production has issued an award in respect of an application for advance of wages and change in working conditions by men employed at the coke ovens at Risca. The Committee order that increase in the rates of wages shall be made ranging from 1d. to 7d. per day in the different grades; that the war bonus of 25 per cent. be increased to 35 per cent.; that week-end work between 2 p.m. Saturday and 6 a.m. on Monday be paid at the rate of time and a-half; and also for the work on statutory holidays, but that colliery holidays cannot be extended to the coking plant. The claim that afternoon and night shifts should be paid the bonus turn on the same conditions as the bonus turn paid to colliery workmen has not been established.

On account of the alleged dismissal of two blacksmiths, between 700 and 800 men employed at the Cefn Cribbwr Colliery stopped work for two or three days notwithstanding advice from their agent that they should immediately return to work upon promise of the two men's reinstatement.

At Pontypridd, on Saturday, a meeting was held of the No. 2 district of South Wales and Monmouthshire colliery examiners, when it was stated that re-examination would be arranged at an early date for those who secured their certificates five years ago. The general secretary intimated that he had learned from the Home Office that the examination would not be such as to cause anxiety, but would be a fair and reasonable test; and the association would see that the interests of the members were safeguarded. Referring to notices which had been tendered by the colliery examiners, their agent stated that he looked forward with confidence to the issue of the struggle. It could not be said that they were taking advantage of the national crisis, for the matters in dispute ought to have been settled long ago. They had for years attempted to secure their aims with individual employers. They had tried collectively in each district, but to no good purpose; and they were now trying all together. Except for Pontypridd district, there were not, he thought, any dissident lodges in any part.

The Iron and Steel Workers' Association of South Wales are seeking to have one o'clock established as the time of finishing work on Saturdays. At present there is no fixture of time, and the men argue that they are working with great regularity, and, therefore, are entitled to have a finishing hour fixed for Saturday. It is stated that the employers are not adverse to the proposal, provided that it can be acceded to without restriction of output. A meeting of the Wages Board will be held on Saturday to consider the matter.

At the Gethin Pit, Abercarnid, on Monday, between three and four hundred men struck work, their grievance being that some of their number had not been paid the minimum wage when working in abnormal places. After an interview with the manager, however, a settlement was arrived at, and the night shift returned to work.

The South Wales and Monmouthshire railwaymen at a meeting in Cardiff on Sunday passed a resolution demanding an increase of 20s. per week. There were about 80 delegates present representing about 16,500 members.

The combined committee which represents workmen in the service of the Ebbw Vale Company have held a meeting to discuss their separate affairs. In regard to the notices served on workmen on the No. 3 South Griffyn pit, it was stated that the notices had been suspended for 14 days, whilst enquiries were made. Additional members were appointed by the combined committee to act. From another district it was reported that the workmen of Abertillery, Ebbw Vale, and Blaina had withdrawn their special collectors of income tax, and the meeting had decided to support the proposal for convening a South Wales conference to consider the question of income tax payments by the wage earners.

At the monthly meeting of the Blaina district Federationists, discussion took place with regard to the grievance relating to small coal, the opinion being that not more than 4 cwt. shall be deducted from a tram, and that all above that quantity should be paid as large coal. Discussion took place as to notices which had been given to men, 62 in one colliery and 176 in another. A report had been made to the Coal Controller, with the result that, as to the majority, the notices were suspended for a fortnight. It was decided to further pursue this matter with the Coal Controller.

The Eastern Valley Miners' District, Monmouthshire, has deputed Mr. Jabez Jones and Mr. Barnwell to visit the various lodges of the South Wales Miners' Federation to appeal for support for the 600 dependants of the 240 miners who are on strike owing to the price list dispute at the Elled Colliery, Pontnewynydd. The deputation explains to the lodges that the Elled workmen are fighting for a principle, and have a good case. They asked for a cutting price of 3s. 6d. per ton, and the owners had offered only 2s. 1½d. There were about 250 men and boys affected, and between five and six hundred dependants. The rate of pay at present is 10s. and 1s. per child from the Central Fund, and 10s. and 1s. per child from local sources—amounts which were inadequate compared with the high cost of living. The Ebbw Vale miners, at a meeting on Saturday, decided to contribute immediately £50 towards the maintenance of the strikers and dependants, and undertook to consider a scheme of weekly payments.

The Cwmbran (Mon.) branch of the Blastfurnacemen and Ironworkers' Union, in conjunction with the N.U.R., has resolved to appeal to Lord Rhondda to dissolve the Food Control Committees set up by the Llantarnam and Llanfrechfa Upper Urban District Councils. They are asking for better representation of the consumers, in accordance with the nominations of the local labour unions.

North of England.

The Easington Lodge of the Durham Miners' Association has resolved that it be an instruction to the Federation Board to seek a complete re-arrangement of the basis of deciding the adjustment of county percentages; the selling price of coal as the deciding factor of percentage is inadequate and unjust; the costs of production and whole data of the question ought to be given in the accountants' ascertainment; and the principle of a living wage ought to be the prime factor in the consideration of the prime costs of production, and, therefore, the Board ought to seek a re-construction on these lines, and raise the 1879 basis to that of a reasonable standard to meet the requirements of modern times.

During August the Northumberland household coal collieries worked an average of 4.6 days per week, as compared with an average of 4.94 in July. Steam coal pits were employed on an average 4.04 days per week, as against 4.67 days in July. The general average was 4.23 days per week, as against 4.76 in July.

Owing to indifferent employment of the Delaval collieries, arrangements are being made to resuscitate the local relief fund. At the meeting at which this was decided, Mr. J. S. Tweddell, manager of the pits, said that, in cases where men could not live on, say, two days' pay per week, the management would give certificates to enable them to get work elsewhere until better conditions prevailed locally.

Fifty-six lodges of the Durham Miners' Association were represented by 160 delegates at a conference, held at Trimdon Grange last Saturday, convened by the local lodge. The following resolutions were carried unanimously:—"That the time is now opportune for negotiations with the coalowners upon the question of the new wage movement for the 1879 basis to be raised 50 per cent. for all classes of workmen." "That the time has arrived when the Durham miners shall press forward the question of the Minimum Wage Act to be amended as follows: (1) That all surface workers shall be included in the provisions of the Minimum Wage Act; (2) the abolition of all disqualifying rules; (3) the minimum wage not to be less than the county average, all other classes in their respective order." "That this conference asks that a special council meeting be held on Saturday, September 29, 1917, for the purpose of especially discussing the above resolutions; that the council decide what action shall be taken, failing a satisfactory reply from the coalowners."

The Marsden Lodge of the Durham Miners' Association is circularising the other lodges in the county urging that the time has arrived for some attempt to eradicate certain anomalies from the regulations for compensation in respect of accidents. The object of the lodge is the equalisation and more logical application of compensation benefit.

The St. Helens Colliery in Workington, which employs upwards of 800 hands, was idle for three days last week owing to a dispute with the drivers. The trouble, it appears, arose out of the promotion of one or two of the boys off the haulages to heaving, some of the lads contending that they had not got their turn. Without consulting either the manager or the colliery delegate (Mr. John Barker) they struck work on Wednesday morning of last week, and the whole of the men were therefore thrown idle for the day. On the following day the lads came to the pit in the morning as usual. Some of them appeared to be strongly in favour of putting in a demand for increased wages, and although Mr. Barker did his utmost to find out what they wanted, they absolutely refused either to go to work or to appoint a deputation to lay the matter before the management, and the pit was again thrown idle. Nothing more was done until a wire was received from the Coal Controller drawing their attention to the conditions of the Conciliation Board, and also pointing out that the dispute, if any, must come through the proper quarter. A meeting was held at Flimby on Friday afternoon, addressed by the colliery delegate and others, and eventually, after some persuasion, the lads agreed to appoint a deputation to meet the management on Monday. The pit, therefore, resumed work on Saturday morning.

The driver lads employed at William Pit, Clifton, laid the pit idle on Tuesday. The stoppage was threatened on Monday by the lads refusing to go down the pit, but on seeing the manager, he got them to descend and work their shift. At a meeting on Monday, it was decided to strike on the following day for 1s. per day advance in wages, for drivers, rope lads and brakemen. The present rate is from 4s. 3d. to 4s. 6d. per day. On Tuesday morning those who turned out refused to go to work, and the pit was laid idle. A meeting was held on Tuesday afternoon, and after a lengthy discussion the men advised the lads to resume work on Wednesday, and in future to give a proper notice to the manager before striking.

Federated Area.

A curious grievance has arisen at the Pendleton and Pendlebury collieries, near Manchester, belonging to Messrs. Knowles and Sons Limited, with regard to the time for finishing work on Saturdays. The men contend that in the old days 12 o'clock was the time for ceasing work, and object to being kept down the pits until one o'clock, and for several weeks they have not worked on Saturdays. With the view of arriving at a more definite understanding on the matter a ballot of the men was taken last week. This resulted in a majority of three to one in favour of tendering 14 days' notice to cease work if a return is not made to the 12 o'clock rule. Hopes are entertained, however, that the grievance will be remedied before any such drastic action is taken. About 3,000 men are affected.

At meetings of Lord Ellesmere's miners, held last week end, in Walkden, resolutions were adopted urging their leaders to bring home to the Government the necessity for effecting some real reductions in the prices of foodstuffs. It was stated that certain retailers in Walkden were that week charging 3s. per lb. for Danish butter. Miners were receiving much higher wages, it was true, but they had to give them to shopkeepers in order to live.

A dispute has arisen at the Baruburgh Main Colliery, one of the new pits near Doncaster, which has a daily output of about 2,000 tons, and employs some 1,600 men, over the price to be paid for ripping. The colliery belongs to the Manvers Main Co. Some time ago the rippers asked for a piece rate considerably in excess of that ordinarily paid, and this was refused. Last week they declined to carry out the orders as to ripping, and stopped the whole of the works at the mine, notwithstanding the offer of the manager to suspend the order pending negotiation. After laying the mine idle for practically a week the men have resumed work, on the advice of the Yorkshire Miners' Association, and upon a promise from the agent of the colliery, Mr. A. T. Thomson, that fresh consideration shall be given to the men's claims.

The supply of house coal to bye workers at a higher price than to miners has led to a strike of the men and boys employed at Wrenthorpe (Low Laithe) Colliery, Wakefield. The cause of the trouble appears to be that the miners get their coal for 6s., whereas the bye workers are required to pay 8s. A conference between representatives of the owners and men has been held, but it proved of abortive character, and at the time of writing no settlement had been arrived at. About 1,800 men and boys are affected. They point out that none of the other collieries in the district make any distinction between bye workers and miners as regards house coal, and that while the bye worker does not earn as much as the miner, his risks are equally great.

The Midlands.

Early this week there was a recrudescence of the trouble among South Staffordshire miners, and the men employed at the Shut End Colliery came out on strike. The local secretary (Mr. H. Whitehouse), who was at the Trade Union Congress, placed the matter before the miners' executive, who passed a resolution strongly condemning the

men's action, and urging them to return to work pending the Coal Controller's decision. Mr. Whitehouse agreed this to the men, with the result that they all agreed to resume work. At the monthly meeting of the council of the South Staffordshire and East Worcestershire Miners' Association on Monday, the whole question of the application for an advance of 25 per cent. and the action of the men in giving notice and leaving work was discussed, and the following resolution was agreed to, "That this meeting of delegates representing all the lodges in the district agrees to act on the advice of their officials, and accedes to the request of the executive to remain at work pending the award. And we recommend to be sent to the executive of the Federation and the Controller a strong protest against the delay, and ask that the award shall be made retrospective to the date of the application."

Scotland.

The underground firemen at Birsieknowe and Dockra pits, Birkip, Ayrshire, have now received an advance of two pence. The firemen in the Dalry, Auchinleck, Nitshill and Lugar districts are now all on an equality in respect of wages.

Satisfactory arrangements have now been made at Dailly, Ayrshire, regarding the pumpmen's wages at the local collieries. A small advance has been conceded by the management.

In connection with the tonnage rate dispute at Auchinloch Colliery, Lanarkshire, it is announced that the manager has agreed to an inspection of the working places affected.

After the examination of two sections of places in Knoweton Colliery, Shotts, Lanarkshire, a recommendation has been made that the tonnage rates should be increased 6d. and 1s. per ton respectively. It is believed that the concessions will be granted by the management and idleness prevented.

At Prestwick Colliery, Ayrshire, discontent prevails in regard to the existing drawing scale. Meetings are to be arranged between the representatives of the masters and the men, and it is believed that matters will soon be satisfactorily adjusted.

A number of the men involved in the recent strike at Bedlay Colliery, Lanarkshire, have up to the present time not been reinstated. The difficulty is the scarcity of places.

At Earnock Colliery, Hamilton, the miners' representatives are seeking to compel the underground motormen to become affiliated to the Lanarkshire Miners' Union. The miners hold that they are supported in their intention by the specifically defined rules of the British Miners' Federation. Idle time is not unlikely if the negotiations at present proceeding for a settlement fall through.

Work has been proceeding much more regularly at the West Lothian collieries during the past few weeks.

At Pencaitland Colliery, East Lothians, the men employed in one of the sections claimed a higher rate of payment. An increase of 3d. per ton has been offered by the manager, and this offer is to be submitted to the men for acceptance or otherwise.

At Carnock Colliery, Stirlingshire, a series of local disputes called for the intervention of the county agent. The grievances have been amicably adjusted without any loss of time.

At the pits in the Bannockburn district of Stirlingshire, the owners have announced their intention of introducing electric lamps, for which it is proposed to charge a small sum from each workman. As the lamps are supplied free of charge at present, the men resent the suggested change. They have decided not to use the electric lamps until the subject has been discussed between the representatives of the men and the masters.

A meeting of the West of Fife colliery surface workers was held at Bowhill, when it was decided to make a demand for an increase of wages of two shillings a day.

For the last three days of last week the whole of the miners of Bent Collieries were idle owing to a dispute regarding the rate paid by brushing contractors. The rate was reduced from 13s. 6d. to 11s. by a new system of contract. A temporary settlement has been arrived at.

RETAIL COAL PRICES (SCOTLAND).

The Secretary for Scotland has issued an Order conferring and imposing upon the Local Authority (in a county the County Council and in a Royal Parliamentary or Police burgh the Town Council), and upon such of their officers as they may designate or appoint for the purpose the powers and duties necessary to provide for the due discharge within their district of the functions assigned to Local Authorities by the Retail Coal Prices Order, 1917. Any expenses incurred by a Local Authority in the execution of this Order shall be defrayed out of the public health general assessment provided that such expenses shall not be reckoned in any calculation as to the statutory limit of that assessment.

United States Pig Iron Production.—The production of pig iron in the United States for the first six months of the current year was 19,258,235 tons, as against 19,815,275 tons in the second half of 1916, and 19,619,522 tons in the first half of 1916.

Alaska Coal Fields Developments.—The main line of the railway from Seward (on the Pacific Coast) to Fairbanks (on the Tanana River)—a distance of 470 miles—is under construction, and according to the *Official Bulletin* (Washington), 150 miles in length is in operation. The railway taps two large coal fields, the Matanuska and Nenana. The coal in the former field has been tested by the United States Navy, and found to be excellent for steaming purposes, while Nenana coal was recently tested by the United States Bureau of Mines, and found to be a fair grade of lignite. It is estimated that the supply in both countries is practically inexhaustible. A branch line to the centre of the Matanuska coal field will shortly be completed. Dredging is being carried out at Anchorage, to provide a tide water port to the coal fields, in order that ocean vessels may be loaded at the docks. At present there is a break of about 25 miles in the line between Anchorage and Seward, which will probably be closed during the next part of 1918, when it will be possible to ship coal to Seward. The railway is also under construction southward from Fairbanks in order to tap the Nenana coal field. The coal obtained will be available for the development of the metallic mineral deposits of the country, such as copper, antimony, and gold.

Notes from the Coal Fields.

LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

On Ebbw Vale Developments—Gravelly Position of Swansea—Miners' Antagonism to Income Tax—Heavy Public Expenditure on New Houses—Coal Output of Gelligaer—Industrial Unrest Among South Wales Colliers—Nationalisation of the Mines.

An extraordinary conflict has arisen between the Coal Controller and the exporters at Cardiff. Some time ago, the colliery proprietors and the coal exporters were requested by the Controller to elect three representatives each, these six gentlemen to form a committee for dealing with the question of arrears on contracts and their cancellation. They met and nominated Mr. H. J. Hill as chairman. But the Controller has appointed Mr. Evan Williams (Swansea) as chairman, with Mr. North Lewis as vice-chairman, and the exporters, considering that this gives undue weight to the colliery interest on the committee, held a meeting on Wednesday, under the presidency of Mr. T. E. Watson, and decided to communicate with the Controller, and inform him that they should adhere to their selection of Mr. Hill. There is a suggestion that unless their wish in this respect be acceded to, the exporters' representatives will not act on the committee.

The annual staff lunch of the head office took place at Ebbw Vale on Monday, and was signalled by the successful starting of important subsidiary plant in connection with the blast furnaces. This plant is stated to have a value of a quarter of a million sterling, and is expected to prove highly remunerative—its purpose being the cleaning of gases from the blast furnaces and the recovery of by-products. Coun. Watkins, who proposed the toast of the day, said they were proud to understand that their company had weathered all the storms of the past half-century, and at the present time was stronger than ever. No small part of their success was due to the considerate treatment of the staff, especially since they had been in the charge of the managing director, Mr. F. Mills. Mr. Beynon, one of the directors, who is High Sheriff of Monmouthshire this year, responded, and, in referring to the energy and enterprise of Mr. Mills, said, jocularly, that if at a board meeting Mr. Mills did not come forward with some scheme for the spending of a quarter of a million or so, they began to think there was something the matter, and began to enquire after his health. Mr. F. Mills also responded, and said that during the past three years and during the next two years the company would have spent something like three to four millions sterling on the development of the concern: extensions to their colliery undertakings, enlargements of the blast furnaces and coke oven departments, also the steel works and the subsidiary operations. The company now employed 30,000 persons, representing a yearly wage bill of three millions sterling; and from the new gas cleaning plant which was being put in, they might expect an important product—namely, potash—would be obtained. He pointed out the necessity of a right understanding on the part of labour as to what was being done in the present difficult circumstances of industry. They must realise that the present was not the time for great changes. He fully sympathised with labour both as to improved surroundings and conditions of work; and he had helped in the past, and would again help in the future. Great mistakes were made on the question of capital and what was a fair return; but unless undertakings were worked at a profit, development ceased, and the industry went back; and if they wanted proof of this they had only to look at the 30 years during which the company paid no dividend. It is understood that the coke oven installation made within the past two years has proved so successful that it will be considerably more than doubled, work to that end being already in progress.

Swansea Harbour Trustees had before them on Monday a very unsatisfactory statement of trade and finance for August. Mr. Roger Beck, who submitted the report of the Finance Committee, said that he had unfortunately to show considerable reduction, due chiefly to the fact that their great French trade had been so seriously damaged by the war. He thought that it was the duty of the Trustees to keep this matter before the Government, with a view to obtaining financial assistance in case a heavier strain was put upon them. The finance for the preceding month, July, showed a decrease as compared with the corresponding month of last year, and there had been a great increase in wages. They must do all they can to encourage Government trade, and there was reason to believe that this would be obtained, for some of the Government representatives were highly appreciative.

Considerable criticism is being made upon the opposition of the miners to income tax, more particularly upon the threat in certain areas to adopt the "down tools" policy if non-payers are prosecuted; and also upon the fact that the conference of miners, which is being called for, is arrogating to itself the right to say what laws shall be obeyed and what shall be disobeyed. As to the general question of the burden of income tax, the men are reminded that the Government have not been ungenerous in making allowances, for rebates have been established in respect of allowances for tools and other expenses; in families where the father has died and a grown-up son supports the remaining children, relief is allowed under the Act of this year—the younger children being regarded as "adopted"; an additional allowance of £1 per quarter is made for clothes and boots; and in families where there are children, not only is there an allowance in respect of those under 16, but there is also a prospect of an allowance of £25 in respect of the wife. As to the demand that the old exemption limit of £160 should be restored in place of the present limit of £130, it is pointed out that the position of a married man with one child will, under the different allowances, be precisely similar to his position in pre-war days—that he would have to earn over £170 in order to become liable to taxation. Whereas in 1913, with a limit of £160, plus £10 for a child, he is still exempt in 1917 because there would be a £120 abatement, and £25 each for wife and child. Really, the man with two children is better off in 1917 than in 1913; and so in an ascending scale according to the number of children. The service that these facts should be put before the conference is held, is urged that the income tax is levied on the shoulders and families, because it is levied on the necessities, which impose a far heavier burden on the family man.

Mr. Watson was entertained at luncheon at Treherbert on Friday of last week in celebration of the

honour of knighthood which has been conferred upon him. Mr. Winston Churchill, who was present, laid great stress upon the excellent services which Sir Leonard had rendered to the nation, he having been highly successful in overcoming great difficulties.

Sergt. F. J. King, at one time superintendent of the Ogmore Vale ambulance brigade, all the members of which volunteered for active service, has now been awarded the D.C.M. This follows a certificate for distinguished service awarded last year during the Somme operations.

Owing to the heavy charges likely to be imposed upon local ratepayers (of whom colliery companies are the principal), peculiar interest and importance attaches to a conference of Monmouthshire local authorities, summoned by the County Council, which has been held in Newport. The Local Government Board had asked them for certain particulars as to housing requirements to be supplied before October 15, and statements which were made during the conference furnish revelation of the huge expenditure which will have to be undertaken. It was stated that financial assistance from the Government would be forthcoming for the necessary provision of additional houses. The chair was taken by Mr. Forrestier Walker, chairman of the Dwellings and Housing Committee of the county, who said that the conference might be regarded as a preliminary one, designed to bring about unity through which they would send to the Local Government Board. The Abercarn Council chairman stated that they had secured the advice of a town planning expert who had had experience in colliery districts, and that it was their intention to take 277 acres at Newbridge and 52 acres at Abercarn for building purposes. They would not proceed on the old principle of getting the maximum number of houses on the minimum amount of space, but there would probably be 10 to the acre, a bath being provided in each tenement. The representative of Abersychan reported that in that colliery area they had a scheme which paid them on erecting 150 houses, and after four years had nearly £1,200 in hand. They proposed erecting more houses at Garndiffaith and had also purchased 12 acres at Abersychan and 5½ acres at Pontnewynydd. They had recently reached a decision that at least 1,000 houses were necessary in their district, and that probably they would be erected if financial assistance from the Government were forthcoming, for the problem was urgent and serious. From Pontypool, it was reported that 100 houses had been erected, and they proposed to put up 200 more. At Panteg the erection of 100 houses was proposed, and the Council has advanced £11,000 under the Small Dwellings Acquisition Act, and this had been a huge success. From the Bedwas and Machen Council it was reported that that authority proposed to erect 300 houses; and another speaker said that the Bedwellty authority would build an additional thousand houses; whilst the Blaenavon representative said Blaenavon would erect 300 if financial aid were obtained. It was stated by the Ebbw Vale representative that 2,000 more houses were needed in that area, there being in some cases as many as 18 persons in one house. Other statements were made that at Mynyddislwyn 750 houses were required; that Blaenavon had a scheme for 101 houses; that Rhymney would provide 150; that 300 to 350 were needed in Tredegar; and 700 in Risca. The conference passed a resolution expressing opinion that, having regard to the serious position of the housing problem, the Government should contribute at least 25 per cent. of the cost, and to make advances of money at a rate of interest not exceeding 3½ per cent.

The annual return of coal worked and raised in the parish of Gelligaer for the year ended June 30 shows that the total output was 1,853,708 long weight tons of large and 507,873 tons of small, this being an increase of 9,858 tons large and 23,251 tons small respectively, compared with the previous year. Chiefly, the increase has been at the Powell Duffryn Bedwellty collieries. It is further stated that the ratable value on the output has been £58,257 in respect of large coal, and £6,092 for small coal, an increase of £416 and £239 respectively. In addition to the foregoing, 92,622 tons of large and 6,383 tons of small worked in other parishes were brought to bank in Gelligaer.

Lance-Corpl. E. Jones, Leinster Regiment, who was a collier employed at the Glamorgan Collieries, Llwynypia, Rhondda, has been awarded the D.C.M. for gallantry in the field. He was attached to the Lewis Gun Section.

"As long as they produced coal in that coal field, they need not have any fear of the enemy landing on these shores." So Sir Leonard Llewelyn on Saturday assured the Fernhill Colliery workmen at Treherbert, where he attended a vegetable show in company with Mr. J. W. Beynon, High Sheriff of Monmouthshire, who is chairman of the colliery company. Sir Leonard stated that, previously to acting as consulting engineer, his father and his grandfather had been connected with Fernhill Collieries. He appreciated the kind feelings shown him by the men of the Rhondda Valleys; and while they were doing their bit in Wales, he was doing his in London.

The Coal and Coke Supplies Committee authorise colliery proprietors to demand cash with order under the scheme of regulated supply; and this is a necessary change, seeing that the collieries will have to supply coals to purchasers with whom they have not previously done business.

The Coal and Coke Supplies Committee (consisting of Mr. T. E. Watson, Mr. Evan Williams, Mr. Nicholas, Mr. W. R. Hann, with Mr. Finlay Gibson, secretary) had an interview in London with the Coal Controller on Tuesday. The special subject of discussion was the supplies of South Wales coal to the south-western counties. The Controller has also under consideration the amended classification of coals suggested by the Coal Owners' Association committee appointed in connection with the fixture of minimum prices. They recommend certain alterations in the schedule; but nothing, of course, can be done until the decision of the Controller is announced. The committee have issued instructions to the colliery companies that all sales of coal are to be made in accordance with prices in the original schedule dated June 28, subject to alterations on August 10. It is stated that the trade will be advised if the further amendments now proposed are agreed to.

Several colliers have been summoned at Blackwood Police Court for stealing timber, the property of the Oakdale Company; and it was stated in evidence that much timber stealing was going on at the colliery, it being extremely difficult to detect offences. A fine was inflicted upon each of the defendants.

The Tredegar Council were recently visited by a representative of the Board of Trade, who explained the proposed scheme of the Coal Controller for distribution of coal to poor persons; and they were informed that the Controller was desirous of inducing the public to exercise more economy in consumption. The scheme submitted will receive further consideration from the Council.

Pte. T. L. Evans, Welsh Guards, 131, Dumfries-street, Treherbert, has been awarded the French Medal for con-

spicuous bravery and devotion to duty on the battlefield. Before enlisting in 1915, he was a miner employed at the Fernhill Collieries, Blaenrhondda.

At a public meeting of the Panteg branch of the British Steel Smelters on Sunday, Mr. W. J. Candy, branch chairman, and Mrs. Candy, were recipients respectively of a wallet of Treasury notes and a gold wristlet watch, in recognition of the excellent services rendered by Mr. Candy in the interest of trade unionism. Mr. Candy, who also received the solid gold badge of the Steel Smelters' Association, is the president this year of the South Wales council of the Steel Smelters' Union. As a result of efforts made by him, in conjunction with other leading representatives, the wages and working conditions at local works have been considerably improved. The Ministry of Labour has recently appointed Mr. Candy on the Advisory Committee to re the scheme for labour substitution.

The Trades and Labour Councils in the Pontypool and Blaenavon districts of Monmouthshire are putting forth strenuous efforts for securing more and better housing for the working classes. A Housing Bureau has been set up, and is representative of the various grades and classes of labour throughout the valley, and one of the objects of the bureau is to induce the six urban authorities between Blaenavon and Llantarnam to amalgamate, with a view to combined action being taken on a gigantic scale to bring about necessary reforms. The amount of money such a scheme would absorb is at the moment inestimable, but the labour leaders are convinced that it will not reach a formidable figure if land owners could be persuaded to dispose of suitable building land at reasonable prices. At a conference of all the urban and rural district councils of Monmouthshire, which was held at Newport last week, it was decided, on the motion of Mr. W. H. V. Bythway, Pontypool, to express the opinion that the Government should contribute at least 25 per cent. of the cost of the various housing schemes prepared in the county, and make the advances for such schemes at a rate of interest not exceeding 3½ per cent.

Northumberland and Durham.

Increased Gas Charges—Institution of Mining Engineers Annual Meeting: the Question of Enemy Subjects.

The Newcastle and Gateshead Gas Company announces that, in consequence of further increases in the costs of labour and materials, the price of gas will be increased to ordinary consumers by 1d. per 1,000 cu. ft. from this month's meter readings, and the quantity of gas supplied to prepayment consumers will be reduced by 3 cu. ft. per penny. The Wallsend and Walker Gas Company is making a similarly increased charge this month.

The Shotton lodge of the Durham Miners' Association has passed a resolution protesting against any agents of the Durham Miners' Association attending "Forward Movement" meetings and advocating much needed reforms when they have the whole machinery of the association at their backs, and hoping that, in future, they will use this machinery to get these reforms, and not have recourse to "side-issue" meetings.

The Ashington Coal Company Limited has contributed £25 to a fund for the placing of a war memorial window in Ashington Parish Church.

Durham City magistrates sent Frederick Robinson, 25, to prison for six months for having stolen £2 17s. 1½d. by means of a trick at Thrislington Colliery. Accused got a boy to draw the money on a false pay note, and afterwards, when seen by the police, tried to chew up the note.

Lieut. Norman L. Prest, of the R.F.A., who has been wounded in action, was, prior to joining up, manager of the Wrightson and Dudley collieries of the Cramlington Coal Company Limited.

The members of the Institution of Mining Engineers, who are holding their 28th annual meeting in the Lecture Theatre of the North of England Institute of Mining and Mechanical Engineers at Newcastle to-day (Friday), will be welcomed to Newcastle by the Lord Mayor of the city and by the president (Mr. John Simpson) and members of council of the institute. A tribute to Lieut.-Col. W. C. Blackett, agent to the Charlaw and Sacriston Collieries Company Limited will be paid by the presentation to him of the Institution Medal for 1916-17. A motion, to which there is likely to be little opposition, will be made by the council to the effect that, whilst a state of war exists between the United Kingdom and any other country or state, all honorary members, members, etc., who are subjects of the enemy country or state shall cease to be connected with the institution, although they may be eligible for re-election after the war in the usual manner.

Mr. Harry S. Ellis, chief electrical engineer for the South Shields Corporation, has been invited by the Coal Controller to undertake important work in connection with coal control. It will be his duty to visit local authorities with the object of discussing possible economies in the use of fuel.

Pte. W. J. Farthing, until recently joint manager at Newcastle of the Shipping and Coal Company Limited, has been promoted to a lieutenancy in the Royal Marines.

Castle Eden magistrates fined Joseph Wolfe, 19, putter at Horden Colliery, £5 for cruelty to a pony. He had lost his temper with the animal, and had struck it about the head with a lamp, inflicting severe injuries, which laid the pony off work for 10 days. At the same court, Thomas Cox, 33, and Oswald Kennedy, 20, were fined 5s. each for having unlawfully fired a shot in the mine at South Hetton without permission. The defence was that the men had been told that the shot had been fired, but they were not satisfied that it had been. To prevent an accident while they were working, they put the battery to the wire to test it. Col. Burdon (chairman) remarked that the men should not have touched the battery. Because other people had not done their duty, it was not for defendants to do it for them.

"Larking" in two colliery tubs on the wagon-way in a wood where the Ashington Coal Company is sawing timber, led to three boys being badly injured, one fatally, last Sunday. The boys had allowed the tubs to go down a decline, with the result that both tubs were upset, and the youngsters thrown out.

The Bishop Auckland magistrates fined Thos. Newton, 17, datal boy at Shildon Lodge Colliery, £1 for having apparently without reason smashed a telephone call box in the pit with a hatchet, thereby isolating from telephonic communication for two hours a portion of the mine in which 27 men were working. These men were thrown idle for that length of time, and the owners lost from 15 to 20 tons of coal output.

Whilst David Bilshaw, 20, putter at Eppleton Colliery, was riding on the limbers of a tub in the pit, the tub caught a side prop and dislodged from the roof a plank, which fell upon Bilshaw, inflicting severe injuries. He died nearly three weeks later from inflammation of the kidneys, which, in the opinion of the jury who enquired into the death, was set up by the accident.

The problem of the discharge of iron ore in these days of labour shortage has been solved, to a very large extent, at Sunderland, the Wear Commissioners having installed a system of grabs whereby it is possible to unload 430 tons of ore in 8½ hours, and 1,550 tons in the double shift when both grabs and tubs are employed.

Lancaster magistrates dealt leniently with John Grecner (22), and Wm. Brown (51), hewers at Tanfield Lea Colliery, who were charged with having had naked lights in the mine where safety lamps were used. The offence was admitted, but it was stated that the coal was mixed with stone, and that they could not see to clean the coal, unless they used candles. Both men were given good characters, and it was stated that Brown had been in the colliery company's employ for 33 years. Under the circumstances, the cases were dismissed.

Yorkshire.

Keighley and Doncaster's Winter Coal Supplies—Fatal Accident at Maltby Main Colliery—Housing Problems at Adwick-le-Street.

In compliance with a request from the Board of Trade (Coal Mines Department), the Bradford Electricity Committee have given authority for the city electrical engineer to render part-time service to the Coal Controller in waiting upon local authorities in Yorkshire with the object of discussing possible fuel economies. The position is honorary, the Government paying travelling expenses.

Keighley has been allotted 500 tons of house coal by the Coal Controller, to be stacked at the gas works, for distribution to the poor during the winter in the event of ordinary supplies falling short. Up to last week, 369 tons of the supply had been delivered.

Tenders for coal were accepted from the Lowmoor Company Limited and from the White Lea Colliery Company Limited (500 tons) for the year ending June 30, 1918, by the Spenborough District Council last month.

At last week's meeting of the Doncaster Corporation, the acting-engineer at the Electricity Works reported that arrangements had not yet been completed for the supply of additional coal for the coming winter. It was decided to communicate with the South Yorkshire Coal Supplies Committee. The Special Coal Committee reported having invited tenders for 200 tons of house coal and 100 tons of steam coal, either at the pit, railway station, or delivered at the various departments of the Corporation. Tenders had in due course been received, and it was decided to accept that of Messrs. Bee, Bingham and Company, of Doncaster, at 24s. per ton delivered.

The Maltby Main Colliery has a good record concerning the light character of accidents to its workmen, but a fatality occurred in the pit last week-end. A clipper, named Alfred Wm. Young (15), was fixing a clip in front of some moving tubs, when he was caught by them, and was killed. The week also witnessed a sad fatality at the Bentley Colliery, the victim in this case likewise being a lad, Frank Needham (14), of New Village, Bentley, employed as a pony driver. He was walking behind some tubs, when the rope, which was of five-strand plastic steel, broke. The tubs ran back, and one of them so severely injured the lad that he died the same evening. A verdict of "Accidental death" was returned.

The question of housing and the provision of an adequate water supply is being taken up with some earnestness by the Adwick-le-Street Urban District Council, which legislates for a large mining district in the Doncaster area. At its meeting last week it was reported that Mr. C. Thellusson, of Brodsworth Hall, was willing to sell land for a housing scheme, and that he would fix a price when he knew the quantity of land required. The surveyor was instructed to see him, and give an outline of the Council's proposals. It was explained that the Bullcroft Colliery Company was now pumping water to Carcroft, and had rendered valuable assistance in overcoming a temporary stoppage of the water supply. The chairman having reported that Mr. Blunt, the manager of the colliery, had been of great help in the matter, the Council accorded him a formal vote of thanks.

For riding on a tub in the Cadeby Colliery, contrary to the regulations of the Mines Act, three pit employees were, at Doncaster on Saturday, fined one week's wages each, and the Bench strongly commented upon the practice. In the case of Elijah Sharpe, pony driver, the penalty was 34s.; Ernest Wooton, pit corporal, 50s.; Joseph Hawkesworth, pony driver, 22s. The chairman of the Bench, Brig-Gen. Bewicke-Copley, C.B., said the magistrates unfortunately heard, every week, of the number of cases going to the infirmary at Doncaster in consequence of this practice; and in the interests of the public, and of the little fellows who were injured weekly, they saw no reason to impose a less penalty than a week's wages.

Lancashire and Cheshire.

Miners Buying Houses—New Developments in Burnley District—Increase in Coal Prices Foreshadowed.

At a meeting of the Ulverston (North-West Lancashire) Council last week, an increase of 5s. to 6s. a ton on coal was foreshadowed if it has to be obtained from Northumberland and Durham instead of from Yorkshire and Lancashire pits. It has been decided to open negotiations with the Coal Controller on the matter.

Co-operative societies in various parts of South-East Lancashire continue to increase the price of their coal. Recently, the Farnworth and Kersley Society put 3d. per cwt. on their coal; and last week the Walkden Society, which has over 3,000 members living in the midst of Lord Ellesmere's Collieries, increased their prices on best coal 4d. Fifty per cent., at least, of the members of this society are employed at his lordship's collieries.

A new departure amongst Lancashire coal owners is to register and advertise their various qualities of coal. For instance, Messrs. Fletcher, Burrows and Company, of the Atherton Collieries, have the following registered names: Atherton, Gib, Steb, Acorns, and Hesban coals.

At a meeting of the Westhoughton District Council held last week, the chairman said he had received from the Westhoughton Coal and Cannel Company £100 for the Lancashire Homes for Disabled Soldiers, and £10 for the Prisoners of War Fund. It was resolved that a letter of appreciation be sent to the company.

Taking advantage of the present prosperous condition of the local coal trade, not a few miners in the Worsley, Walkden, Little Hulton, Atherton, and Bolton districts are now purchasing their own houses through co-operative societies. Colliers in these days are far more thrifty than they were a few years back.

Important developments in the shape of opening out new seams and the effecting of surface improvements, are being carried out at the collieries owned and worked in the Burnley district by the executors of Col. Hargreaves.

On the minutes of the Housing and Town-Planning Committee being submitted for confirmation at a meeting of the Little Hulton District Council last week, Mr. Hodgkiss

protested against building at Tynesbank. He did not object to their own land being built upon as an experiment, but he objected to saddling the ratepayers with a speculation on someone else's land, secured on a lease containing a clause which would prevent them obtaining compensation if there was any subsidence caused by colliery working.

The Midlands.

The commands of the Coal Controller as to increased deliveries of minerals to the Metropolis at the sacrifice of local demands, continues to engender considerable disquiet in Warwickshire and Staffordshire. The coal masters have not taken kindly to an Order which means serious inconvenience to domestic and works consumers in the Warwickshire and Staffordshire area at a period of the year when unbroken coal supplies are a matter of the first moment. The colliery owners point out that the trade which is now being disappointed of deliveries is much more important to them, as a whole, than the London market. The case for the Coal Controller, however, is understood to be that Birmingham and the Midlands urban centres have a great advantage over London in the matter of house coal supplies, inasmuch as the coal fields are at their door. Transport of coal offers slight difficulties in comparison with those which trouble London. The policy has been to stock the cellars of London during the summer in order to limit winter transport, and to accumulate stocks for that very large part of the population which has no cellarage accommodation. With that process carried to a reasonably satisfactory stage, comparatively little further coal will be needed during the hard weather. The effect of the policy will, the Coal Controller holds, shortly be to liberate supplies from the Midland collieries wholly to local and other non-Metropolitan uses. As things are, London will not get nearly as much coal as the population would use in a normal winter: stern economy will have to be exercised, and is, indeed, being enforced by the non-delivery of the full supplies ordered by the rich. By the exercise of patience all round, it will be found that London will have just enough coal to rub along with, while the Midland cities, because of their contiguity to mines relieved of the present pressure will, the Government authorities state, shortly be able to replenish their supplies abundantly. Perhaps within a few weeks, more or less, the pressure on supplies will be relaxed.

The Government assurances hardly suffice to satisfy either the Warwickshire coal owners or the factors, and the latter, who have large contracts for domestic sorts on hand, are passing through an anxious time. As regards owners in Warwickshire and Staffordshire alike, the only conclusion that these can come to is that, there being a shortage in the Metropolis which must be made up, it is apparently considered by the Government to be good policy to meet the situation now, leaving consuming districts less remote from the collieries to redress the balance later on, when transport may be more precarious. Large numbers of householders in Birmingham, especially who have storage facilities, have already laid up stocks against the winter. They are loth to break in upon those reserves before they are compelled, however, and merchants are now being pressed for deliveries much beyond their ability to respond. Happily, the supply of fuel for industrial purposes is unaffected by the commandeering of Midland coal. Provisional allocations have been made in the area under the Coal Controller's scheme for replacing from within the defined radius supplies of coal which have hitherto been derived from more distant places. Manufacturers have found in some cases that the new coal assigned to them has not possessed the special properties of that for which they have been going further afield; but points like this are not incapable of adjustment where real ground can be shown. Mr. Frank Impey, the chairman of the Coal Supply Committee for the Birmingham district, states that the present tension is not likely to last more than three or four weeks. The coal masters, however, doubt Mr. Impey's reading of the "signs of the times," and they are not afraid to declare their hesitancy openly.

The Mayor of Wolverhampton, at Tuesday's meeting of the Town Council, said that application had been made to the Controller of Mines for the allotment of 1,000 tons of coal for distribution among the poorer classes of the borough in case the ordinary supply fell short during the winter. This request has been acceded to, and premises for the storage of the coal had been secured.

Kent.

The weekly output at Snowdown Colliery has again attained 3,000 tons. A certain number of the men are now engaged on the opening out of the Snowdown Hard seam, and, considering present circumstances in the mining industry, fairly good progress is being made. The Tilmanstone Colliery raised about 2,800 tons last week.

Dover Town Council had an application before them, asking them to support the resolution of Canterbury Town Council with regard to colliery labour. It was mentioned in a letter sent by Mr. Wells, director of Tilmanstone Colliery, that their board are continually receiving requests to increase the output, but workmen are still being taken from the pits for the Army. He stated that about £3,000 in wages is paid weekly at the collieries, and a large proportion of this is spent in Dover. As the Canterbury resolution referred to increased labour to sink Chislet Colliery to the coal, the Dover Council took no action on it. The local feeling is that, as it must be some months before Chislet Colliery is raising coal, it would be far more effective if the local councils were asked to approach the authorities with a view to more labour being obtained for Tilmanstone and Snowdown collieries, where coal is being worked, especially with the prospect of a shortage of coal in the coming winter.

The Ministry of Munitions have given their approval for the transfer from the East Kent Colliery Company Limited to the Tilmanstone Building Syndicate of half the amount authorised for the miners' houses to be erected by the syndicate near Tilmanstone Colliery. Comfortable cottages with a good extent of garden ground are to be provided. Local builders have been asked for tenders for the houses.

Scotland.

New Order Difficulties—Proposed Scottish National Gas Council—Burntisland and Methil Coal Shipments—Miners and Recruiting.

The new Order of the Coal Controller, restricting the area of the supply of coal, is causing a great deal of anxiety to Scottish gas managers, and the North British Association of Gas Managers are making strong efforts to have a continuance of the present arrangements. Representatives of the Controller have had a meeting with representatives of the council of the association and a number of gas managers. So far as areas No. 17, Scotland, south-eastern counties; No. 18, Scotland, north-western counties; and No. 20, Scotland, south-western area, are concerned, the directions may be regarded generally as satisfactory; but area No. 19, Scotland, north-eastern, is the one in which

the greatest difficulty and trouble will be encountered in regards gas works. The supplies, according to the Order, were to be drawn from the Fife coal fields, and it is well known that most of these coals were very poor for gas works purposes—in fact, very few gas works used more than a very small percentage of them. That was fully put before the representatives of the Coal Controller, who indicated that in cases where there was strong evidence that the coal was unsuitable for gas works, sanction would likely be given to draw upon the other areas for a certain percentage of their requirements. The facts and figures put before the council were amazing; and could they save even one-half of the ton-miles they calculated on, it would be a great achievement. The Coal Controller had arranged to appoint a neutral person to the Coal and Coke Committee. They (the Association of Gas Managers) considered that the gas industry should have at least one representative, which the representatives agreed to consider with the Coal Controller; and the North British Association of Gas Managers are now informed that the Controller has appointed a second neutral person. There is a proposal under consideration to form a Scottish National Gas Council.

Among the list of justices of the peace newly elected for the county of Fife are the names of Messrs. C. A. Carlow and C. C. Reid, general manager and agent respectively of the Fife Coal Company Limited.

The shipment of coal at Burntisland for the last week totalled 10,150 tons, a decrease of 5,300 tons, as compared with the same week last year. The quantity of coal shipped last month was 49,367 tons. The shipments at Methil show an increase for the week, being 21,515 tons, as against 18,488 tons in the previous week.

At Dunfermline Sheriff Court, a miner was fined £2 for contraventions of the Explosives Order while at work in Blairhall Colliery. The section was one in which safety lamps were in use, and the accused was charged (1) for the purpose of inserting a detonator attempted to remove the stemming of the shot hole; (2) neglected to drill for another shot-hole not less than 12 in. apart; (3) received a detonator before it was required and about to be used by him.

A special conference of the Lanarkshire Miners' Union was held in Hamilton to consider the proposals of the Coal Controller on the subject of recruiting from mines. A vote was taken on the direct issue as to whether the Miners' Federation as such should take part in recruiting as proposed. By a majority, the delegates answered the question in the negative.

So far as Ayrshire is concerned, the county board there has decided by a majority to uphold the recruiting scheme as outlined by the War Office authorities after consultation with the Coal Controller.

On the occasion of his promotion and appointment as manager of Dykehead Colliery, Larkhall, Mr. John O'Donnell, under-manager at Home Farm Colliery, Lanarkshire, has been presented, on behalf of the officials and workmen there, with a roll-top desk, gold-mounted walking stick, and a well-filled pocket book.

THE FREIGHT MARKET.

With no lessening in the demand for tonnage wherewith to carry cargoes of coal and coke to Allied and neutral ports, the outward freight market languishes under the disability imposed by the smallness of the supply. At the north-east coast, whilst shipments on official account have proceeded at a rate which has relieved the local mining industry of considerable anxiety as to regularity of employment, there has been very little done in the way of the taking up of vessels for neutral directions. Two steamers, aggregating 4,300 tons, have been chartered for Gothenburg at 200 kr., and coal shipments to Norway have been assisted by the fact that several vessels have been engaged on the other side to come to this country for return cargoes. There is less pressure as far as Sweden is concerned. Although the demand for vessels for Spanish and Portuguese discharge is strong, at about 90s. to Lisbon, 100s. to Oporto, and 215s. to Barcelona, no fixtures for these directions have been recorded this week. Port Said is unaltered at 165s. Coasting business has been done at from 19s. to 20s., Tyne to London. Only a few vessels have been fixed for coal and coke carriage to French Atlantic ports at the scheduled maximum rates. Gibraltar has been done, for a 5,000-tonner, at the very high rate of 97s. 6d. At South Wales, chartering has been absolutely confined to business for French Atlantic destinations. Vessels for neutral ports are in keen enquiry, but none has been on offer, although high rates would gladly be paid. Tonnage shortage at the Humber prevents the satisfaction of a strong demand for tonnage for North France and for West Italy.

Homewards, the River Plate is quoted at 145s. from up-river and 140s. from down-river ports to the United Kingdom—figures which fail to attract tonnage. At the United States, coal freights from Virginia to the Plate are steady, at 125s., with 33 dols. for Rio discharge. For wheat cargoes, on Committee account, the Gulf is quoted at 35s. to West Italy and 32s. 6d. to France, and the Northern Range at 32s. 6d. to Mediterranean and 30s. to the United Kingdom or French Atlantic. On net form, Northern Range to French Atlantic is quoted at 250s., with 210s. for Liverpool discharge. Very little tonnage is on offer at the Far East, and rates are largely nominal. Haiphong-Saigon to French Atlantic with rice is quoted at 500s. Bombay to West Italy is listed at 400s. Madras Coast to Marseilles with kernels is steady, at 500s. Burmah to the United Kingdom is firm, at 480s. Rates in the Mediterranean ore and phosphate freight market are well maintained.

Tyne to Calais or Dunkirk, 200, 50s., coke; En Basse, 450, 60s.; Gibraltar, 5,000, 97s. 6d.; Gothenburg, 2,400 and 1,900, 200 kr.; London, 1,100, 19s. 6d.; 1,100, 19s.; 2,000, 20s., reported; and North French Range, 200 and 700, 45s., coke.

Cardiff to Bordeaux, 3,000, 34s.; 3,100, 33s.; Brest, 1,500, 45s., neutral; Granville, 850, 47s. 6d., neutral; 700, 48s., neutral; La Pallice, 1,400, 61s. 6d., neutral; Rouen, 1,100, 1,150, 1,400, and 1,600, 48s. 9d., neutral; 1,500, 49s. 6d., patent fuel, neutral; St. Malo, 1,000, 21s.; 600, 45s., neutral; and Sables, 1,300, 63s., neutral.

Port Talbot to Bordeaux, 2,000, 69s., neutral; Rouen, 1,550, 25s. 3d., patent fuel; 1,500 and 1,600, 19s. 6d., patent fuel, neutral; and Granville, 850, 47s. 6d., neutral.

Neath Abbey to Honfleur, 450, 48s., neutral.

Newport to Bordeaux, 3,100, 33s.

Swansea to Caen, 1,300, 46s. 6d., neutral; Sables, 1,300, 63s., neutral; and Brest, 700, 46s. 6d., neutral.

In view of the necessity of economising coal, a scheme has been drawn up providing for a further reduction of the Swiss passenger train service.

CONTRACTS OPEN FOR COAL AND COKE.

Advertised in this issue received too late to be included in this column, see LEADER and LAST COLUMN.

WIMBORNE.—The Corporation invite tenders for the supply of coal to their Electricity Supply Station. Particulars may be obtained upon application to the borough electrical engineer. Sealed tenders, endorsed "Tender for Coal, Electricity Works," should be sent to the town clerk, town clerk's office, Municipal Offices, Southampton. No pledge is given to accept any tender.

Abstracts of Contracts Open.

ABERAYRON, SEPTEMBER 22.—Coal for the Schools. Tenders to the District Committee, Aberayron.

AYLSHAM (NORFOLK), SEPTEMBER 18.—Coal for the Guardians. Tenders to the Workhouse.

BARMING HEATH AND CHARHAM (KENT), SEPTEMBER 24.—Coke for the Asylums Committee. Tenders to the clerk to the Committee, 9A, King-street, Maidstone.

BARNSTAPLE, SEPTEMBER 17-18.—Coal for the Guardians. Tenders to the clerk.

BICTON HEATH (NEAR SHREWSBURY), SEPTEMBER 17.—Coke, etc., to the Salop County and Wenlock Borough Lunatic Asylum for three months from October 1 next. Tenders to the Visiting Committee.

BLACKBURN, SEPTEMBER 18.—Coal for the Guardians. Forms at the Union Offices, Cardwell-place.

BIRKENHEAD, SEPTEMBER 18.—Coal for the Guardians. Tenders to the clerk at the Institution, Church-road, Birkenhead.

BRADFORD, SEPTEMBER 24.—For the supply of coal for the North Bierley Guardians, Bradford, for the period October 1 to December 31.

BRIDGNORTH, SEPTEMBER 20.—Coal for the Guardians. Forms of tender of the clerk, New Market Buildings.

BROMLEY, SEPTEMBER 18.—Coal for the Guardians. Tenders to the clerk.

BURNLEY, SEPTEMBER 18.—Coal for the Guardians. Forms of the clerk, Union Offices.

BURTON-ON-TRENT, SEPTEMBER 24.—Coal for the Guardians. Forms of the clerk.

CARDIFF, SEPTEMBER 21.—Coal for the Guardians. Forms of the clerk, Union Offices, Queen's Chambers, Cardiff.

CHELTENHAM, SEPTEMBER 17-20.—Coal for the Guardians. Tenders to the Workhouse.

CHESTER-LE-STREET, SEPTEMBER 25.—Coal and coke for the Guardians. Tenders to the clerk.

CHICHESTER, SEPTEMBER 17.—Coal and coke for the Guardians. Forms at the office of the clerk.

CLAYTON (YORKSHIRE), SEPTEMBER 20.—Coal for the Guardians of North Bierley Union. Tenders to the clerk.

CROYDON, SEPTEMBER 24.—Coke for the Guardians. Tenders to the Union Offices.

DRIFFIELD, SEPTEMBER 19.—Coal for the Guardians. Forms at the office of the clerk.

GATESHEAD, SEPTEMBER 24.—Coal for the Guardians of the Gateshead Union. Tenders to the clerk.

GAYTON (NORFOLK), SEPTEMBER 19.—Coal for the Guardians of Freebridge Lynn Union. Tenders to the clerk's office.

GRENOSIDE (SHEFFIELD), SEPTEMBER 19.—Coal for the Guardians of the Wortley Union. Tenders to the acting-clerk, Union Offices, Grenoside, Sheffield.

GRIMSBY, SEPTEMBER 18.—400 tons house coal, 100 tons steam coal, and 400 tons best gas-house coke, for 12 months, commencing October 1, for the Education Committee. Tenders to the clerk to the Education Committee, Education Offices.

HERTFORD, SEPTEMBER 20.—Coal and coke for the Guardians. Tenders to the Board-room, Shire Hall.

HOLLINGBOURN (MAIDSTONE), SEPTEMBER 27.—Coal and coke for the Guardians of Hollingbourn Union. Forms of the clerk, 33, Earl-street, Maidstone, or master of Workhouse.

KEYNSHAM, SEPTEMBER 20.—Coal for the Guardians. Tenders to the clerk.

LANCASTER, SEPTEMBER 18.—Coal for the Guardians; also slack. Forms at the office of the clerk, 5, Daltou-square.

LEEDS, SEPTEMBER 18.—Coal for the Guardians. Tenders to the clerk.

LONDON, E., SEPTEMBER 19.—Coal and coke for the Poplar Board of Guardians. Forms of the clerk, Upper North-street, Poplar, E.

LONDON, S.E., SEPTEMBER 20.—Coal and coke for the Guardians of Woolwich Union. Tenders to the Workhouse.

LONDON, S.W., SEPTEMBER 19.—Coal for the Guardians of the Westminster Union. Forms at the offices of the clerk, Prince's-row, Buckingham Palace-road, S.W. 1.

LONDON, S.E., SEPTEMBER 22.—Coal and coke for the Lambeth Board of Guardians. Forms at the office of the clerk, Brook-street, Kennington, S.E. 11.

MERTHYR TYDFIL, SEPTEMBER 24.—Coal for the Guardians. Tenders to the clerk, 134, High-street.

NEWTOWN (MONTGOMERY), SEPTEMBER 19.—Coal for the Guardians of Newtown and Llanidloes Union. Tenders to the clerk at the Institution, Caersws.

OLDHAM, SEPTEMBER 17.—Coal for the Guardians. Forms of the master of the Poor Law Institution.

POOLE, SEPTEMBER 20.—Coal and coke for the Education Committee. Tenders to the town clerk.

ROSCOMMON, SEPTEMBER 24.—35 tons best double-screened Wigan coal for the Roscommon County Council. Tenders to the secretary to the County Council, Court House.

SEDGLEY, SEPTEMBER 22.—Coal and coke for the Staffordshire Education Committee. Tenders to the Council Schools clerk, Sedgley, near Dudley.

SOUTHAM, SEPTEMBER 25.—Coal and coke for the Guardians. Forms of the clerk, Market Hall.

SOUTHEAST-ON-SEA, SEPTEMBER 21.—House coal for one year from October 1, for the Corporation. Tenders to the town clerk, Municipal Buildings.

SPOCKHORN, SEPTEMBER 17.—Coal for the Guardians. Forms at the Union Offices, Shaw Heath.

ST. ALBAN, SEPTEMBER 25.—Coal for the Visiting Committee. Tenders to the Asylum.

ST. ALBAN, SEPTEMBER 18.—Coal for the Guardians. Tenders to the Workhouse.

ST. ALBAN, SEPTEMBER 19.—Coal and slack for the Guardians. Tenders to the clerk, Bewsey-chambers,

WELLS (SOMERSET), SEPTEMBER 20.—Coal to the Somerset and Bath Asylum. Tenders to the Asylum.

WESHAM (LANCASHIRE), SEPTEMBER 25.—Coal and slack for the Guardians of Fylde Union. Tenders to the clerk, Union Offices, Wesham.

WEST MALLING (KENT), SEPTEMBER 19.—Coal for the Guardians of the Malling Union. Forms of the clerk.

WIGAN, SEPTEMBER 18.—Coal for the Guardians. Tenders to the master, Poor Law Institution, Frog-lane.

WOTTON AND BARNWOOD (GLOUCESTER), SEPTEMBER 21.—Coal for the Committee of Visitors. Tenders to Wotton Asylum.

WREXHAM, SEPTEMBER 24.—Coal for the Guardians. Tenders to No. 10, Temple-row, Wrexham.

The date given is the latest upon which tenders can be received.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Bell Brothers Limited.—The directors have declared an interim dividend of 5s. per share, less tax, on the ordinary for the half-year ended June 30, 1917.

Briggs (Henry), Son and Company Limited.—The report for the year ended June 30 last states that the profit amounted to £181,072, which, added to £64,609 brought forward, gives a total of £245,680. After deducting interim dividend paid in February last, there is left £221,090. The directors recommend the payment of the dividend of £2 12s. 6d. per share on the "A" shares, and £1 15s. per share on the "B" shares, free of income tax, making for the year £3 15s. and £2 10s. respectively, leaving to carry forward £163,712.

Cammell, Laird and Company Limited.—An interim dividend on the ordinary shares of 2s. 6d. per share is proposed, being 2½ per cent., less income tax, payable 3rd proximo.

Insoles Limited.—The directors' report for the year ended June 30 last states that the profit on the year's trading, after making provision for excess profits tax and depreciation of leases, plant, etc., amounts to £54,316, which, with the balance of £8,082 brought forward from last year, and deducting interim dividends on preference and ordinary shares, leaves a disposable balance of £51,599. The directors recommend the following payments: Dividend of 3 per cent. on preference shares and 5 per cent. on the ordinary shares for the six months ended June 30 last, and a bonus of 10 per cent. for the year on the ordinary shares, leaving a balance to carry forward of £22,799.

Pearson and Knowles Coal and Iron Company Limited.—The directors have decided to recommend the payment of the usual half-year's dividend at the rate of 6 per cent. per annum on both the preference and second preference shares, and a dividend of 6s. 6d. per share on the ordinary shares, making 10 per cent. for the year, all less tax. They also recommend a bonus on the ordinary shares of 5s. per share, free of income tax.

Powell Duffryn Steam Coal Company Limited.—The directors have declared an interim dividend in respect of the current year for the six months ended June 30 of 10 per cent. (actual) on the ordinary shares (free of income tax).

Snowdown Colliery Company Limited.—The accounts for the year ended March 31 show a total income of £6,442, and after charging debenture and prior lien bond interest, the net result was a loss of £10,837, increasing a debit balance brought down to £18,354. In their report the directors state that the quantity of coal raised during the year was 16,855 tons more than for the previous year. In March last the sinking in No. 2 pit by the parent companies (Kent Coal Concessions Limited, etc.) reached a fine seam of coal at a depth of 3,007 ft., and in accordance with their programme they do not at present intend to continue the sinking below that depth.

Staveley Coal and Iron Company Limited.—The report for the year ended June 30 last states that the profit, after providing for excess profits duty, etc., amounted to £317,623, which added to £5,019 brought forward, gives a total of £322,642. The directors recommend the payment of a final dividend of 2s. per share on the fully-paid shares, and 1s. 6d. per share on the partly-paid shares, making 15 per cent., free of income tax, for the year, and the appropriation of £100,000 to reserve, carrying forward a balance of £7,592. Practically the whole of the undertaking is now under the control of one or other of the Government Departments.

Wells (J. and G.) Limited.—The directors have declared an interim dividend on the ordinary at the rate of 6 per cent. per annum, free of tax, payable on September 17. This is at the same rate of last year.

NEW COMPANIES.

Harperley Park Coal Company Limited.—Private company. Registered September 4. Nature of business indicated by the title. Capital, £7,000. Directors: H. D. Parsons, M. Dunn, and W. G. Urwin.

Kentish Shipbuilding and Engineering Company Limited.—Private company. Registered office, The Lower Wall, Whitstable, Kent. Registered September 6. Nature of business indicated by title. Capital, £20,000 in 20,000 £1 shares. Director, J. K. Morris.

Lowson (Henry) Limited.—Private company. Registered September 5. To acquire and take over as a going concern and carry on the business of colliery proprietors, coke burners, and brick manufacturers, etc. Capital, £7,000. Directors: H. Lowson and Elizabeth Jane Tower.

Tatner (Geo. P.) and Company Limited.—Private company. Registered office, 87 and 89, Hythe-street, Dartford, Kent. Registered September 5. To acquire and take over as a going concern and carry on the business of coal merchants and factors. Capital, £6,000. Directors: H. G. Watson, G. P. Tatner, and E. Bucknell.

Tilmanstone Miners' Dwellings Building Syndicate Limited.—Private company. Registered September 4. Nature of business indicated by title. Capital, £5,000. Directors to be appointed by the subscribers. Subscribers: W. Durrant, P. C. Lawrence, H. E. Underclown, and four others.

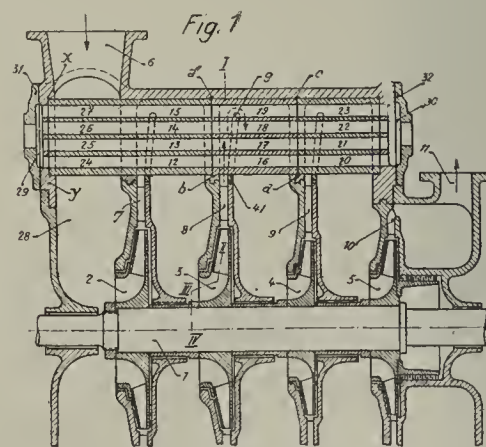
Vaalbank (Transvaal) Colliery Limited.—Private company. Registered September 3. Nature of business indicated by title. Capital, £500. Directors to be appointed by the subscribers. Subscribers: A. Knopwood, R. W. Mitchell, W. J. Thompson, and four others.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

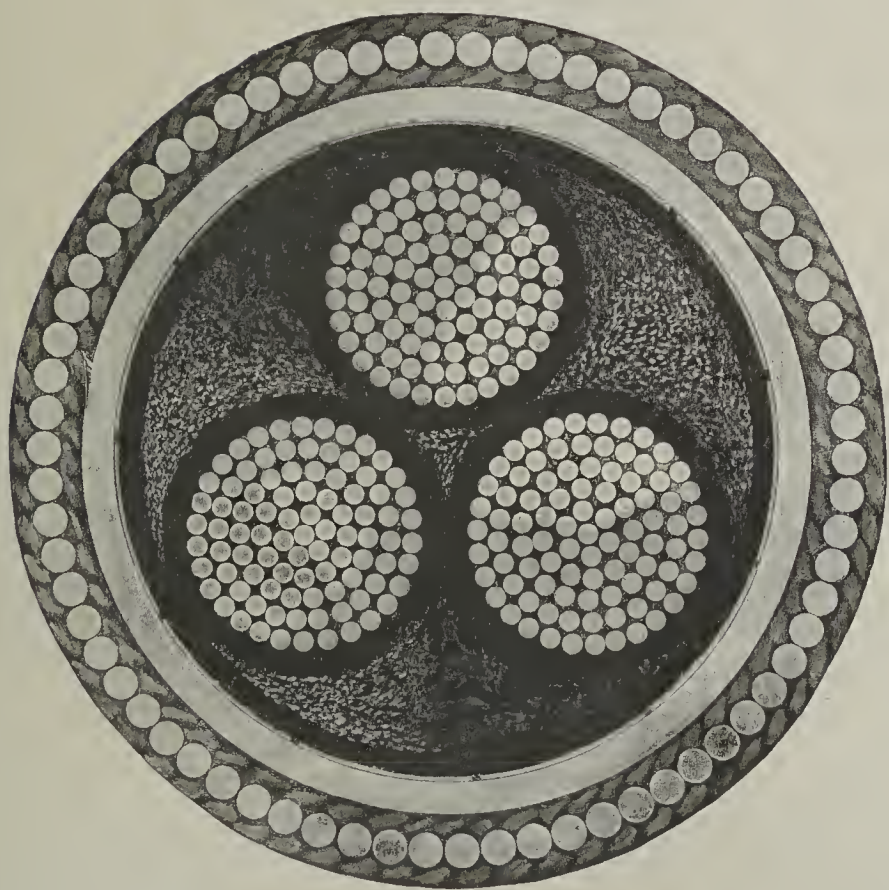
15065 (1915). *Improvements in Blasting Charges and Cartridges.* W. Weber, Hayingen, Lorraine.—This invention relates to a blasting cartridge depending on the action of liquid air, and consists in certain improvements in the composition and arrangement of the ingredients of the blasting charge, and in the means for priming the charge. In the accompanying drawings, fig. 1 shows in sectional elevation a cartridge containing the blasting charge according to the invention; fig. 2 is a cross section on line A—B of fig. 1; fig. 3 shows a modification as regards the arrangement of the component parts of the blasting charge and the kind of primer used; fig. 4 is a cross section on line C—D of fig. 3. To saturate the cartridge with liquid air, it is preferably submerged in the liquid which may be contained in a suitable vessel, and is kept therein until the saturation is complete. The saturated blasting charge may be primed by means of an ordinary priming cap. However, any kind of electrical primer, such as a spark fuse or a low-tension fuse, or an ordinary cord fuse, may be used for priming the charge, provided the cord fuse *a* (fig. 1) or the electrical fuse *b* (fig. 3) without a priming cap is wrapped in a combustible absorptive material, such as is indicated at *c* (figs. 1 and 3). This combustible absorptive wrapping will act as an independent explosive after having been saturated with liquid air, and will thereby cause the explosion of the blasting charge or cartridge. If the blasting charge is filled into a cartridge, the liquid hydrocarbon can be poured in through a channel *d* provided within the cartridge (figs. 1 and 3) shortly before the charge is fired. To increase the durability of the cartridge, thereby securing a better blasting action, the cartridge to be saturated with liquid air is provided with an insulating casing, which may be produced by placing several layers of paper *e* (figs. 1 and 3) loosely one upon the other so as to form air spaces between the several layers. One or more of such air spaces may be filled with straw *f* (figs. 1 and 2). Cartridges provided with a well closed casing of this kind are capable of retaining the liquid air for a period of more than half an hour, whereas a cartridge encased in a single pasteboard tube would be able to keep its activity only for about half this time. A further advantage is also obtained, since a number of shots can be prepared, tamped, and set at the same time. (Four claims.)

105748. *Improvements in Cooling Devices in Multistage Centrifugal Compressors.* Société Anonyme des Ateliers de Constructions Mécaniques Escher, Wyss et Cie., Zurich, Switzerland.—This invention relates to a cooling device in multistage centrifugal compressors having cooling channels parallel to the axis of the compressor shaft. Fig. 1 is a part of a longitudinal section through an air compressor having four stages, the cooling channels of this compressor being arranged in separately inserted bodies cast together with the side or partition wall of the stages. Four rotor wheels 2, 3, 4, 5, are fixed to the shaft 1. These wheels deliver the air sucked in through the branch 6 successively into the diffusers 7, 8, 9, 10 respectively. 11 denotes the delivery branch of the compressor. Let it be assumed, for instance, that the air delivered by wheel 2 into diffuser 7 has now to be re-cooled on its way to the next rotor wheel 3. To this end there are arranged, in a



special annular space provided outside the diffuser blades, channels 12, 13, 14, 15, parallel to the axis of shaft 1, and supplied with cooling water. These channels are provided in separately made bodies. These bodies may be cast into the casing. The next pressure stage is provided with channels 16, 17, 18, 19, arranged in a similar manner. Similar channels 20, 21, 22, 23 are also provided behind the rotor wheel 4. Moreover, similar channels 24, 25, 26, 27, are also provided in the suction chamber, and these channels communicate with the annular water chamber 29. In order to avoid the provision of special water chambers for the supply and exhaust of the cooling water in connection with each stage, and to make all channels accessible from outside and render the cleaning of these channels also possible without dismantling the compressor, even during the running of the compressor, should necessity arise, the channels 24, 12, 16, and 20, as also channels 25, 13, 17, and 21, and so on, are arranged in a co-axial manner. The channels 20, 21, 22, 23, communicate with the water chamber 30 provided on the right hand side. After the opening of the water chambers 29 and 30 upon the removal of covers 31 and 32, the channels 24, 12, 16 and 20, the channels 25, 13, 17, and 21, and so on, forming respectively a continuous or through-going channel, are accessible from outside, and may be cleaned mechanically. The air leaving the diffuser 8 is guided at first radially outwards by the aid of a special annular wall 41, is turned round at *g*, and is then guided in a substantially radial direction inwards

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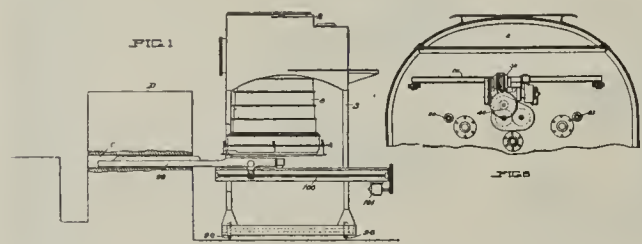
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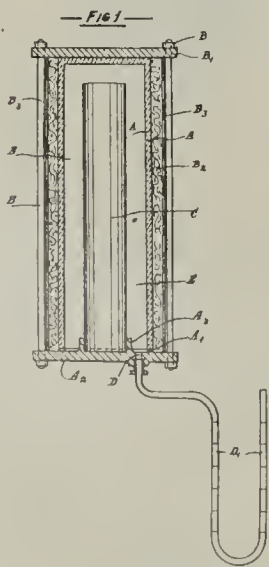
shaft, so that it comes within reach of the wheel 4. Along this path the air is forced to pass through the cooling bodies. In a cooling device according to this invention, it is possible to obtain a limited space a large and very effective cooling surface which opposes a relatively small resistance to the air flowing past it. Such a device may be easily manufactured, is reliable in working, and can be easily cleaned, even during the running of the compressor, should necessity arise. The possibility of any easy cleaning is of particular importance in those cases where only impure water is available for the cooling, as this is generally the case, for instance, in mines. (Six claims.)

107775. *Method of Charging Gas Retorts.* A. E. White, 88, 89, and 90, Chancery-lane, London, W.C. (Communicated by Riter-Conley Manufacturing Company, Leedsdale, Allegheny, Pennsylvania, U.S.A.)—This invention relates to a method of and apparatus for charging gas retorts, the chief object being to reduce the time required for charging the retorts, and ensure that the charges are rendered substantially uniform as to the amount of coal therein. According to this invention a charge delivery mechanism and retort charging mechanism are rendered active successively to deliver a charge separated from the supply to the retort charging mechanism and to charge the same to the retort, the operations being relatively timed so as to complete the charge separating action before the retort charging mechanism reaches the charge receiving position. The mechanism for supplying charges of coal to the retort charging mechanism comprises a charge delivery receptacle which is supplied with a predetermined amount of coal by a charge forming and conveying mechanism, so as to be in condition for delivering a fresh charge to the retort charging mechanism when the same has returned to the charge receiving position. In this manner, the time between successive chargings is considerably reduced, as the loss of time required to prepare the succeeding charge after the charging mechanism has returned is practically eliminated. A cycle of operations of the machine is provided by means of which the completion of the charging operation automatically brings into action the discharge of the reserve charge into the retort charging mechanism, and then automatically brings into action a feeding mechanism, which automatically conveys the coal for the succeeding reserve charge



to the charge delivery receptacle, this feeding mechanism operating until the proper amount of coal is delivered to said receptacle whereupon the feeding operation ceases, and the conveying mechanism is preferably, although not necessarily, reversed so as to prevent coal from being added to the weighed charge or being otherwise dropped from the conveyor mechanism. Fig. 1 is a diagrammatic view showing a charging and discharging machine, a portion of a stack of benches with the fuel charger shown as entered into one of the retorts. D represents a stack of retorts, indicating one of the retorts of the stack, 2 indicates a bin or hopper supported on the upper portion of the framework 3 of a charging and discharging machine designed to travel along a track 98 disposed in front of the stack of retorts. 99 designates a charger adapted to be moved into and out of a retort by the operation of a threaded rod 100 adapted to be rotated by a motor 101. The charger 99 is shown as moving into the retort c, the normal position of the charger being with that portion which is shown as carrying the charge, beneath a chute 8, shown as telescopic, said chute having its upper end properly positioned with respect to a dumping receptacle. As shown, the lower end of the chute is provided with a wing structure adapted to be operated by a motor at the proper time and which is adapted to place the wings in position to practically form an enclosure between the bottom of the chute and the charger. (Eighteen claims.)

107811. *Improvements in Gas Testing Apparatus.* H. R. Webster, The Oaks, Scotland-lane, Horsforth, near Leeds. — This invention relates to gas testing apparatus working on the diffusion principle, the object being to provide a diffusion apparatus for detecting and indicating the presence and proportion of absorbable gas in a mixture of air or gases, say, for detecting and indicating the presence and proportion of carbon dioxide contained in the flue gases of boiler furnaces, recovery plants, and the like. The diffusion apparatus, according to this present invention, comprises a porous vessel containing a chemical absorbent, such as caustic soda, caustic potash, soda lime, or unslaked lime, either in the liquid form or dry form, but preferably in the dry condition. The open end of the porous vessel may be closed either by a flexible diaphragm or by a liquid diaphragm, such as a U-tube of mercury or water, and the exterior of the said porous vessel may be provided with protective or insulating porous materials for counteracting the effects of changes of temperature, strong air currents, dust, and the like. Fig. 1 is a sectional elevation of a portable form of the diffusion apparatus, designed for use in cases where the apparatus itself is required to be introduced directly into the gases to be tested. A is a porous vessel of cylindrical form, which is closed at the top, and having its open bottom end made gastight by a packing ring A', with a bottom plate A'' connected by bolts B to a top plate B'. The bottom plate A''

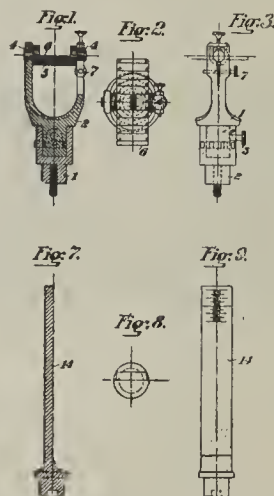


is fitted with a central vertical shaft, which is held in a central position by a support. The shaft is connected to a handle at the top, and the bottom of the shaft is connected to a U-tube. The U-tube is connected to a porous vessel A, which is closed at the top and has its open bottom end made gastight by a packing ring A'. The bottom plate A'' is connected by bolts B to a top plate B'. The bottom plate A'' is fitted with a central vertical shaft, which is held in a central position by a support. The shaft is connected to a handle at the top, and the bottom of the shaft is connected to a U-tube. The U-tube is connected to a porous vessel A, which is closed at the top and has its open bottom end made gastight by a packing ring A'. The bottom plate A'' is connected by bolts B to a top plate B'.

vessel A and the absorbent cartridge C. The action is as follows: On the above-described apparatus being placed in the flow of the gases to be tested, the gas passing through the perforated metal casing B' and the filtering material B'' comes into contact with the porous vessel A, and diffusing through it reaches the chemical absorbent C, which immediately absorbs the carbon dioxide contained in the gas, thus causing within the space E a partial vacuum, the amount of which is shown by the height of the water in the graduated U-tube D'. (Five claims.)

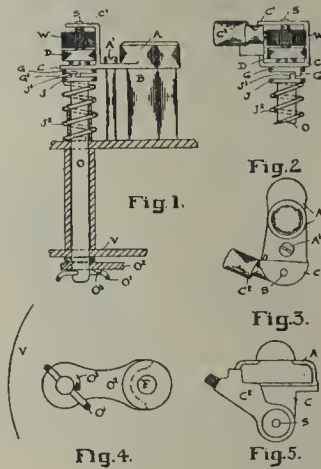
108012. *Improvements in Measuring Instruments for Mining.* B. Lukaszewicz, Kopalnia Kazimierz, via Granica, Poland. — The present invention relates to an apparatus for mine measurements with the aid of a theodolite, and permits in a simple and reliable manner of obtaining a rapid and accurate measurement of length and also a measurement of the angle of inclination of the particular gallery. Fig. 1 shows a side elevation of the apparatus in section; fig. 2 is a plan thereof; fig. 3 is a side elevation of fig. 1; fig. 7 is a side elevation of an auxiliary apparatus for the measurement of the angle of inclination in section; fig. 8 is a plan; and fig. 9 a front elevation of the same. The instrument shown in figs. 1 to 3 has a lower portion which is screw-threaded so as to enable it to be attached to a stand with a head which can be adjusted in all directions horizontally. The upper part 2 is mounted to rotate in the under part 1 about a vertical axis, a screw 3 serving to clamp the two parts firmly together. The upper part 2 is forked, and has two bearings 4 for the reception of an axle 5. This axle 5 is provided at its middle part with a recess in such a way that the upper surface of a measuring scale 6 attached to the axle lies in the geometrical axis of the axle 5. When the axis of rotation of the upper part 2 and the axis of rotation of the under part 1 coincide with the direction of the plumb line, the axle 5 and its central part are horizontal, and if necessary the axle 5 can be clamped in this position by a screw 7. The measuring scale 6 is provided with a centimetre and millimetre scale or graduation. The point of intersection of the zero mark or division of the scale with the central longitudinal division coincides with the vertical axis of rotation of the instrument independently of the position thereof. In order to enable the measuring tape, which is laid on two such devices, to be correctly stretched, an auxiliary instrument is employed. In galleries which have an inclination, the angle of inclination has to be determined, so that the projection of the length required can be determined. For this purpose, the arrangement shown in figs. 7 to 9 is employed. It consists of a vertical measuring scale 14, which is of such a size that the zero point of this scale is situated at a height above the theodolite stand, which is equal to the mean height above the stand of the point of intersection of the line of sight and the vertical centre line of the theodolite. The deviation from said mean height being read off the line of sight of the theodolite is, as already explained, directed to a corresponding graduation above or below said zero point. (Two claims.)

107872. *Improvements in Staiths.* A. D. Ross, 38, General Graham-street, Sunderland. — This invention relates to staiths and similar apparatus for loading coal and other loose materials into the holds of ships, barges, or other receptacles, of the type comprising an elevated platform or deck on to which the wagons containing the coal or the like are run, a hopper into which the coal or the like is discharged from the wagons, and a shoot having a vertically sliding member of U-shaped section adapted to be raised and lowered and disposed between the hopper and spout, which delivers the coal or the like into the ship's hold, the U-shaped member being closed below its connection with the hopper. Fig. 1 is a part elevation of one construction of staith embodying the invention; fig. 2 is a section on the line X—Y in fig. 1; and figs. 3 and 4 are outline elevations to a smaller scale illustrating two positions of the shoots. As seen in fig. 2, a vertically sliding shoot a of approximately U-shape in plan is provided, and in conjunction therewith a fixed vertical back plate b depending from the outlet of the hopper shoot c and supported by uprights d. The sliding shoot a is balanced by weights e on chains or ropes f passing over pulleys g suspended one at each side of the sliding shoot a from the underside of the staith platform or upper deck h, and said shoot is guided as it is raised and lowered by projecting angle bars j, which engage vertical guide plates k on uprights m, and by angle bars n on the uprights d, which engage the sides of the shoot a. The balance weights e may also be guided if desired. The means for vertically adjusting the sliding shoot a conveniently comprise a chain or rope p attached to the front of the shoot and passed over and attached to a sheave q on a horizontal shaft r in the bearings carried by the uprights m, said shaft and sheave being rotated to pay out or wind in said chain or rope by a worm s on a vertical shaft t engaging a worm wheel u on the horizontal shaft r, said shaft t extending through the platform or upper deck h of the staith, where it is provided with a handle v or hand-wheel whereby it can be rotated. The upper end of the sliding shoot a closely engages the mouth or outlet of the hopper shoot c, the U-shape of the sliding shoot permitting its rise and fall without coming into contact with the hopper shoot. The fixed back plate b closes the sliding shoot, and forms its fourth side. At the bottom the sliding shoot bends outwards, as shown at a', the main portion of said shoot being vertical. The mouth of the sliding shoot rests within the falling spout w, which is trough-shaped as usual. A hinged trap door x is provided in the hopper shoot to control the flow of coals therefrom, said trap door being connected by a link x' to a crank y on a horizontal shaft z, rotated through worm or bevel gearing by a vertical shaft z' extending through the upper deck h, where it is provided with a handle z'' or hand-



wheel. By rotating the shaft z' the crank y can be rotated to swing the trap x open, as indicated in dot-and-dash lines in fig. 1. The falling spout w is mounted and operated from the upper deck as usual, and the platform h of the staith is supported by uprights as usual, which, with the exception of the uprights d and m, are omitted from the drawings for clearness. As the upper end of the falling spout w engages the bottom of the sliding shoot a, it will be found that adjustment of the falling spout in the usual way will in most cases automatically adjust the sliding shoot. (Six claims.)

108027. *Improvements in Igniters for Miners' Safety and other Lamps.* E. A. Hailwood, The Towers, Laneside, Churwell, near Leeds. — This invention relates to improvements in igniters for miners' safety and other lamps. Fig. 1 is an elevation of an igniting device as applied to a miner's safety lamp vessel provided with a circular wick; fig. 2 shows another view of the mechanism; fig. 3 shows a plan of the igniter and wick; fig. 4 shows a plan of the operating handle in the base of the lamp vessel; and fig. 5 shows a plan of a device adapted to a flat wick or burner. In carrying out the invention, a sleeve-like member A is provided adapted to be attached to or passed over the burner and wick tube B, a portion of the sleeve member A acting as a wick or wick tube stop, by slightly overhanging the wick or wick tube. The member A may be attached to the burner in any convenient manner, such as by bayonet joint means, or by a screw A', substantially as shown. The sleeve member A carries one or more brackets C, C', which support a spindle or shaft S, carrying a milled wheel W and a spring D in the nature of a clock spring, one end being attached to the spindle, and the other to one of the brackets or their parts. An extension or part C' of the bracket C' will be in the form of a boss or tube in which a piece of cerium or like metal will be mounted and arranged so as to engage the wheel W, the cerium metal being held in contact with the milled wheel W by any usual spring and adjusting screw in the manner common to cerium ignition now in use for various purposes. The shaft S will at one extremity be provided with a disc or clutch member G having a projection recess or equivalent G' formed thereon. When the before-mentioned device which forms one unit is put in situ the plate G will come in line with a similar but opposite clutch member or disc J, the projections G' and J' engaging as in figs. 1 and 2. The disc J is carried on the upper extremity of the operating spindle O, carried loosely by the lamp vessel V, the disc J being pressed upwards by a spring J'. The lower end of the spindle O projects to the base of the lamp vessel V, and is provided with a handle ring or pin O' with a readily renewable washer O'' interposed, as in figs. 1 and 4. The washer O'' will have provided thereon adjacent to the shaft or spindle O an incline or cam O'', and the washer will be held in position by the handle O', and be prevented from rotating by a fork or cut away portion on its other end engaging the spindle F of the wick raising device, as in fig. 4. On moving the handle O' and spindle O the ring or pin of handle O' will climb over the cam turning the discs J and G and winding up the spring D. When the extremity of the cam O'' is reached, a slight movement or turn permits the shaft O to fall, and so free the discs J and G. The clock spring will act to return to its normal position, and so actuate the wheel W and cause a flash to be projected in the vicinity of the wick and ignite same. A further movement of the ring will cause the discs to again engage ready for the next operation. Fig. 5 is a modified form of igniting unit adapted for flat wicks as opposed to round ones, the operation and arrangement being identical. (Four claims.)

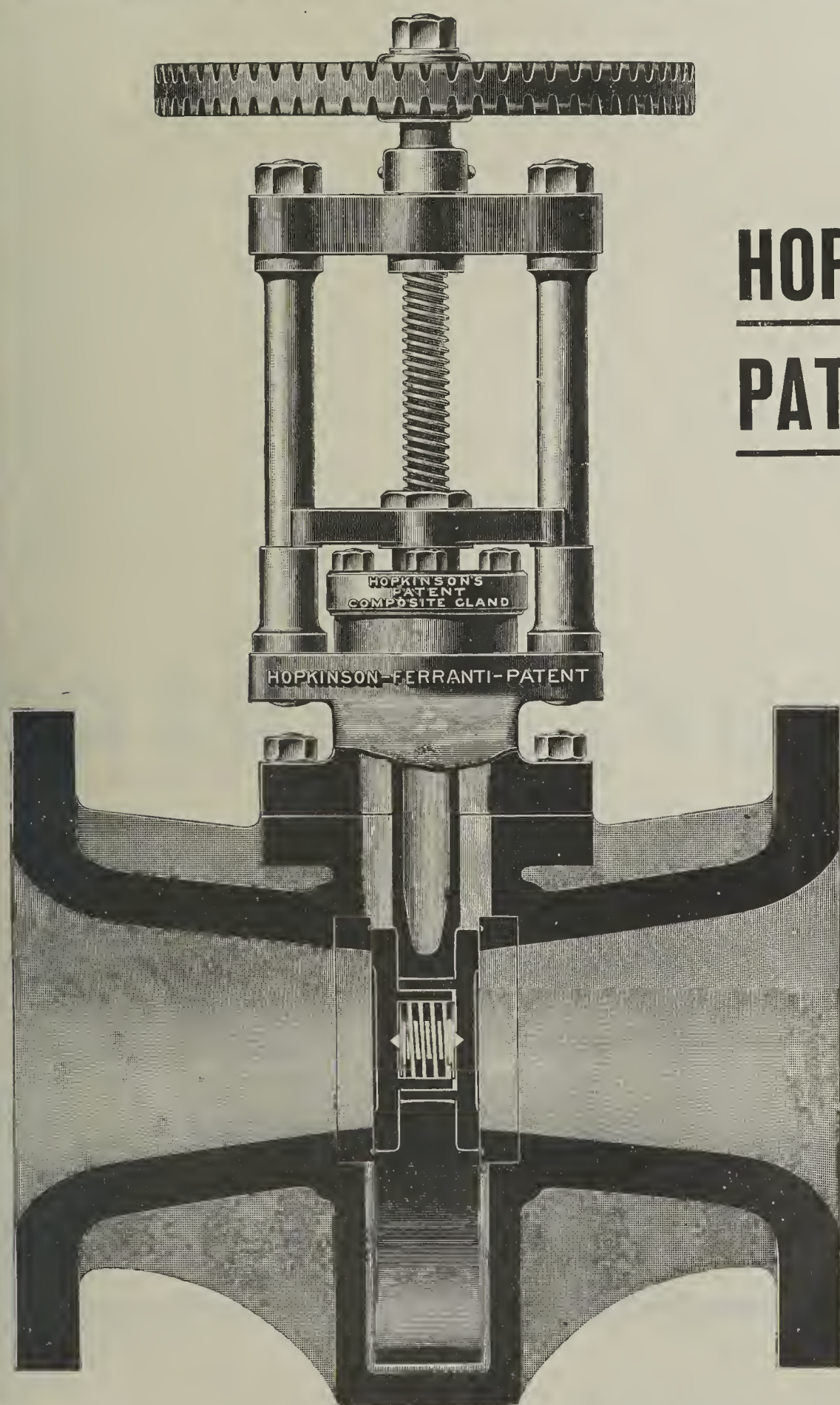


107879. *Improvements in Regenerative Coke Ovens.* A. G. Bloxam, Bank Chambers, 29, Southampton-buildings, London. (Communicated by Evence Coppee et Cie., of 103, Boulevard de Waterloo, Brussels, Belgium.) — The present invention relates to an installation of regenerative ovens which may be heated with poor producer gas or blast furnace gas or with rich gas, such as oil gas, indifferently, and in which the inconveniences are avoided, while the complete or reciprocal independence of the ovens and regenerators eliminates any restricting effect of one on the other. Fig. 2 is a longitudinal vertical section, showing the communications between the air regenerators and the external collecting flues for the supply of air or for exhaust. Fig. 4 is a longitudinal vertical section through a heating wall showing respectively the communications between the gas and air regenerators and the collecting flues for distributing the hot gas and air into the different sole flues. When the ovens are heated by poor gas and the regenerators have been constructed to preheat the gas and the air for combustion, the poor gas is supplied through pipe 1 or 1' extending along the battery, and is distributed by these pipes alternately, according to the phase of reversal. The gas is supplied to each gas regenerator 3 through a pipe 2 in volume sufficient to heat one sub-battery. It passes from one end of the regenerator to the other, and through the passage 4 into the hot gas collecting flue 5 common to the whole battery. The passages 6 (fig. 4) controlled by dampers 7 distribute the gas to the gas sole flues 8, which feed the several heating walls. The air necessary for burning the poor gas is drawn by the chimney draught or blown by a fan through the outside collecting flue 9 extending along the whole battery. It enters regenerators 10 through passages 11 (fig. 2) controlled by dampers 12, passes through the regenerators, and leaves them by the passages 13 (fig. 4) to enter the hot air collecting flue 14 common to the whole battery. Passages 15 controlled by dampers 16 distribute the hot air to the several air sole flues 17. The hot air and gas distributed by means of the aforesaid sole flues along the heating walls enter through ducts 18 and 19 (fig. 4) into a series of like rising flues 20, the burnt gases returning through rising flues 20' alternating with the flues 20. Flues 20' are in communication through ducts 18' and 19' with sole flues 8' and 17' (fig. 2) similar and parallel to the flues 8 and 17; from here the burnt gases are distributed, according to the resistance offered by the dampers 7' and 16', to the collecting flues 5' and 14', symmetrical with the collecting flues 5 and 14 and communicating respectively with regenerators 3' and 10', which are in course of being heated, and, when reversal occurs, will serve to heat the gas and air respectively. The passages 11' and 21' (fig. 2) controlled by dampers 12' and

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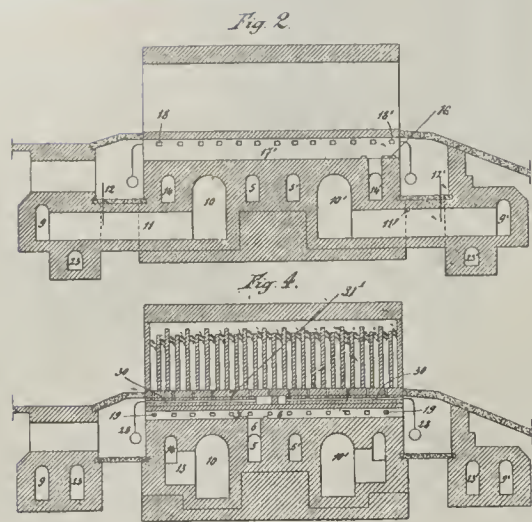
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FIGURE NO. 2028 (CAST IRON BODY)
FIGURE NO. 2029 (CAST STEEL BODY).

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which govern the distribution of the gases to the several regenerators, conduct the latter to the outside collecting flues 9¹. At the next reversal, the poor gas for light to the regenerators through pipes 1¹ through the outside collecting flue 9¹. The combustion products is then through



the outside collecting flues 9 and 23, the latter being fed through passage 21 controlled by damper 22, and the flow of gases in the flues, regenerators, and collecting flues is reversed. (Six claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Axtell, F. C. Liquid fuels. (12809)
 Basset, L. P. Treating ores in blast furnace. (12863)
 Bennett, J. W. Furnace firebars. (12596)
 Bentley, J. Systems of control for electric motors operating cranes, etc. (12855)
 Bone, D. R. Process of producing and conserving heat for furnaces, etc. (12896)
 Bromley, A. W. Overhead driving truck for mono rail tractor. (12693)
 Chenky, N. Pulleys and pulley blocks. (12811)
 Coleman, A. B. Hand tools or appliances for facilitating making of block fuel or briquettes. (12601)
 Cornthwaite, H. and S. Electric induction furnaces. (12816)
 Davis, W. H., and Davis and Son, J. Miners' lamps. (12882)
 Edser, E. Softening water. (12624)

- Foulstone, H. Separation of dust from coal. (12708)
 Goodall, Clayton and Company. Manufacture of coal gas. (12834)
 Harvey, L. C. Crucible melting furnaces. (12912)
 Mack, H. Process of mining coal or other rock. (12842)
 Minerals Separation Limited. Softening water. (12624)
 Mitchell, W. Transmission cord for belt fastenings. (12653)
 Morgan Crucible Company. Crucible melting furnaces. (12912)
 Nicoresti, C. A. Cofman. Solidification of hydroxy-toluenes, cresols, and homologues of the series $C_6H_4CH_2OH$ by means of salts of fatty acids. (12621)
 Oré, E. Regenerating coke ovens. (12866)
 Pickston, W. T. Coal saver for domestic fires. (12763)
 Settle, T. Manufacture of coal gas. (12834)
 Shannon, H. Liquid fuel. (12856)
 Spencer, R. Furnace firebars. (12596)
 Tucker, S. Softening water. (12624)
 Vennard, W. Transmission cord for belt fastenings. (12653)
 Westinghouse Electric and Manufacturing Company. Underfeed stokers. (12682)
 Westinghouse Electric and Manufacturing Company. Mechanical stokers. (12683)

Complete Specifications Accepted.

(To be published on September 27.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 7516. Robinson, J. G. Employment of pulverised fuel in the furnaces of steam generators. (109063)
 10537. Lea, J. E. Apparatus for registering the amount of fuel fed into a boiler furnace or the like. (109067)
 12232. Wrightson, T. G., Ringquist, J. M., and Head, Wrightson and Company. Hoists for charging blast furnaces and the like. (109088)
 12233. Allen, C. C. Piston packing rings. (101410)
 12267. Slyke, F. E. van. Coal and like cutting machines. (109092)
 12275. Bleckley, H. S., Atherton, T., and Massey, E. Blast furnace charging plant. (109093)
 17825. Rollason, A. Refining of iron. (109178)
 18377. Bullard, H. A. Rotary engines and pumps. (109186)
 1917.
 1688. Walker, Hunter and Company, and Walker, J. Means for disposing of ashes and the like in stoves and similar apparatus. (109206)
 6350. Dowson and Mason Gas Plant Company, Wright, T., and Mawby, E. W. Water cooled tubes of gas-fired shell billet and like heating furnaces. (109229)
 6351. Dowson and Mason Gas Plant Company, Wright, T., and Mawby, E. W. Gas heated annealing and like furnaces. (109230)
 9331. Gill, H. A. Ash conveyors, particularly of the steam jet type. (109240)
 9571. Siemens-Schuckertwerke Ges. Winding or hauling machinery. (107766)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
 8536. Soc. Nouvelle des Etablissements E. Muller. Process of baking graphite crucibles, bricks, etc. (109247)
 10635. Soc. Anon. des Ateliers de Constructions Mécaniques Escher, Wyss et Cie. Steam turbine plants. (109251)
 10703. Espenbahn, E. V. Treatment of gases obtained from coal and other carbonaceous fuel. (109251)
 12590. Krupp Akt.-Ges. Grusonwerk, F. Treatment of ores. (109271)

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named **post free.**

Annual Colonial Reports: (No. 925), Zanzibar Report for 1916 (for Report for 1915 see No. 886). Dated August 1917. (London: Published by H.M. Stationery Office). Price 1d. net.

PUBLICATIONS RECEIVED.

"Wigan and District Mining and Technical College Calendar" (61st Session, 1917-18), commencing Monday, September 10, 1917, price 2d., by post 4d.; "Income Tax for Investors for Year 1917-18 (Rates, Relief, Repayment) (Frede. C. Mathieson and Sons, 16, Copthall-avenue, E.C. 2), price 1s. net; "Year Book of the Michigan College of Mines, 1916-1917" (published by the College, June 1917); "Journal of the Franklin Institute" (Vol. 184, No. 2), August 1917, price 50c.; "Journal of the Royal Statistical Society" (Vol. 80, Part 4), July 1917 (London: Royal Statistical Society, 9, Adelphi-terrace, Strand, W.C. 2), price 5s.; "Annales des Mines—Partie Administrative ou Recueil de Lois, Décrets, Arrêtés et Autres Actes Concernant les Mines, les Carrières, les Sources d'eaux Minérales, etc.," (Onzième Série, Tome 6), Documents du 2^e Trimestre, 1917.

Iron and Steel Institute, Annual Meeting, September 20-21, 1917: (No. 1), "Notes on the Present Knowledge and Practice in regard to the Briquetting of Iron Ores," by Guy Barrett and T. B. Rogerson; (No. 2), "A Note on the Microstructure of Commercially Pure Iron Between Ar and Ar₂," by W. J. Brooke and F. F. Hunting; (No. 3), "The Influence of Heat Treatment on the Electrical and Thermal Resistivity and Thermo-Electric Potential of Some Steels," by Edward D. Campbell and William C. Dowd; (No. 4), "New Experiments on Shock Tests and on the Determination of Resilience," by Georges Charpy and André Cornu-Thenard; (No. 5), "Notes on the Heat Treatment of Grey Cast Iron," by J. E. Hurst; (No. 7), "Investigation Upon a Cast of Acid Open-Hearth Steel," by T. D. Morgans and F. Rogers, D.Eng., B.A., M.Sc.; (No. 8), "The Acid Open-Hearth Process," by F. Rogers; (No. 9), "The Eggertz Test for Combined Carbon in Steel," by J. H. Whiteley; (No. 10), "The Failure of Boiler Plates in Service and Investigations of the Stresses that Occur in Riveted Joints," by E. B. Wolff, Dr. Ir.

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THE COLLIERY GUARDIAN

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JOURNAL OF THE COAL AND IRON TRADES.

VOL. CXIV.

FRIDAY, SEPTEMBER 21, 1917.

No. 2960.

INSTITUTION OF MINING ENGINEERS. ANNUAL MEETING IN NEWCASTLE.

MR. WALLACE THORNEYCROFT (Glasgow) entered upon his second year of office as president of the Institution of Mining Engineers by occupying the chair at the 28th annual general meeting of members, held in the Lecture Theatre of the North of England Institute of Mining and Mechanical Engineers, at Newcastle-on-Tyne, on Friday, September 14.

Speeches of Welcome.

The LORD MAYOR of NEWCASTLE (Mr. George Lunn) extended to the members a civic welcome to the city. He stated that Newcastle was the commercial centre of the coal fields of Northumberland and Durham, and that their shopkeepers, ship owners, coal exporters, and brokers recognised very fully how much their individual prosperity was bound up with the prosperity of the great mining industry, which, in turn, was very largely dependent on the profession of the mining engineer. Their visit was shorn of some of its accustomed glory. They had put over their portals, "No admittance—except on business." They were really a "controlled establishment," controlled by the necessities of the war and the national situation. That, of course, meant that the mining industry, like every other branch of trade and commerce, was dominated by the grim realities of the world war. If, however, the war clouds had cast their shadow over that gathering, there was a silver lining. Their members had contributed largely to the war forces fighting at home and abroad to maintain the honour of the British flag. They were sharing in the work of the Ministry of Munitions, and were placing all their expert knowledge, obtained in scientific research, at the disposal of those who were seeking to combat the fiendishness of the Hun. They had their "Roll of Honour." The mining engineers had won for themselves immortal renown on every sector of Britain's "far-flung battle line." They were the pioneers of all the offensives that had brought honour to British arms, by the tunnelling which their members had supervised. The battles of Messines and Vimy Ridge were glorious pages in British history. The mining engineers prepared the pages on which the history was written, and the miners—including those of Northumberland and Durham—helped to write the story. The miners from those northern counties had gone in their scores of thousands, and Great Britain and her Allies owed an unpayable debt of gratitude to those sons of the coal fields, those heroes of the underworld. He hoped that that meeting would fulfil their highest expectations, and that, before the next annual meeting, the war clouds would have been dispelled by the sun of Peace, prefaced by the winds of Victory.

Dr. HADOW, Principal of Armstrong College, Newcastle, said that, although every great institution had its own interests and its own problems, he did not think that there was one which touched the welfare of the community at more vital points than did that institution. Not only was there the scientific side of the provision of the most urgent necessary of life—our material civilisation without coal would be unthinkable—but there was all that great side of the work which had to do with the prevention of accidents—and one could not over-estimate or over-state that; and, thirdly, they had before them some of the most serious, most difficult, and most urgent of those great economic problems which we should have to face in the industrial reconstruction which was to come. On all sides, the welfare of England depended very largely indeed upon the deliberations of mining engineers and upon the conclusions to which they came. Therefore, he bade them welcome.

Mr. JOHN SIMPSON, president of the North of England Institute of Mining and Mechanical Engineers, briefly endorsed the welcome.

Mining Students on Active Service.

The PRESIDENT, responding, said the Lord Mayor had pointed out that there were to be no social gatherings, and that they had to attend very strictly to business. That was absolutely correct. They were all strenuously engaged in trying to get the maximum output with the minimum number of men, and to produce as much as possible of those by-products which were so essential for explosives. At the same time, they had to contend with the taking away—from the surface, at any rate—of a great number of men. They wished to record their appreciation of the services of numbers of their own members who were fighting at the front. There was one matter on which they needed assistance, and on which, perhaps, the Lord Mayor might help the council. That was in connection with students on service—young men who had left at a very critical stage of their career, being either at the university or serving their apprenticeship. There was a tremendous break in their studies, and the institution had endeavoured to obtain some concession in the matter of taking their certificates as colliery managers. They were successful in part, but the real utility of the concessions was very largely marred by

the refusal of the authorities to allow the holder of a certificate, who had been on service and whose time of taking that certificate was delayed by the fact of his being on service, to act as a manager until he had completed the statutory term of underground work experience. The institution held that the practical experience such a man was now undergoing, leading men in face of danger, was very useful for their work in civil life. He appealed to all who could to tackle their members of Parliament, and enable the institution to get what they believed to be justice for those young men. As to the economic questions, that institution had an unwritten rule that economic questions dealing with wages were outside their sphere of discussion. Economic questions, apart from purely technical questions, were not discussed by them. The problems to be dealt with in the very near future regarding the change that was taking place in the conduct of all industries were, of necessity, very considerable. Their coal pits were not now their own. Under what form of control the pits would be in the future, none of them could say; but they, as the technical side of the industry, would have to continue to do their best to raise the coal as economically and safely as possible; and these were the objects that their institution had to keep in mind. Their charter was granted for "the advancement of coal and iron ore mining and allied industries and the promotion of the acquisition of knowledge necessary for the control and direction of mining operations in relation to stratified deposits." These were the objects they had in view, and endeavoured to carry out.

Presentation to Col. Blackett.

The PRESIDENT then presented the "Institution" medal to Col. William Cuthbert Blackett, T.D., "for his eminent services to the science and practice of coal mining." He said he was very glad that that meeting was being held in Col. Blackett's home district, as although Col. Blackett was well-known as a first-class mining engineer over a much wider area, he (the speaker) was certain that Col. Blackett's colleagues in the North of England would best appreciate the great service he had rendered during the last 30 years in connection with rescue work, after some of the devastating accidents their collieries were subject to, and, also, in the investigations that had followed in order to ascertain the cause. Col. Blackett had repeatedly risked his life to save the lives of others, and, as the result of his investigations, was among the first to grasp the true explanation of a dust explosion. He had written a number of papers on the subject, and the explanations of and deductions from his observations had since proved to be correct in the experimental galleries in this country and abroad. Correct diagnosis was the prelude to cure, and, although it was too soon to say that they had at their command a certain cure for the evil of explosions of coal dust, great progress had been made; and, as one of the early investigators, they honoured Col. Blackett, who had also devoted much time and thought to the development of a reliable type of rescue apparatus. Turning to his activities in other directions, they found that Col. Blackett's exceptional grasp of the conditions of collieries and his originality of thought, together with his sound knowledge of scientific principles, had naturally led him to devise and work out a number of improvements connected with coal mining, some of which had formed the subject matter of patents. Amongst these might be mentioned sockets for winding ropes, offtake sockets, tipplers, coal washers, and, above all, the face conveyors with which his name was so prominently connected. He was the first to produce a practical underground conveyor, and to show that its use under favourable conditions, especially in thin seams, reduced the cost and difficulties of working the latter, so much so that there were few coal fields in the country in which thin seams were being worked where face conveyors were not found. For many years back, when there had been any subject under discussion in connection with legislation bearing upon coal mining, and, in particular, during the passage of the Coal Mines Act, 1911, and many subsequent arbitrations, Col. Blackett had been called upon to advise or give evidence. His experience and ability, his concise expression of opinion, his power of illustration and demonstration and sense of humour, had been greatly appreciated by all concerned. Col. Blackett had been a member of the North of England Institute since 1876, was president in 1912 to 1914, when war broke out, and was then called out for military service. He had been active in the service of his country ever since that time, held the Territorial Decoration, and was at present the Colonel Commanding the Durham County Volunteer Regiment. He had been awarded the Royal Humane Society's medal for saving life, and in 1906 had received the "Greenwell" medal of the North of England Institute. The University of Durham awarded him the honorary degree of Master of Science in 1914, in recognition of his

eminent services to mining technology; and the speaker now asked them to endorse the unanimous finding of their committee to award him the gold medal of that institution.

Col. BLACKETT, responding, said he never got a greater surprise in his life than when he heard that he was to be given that medal. It seemed to him that there were so very many men—men in the North of England, too—who had equal claims upon the medal, and he could only imagine that his name occurred because the council wished to show some honour to the neighbourhood they were visiting. He hoped that, when they thought of the distinguished men who had received earlier presentations of that medal—they were all present that day, with the exception of Dr. Haldane, who had been called away suddenly to France—they would not think that the honour had fallen into a lower stratum. He feared that that might be so, but he hoped that it would not occur as an absolute fact to everybody. He was pleased at the honour, as everyone would know, and if the grace of his expression was not all they might expect, he hoped that everyone would realise that its depth and sincerity was all that could be wished for. He hoped to be able before long to show that medal to his son (at present a prisoner of war in Germany), and if the war permitted the latter to carry out his pre-war intentions to go on with mining engineering—of which there might be some doubt now, owing to the passage of time—he hoped that he would try to win the medal in his turn.

Dr. W. N. Atkinson's Warning.

Dr. W. N. ATKINSON (Cardiff) asked permission personally to return thanks for the medal which was granted to him last year, the state of his health having prevented him from attending the meeting at that time. He appreciated the honour very highly, and he hoped that it would prove an incentive to himself and others to do what they could to prevent explosions and loss of life in mines. There was still much room for work in that direction, for, although the influence of coal dust in these disasters had been under discussion and investigation for the past 40 years, there were still differences of opinion on some points, particularly as to the true interpretation of some of the indications observed in explosions, and also as to the best means to be taken for preventing such disasters. They were still without any effective regulations for dealing with the danger, and he was afraid that there were hundreds of pits only waiting for the initial blast to cause a widespread disaster.

Annual Report.

The 28th annual report of the council stated the membership at 2,933, exclusive of those on active service whose names had not been returned by each institute. About 400 members were serving with H.M. Forces. During the year, six had been reported killed, three had died of wounds, 10 had been wounded, 19 had received rewards and distinctions for gallantry in the field, and six had been mentioned in despatches. Twenty-two civilian members—including Messrs. L. R. Fletcher, T. E. Jobling, J. P. Kirkup, J. H. Merivale, and H. Pilkington, past members of the council—had died. The institution had ceased to be affiliated to the British Association for the Advancement of Science. The British Association Committee on Fuel Economy had practically ceased to exist. Its work had been undertaken by the Committee on Fuel Research, with Sir Geo. Beilby, F.R.S., as chairman, and Prof. W. A. Bone, F.R.S., as scientific adviser.

The Advisory Council for Scientific and Industrial Research had made a grant of £350 towards the first year's expenses of a research into "The Control of Atmospheric Conditions in Hot and Deep Mines," and a sub-committee, of which Prof. J. Cadman, C.M.G., was convener, had been appointed, and was proceeding with the investigation. The council had also made application for a grant in aid of a research into "The Destruction of Pit Timber and its Prevention." One of the conditions made in connection with grants in aid of such investigations was that a portion of the cost should be borne by the industry benefiting by such research. The South Wales Institute of Engineers had been asked, and had consented, to associate itself with the institution in an appeal to the Mining Association of Great Britain for funds in this regard.

The efforts of the committee appointed to consider the position of mining students serving with the Colours, as regards the examination for certificates of proficiency on their return from active service, had been partially successful. Statutory rules and orders had been issued, granting privileges so far as the written and oral examinations were concerned, but no concessions were allowed with respect to the statutory five years required to be spent in gaining practical experience. The certificate was withheld until the period was completed, although the candidate might have passed the examination. The council acknowledged the privileges that had been granted, but regretted that these should be made practically inoperative by refusal to grant any concessions in regard to service. The committee was continuing its efforts to accomplish that object.

memorial on behalf of the institution, the Steel Institute, the Institution of Mining Engineers, and the Institute of Metals, had been the chairman of the Advisory Board for Industrial Research urging the organization of a Central Department of Mines and Minerals. A Departmental Committee had been appointed to prepare a scheme for the establishment in London of such a department.

In response to a request from the Board of Trade as to its opinion, the council had replied that, in its opinion, there should be reciprocal recognition by the British and Russian Governments of engineering degrees and diplomas granted in either country.

During the year ended July 31 last, the ordinary income was £4,473 14s. 8d., as compared with £4,642 13s. 6d. for the previous year, and the expenditure was £3,633 10s. 2d., as against £4,776 17s. 6d. The balance of assets over liabilities, exclusive of the capital fund and of the value of the stocks of *Transactions*, but inclusive of the value of furniture and fixtures, after allowing for depreciation, now stands at £3,608 12s. 8d., as against £2,799 0s. 4d. The institution's investments are valued at £11,560.

Officers for 1917-18.

The officers for the ensuing year were stated to be as follows:—President, Mr. Wallace Thornycroft; vice-presidents, Mr. William Pickup and Mr. John Gerrard (representing the Manchester Geological and Mining Society), Mr. George Spencer (representing the Midland Counties Institution of Engineers), Mr. C. C. Ellison and Mr. W. D. Lloyd (representing the Midland Institute of Mining, Civil and Mechanical Engineers), Mr. David M. Mowat, Mr. James Hamilton, and Mr. Humes Barrowman (representing the Mining Institute of Scotland), Col. W. C. Blackett, Mr. Frank Coulson, Mr. T. Y. Greener, and Mr. C. C. Leach, and Mr. F. R. Simpson (representing the North of England Institute of Mining and Mechanical Engineers), Mr. J. Gregory (representing the North Staffordshire Institute of Mining and Mechanical Engineers), and Mr. Alexander Smith (representing the South Staffordshire and Warwickshire Institute of Mining Engineers).

In moving the adoption of the annual report, the PRESIDENT said that the secretary (Mr. Percy Strzelecki) had been seriously ill for the last three months, but was with them that day, convalescent, he was glad to say. In consequence of the illness, the work of preparing for the meeting had fallen largely on their honorary secretary (Prof. L. T. O'Shea), but, thanks to the North of England Institute, much of the work had been undertaken by the officials of that organisation.

Mr. R. W. DRON seconded the motion, and the report was adopted.

Enemy Alien Members.

It was agreed *nem. con.*, in accordance with the resolution adopted unanimously by the council, that the following by-law should be added to the institution's by-laws:—"In the event of a state of war existing between the United Kingdom and any other country or state, all honorary members, members, associate members, associates, or students, who shall be subjects of any such enemy country or state, shall forthwith cease to be honorary members, members, associate members, associates, or students of the institution, but may be eligible for re-election after the war in the usual manner."

The Oxidisable Constituents of Coal.

This paper, by Mr. J. IVON GRAHAM, B.A., B.Sc., and Mr. JAMES HILL, M.Sc., both of the Doncaster Coal Owners' Research Laboratory, was published in our columns last week, pp. 491-92. It was read by Mr. GRAHAM.

Discussion.

The PRESIDENT asked for information as to the cause of the action of the coal on the photographic plates, as did Col. BLACKETT, who enquired if the influence which affected the plates was of the nature of light, heat, or chemical combination.

Mr. G. SPENCER (Midland Counties) suggested that the activity might be radio-activity.

Mr. T. Y. GREENER (South Moor) wanted to know what bearing these experiments and results had upon the spontaneous combustion of coal in mines.

Dr. R. V. WHEELER (Home Office Experimental Station, Eskmeals) wrote stating that he was strongly of the opinion that researches of the nature described in the paper, regarding the composition of coal, formed the only satisfactory means of elucidating the problem of the spontaneous combustion of coal. He congratulated the authors on breaking away from the hackneyed absorption experiments upon which so much time had been spent by previous investigators. The important fact demonstrated was that the rapidly oxidisable constituents of a coal were contained in the portion that was insoluble in pyridine. That fact was established by Mr. C. B. Platt at the Home Office Experimental Station in 1913. The results of Mr. Platt's experiments were communicated to the Spontaneous Combustion Committee, and the details would no doubt be published in due course. Briefly, they showed that, of the three portions into which a coal could be separated by the solvent action of pyridine and chloroform, two only, viz., the portion insoluble in pyridine and the portion soluble in pyridine but insoluble in chloroform, contained compounds capable of rapid self-heating. The portion soluble both in pyridine and in chloroform, though very inflammable when raised to a sufficiently high temperature, did not heat spontaneously. He was unable to understand the

the authors regarding the action of the extract and residue, on a photographic plate. He believed that Barnsley softs and other coals so widely in constitution as to give such different results with pyridine, compounds whose action on a photographic plate was just the reverse of that obtained from other bituminous coals. The experiments of Mr. Platt and himself were

not confined to Silkstone coal. However, he was making experiments with Barnsley softs, and would communicate the results to the authors. If he remembered rightly, Russell obtained his best coal pictures with lignites, and practically no images with anthracite—results which the authors also reversed. It would be of interest to know the brand of photographic plate used, and also whether, in the experiments as to the comparative densities of the images given by extract and residue, the deposits of powder were placed on the same plate.

Mr. GRAHAM said he was sorry he could not explain the cause of the photo-chemical action. Dr. Wheeler had definitely stated that it was considered to be due to an oxidation process going on, but whether that oxidation process caused ultra-violet rays to be set free, the speaker did not know. In view of Dr. Wheeler's definite statement, when the authors of that paper found that their extract, which he would call the resinous material, did not oxidise, they adopted the photographic method to see if their extract differed in any way from Dr. Wheeler's. Their extract certainly did not exhibit that photo-chemical effect. Their extraction was carried out under conditions rather different from those of Dr. Wheeler, at the lowest temperature possible. Dr. Wheeler's experiments appeared to have been carried out at the boiling point of pyridine—pyridine under atmospheric pressure, which boiled at about 115 degs. Cent. Mr. Hill and the speaker thought that possibly they had not extracted their coal sufficiently, and had left those substances which caused photo-chemical action in their residue; hence the further extraction with pyridine, resulting in their residue giving a photographic effect rather more marked, if anything. He thought Dr. Wheeler was in error in his reference to Dr. Russell and lignite, for, as far as he remembered, Dr. Russell found that the lignite did not affect the photographic plate, and that anthracite did—the result they themselves attained. Dr. Russell also found that dry coal was rather more active than moist, and that this action on the photographic plate was not produced when the plate was kept in an atmosphere of carbon dioxide instead of oxygen. Their experiments were carried out in the normal laboratory air. Dr. Russell found that, when he placed his coal in a right-angled tube, and passed a current of air over it, he got the effect on the photographic plate. It looked as though some vapour or something of the sort was being given off which affected the plate. The speaker thought that they got much the same effect with radio-active minerals. Dr. Wheeler's results would rather lead one to think that it was the resinous material that oxidised and that that oxidation produced photo-chemical action, but they found that the resinous material they got did not oxidise, and that the photo-chemical action was left in the residue. The lignite, which oxidised at a tremendous rate as compared with other coals, did not produce any photo-chemical action. The coals used by Dr. Wheeler and themselves were different. His was a coking coal, and theirs was not—or, at all events, it was a very poor coking coal. The difference might be due to the difference in coal, but Dr. Wheeler did not think so. Previous workers had shown that, on strongly coking coal, they got up to 25 per cent. of extraction. Dr. Wheeler got up to 35 and 38 per cent. of extraction by pyridine. Their object was to find that substance or those substances in coal that underwent oxidation, with the idea of ascertaining the cause of spontaneous combustion. If the cause could be satisfactorily ascertained, he thought it would be a great help in practical work. He thought, also, that work on the lines narrated would certainly help in establishing what the constitution of coal was. The more they knew of the chemical action of coal and of its constitution, the more they would be assisted in the future development of various processes.

Mr. PHILIP KIRKUP (Birtley) asked if iron pyrites had anything to do with the results obtained. Iron pyrites was subject to oxidation, and had been the cause of many cases of spontaneous combustion.

Mr. GRAHAM replied that the point as to photo-chemical action being caused by pyrites was eliminated by the fact that there was practically no pyrites in the coal examined or in the anthracite.

Prof. L. T. O'SHEA (the secretary) characterised the results obtained by the authors as somewhat startling. He thought it had been generally accepted that the bodies liable to oxidise in coal were resin, and that the others were indifferent to oxidation; but the authors' conclusions were of considerable importance, and such researches would probably prove more far-reaching than they seemed to be at present. Examination of bodies of that character might lead, sooner than they expected, to the determination of the difference between non-coking and coking coals. If that were done, they should be able to work on some scientific basis with regard to the use of non-coking coals in the coking process. At present, they had only a haphazard way of trying, by mixtures, what coals could be mixed together to produce metallurgical coke, and they were apt to say that only practical experience could tell them what the mixtures should be. If, however, they could once determine the cause of difference, they would be able to say definitely that, by mixing certain coals, they could get metallurgical coke without experimenting, and, in the future, they might be able to use that non-coking slack which at times—and never more so than at present—formed such a drug on the market. It was an important question in the coal economy of the country. From researches made some time ago, he could confirm the statement that the solubility in pyridine of a non-coking coal was less than Dr. Wheeler had found to be the case of coking coal.

Mr. R. W. DRON referred to the authors' statement that moisture considerably accelerated the rate of oxidation of coal, and that, therefore, the presence of moisture was the most probable explanation of the increased absorption of oxygen over that of the original coal. He had looked at a report of a Com-

mission appointed by the Australian Government to deal with the question of spontaneous combustion on board ship. They had erected two bins, one filled with dry coal, and the other with coal saturated with water. The coal in the dry bin heated up, and in six weeks was practically on fire. In the case of the wet bin, there was no increase of temperature in three months. Was there some special way in which moisture must be present to cause spontaneous combustion?

Col. BLACKETT asked for a definition of "oxidisable." He imagined that all the contents of coal except the ash were oxidisable, and, if one experimenter found that his resinous extract was not oxidisable under certain conditions, and another found the extract oxidisable under slightly different conditions, it did not help him to have them arguing about the matter, so long as the conditions were not identical.

Prof. O'SHEA said Col. Blackett was quite right as regarded his idea of "oxidisable." Every substance which would combine with oxygen might be looked upon as oxidisable. In chemistry, however, in the ordinary way, the term "oxidisable" had been confined to those substances which were oxidisable before a certain temperature was reached. Bodies oxidisable at the temperature at which they ignited were not called oxidisable, but combustible. The term "oxidisable," as used in that discussion, referred to substances which would combine with oxygen at a temperature below that at which they would unite.

Mr. W. H. CHAMBERS (Rotherham) said that they who worked in deep mines that were liable to underground fires were very much interested in the investigations of chemists to assist them as to the causes of the heating that preceded positive combustion. It was in 1910 that the collieries with which he was connected became so dangerous. They had, for 30 years, been subject to outbreaks of underground fires. They had on an average two per year. In one pit, which was contiguous to another, fires occurred on the east side—which was nearest the other pit—but they did not have fires on the west side of that pit. In the other pit, however, there were no fires occurring on the west side—i.e., the portions of the workings nearest to where the fires were frequent in the other pit—but the fires occurred at the side furthest away. In 1910, he approached Mr. Fryar and the late Sir Arthur Markham, through the late Mr. Pickering, to co-operate in an investigation of the circumstances attending these fires. In 1912, however, there was an explosion at the Cadeby Colliery, which interfered with the progress they had hoped to make with their investigations under Dr. Harger, of Liverpool, and he had other things to think about. During that interval Dr. Haldane was appointed by the Committee of the Doncaster area, and followed up the investigations as to the constituents of coal, and so on. That was not what the speaker wanted at that time. He wanted to know the analysis of the air, and what was coming off from dangerous areas or from areas that might become dangerous. They had been very successful, because, since that explosion, they had had no underground fires at all. That was due to the assistance of a chemist, who analysed the atmosphere in the neighbourhood of what might be dangerous areas. Samples were taken every day, and, if there was an increase of CO₂ coming off, steps were taken to deal with it, either by excluding air which was causing the heating to come on, or by opening the area out so that the ventilation would carry off the heat that was generated, in order that active combustion might not ensue. He was not a chemist, and he could not quite grasp the object of these analyses and investigations. They knew that there was something that did heat in the coal. It might be very useful, in an economic way, to conduct these investigations, but he did not think that they were going to assist in the primary object of preventing underground fires. He did not wish to disparage these investigations, but he thought that they had gone beyond the province of mining engineers.

Proposing a vote of thanks to the authors, the PRESIDENT said his own feeling was that, in time, they would all appreciate the fact that these papers from the Doncaster Laboratory were very valuable contributions to the literature of coal.

American Notes.

An abstract of Mr. SAMUEL DEAN's paper under this title appeared in the *Colliery Guardian* last week, pp. 493-94.

Discussion.

Mr. H. F. BULMAN (Newcastle) wrote with reference to Mr. Dean's advocacy of room-and-pillar working as against longwall, and said the reasons given in the paper pointed to the less cost being due to the good thickness of the seams worked, which did not require height to be made by the removal of stone in roof or floor. In thin seams, where height had to be made in all the roads in bord-and-pillar working, the longwall method admitted of some saving in stonework. The room-and-pillar method described by Mr. Dean seemed to be what was commonly known as "single stall" working, and was not the bord-and-pillar method of the North of England. It was interesting to note that, in a recent paper by Mr. Geo. Gibb, on "Intensive Mining in Thin Seams," read before the Mining Institute of Scotland, in working thin seams at a Scottish colliery a system of pillar working had been found to be more economical than longwall. The system described by Mr. Gibb appeared to be much the same as what was sometimes called "longwall retreating," i.e., first dividing up the whole area into large panels or blocks by headings driven to the boundary, and then working outbye by longwall, leaving the goaf behind. Probably that might often be the most economical method, taken over the whole period of working, but financial conditions did not generally allow of waiting for the long-deferred output. A point generally admitted in favour of longwall was that a larger proportion of the seam could be got as "round" coal, especially in thin, hard seams. Mr. Dean stated that 95 per cent. of the coal could be

recovered in American room-and-pillar mines, but British practice pointed to a larger proportion of the entire seam being got by longwall than by any other method. The county of Durham was a great coke and gas coal district. Many of the seams were worked for the manufacture of coke or of gas, and, for these purposes, large coal was not required. That, no doubt, accounted to a large extent for the prevalence of bord-and-pillar working there. Why bord-and-pillar working was the method initiated and practised for a very long time in the Northern coal field, and longwall in the Midlands, it was not easy to say. There seemed to be no scientific reason, just as there was none for the use of small tubs, holding about 12 cwt. of coal, in some districts, and big trams, holding two tons, in others. The driving of roads to form rectangular pillars which were left to support the roof was, no doubt, the methods which would first suggest itself to the inexperienced miner as the simplest and safest. It was not until about the middle of the 18th century that the removal of the pillars was generally practised in the Newcastle coal field. To the primitive coal miner, the removal of the seam in a long face might well appear a dangerous and difficult operation. It was probable that the longwall method was suggested by the previously existing system of working metalliferous lodes. Probably some colliery manager in Shropshire, where longwall was said to have been first practised some 300 years ago, had had previous experience in metal mines. Forty to 50 years ago, longwall was a novelty in the Northern coal field, and was being introduced for working the hard seams of Northumberland, which could not be worked at a profit at that time by bord-and-pillar methods. Changes were generally due to economical causes. The longwall method was found to cost less for stonework, to give a larger proportion of round coal, and to give an increased output per hewer per shift. There was no doubt that the longwall system was carried out most efficiently in those Midland districts where it had been practised for generations, just as the best examples of bord-and-pillar working would be found in the Northern district.

Mr. S. H. CASHMORE (Tamworth) wrote that Mr. Dean struck an opportune note when calling for better attention to the health of the workers, and that it would appear desirable that recommendations from the institution should be sent to the Home Office on matters affecting health. Waste pervaded the mining industry at the present time to an alarming extent, and only collective action could hope to deal with it. Waste of any kind, whether of power, materials, possible by-products, unburnt carbon (smoke), or land would seem to indicate lack of both efficiency and imagination. Again, large areas of native wood were not being stripped. Was re-afforestation proceeding? To bring the industry abreast of the times, mines should be provided with almost unlimited electrical power, capable as it was of long-distance transmission. They might then look forward to the disappearance of underground steam- and rope-driven pumps and haulages, which were less efficient and tended to high boiler consumption. Mr. Dean's remarks on scientific management should be carefully noted. The writer believed that, in most departments of colliery working in this country, sufficient attention was not given to detail. As to methods of working coal, he was afraid that the British mining world as a whole had been too conservative in the past, the fact accounting for the adoption of the longwall system for almost all seams. Possibly, a reason for the bord-and-pillar method in Britain was that the British miner was too exacting in the matter of yardage prices in the whole or first working. At the colliery with which he was connected, he had employed longwall retreating successfully under bad roofs. That method had practically all the advantages of bord-and-pillar, with a correspondingly less amount of heading or deadwork. Undoubtedly, the cure for surface subsidence and the high cost of brushing or road ripping was hydraulic stowage, so well explained by Mr. J. Drummond Paton, of Manchester.

Mr. HENRY T. WALES (Swansea) stated, in a written contribution, that it would, he thought, be generally admitted that, until quite recently, the actual methods of coal-getting in this kingdom showed little variation from those in use 50 or 60 years ago, although the scale of underground operations had been considerably increased during that period, and many improvements had been introduced with a view to safety and efficiency. So long as hand work was relied on for getting the coal, there was little scope for any great changes from the practice of 60 years ago, and the use of machinery was, in many cases, not practicable or desirable. There was probably no operation in which methods of working were so dependent on the conditions to be met with as in coal mining. What was best at one time might have to be largely modified in a short period. The changes to be considered were those imposed by Nature, and affected the seams in many ways, such as gradient, nature of the roof and floor and of the coal. These changes were not confined to individual collieries, but affected the various coal fields of the country, and, they were prepared to learn, our own coal fields were, in many respects, entirely different from those of other countries. Comparing the American coal fields—of which he had had no personal knowledge—with those chiefly of South Wales, he gathered that the differences were to be found in the nature of the roofs overlying the seams, the extent to which machinery was used for coal-getting, the use of explosives, and, last but not least, the point of view from which the workers regarded their occupation. It was quite clear that the subsidiary haulage roads in South Wales could not be kept sufficiently wide to permit of the use of mine cars of the capacity described in Mr. Dean's paper on "Modern American Coal Mining Methods," and that there was a great difference in the nature of the roofs was confirmed by the suggestion that the room-and-pillar method of working was preferable to longwall. The first-named system prevailed in former times in South Wales, but

during the last 60 years it had been gradually replaced by longwall, which was now almost universal. It was found, as a general experience there, that the formation of ribs was inadvisable, and resulted in bad fractures of the roof and consequent falls along the lines of the ribs. Hitherto, the use of machinery had been on a small scale, and had been confined chiefly to the work of undercutting in seams of thin section. Of recent years, conveyors had begun to be applied, and their use was extending. On the ground of safety, the use of explosives was limited as much as possible, besides which it was important, in most seams, to maintain the yield of large coal at the highest point. As to the relations between capital and labour, in any industry the interests of these were the same, and were interdependent. It was out of the profits produced by the joint efforts of everyone concerned that the rewards could be obtained in the shape of interest on capital and of wages. There were, unfortunately, leaders of the workmen who denied the truth of the mutuality of interests; and they could hardly be surprised, therefore, if many of the workers had accepted that false and pernicious view. The division of the proceeds of industry was of quite secondary importance compared with the first and essential aim of obtaining the highest possible prosperity, but the workers ran little risk, in view of their powerful organisations, and of the weight of public opinion and Government control, of receiving less than their due share. It was undoubtedly the fact that workers did not put forth the efforts which might reasonably be looked for, and statistics showed that, during the last 20 or 30 years, the output per person employed in coal mining had steadily decreased. That was not due to want of capacity in the worker, but to a lack of realisation of the fact that it was really to his interest to give his best support to the industry in which he was engaged. It was a hopeful sign to see that some of the workers' leaders were taking a sound and far-seeing view of the future position.

Mr. JOHN GIBSON (Kilmarnock) wrote submitting that nine-tenths of the whole art of management was contained in (1) the handling of men, which was largely a matter of psychology, plus a knowledge of history; (2) the handling of groups of conditions and circumstances, which was largely a matter of clear and complete observation and accurate inference; and (3) the handling of material and labour in view of certain financial limitations, which was a question of economics. Most of the defects of management noted by Mr. Dean might be traced to the fact that hitherto the training of captains of industry on both sides of the Atlantic had been almost entirely confined to technical matter, to the complete exclusion of psychological, historical, logical, and economic matter. A manager so trained would be likely to deviate, on the one hand, to timidity, and, on the other hand, to truculence, and would not pursue a policy of consistent firmness and kindness. He entirely agreed with Mr. Dean that the machine had had attention and the man little or none in the past. Pains and patience should be taken in giving every man instructions regarding his work. It was not enough to say to a miner advancing a room, "Keep a little to the left," or such like. View-strings or other methods for directing the drive should be fixed. If a tracklayer was laying rails, it was not enough to say, "Dip more," or such like. If such were required, a gradient should be determined, and the man given the gauge and level for his guidance. Again, the night foreman, in instructing his repairers, should give detailed instructions, such as: "You will get such-and-such tools at a certain place; suitable timber is at a certain point; you will go to No. 6 branch road off No. 11 S.E. heading; 20 yds. from the junction, you will see so many sets of broken timber; these you will replace at a given height from the rails; stow your *débris* in such-and-such a road." In these circumstances, the manager could demand work, not excuses. How often did it happen, however, that instructions of that kind were not given? Time was lost in looking for tools, timber, and trams. The dirt was stowed where it had to be lifted again, the job was not completed, the day shift drawer struggled through at great disadvantage, night shift repairers reasoned that their work was of no importance, and a lackadaisical spirit flourished. Again, let them take the conditions of work for the most important man in the colliery—the coal-getter. (1) Did the work suit a particular man's experience and capabilities? For example, it seldom paid to have a man used to strong roofs working under a tender roof. A man used to a 20 in. seam was not at his best in an 8 ft. seam. One accustomed to filling a big output in a soft seam lost heart in a hard seam. (2) Ventilation was an important matter in regard to efficiency. The method of dealing with water, if present, was another. The supply of tubs, also, was of extreme importance. (3) What of the incentive to the man? He could not imagine anything more likely to bring out the best effort than the bonus system Mr. Dean cited. He hardly followed Mr. Dean in the assertion that the workmen of Germany were better housed than those in the United States, but, if that were so, he submitted that the higher output per man in the United States was produced in spite of, not because of, worse housing. Apart from the greater virility resulting from better housing, it had the effect of tending to raise the standard of living, which required higher earnings, and tended to greater output. (4) Output per man depended to some extent upon the manager. The psychology of management had been given less attention on this than on the other side of the Atlantic. He thought that it was fairly well established now that a workman was tired when he thought he was—in other words, that tiredness was a mental rather than a physical phenomenon, or that, at least, a distinction might be drawn between the mental phenomenon of tiredness and the state of physical exhaustion. The "second wind" of the athlete was an example of that. It followed, then, that the leader of men who mercilessly worked his men and paid them well, who would accept nothing

but the best effort, would tune all hands to a high standard. Mr. Dean had not proved his case that a large output per man in America was principally due to the large capacity cars, further than that a large car could be used, the larger within certain limits the better. As to the comparison of American and German conditions and methods, it was well to bear in mind the humorous words in which the attitude of the German Government towards the governed was crystallised: "Get yourself born: we do the rest." The whole German system seemed to rest on detailed organisation (frequently referred to in this country as "red tape"), on perfect submission of the subject, and on the peculiar system invented and perfected by the German Government of combining military, financial, commercial, diplomatic, and political means to the desired end of world-power. Even were such policy within the powers of the American or British Governments, and considered desirable, it was very doubtful if the barrack-room discipline required would suit the genius of the Anglo-Saxon race.

Mr. SAM MAJOR (Glasgow) said he did not believe in a general bonus paid on the total output. It seemed to him that a bonus, to be effective as an incentive to work, should give the worker, as directly and as quickly as possible, the reward of his efforts. The deferred bonus did not give a due return on the expenditure in respect to it. What seemed to him to be the greatest need in this country was to induce the men by some means to do their best. He had had the experience during the war of running a factory with between 400 and 500 women, and the output had been, beyond all comparison, greater than it would have been with men in their present temper. The women were doing their best in their part of the works, but the men were not doing their best in the other part of the works. What employers must try to do was to enlist the co-operation of their employees in increasing the output and reducing the hours of work. He had occasion a few weeks ago to speak to a group of his own men, most of whom had been in the employment of the firm for many years as fitters. He pointed out to them that not one of them had ever given him a single suggestion in regard to their work which would in any way facilitate the progress of their work and reduce the time for carrying it out. For that attitude of mind, employers themselves must take a large share of the responsibility. It was quite certain that many things must have suggested themselves to such men which would have been of value to the employer, and it would have been worth the employer's while to have made it worth while to the men to make known their suggestions. As to the comparisons between America and Germany, so far as his observation went, the scientific administration in Germany had not increased their output of coal. He had no hesitation in saying that, in Westphalia, in seams of corresponding thickness, the output per man at the face was less than in this country. He spoke of the output per man "at the face," because, of course, there was a great deal of time spent in German mines in solid packing and in guarding against gas.

Col. BLACKETT remarked it was impossible to reply to Mr. Dean with any great amount of intelligence, when one did not quite know what were the conditions under which he was expressing his views. In one place, for example, Mr. Dean compared a 12 ft. seam with a 6 ft. seam. In this country, our comparisons would probably run from about 2 ft. 9 in. to 3 ft. 3 in., and, therefore, it became practically impossible to make any useful remarks upon such a paper, because one did not know all the conditions. Let them take, for example, the question of bord-and-pillar working. At the collieries with which he was mostly concerned, they adopted, from time to time, at one part of a seam—which did not vary from 6 ft. to 12 ft., but from probably 2 ft. to 2 ft. 8 in.—the longwall system of working, and then it might be suddenly discovered that that method was not so suitable as bord-and-pillar, and the seam was thereupon changed over to that latter method of working. They in the North of England did not bind themselves to one system of working for ever, but varied their conditions to get the most economical methods. They could not compare the two systems until all the conditions of the seams had been thoroughly understood, and the results had been arrived at by practical demonstration. The waste in one bord-and-pillar method of working might condemn it in certain places, but might not be one-quarter as much in another place. As to co-operation with their workmen, he held very strongly indeed that they should co-operate with their workmen, that their mining operations should be carried on entirely in that spirit, and that the sooner it was done the better. The reason they were not co-operating with their workmen was that they started, generations back, on a wrong principle. They had brought up their miners on a wrong system, and had been some of the worst offenders in the North of England. They had taught their workmen to believe that the best way of paying them was to base results on selling prices. The result was that anything that could be borne in upon the workman to increase the selling price had been a good enough weapon for him to use, so that the miner only thought—having been taught of the relationship between supply and demand—that, if he could limit the supply in any way at all, the demand would go up and wages would go up also. Therefore, the miner set about it to lie idle, to work short time, etc. The miner, for the same reason, would oppose everything that they wanted in the way of improving their mines. On the other hand, if he had all along been accustomed to the idea that the better he did for the mine owners, the better he would do for himself, they would have co-operative workmen and better results.

Mr. SIMON TATE remarked that Mr. Dean had seen the American employer still continued to demand a high production per man. In England, employers had to be satisfied and thankful if they could get a hour of any kind, and, in this country, it was not the employer who demanded, but the workman who made the demand for the highest possible remuneration for the minimum

ment of work. In these demands, workmen had been encouraged by the present political situation and the war. The need for more workmen, even in America, was not confined to America, but was acute in this country as anywhere else in the world. The ability of the employers to impose a system at American collieries was a sure indication that the American miners had not yet obtained the power to impose conditions on their employers, as the men had done in this country. Certainly no such system would be possible here. Mr. Dean remarked that, where unions of workmen existed, one of the results was the limitation of the earnings of the miners. From the speaker's own experience, America would find that, as the power of the unions increased, the output per man would decrease. One of the principles that seemed to operate was that of the restriction of labour, sought for and obtained by various methods, such as the shortening of the working hours, the full payment of wages for lessened labour, as seen by the results of the Minimum Wage Act; and, even where machine work had been largely adopted, obstructive tactics had not been absent. As to methods of working, he had not had an opportunity of personally inspecting the American method of room-and-pillar, but, from the appearance of all the plans he had ever seen of American mines, there must be, in the final extraction of the pillars, a large amount of waste, even under the most favourable conditions. With the unlimited resources of coal in America, that might not be a serious matter, but in this country, especially in the Northern district, where the coal field was of limited area and resources, it would be a national crime to adopt so wasteful a system as the room-and-pillar method appeared to be. Was Mr. Dean quite certain that 95 per cent. of the coal was obtained out of these American mines? The speaker added that he thought that the statement that the goodness or badness of a roof was generally the measure of skill with which it was managed was very doubtful, as no amount of skill could bridge the difference between a very bad roof and a good one. Numbers of men agreed with Mr. Dean that large mine cars would be advantageous to this country, but it must not be overlooked that many of the shafts were not large enough to permit of the large cars entering the mine.

Mr. C. C. LEACH (Seghill) said the unfortunate thing about pits was that they did not always make money. They could not have co-operation with the workmen unless they were always making money. Unless they kept the control of the pits in their own hands, he thought the coal trade would go back.

Prof. HENRY LOUIS (Armstrong College, Newcastle) said he thoroughly agreed that the paper was far too discursive, and neglected details. On the question of mine cars Mr. Dean forgot to mention that the great majority of the pits of which he wrote were day drift pits, where there was no trouble in getting the cars in. Those who were familiar with American coal mining knew that the American was in the minority in American pits. The large number of their labourers were Hungarians, Poles, etc., men of all nationalities, swept up from all countries because they could not get a living in their homeland. Mr. Dean was dealing with a very inferior class of men, and thought that the right way to treat all coal miners was as machines. In this country, we had got a set of miners who, whatever their defects, would think for themselves, and have a certain amount of independence of spirit. They could not work Englishmen as they would Germans, Hungarians, or Poles. That essential difference was seen very strongly when Mr. Dean actually compared the way in which employers, whom he blamed in the matter, treated machinery and labour respectively. Mr. Dean quite forgot that the machinery had not got a brain, and could not think or act for itself, whereas the workman could. The proper way was not to treat a man like a machine, but to educate him and let him think and act for himself. Mr. Dean was looking at the matter entirely from the wrong point of view. He was not looking at the class of men in this country, but at a class of man who probably was not much better than a machine, and had to be so treated.

Col. BLACKETT said he did not desire his remarks as to co-operation to be misunderstood. What he meant by co-operation was that, instead of basing the same wage and the same money—not necessarily any increase, although he hoped there might be, upon the selling price—the percentage should be based upon the profit made. That change would accomplish the fact of co-operation. The moment the basis was shifted over from the selling price to the profit, they made the workman a partner with them, and in sympathy with them, and they did not necessarily ruin themselves by making him a partner.

Col. HARRY RHODES (Rotherham) said the paper was not one that lent itself to discussion. In dealing with the question of longwall v. room-and-pillar, if Mr. Dean had any authority for saying that packing did prevent damage to the surface, the speaker should like to know where it could be done and seen.

Mr. G. L. KERR (Glasgow) observed that Mr. Dean said: "The interests of both (capital and labour) are identical, and neither can succeed permanently without the other." He thought that neither side believed that, least of all the miners' unions. He believed that the latter thought they could do quite well without the coal owners. The policy of the miners' leaders had been to set down a standard wage for a standard output for every man, irrespective of his ability. As to the methods of working, Mr. Dean had omitted to state that the loss of life per 1,000 men in American mines was over 3.2, as compared with 1.2 in this country. That indicated that room-and-pillar work was much less dangerous than longwall. Room-and-pillar work was a system of working in which the room-and-pillar method was used. There could be no dispute as to the relative merits of room-and-pillar and longwall. In a seam 2 ft. 6 in., or even 3 ft. 6 in., in circumstances, there was only one method of working. He would be very

much interested to see a large car, holding five or six tons, taken into a 2 ft. seam. A tub that could be handled easily by a boy or a young fellow was the most economical tub for such a seam. He called attention to the significance of the fact that, in 1887, the output of coal in America was 413 tons per man, but, in 1911, it had been raised to 600 tons, whilst our output had declined, in that period, from 312 tons to 252 tons. Machinery might account for that increase to some extent.

Mr. Dean was accorded a vote of thanks for his paper.

The Spontaneous Firing of Coal.

Mr. J. R. R. WILSON (H.M. inspector of mines for the Northern Division) opened the discussion on Dr. J. S. HALDANE's paper on "The Spontaneous Firing of Coal."* Dr. Haldane stated that, if the coal was liable to heating, and particularly if it crushed easily, the method of working should be such as to reduce to a minimum the occurrence of crushing; and he reminded them also that there could be no heating without oxygen. In his paper on "The Absorption of Oxygen by Coal,"† Mr. Winmill gave the rate of oxidation of Barnsley softs at certain collieries, which he had labelled A, B, C, D, and E, in the Doncaster area. The rate of oxidation at D and E was the same, and the analyses of the coals were practically identical. At D, the speaker believed that there had only been one gob-fire in the history of the mine, and that was easily accounted for. At E, there had been many fires. All these mines were worked longwall. At the majority of them the gate roads were 22 yds. up to 30 yds. apart, the gate packs were 7 ft. 6 in. to 9 ft. in width, and there were no intervening gob packs. At others, the gate roads were from 40 yds. to 50 yds. apart, with gate packs 6 ft. to 7 ft. 6 in. in width, and there were intervening gob packs, in some cases 12 ft. wide, so spaced that the waste was only from 4½ yds. to 7 yds. in width. The packs were built up to the top coal. At the first-mentioned group, the roof broke off to the gate packs, filled up the gob well above the height of the gate, and completely buried the fallen top coal which might not have been filled out. The weight was also taken off the face. At the second group, the roof could not get down, the gob spaces were not filled, the coal above the packs was crushed, and the air got through the gate packs and heated the coal. In giving evidence before the Departmental Committee on Spontaneous Combustion of Coal, a manager of a colliery working the Barnsley seam said he thought the gob packs were a good thing, as they prevented the fires from spreading throughout the goaf. At that colliery they generally put in gob packs, but not always. They never had a fire where there were no gob packs, and the fires that did occur were usually in the top coal at the inside of the gate pack or over the first gob pack. At one mine, where the gate roads were 22 yds. apart, for many years all the coal was riddled in the mine, and the small coal was thrown into the gob. In spite of that, and an amount of top coal left, there never was a gob fire, nor, the speaker believed, any heating discovered. The opinion he expressed some years ago, in giving evidence on gob-fires in the mines in the Doncaster area, was that longwall with narrow wastes and numerous gob packs was responsible for much of the trouble experienced. He considered that, next to stowing the goaf tight by artificial means—e.g., the hydraulic method—the best course was to let the goaf stow itself by falling. Hence he thought that wastes only 7 yds. wide, with intermediate gob packs, were inadvisable, on the ground that such a system did not conduce to heavy breaks, and to letting the roof fall sufficiently freely to tighten up the waste and exclude air until a very considerable period had elapsed. He pointed out that, in other parts of the same coal field, the Barnsley seam, with top coal as thick, if not thicker, than at the mines under consideration, was worked with little or no trouble from gob-fires, and he thought that it was significant that, at these collieries, with a 9 ft. gate and 7 ft. 6 in. gate packs, the gates were 22 yds. apart, with no intermediate packs. Under that system, the wide area of unsupported roof tended to fall freely to a good height, and then, if the roads were well ripped and the packs tightly built, the roads were ultimately in the hard stone above the goaf. That method had been criticised on the ground that to dispense with gob packs involved very great difficulty in keeping the face open between the gates, but, by the use of wood chocks, that difficulty had been surmounted. With regard to the danger of the heavy falls in the waste leading to fractures which might let air from the road into the waste over the top of the pack, he could only say that that appeared possible, but that he had not found it a danger in practice. As to why fires in a particular mine were always on two sides of the royalty and never in the other parts of the mine, whereas the system of working was the same throughout, later investigation had shown him that, where the fires occurred, there was a strong roof, and that in other parts of the mine the faces were straighter, there was practical freedom from faults, and, most important, there was some 17 ft. of a softer shale, which, being friable, broke up readily, and, consequently, better filled the goaf spaces. With regard to Mr. W. Humble's remarks on the present immunity from fires at Brodsworth through a better system of packing and stowing off of old roadways and gobs, they seemed to have done something to get over the difficulty of the system he (the speaker) had described as obtaining at the second group of collieries, and to approximate the conditions to those obtaining at the first group, where the gate packs were buried from 50 yds. to 60 yds. from the coal face. He had given some years of thought to that question, particularly in connection with the Barnsley seam, and he was convinced that it was more than a coincidence that, wherever the system obtaining at the second group was adopted, dangerous heating always occurred, whereas, in the other system, heating was practically unknown.

* *Colliery Guardian*, June 22, 1917, p. 1165.

† *Colliery Guardian*, June 16, 1916, p. 1135.

Col. BLACKETT asked whether it was found that these fires occurred more in a rise district than in a dip district. If there were tendencies to heating and gob-fires in a rise district, there would be a tendency for the carbon dioxide formed to flow out of the district and let in more oxygen, whereas, in a dip district, there would be a tendency for the carbonic dioxide to lie permanently in the hollows.

Mr. SIMON TATE asked if anything depended on the depth of the mine. Was it a fact that, in the shallower portions of the Yorkshire coal fields, gob-fires were practically unknown, and that where the mines were deeper, gob-fires were more common?

Mr. ROBT. CLIVE (Doncaster) said that, as coming from one of the pits where that very bad system mentioned by Mr. Wilson happened to be in use, he found that the principal trouble from the fires was generally on the sides of the roads. Latterly, he had never known of a case where there had been any fire that could have been ascribed to the difference in width of the gob, and they had frequently had slight heatings in the roadside, in which it had not been a case of air leaking through from the road itself into a gob, but air from a crack. Generally, such heatings were detected long before they got to any dangerous stage, and were easily dealt with, being dug out and sand filled in. In nearly all these cases, the heating itself was only of very small extent, and perhaps half a tubful of warm ground was all that they would find. The actual heated part might only be a shovelful. Their system might not be as good a system as that of Mr. Wilson, from a working point of view, but that system was best which ensured the least number of falls at the face, because these falls were the main source of the fires which were caused by the methods of working. When there was a large fall at the face, and the coal got very much broken up, with air percolating all round it, there was always a liability that trouble might occur at that place at some later stage. At his pit, they felt that the best way to avoid gob-fires was so to work the face as to get the minimum chance of falls.

Mr. W. H. CHAMBERS (Rotherham), as one who had had the experience of managing pits in which these fires occurred, said that the air that percolated and set up the heating did not go through the packs, but through fissures and over the top of the packs. Gob-fires did not occur where the coal was thin. In one colliery in particular, where there was a great amount of slack thrown back because it was not thick, and there was no great weight of coal on top of it, the coal did not fire, although it ought to have been just the place, according to anything one could conjecture, for a fire to occur. He had never seen a fire burn through from one gob to another through a pack. The fire occurred in the gob that was nearest the gate, and easiest to get through. One could scour through that and into the gob, and into the other pack, and then one had got it sealed off there. They had put scores of fires out in that way. He had known a fire to go on burning merrily for 10 years, and then they had had to dig it out. The smaller the area it was confined in, the easier the operation was. He was sure that they were very much obliged to Mr. Wilson for bringing that matter before them for consideration, but he was afraid that Mr. Wilson's method would not do. He (the speaker) had gone in that direction, and he thought it was a wrong one. They were making their cross gates across the wastes with very thick packs, and they found it a very good thing to do, but the packs should not be so big as to prevent the roof bending down without fracture and closing up the gob and making it solid. If there was any obstruction anywhere, or a short cut for the air to go through, it would go through the fissures he had mentioned, and then there would be trouble.

Col. RHODES said that one of the collieries with which he was connected was, he rather gathered, colliery D referred to in Mr. Wilson's remarks. Whether the fact that they had only had one gob-fire there was due to the adoption of the method mentioned, he did not know. In his opinion, that fire was caused by circumstances that could not have been prevented. Another colliery, which he fancied was also referred to by Mr. Wilson, had been more or less troubled with gob-fires. They had had five heatings, none of which had occurred in a straight coal face, but all under abnormal conditions. On one side of that colliery was another colliery with no gob-fires; on three sides they had collieries with gob-fires, more or less. The one that had never had a fire was in the rise, two others were on the level, and two others on the dip.

Mr. TATE asked at what depth these fires referred to by Mr. Wilson occurred.

Mr. WILSON replied that they were all deep pits.

Mr. CHAMBERS said there was one colliery 450 yds. deep at which there had been frequent fires. There were others 600 yds. deep and over, working practically under the same conditions, and they had no fires at all.

Col. RHODES said he knew one pit in which a fire existed at a depth of 380 yds., and was believed to be the remnants of a fire which started many years ago, but had not been heard of for 10 or 15 years. He had also had experience of a fire in another seam at a depth of about 270 yds.

Mr. C. C. LEACH said that, in a pit with which he was connected, they had a fire 40 fms. deep in a seam that had doubled over itself.

Replying to the discussion, Mr. WILSON said the point he had sought to make was that in those pits that adopted the system he advocated, they never got fires. He had intentionally confined his remarks to the Barnsley seam and to Barnsley pits because they were referred to in that series of papers. He could have given many other instances where the system of working allowed the air to get through. They knew that coal oxidised, and that it might cause a fire when it did oxidise. His point was that they should not allow it to oxidise.

Acetylene Mine Lamps.

Mr. WM. MAURICE's paper on "Acetylene Mine Lamps" was discussed by

Mr. ARCHIBALD RUSSELL (Bacares, Spain), who wrote trusting that the paper would bring before mine owners and managers the many advantages of the acetylene lamp, not only as regarded economy, but safety and convenience. In Spain, that type had almost completely superseded the oil lamp, even in districts where the oil was obtained from olives grown close to the mines, whilst carbide had to be transported a considerable distance by sea or land, or by both. A 16 candle-power acetylene lamp required about 1 oz. of carbide per hour, and thus, at pre-war prices, cost about 1d. per shift of eight hours—including replacement of burners and accessories, the cost of which was very small when lamps were properly handled and looked after. It was very difficult to determine the exact monetary gain per shift to owners and miners, but the workmen declared that the use of the acetylene lamp was worth a 10 per cent. rise in wages—at least as compared with the oil lamp. That was to be expected, as the oil lamp only gave from 1½ to 2 candle-power under the best conditions. Acetylene would burn in an air current of greater velocity than would oil lamps or candles, although more liable to be extinguished by sudden concussions arising from shots fired; and it would also burn more readily in a place in which ventilation was sluggish. The men could return to the working places very quickly after shot-firing, and could also examine the condition of the roof and sides, both more carefully and more rapidly, and have greater confidence in the condition of these. The mucous membranes of the nose and mouth were very little affected by acetylene lamps, whereas the effects of oil lamps and candles were very objectionable. In high workings, the roof could be inspected with greater facility, whilst the work of timbering was more expeditiously carried out. In haulage sidings or junctions, the light afforded was of great convenience, whilst, in actual mining, the good light enabled the miners to distinguish between bands of inferior mineral and impurities and the ore. It was almost certain that a trial of properly constructed acetylene lamps in mines in Great Britain—especially in metalliferous mines—would mean the adoption of these lamps in places where hitherto candles and oil lamps had been used, and a reduction in the number of accidents would be sure to follow.

Mr. JAS. ASHWORTH (Vancouver) wrote remarking that the reasons given by the British authorities for declining to entertain the proposition to introduce acetylene lamps into British coal mines were not very clear. The Ashworth-Clowes hydrogen gas lamp was permitted, and the difference between that lamp and the acetylene was that one carried its gas in a cylinder under pressure and the other made its gas whilst in use; but if the acetylene gas were supplied from a steel cylinder, the acetylene and hydrogen lamps would be practically on the same level. Both gases, if mixed with the air feeding a safety lamp flame, were undoubtedly very dangerous to the safety of a safety lamp. No known safety lamp could safely withstand the ignition of a mixture of hydrogen and air inside it, and probably the same was true of a mixture of acetylene gas and air. Not very long ago, the writer had visited a coal mine where open acetylene lamps were principally used, but there was a possibility that some gas might be found in a broken-up part of the mine. A few oil safety lamps were also taken along, amongst which was a Wolf lamp of the Clanny type, with a single gauze. On reaching the spot where gas was suspected, the safety lamps were lighted. The writer remarked that he did not consider the lamp of the Clanny type a safe one to use for gas testing under the conditions. On returning to the fire bosses' cabin, an experiment was made by extinguishing the flame of an acetylene lamp, allowing the gas to play on top of the gauze of the Clanny type lamp. Ignition eventually took place inside the lamp, and the flame was carried through the gauze instantly, igniting the open acetylene lamp. In the writer's opinion, an acetylene safety lamp was not sufficiently safe to use in a gaseous mine, principally because the means for regulating the supply of gas to the burner was not under absolute control. The acetylene safety lamp was more complicated than the ordinary safety lamp, and was expensive to clean and re-charge. The writer had nothing to say against its use in an open lamp mine, as, under these conditions, it was excellent.

Dr. HENRY LOUIS claimed that he was, possibly, one of the oldest students of the use of acetylene lamps underground. His first experience was in 1903, using an acetylene bicycle lamp. He had, on that occasion, to examine a copper mine. Those of them who had to make such examinations would know that, by the light of a candle or an oil lamp, it was impossible to tell the difference in colour between the iron pyrites and copper pyrites in a face; whereas, by the pure white light of acetylene, the difference was quite plain. Since that time, he had introduced its use very largely indeed in ironstone and metal mines of all descriptions in which such a lamp could be used safely. Some years ago, when in a mine in Norway, he found that nearly all the men were using acetylene lamps. They said that these cost them considerably more than candles, but that the improved light enabled them to produce so much more that it paid them to use the acetylene light. He had had an acetylene safety lamp, and had kept it burning for a good long time in his house, but, from the way it behaved there, he never had the pluck to take it underground. It was a fact that acetylene combined with copper and one or two other metals, but especially with copper, to form an explosive compound. That was a source of danger which ought to be kept in mind. He had never heard of an accident that could be traced to that cause, but it was a perfectly possible cause of accident; and a man using a brass acetylene lamp was running an unwarranted risk. Acetylene lamps should always be made of steel, tin, or some similar metal, and not of copper or brass.

* *Colliery Guardian*, June 15, 1917, p. 1123.

The following papers were open for discussion, but none resulted:—"Modern American Coal Mining Methods, with Some Comparisons," by Mr. Samuel Dean; "Contribution to the Micro-Petrology of Coal," by Mr. Geo. Hickling; "The Higher Training of Colliery Managers," by Mr. G. L. Kerr; "The Economical Production and Utilisation of Power at Collieries," by Mr. F. F. Mairet; and "Some Practical Notes on the Economical Use of Timber in Coal Mines," by Mr. F. C. Lee.

On the motion of the PRESIDENT, seconded by Mr. CLAVE, the North of England Institute was thanked for permitting the use of its rooms for the purposes of the meeting, the President remarking that it was suggested that the institution should ultimately have a building in London, and that he hoped that when they designed the London building they would have the Newcastle building in mind.

On the motion of Mr. JOHN SIMPSON, seconded by Col. BRACKETT, Mr. Thorneycroft was thanked for his conduct in the chair, and the meeting ended.

WATER BARREL FOR SHAFT SINKING.

The suction water barrel illustrated, has been designed to overcome the objectionable feature of the ordinary water barrel in so far as the total unwatering of a mining shaft is concerned. The ordinary arrangement of water barrel, with valve on bottom, cannot unwater a shaft below a depth of water corresponding to the height of the barrel. Fig. 1 shows the position the barrel takes when being lowered or raised in the shaft. Immediately on reaching the bottom, and when the barrel comes to rest, the foot valve on bottom opens automatically, and the further lowering of winding ropes causes the plunger to fall and assume the position shown on fig. 2. During the descent the valves on the plunger open and allow the air, which

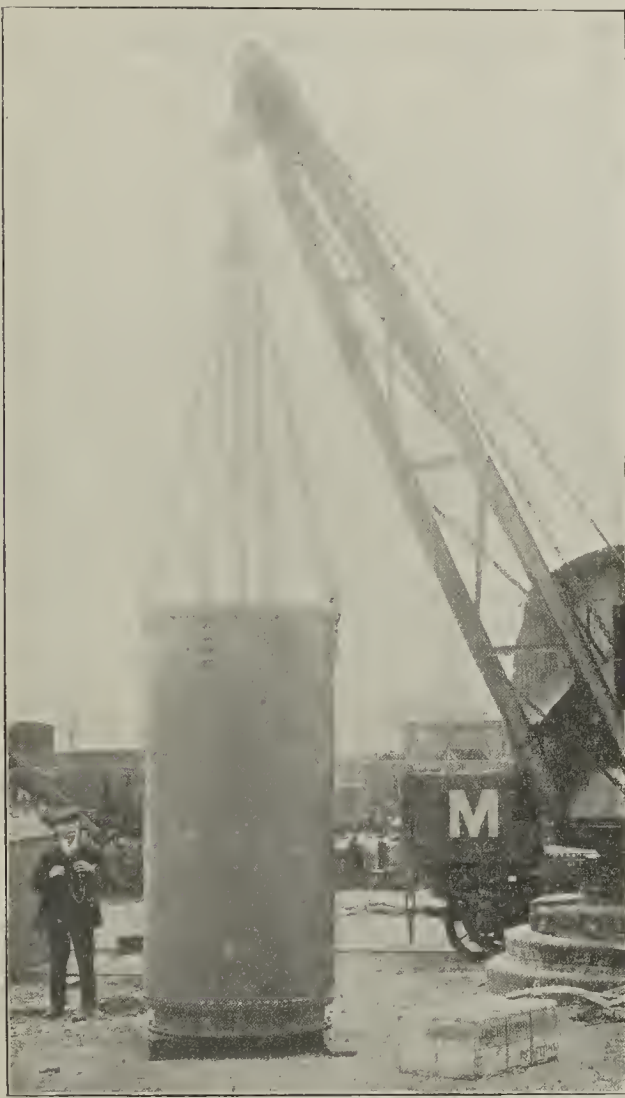


FIG. 1.—BARREL READY FOR LOWERING.

would otherwise tend to be compressed, to pass through. At the beginning of the winding stroke the rope acts first on the plunger and draws it upward, the resulting suction effect drawing water into the barrel through the open bottom valve. When the plunger has reached the top of the barrel the rope-pull begins to lift the latter, the foot valve closing automatically when contact with the shaft bottom ceases. On arrival at the pit mouth the barrel is raised clear, and is then lowered on to a tray which is pushed over the doors at the pit mouth. When the barrel touches the tray the foot valve again opens automatically and discharges the water, which runs away through troughs. These self-filling barrels are made in various sizes from 500 to 1,500 gallons capacity, and enable the shaft to be completely emptied of water in an expeditious manner, leaving the whole of the shaft clear.

Donetz Coal Accumulations.—In the Northern Donetz and in the Ekaterinsk, Serebryakoff, and Byelokalitvinsk coal districts, stocks of coal are now lying to the extent of 12,000,000 poods, and this is expected to bring about the stoppage of 20 mines, and to throw 5,000 workers out of employment.

The Stanton Iron Works Company Limited advise us that, with a view to centralising their business in London, they are removing their office on October 1 from 44, Coal Exchange, E.C.3, to Maxwell House, Arundel-street, Strand, W.C.2. Their new telegraphic address will be "Cobbles, Eastland, London," and the telephone number Central 6808. Mr. Arnold Longden, who has represented the company for some years on the London Coal Exchange, will continue to supervise the company's interests at Maxwell House.

THE COAL DEPOSITS OF REEFTON, NEW ZEALAND.*

By J. HENDERSON.

The coal seams of the Reefton subdivision consist of three sets of beds, tertiary in age—the Mawheranui, Oamaru, and Pareora series respectively. The seams of the oldest beds range in quality from anthracite to bituminous; those of the middle series from bituminous to brown; and those of the youngest through various grades of brown coal. The coals of the middle group are by far the most extensively developed, and up to the present they are the only ones that have been worked, although prospecting operations have been undertaken in connection with the seams of both the other horizons.

Origin of the Seams.

With regard to the origin of the seams, the author considers the "growth-in-place" theory more consistent with the facts observed in the Reefton subdivision than the drift theory. The coal seams themselves must be regarded as layers forming a part, though a very small part, of the whole rock sequence, and any hypothesis of origin must take this into account. The deformative movements that preceded the laying down of the coal measures (undoubtedly of littoral deposition) belonging to the Mawheranui and Oamaru series were of a nature to cause the land to supply the rivers and waves with vast quantities of spoil. At the same time, the land surface drowned by the sea invasion was of a senile topography, and the recesses and embayments formed were wide and shallow; in fact, the conditions were peculiarly favourable to the formation of tidal flats and lagoons. The youngest group of coal measures are of deltaic deposition, an origin implying the existence of extensive shallow lakes and lagoons during that period. The coal horizon in each case is situated quite close to the basal rock of the locality, and where several seams occur they are separated by no great thickness of sediment. The seams themselves are usually contained between current-bedded sandstones and grits, from which they are

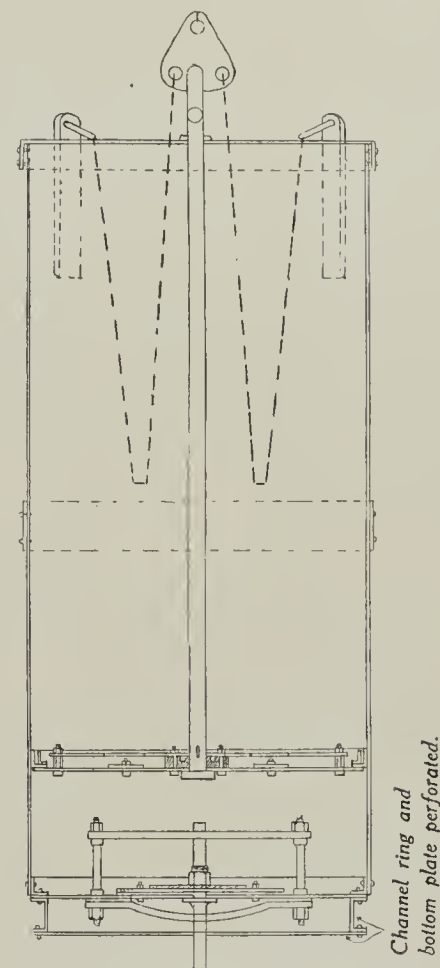


FIG. 2.—SECTION THROUGH BARREL WHEN LOWERED.

usually separated by thin layers of carbonaceous shale or shaly sandstone. Occasionally fireclay is present, and seams of this occur indifferently on the roof or floor. The enclosing strata may carry many discontinuous layers of carbonaceous matter, and the roof of the seam often shows numerous minor irregularities evidently not due to movements of the coal measure rocks. The coal seams are decidedly lenticular, and toward the edges of the deposits the coal gradually decreases in thickness, its place being taken by carbonaceous shale or mudstone. The gradation is usually effected by the appearance of a number of dirt layers that steadily thicken and finally entirely displace the coal, which generally, in addition, contains an increasing amount of ash. At other times the sandstone of the floor and roof approach until only a thin layer of carbonaceous material remains. Dirt bands consisting of a few inches of carbonaceous shale are by no means rare, and these are also lenticular.

The existence of shallow lakes and lagoons formed by wave action in indentations protected from the full force of the sea, or in estuaries where the currents were not strong enough to disperse the abundant river spoil, is postulated for each coal forming period. These sheets of water would in time be occupied by swamps, the vegetation of which would tend to creep landward up the gently sloping flats until the surface of the swamp was above the drainage level. On rare occasions, by the combination of unusual conditions, the sea would burst the barrier it had raised, a river would break into the morass, when a wide area of sediment forming a dirt band would be deposited of a thickness depending upon the length of time elapsing before restoration of normal conditions. At the edges of the morass a constant oscillation of cord-

* From New Zealand Geological Survey *Bulletin* 18 (new series).

the detrital matter deposited on the land, whether vegetable or inorganic, but where the land was steeper this feature would not be so marked. A slight depression of the land might be covered by the transgression over the low-lying portion and cover it with sand, while the higher portions remain clear, and when the waves had built a barrier the vegetation would spread from the unburied part of the morass and occupy the newly-formed lagoon. Thus could arise the splitting of seams, although this feature may have other origins. This method is indicated if no great thickness of rock separates the seams, and if the junction is in the direction of the old land, and is effected by the gentle rising of the lower seam towards the upper.

The complete burial of the coal forming swamp would follow a land depression of slightly greater amount. The sea would transgress and kill the fresh water vegetation. Its seaward margin would at first entangle much of the coarser material, and thus the earliest layers of inorganic *débris* would consist for the most part of fine mud only, which, intermingled with the plant remains of the surface of the old morass, now forms the carbonaceous shale frequently found on the roof of coal seams. No doubt at times the waves would strip off the upper layers of the swamp and expose the half-decomposed vegetable pulp underneath; but it must be borne in mind that the swamp lagoon could have been formed only in a sheltered recess of the coast, where the waves would tend to prograde the shore, so that although part of the embryo coal seam might be denuded, the greater portion would soon be protected by a cover of beach deposit. If the land depression was not great, the coast line would not be essentially altered, and in course of time conditions favourable to the accumulation of vegetable matter would recur. Whether the new lagoon was inland or seaward of the old would depend upon several factors—the amount of depression, the amount of waste, the contour of the new shore, etc. As depression continued (in spite of pauses permitting progradation of sheltered portions of the coast), the first-formed beach deposits would be covered by purely marine beds, while the marginal swamps would move inland, and give rise to other seams belonging to younger overlapping layers, and in each case near the basement rock of the locality. It should be noted, however, that as the land sank, its elevation and area would constantly decrease, with a corresponding diminution of the supply of *débris* for beach building. This accords well with the vertical distribution of the seams in the three tertiary series, since they are far more frequent in the lower than in the middle, and are entirely absent in the upper layers of each group, even where these rest upon the gently sloping surface of the ancient land.

One of the axioms of geology is that the past should be interpreted in conformity with the natural forces in operation at the present time. In the writer's opinion, the theory just outlined does this, the essentials being: (1) An intermittently sinking land, which also implies the existence of sheltered embayments; (2) a plentiful supply of waste; (3) a swamp deposit. The first two conditions were undoubtedly fulfilled during the tertiary, while examples of the third, known to the writer, are furnished by many of the morasses of the Piako Plain. In depth these consist of half-decomposed vegetable pulp, and contain considerable quantities of resinous particles and lumps, as well as the trunks of trees of which the groves were overwhelmed long since, when the land was depressed. These, if buried by sand and mud, could well form coal seams. Strictly analogous with them are the lignites of Tauranga Harbour, which contain tree stumps and fallen boles set in a structureless mass. These seams were formed during the post-tertiary depression, and that they accumulated by growth in the place they now occupy cannot be doubted.

Distribution of the Coal Deposits.

If the earth structure of the subdivision has been correctly interpreted, and if the principles controlling the formation of coal seams are essentially as set forth in the section above, it becomes possible to indicate, with an exactness depending on the number of data available, the position and extent of the coal bearing areas. Thus it is known that the movement that preceded the Mawheranui period was accompanied by radial faulting and the differential elevation of adjacent earth blocks. Since similar movements, some of which were undoubtedly along the same fractures, determined the present land form, it is reasonable to assume that the land features now existing were already taking shape. Apparently the sea during Mawheranui times covered the southern end of the Paparoa block to at least as far as the Freeth River, and it may be supposed that an arm extended still farther northward along the graben and across to its eastern border. Doubtless also the depression extended far into the land, and was drained by a considerable stream that brought down an abundant supply of waste, and the conditions must have been peculiarly favourable for the formation of coal seams. It seems probable, then, that a fringe of coal lenses extends along the margin of the ancient gulf, and that workable seams, though at a very great depth, exist as far north as Hukarere. On the western side of the Paparoa Range the problem of the distribution of the coal measures of this age is not so simple. There is some evidence in the breccia and breccia conglomerate beds of Bullock Creek and Brighton that a rift valley, of which the western wall has long since foundered, and of which the floor only remains, was formed, and in the anthracites of the Fox River that coal accumulated in it during that period. On the other hand, it is known that the erosion took place before the deposition of the Oamaru beds, and there is no evidence of this erosion went. There is also the possibility that a great part of the coal measures of this age are between the basement rock and the tertiary strata. This and the question of the horizon can only be deter-

mined by boring. It should be noted that from the Punakaiki northward the bore would have to penetrate, before reaching the older tertiary rocks, only a shallow thickness of the lower beds of Oamaru series, which themselves also contain a coal horizon.

The Oamaru rocks probably underlie the whole of the Inangahua trough to a depth steadily increasing from the north southward. That conditions favourable for the formation of coal seams prevailed over wide marginal belts during the early Oamaru period is certain; but that these belts, due to successive depressions at irregular intervals, form a continuous sheet beneath the younger purely marine beds of the same series is very doubtful, and where other information is not at hand the distribution and commercial value of the hidden coal lenses can only be determined by systematic boring.

No workings have hitherto been undertaken in the coal seams of the Pareora age, but from the study of the outcrops they appear to be decidedly more irregular both in thickness and composition than the seams of earlier age. On this account the writer considers that exploration by boring is even more essential in connection with these seams than for the coals of the Oamaru and Mawheranui measures.

Composition of the Coal.

The transformation of vegetable matter into coal of various grades is recognised to have been effected by a slow distillation. It is obvious that this process, as applied in respect to the layers of vegetable material contained in rocks of various character, is very different from the distillation of the same material in the laboratory, and it is manifestly impossible there to reproduce conditions identical with those obtaining in nature. Nevertheless, the main factors on which the composition of the final product of a distillation depend are as potent in the one process as in the other. These are: (1) The nature of the original substance; (2) the time occupied in the distillation; (3) the intensity of the heat; (4) the physical pressure to which the material is subjected; and (5) the facilities of escape afforded the gaseous products of the process.

Nature of the Original Substance.

Some authorities consider that although the change from peat to brown coal is established, no process or combination of conditions and processes could convert a brown coal into a bituminous coal or an anthracite; in fact, they maintain that the "mother substances" of these coals were originally essentially different. This hypothesis seems to be also based, in part at least, on the erroneous supposition that bituminous and anthracite coals are confined to rocks of a palaeozoic age. In Reefton subdivision, however, coals of the Oamaru series range from brown to bituminous coal, while if the whole of the tertiary coals be considered, the range is from brown coal to anthracite. With such wide differences in the composition of coals not differing greatly in age, and laid down under similar conditions, it seems indeed extremely hazardous and entirely unnecessary to postulate material differences in the original "mother substance," especially as such an assumption is unsupported by positive evidence. On the other hand, although the chemical composition is similar, there is a decided difference in the physical structure of the coals of the Pareora series when these are compared with the lignitic material occurring in the same set of beds. In the case of the lignitic material, the woody structure and bark of the tree stems, which have been much flattened out, is plainly discernible, while the coal is apparently homogeneous. It is suggested that the coal has been formed from partially decomposed vegetable *débris* accumulated under water, while the lignitic bands represent forest growth overwhelmed by sedimentation. The "doughboys" of Seddonville may represent portions of tree trunks contained in swamps, but still sound, or at least not completely decomposed, when the fermentative action of the bacteria was checked by burial beneath inorganic *débris*. Later the distillation processes destroyed all trace of woody tissue and left material differing considerably in physical, but not in chemical, properties from the surrounding coal.

Age of the Coal Seams in Relation to their Composition.

The time during which the vegetable matter has been subjected to the slow distillation has had a decided influence on—in fact, by many is considered the main factor in determining—the nature and composition of the resultant product. In New Zealand, however, it was long ago recognised that the mere lapse of time would not reasonably explain the variations in the grades of coal. On the west coast, where the seams lie flat or gently inclined, the effect of age on the composition of the coal is shown by the following table representing the range of the average coals of each series:—

	Mawheranui series.	Oamaru series.	Pareora series.
Fixed carbon	66-45	50-32	40-42
Hydrocarbons	33-45	42-50	45-38
Water	1-10	8-18	15-20

As the coals of each group do not differ greatly in age among themselves, it is evident that the composition does not depend entirely on time, but may be due to heat of distillation, the effect of which is best seen where coal seams have been altered by the intrusion of igneous rocks. An example of such metamorphism is unknown on the west coast, but may be studied in connection with the coal seams of the Malvern Hills, Canterbury. There are also numerous examples of coal alteration brought about chiefly by the pressure accompanying fault movements. Thus the fault involved coal seams of the Fox River belonging to the Mawheranui series have the composition of high-grade anthracite, while the flat-lying seams of the same age contain bituminous coal only. Another example, and one exhibited by the coals of the Oamaru series, will suffice. At Murray Creek the coal, where not crushed by faults, contains 50 per cent. of fixed carbon and 5 per cent. of water, figures altered to 52 per cent. and 2.7 per cent. respectively only a few chains away, where it is strongly crushed but not

pulped. In this locality pitch has been found, presumably produced by the heating of the coal by earth movements.

Description of the Coal Seams.

For convenience of description, the coal seams of the subdivision may be divided into a number of groups. The separation adopted depends primarily on time, and secondly on distribution. Mawheranui series—eocene(?): Greymouth group, Porarari group, Fox River group. Oamaru series—lower miocene: Buller Gorge group, Three Channel Flat group, Fletcher Creek group, Reefton group, Plateau group, Waiwhero group, Garden Gully group, Brighton group, Pareora series—upper miocene: Giles Creek group, Camp Creek group. A detailed description of these groups, with analyses and particulars of the various seams, is given in the report.

Inter alia, it is stated that, on the Fox River 26 ft. of crushed coal and two outcrops of hard anthracite, 7 ft. and 11 ft. thick respectively, have been discovered. In the Buller Gorge group, outcrops 4 ft. to 8 ft. thick occur on Slub and Pensini creeks, and of 4 ft. on Blue Duck Creek and Muddy Creek; whilst 15 ft. of clean, fairly hard coal is worked at the Coal Creek Mine. In the Three Channel Flat group, a steep 2 ft. seam has been worked at the Flaxbush Creek Mine, and a 2 ft. to 3 ft. seam on Thompson Creek, where there are numerous outcrops of crushed coal 3 ft. to 5 ft. thick. On Little Flatbush Creek there is a 10 ft. seam of clean coal; and on Big Flatbush Creek one of 8 ft. to 10 ft. in thickness. The Fletcher Creek group comprises a 20 ft. seam on Shag Creek, a 4 ft. seam on York Creek, and three large outcrops (12 ft. to 20 ft.) on Fletcher Creek, a 12 ft. to 16 ft. seam occurring on Coll Creek. In the Reefton group, outcrops occur over a distance of eight miles from Italian Gully to Devil Creek. The coal is semi-bituminous, and forms a good steam and house coal. On Coal Creek a 21 ft. seam, of rather crushed coal, is reported; and at the Archer mine on this creek two seams of excellent coal, each 10 ft. to 16 ft. thick, are worked. On the right bank of the Waitahu River are three outcrops, 12 ft. to 16 ft., 5 ft., and 2 ft. respectively, and the two larger seams are being worked. On Madman Creek a 20 ft. seam of first-class coal has been partly developed. In Stony Creek there are two seams, 16 ft. and 5 ft. thick, and an outcrop of a very large, though faulted, seam. Two seams, one about 12 ft. and the other 20 ft., have been worked on Stony Batter Creek, and there are abandoned workings near the town of Soldiers. In the Plateau group there are two seams, 9 ft. to 26 ft. and 4 ft. to 22 ft. respectively, on Murray and Lankey creeks; one, 5 ft. to 8 ft. thick, on Rainy Creek; one, 10 ft. to 16 ft., on Deep Creek; one (crushed coal) varying in thickness from 1 ft. to 12 ft., in the Merrijigs area (Prospect Creek); and several outcrops on Garvey creeks and adjacent streams. Several of the seams in this group have been worked to supply fuel for gold mines in the vicinity. In the Waiwhero group, a 20 ft. outcrop of clean hard, brown coal has been reported on Waiwhero Creek; and in the Garden Gully group, a large outcrop on Fitzgerald Creek has been worked. In the Brighton group, a 5 ft. to 8 ft. seam crops out at Welshman Terrace, near Brighton, and extends for some distance on both sides of the Fox River; and seams up to 8 ft. thick occur in the foothills north of Bullock Creek. The Giles Creek group comprises two large outcrops: one—two seams, 8 ft. and 30 ft. respectively—about 2½ miles above the junction of Giles Creek with the Inangahua River, and another about 1½ miles further up stream. In the Camp Creek group are numerous outcrops varying up to 20 ft. thick, including three sets of 4 ft. to 9 ft. seams on Dee Stream.

Ultimate Analyses.

The following ultimate analyses of coals from the Oamaru series have been made in the Dominion Laboratory:—

	Felix Creek.	Caples- ton.	Caples- ton.	Madman Creek.	Stony Batter Creek.
Carbon	60.89	67.16	67.16	66.91	66.44
Hydrogen	6.19	6.74	6.56	6.45	6.44
Nitrogen	0.84	0.59	0.56	0.60	0.70
Oxygen	25.98	21.34	20.19	21.78	23.84
Sulphur	2.65	2.70	3.81	1.76	1.59
Ash	3.45	1.47	1.72	2.50	0.99
Calorific value ..	5,993	6,889	6,904	6,730	6,596

The total production of coal mines in the Reefton subdivision up to 1914 amounted to 256,675 tons, of which 13,899 tons were from Buller Gorge, 8,095 tons from Three Channel Flat, 26,992 tons from Boatman Creek, 31,993 tons from Burke Creek, 6,240 tons from Reefton, 5,139 tons from Devil Creek, 48,847 tons from Merrijigs, 9,306 tons from Inkerman, 104,262 tons from Murray Creek, and 1,902 tons from Deep Creek.

Coal Crisis in Germany.—The Dutch Consul at Essen reports a coal crisis in Germany. Stocks are low, and the output, owing to shortage of labour and slackness on the part of miners, is totally inadequate to the demands. For instance, from a good Ruhr mine, the output of one miner is now no more than 900 kilogs. (18 cwt.) a day, whereas in July of last year it equalled 1,010 kilogs. The average daily output of the mines has fallen from 1,260 tons to 784 tons. Further, the present mining equipment is worn out, and, as new machinery is lacking everywhere, operations are carried out under difficulties.

Coal Production in the Donetz Basin.—The production of coal in the Donetz coal basin in the first half of this year amounted to 823,000,000 poods, or a reduction of 22,000,000 compared with the corresponding period of 1916. The considerable decline in the output of the months of May and June was due to the reduced productivity of the workpeople; and competent authorities do not expect any improvement in this respect with such hands. The metallurgical works must reduce production or even stop while this diminution of output of fuel continues. The June production of cast iron was 1,160,000 poods, or 21 per cent. less than in June last year. The cause is the shortage of coal.

CURRENT SCIENCE AND TECHNOLOGY.

Testing Refractory Brick.

A number of recommendations for practice in testing refractory brick were presented at the Atlantic City meeting of the American Society for Testing Materials. To apply the slag test, it was advised that uniform pockets should be drilled ½ in. deep, as close together as the nature of the brick material permits, using a drill ⅞ in. in diameter, with the point tapered to include an angle of 150 degs., and the width of the bit such as to cut a hole 2½ in. in diameter. The bricks are then heated to testing temperature (1,350 degs. Cent.), and a known quantity of slag is placed in the drill cavities. When cold, the bricks are sawn through, so that one of the sawed faces accurately bisects the centre of the original cavity, and the area of slag penetration thus exposed is then measured by means of a planimeter. The degree of fineness of the slag does not affect the penetration, and the amount of penetration is not increased by keeping the brick in contact with the slag for a longer period than two hours. Moreover, increasing the amount of slag does not affect the slag penetration, when reduced to a unit of area exposed to slag action. For routine work, it is recommended that 35 grms. of powdered slag (through 40-mesh) should be introduced into the drilled cavity after the brick has been heated to 1,350 degs. Cent., held at that temperature for two hours, and cooled in the furnace. Check experiments made showed that greater uniformity of results is obtained with the drilled pockets than by immersion. Drilled pockets are also preferable to the use of large trays to contain the slag, because of economy of space in the furnace. The drilled pocket method has several points which recommend it as a standard method. It is very flexible, as cavities, slags, temperature, and the amount of slag can be easily changed to correspond to the service conditions under which the bricks are to be used. It is rapid, easily performed, and results are expressed by a definite numerical quantity.

When clay bricks for blast furnace or similar uses are to be tested, blast furnace and heating furnace slags are used. Silica bricks for open-hearth use are tested with open-hearth and heating furnace slags. The slags used in the development of this test were selected as representing the iron and steel industry, and were of the following chemical composition:—

	Blast furnace slag.	Heating furnace slag.	Open-hearth slag.
	Per cent.	Per cent.	Per cent.
Silica (SiO ₂)	38.0	35.0	18.4
Iron (Fe)	1.5	44.0	14.5
Manganese (Mn)	1.0	0.5	5.1
Alumina (Al ₂ O ₃)	14.5	6.0	3.8
Lime (CaO)	42.0	1.5	44.1
Magnesia (MgO)	2.0	0.5	6.3
Sulphur (S)	1.0	—	0.4

Action of Aluminium Chloride on Solvent Naphtha.

In a paper read before the Industrial Section of the American Chemical Society, Messrs. R. J. Moore and G. Egloff state that the formation of benzene and toluene from solvent naphtha may be accomplished by the action of anhydrous aluminium chloride, or by generating the aluminium chloride within the body of the liquid by passing hydrogen chloride gas over aluminium powder or filings in the presence of mercuric chloride. The formation of aluminium chloride within the body of the oil by passing hydrogen chloride over aluminium is enormously increased by the addition of a small amount of mercuric chloride, which seems to be catalytic in its action. Both methods were tried. In the anhydrous aluminium chloride experiment, a charge of 5 per cent. by weight of aluminium chloride was added to 1 litre of solvent naphtha. The distillation of the solvent naphtha was conducted in a round bottom flask of 2 litres capacity, with a Hempel column to which was attached a 24 in. Liebig condenser. During the distillation, copious volumes of hydrogen chloride came over with some of the volatile aluminium chloride. The distillate was neutralised with a 10 per cent. sodium hydroxide solution, washed and dried over fused calcium chloride. The residue in the flask solidified on cooling to a heavy black tar, with a layer of lemon-coloured light oil upon the surface. This residue was shaken with sodium hydroxide, and filtered free of aluminium chloride compounds of some of the hydrocarbons present and free carbon, the oil layer being separated, washed, and dried.

In forming aluminium chloride within the body of the oil by the action of dry hydrogen chloride gas upon aluminium powder or shavings in the presence of a trace of mercuric chloride, a charge of 1 litre of solvent naphtha was used in the same flask as in the above experiment, with a slight modification later described. One per cent. by weight of powdered aluminium was added to the liquid, and 0.1 per cent. of mercuric chloride. A glass tube was passed through a hole in the cork extending to the bottom of the flask and attached to the hydrogen chloride generator. The hydrogen chloride was generated in a Freas apparatus by dropping concentrated sulphuric acid of 1.84 specific gravity upon ammonium chloride. The gas was washed and regulated by a Dreschel wash bottle containing concentrated sulphuric acid. The formation of aluminium chloride colours the whole mass of solvent naphtha to a deep red, increasing to a blackish looking mass. The distillation was carried on for 24 hours, and yielded a distillate of 82.3 per cent. of the initial charge. The distillate and residue were neutralised, washed, and dried. The percentage yields of benzene and toluene by the two methods of using aluminium chloride are not markedly different so as to state definitely any advantage of one over the other as to yields. The percentage yield of toluene is approximately 25 per cent. less when using solvent naphtha in comparison to pure xylenes. A comparison of the data of aluminium chloride treatment of solvent naphtha with thermal and pressure decomposition indicates that the cracking of solvent naphtha

under temperature and pressure yields greater percentages of benzene and toluene, as shown in the table:—

	Anhydrous AlCl ₃ .	Generated AlCl ₃ .
Recovered oil	0.870	0.872
Per cent. of recovered oil	78.1	82.3
Per cent. benzene in recovered oil	1.9	1.5
Per cent. toluene in recovered oil	17.9	17.6
Per cent. of benzene basis of original oil	1.5	1.9
Per cent. of toluene basis of original oil	13.9	14.5

MINERAL STATISTICS FOR 1916.*

Part I. of the Annual General Report on Mines and Quarries for the year ending December 31, 1916, as hitherto, sets forth the divisional statistics for the year, and also includes this year the reports of the divisional inspectors, which, owing to the war, have been much reduced. It will be followed by other parts dealing with labour and output. General remarks on other matters connected with the Department will appear in Part II. During the present emergency, the report and statistics are limited to the consideration of the more important questions arising during the year, and the presentation of the more important figures. The form in which the statistics appear in this part of the work is governed by administrative arrangements.

Persons Employed.

The returns show that from January to July 1914 the number of persons ordinarily employed at the 2,988 mines under the Coal Mines Act was 1,133,746, or an increase of 5,856 on the figures (1,127,890) for the year 1913; but that on the last pay-day in December 1914 the number of persons employed had fallen to 981,264. The total number of persons employed under and above ground for the year 1916 was 998,063, as compared with 953,642 for the year 1915, showing an increase of 44,421.

The number of mines at work during 1916 was 2,847, being a decrease of 24 on the figures for the previous year.

The number of persons employed at the 468 mines under the Metalliferous Mines Act in 1916 was 19,455, or a decrease of 386 persons as compared with the year 1915.

Of the 998,063 persons working at the mines under the Coal Mines Act, 792,911 were employed below ground. Of the 205,152 surface workers, 9,722 were females. There is an increase of 2,201 females as compared with 1915.

The number of young persons under 16 employed below ground in these mines was 59,649. The total number of surface and underground workers under 16 was 87,110.

At the mines under the Metalliferous Mines Act, 11,858 persons worked below ground, and of the 7,597 surface workers, 225 were females.

At the quarries under the Quarries Act there were 48,196 persons employed, of whom 30,767 worked inside the actual pits or excavations, and 17,429 outside. Compared with 1915, there is a decrease of 13,931 in the total number of persons employed at quarries.

The persons employed occasionally at quarries are not included in the above figures.

Output of Minerals.

The total output of minerals at mines under the Coal Mines Act was 267,062,950 tons, of which 256,348,351 tons were coal, 1,712,281 tons fireclay, 5,648,602 tons ironstone, and 2,994,386 tons oil shale.

Adding 21,712 tons from open quarries, the total output of coal was 256,370,063 tons, which is an increase of 3,166,154 tons on that of the previous year. This excess is increased by 5,303 tons, representing the output of coal from certain workings not included under the Mines or Quarries Act, making the total output of coal from all sources 256,375,366 tons.

The differences in the coal production in the several inspection divisions as compared with the previous year (excluding the small quantities obtained from quarries) are as follow:—

	Tons.
Scotland	+ 497,775
Northern	+ 239,839
York and North Midland	+ 501,375
Lancashire and North Wales	— 16,038
Ireland	+ 5,276
South Wales	+ 1,628,109
Midland	+ 312,569

The total output of minerals at the mines under the Metalliferous Mines Act was 2,658,795 tons, of which 1,752,614 tons were iron ore.

The total quantities of stone and other minerals obtained from the quarries under the Quarries Act was 32,054,093 tons, of which 5,599,861 tons were iron ore. Adding to the produce of mines and of quarries over 20 ft. deep 493,581 tons, obtained from shallow open workings, we arrive at a total output of iron ore of 13,494,658 tons.

Fatal Accidents.

Accidents at the mines under the Coal Mines Act caused 1,313 deaths. Compared with 1915, this is an increase of 16.

At the mines under the Metalliferous Mines Act there were 23 deaths from accidents. Compared with 1915, this is an increase of 2.

At the quarries under the Quarries Act the accidents resulted in 58 deaths. Compared with 1915, this is a decrease of 16.

Death Rates from Accidents.

The death rate of the underground workers at the mines under the Coal Mines Act was 1.47 per 1,000

* From Part I. (Divisional Statistics) Mines and Quarries: General Report. By the Chief Inspector of Mines.

persons employed, as against 1.55 in 1915. The death rate of the surface workers was 0.73 per 1,000 employed, as against 0.65 in the previous year. The death rate of the underground and surface workers as a whole was 1.32, as against 1.36.

At the mines under the Metalliferous Mines Act the death rate of the underground workers was 1.60 per 1,000 persons employed, and of the surface workers 0.53 per 1,000. The corresponding figures for 1915 were 1.43 and 0.50 respectively. The death rate of the underground and surface workers as a whole was 1.18, whilst that of 1915 was 1.06.

At the quarries under the Quarries Act, the death rate from accidents of the workers inside the actual pits or excavations was 1.56 per 1,000, and of the persons employed at factories and workshops outside the quarries, but connected with them, 0.57 per 1,000. The corresponding figures for 1915 were 1.55 and 0.54 respectively. The death rate of the inside and outside workers as a whole was 1.20 in 1916, as against 1.19 in the previous year.

All the death rates for 1915 were calculated on the number of persons ordinarily employed at mines under the Coal Mines Act during the period from January to July of that year.

STEEL WORKERS' WAGES AND OUTPUT.

Remarkable figures were given at the meeting of the Iron and Steel Institute in London on Thursday, regarding production and wages in the steel trade in this country, compared with other countries. Labour conditions here, as against those prevailing elsewhere, were stated to be detrimental to output, and stress was laid on the following points:—(1) In this country there is a shorter working week. This is doubly hurtful to the output, in that the furnaces are cooled down more at the week-end, and consequently take longer to recover their full heat. (2) The objection of the men as a body to promotion by merit. (3) The lack of close attention and obedience which should be given by such highly-paid men. (4) This might be improved if careless workmen understood that they would immediately lose their jobs; but this was rendered almost impossible by the men as a body, except in cases of very gross carelessness. (5) It is well known that the men can turn out more steel when they put forward their best efforts. (6) There is no doubt that the high wages should command the best men, and that these men should do their utmost to secure the maximum output, but we fear that owing to the attitude of the men in protecting carelessness, these extremely high wages have an effect in the opposite direction, and reduce output, as the careless man can make as much as he wants without effort.

The following is a comparison of smelters' earnings per shift in several countries before the war:—

	English.	American.	German.
First hand	36s. 11d.	17s. 4d.	9s. 6d.
Second hand	24s. 9d.	11s. 3d.	7s. 0d.
Third hand	18s. 5d.	9s. 9d.	5s. 6d.
	80s. 1d.	38s. 4d.	22s. 0d.

Weight of steel made per shift is approximately in ratio of 1.0 ... 1.5 ... 2.0

OBITUARY.

Capt. George K. T. Fisher, of the Norfolk Regiment, whose death has occurred from wounds received in action, was a director of the Wearmouth Coal Company Limited, Sunderland.

Mr. William Jackson, proprietor of the Wallnook Colliery, Wårdle, near Rochdale, met with a tragic death on Thursday afternoon of last week. He was found lying in the cartway near the colliery suffering from serious injuries, having apparently been run over by a coal cart. The deceased gentleman was 72 years of age.

Second-Lieut. William E. Avery, M.I.M.E., Northumberland Fusiliers, whose death in action on July 1, 1916, is now reported, served his apprenticeship under Mr. Philip Kirkup, of the Birtley Iron Company Limited, county Durham, and, passing the examination for first-class (manager's) certificate and for surveyor's certificate under the Coal Mines Act, 1911, he was, at the outbreak of war, under-manager of the Bewicke Main Colliery of the Birtley Iron Company.

We regret to record the death, on the 16th inst., of Mr. Thomas Mitchell, senr., of Lostock Park, near Bolton. The late Mr. Mitchell was in his 76th year, and, prior to a few years ago, was senior partner in the firm of Messrs. Thomas Mitchell and Sons Limited. The deceased gentleman had a very wide business connection, and had seen the business of Thomas Mitchell and Sons Limited grow to its present position in the machinery trade. The business will be continued by his sons.

Capt. Frederick (Eric) Mottram, of the South Midland Brigade of the Royal Field Artillery (T.F.), who died of wounds in France on September 9, at the age of 23, was the third son of Mr. Thomas H. Mottram, H.M. divisional inspector of mines, Doncaster. Before taking his commission in 1914, Capt. Mottram was assistant to the manager of the Yorkshire Main Colliery, Doncaster, and was regarded as one of the most promising of the younger mining engineers in Yorkshire.

An association has been formed at Sion, Switzerland, to acquire and work all the Swiss anthracite mines. The capital is 500,000 fr. in 500 bearer shares of 1,000 fr. each.

A strike of steel workers at Briton Ferry, near Swansea, which arose over the dismissal of a foreman electrician, over 1,000 men being affected, has been settled, the men, after a conference with representatives of the Ministry of Munitions, deciding to resume, the matters to be referred to arbitration.

At the annual meeting of Messrs. Henry Birtley and Company Limited, colliery proprietors, held on Thursday, the chairman, Mr. W. G. Jackson, announced that an agreement had been recently come to between the Yorkshire owners and miners who had gone into the pit since the outbreak of the war, under which all Class A men were to be released for the Army.

CONTENTS.

ITEMS :—	PAGE
Men and the Miners' Federation	547
Fuel Research Board	547
Drill for Shaft Sinking	543
The Coal Deposits of Reefton, New Zealand	543
Mineral Statistics for 1916	545
Steel Workers' Wages and Output	545
Obituary	545
Mining Employment Statistics	552
South Wales Mining Timber Trade	552
The American Coal Trade	552
Book Notices	552
High-Tension Current in Mines	553
Labour and Wages	554
Open Contracts	558
The Freight Market	558
Abstracts of Patent Specifications Recently Accepted	558
New Patents Connected with the Coal and Iron Trades	560
Government Publications	560
Publications Received	560
Catalogues and Price Lists Received	560
REPORTS OF MEETINGS :—	
Institution of Mining Engineers	539
THE COAL AND IRON TRADES	548-551
The London Coal Trade	551
The By-Products Trade	551
The Tin-plate Trade	551
CURRENT SCIENCE AND TECHNOLOGY	545
NOTES FROM THE COAL FIELDS	555
COAL, IRON AND ENGINEERING COMPANIES	556
MISCELLANEA :—	
Donetz Coal Accumulations	543
Coal Crisis in Germany—Coal Production in the Donetz Basin	544
Prospecting in the Litry (Calvados) Coal Area	551
Imports of Pit Props—Imports and Exports of Coal Products—Japanese Coal Exports	552
French Coal Production	556
Exports and Imports of Mining Machinery—Miners' Wages in Germany	560

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LONDON, FRIDAY, SEPTEMBER 21, 1917.

The London coal trade continues with very little change except that the tonnage coming forward shows an increasing quantity. The depot trade is very brisk, and both railway and seaborne supplies are arriving more satisfactorily. Back orders are being dealt with, and strenuous efforts made to build up stocks for the winter. Hard steam coals are very difficult to obtain. Brights, kitchen coal and bakers' nuts are moving freely. Gas coke is fairly plentiful. Slacks are improving. Merchants are still working upon the Board of Trade instructions to deliver only one ton to each householder during September.

Northumberland and Durham report very little change on last week's conditions; inland demands have been well maintained, and rather more chartering has been done for more distant destinations.

Yorkshire and Lancashire centres still experience a heavy inland demand for all classes of coal, and there is practically no surplus fuel offering.

The drain upon Yorkshire and North Midland output for London and the south, coupled with official requirements, continues to have an adverse effect upon shipments from Humber ports.

Nothing of a fresh nature is reported regarding the Scotch coal trade; industrial demands are steadily maintained, and household orders are increasing. Considerable idle time is being experienced in Fife-shire. Irish conditions are without change.

The South Wales trade continues to be devoid of much animation, enquiry being restricted in all sections; except in reserved qualities coals are very plentiful; pit stoppages are reported, and the tendency is likely to continue. Coke is a strong market on enquiries from France.

The freight market is still embarrassed by the continued shortage of collier tonnage, although there has lately been some little improvement. At north-east coast and South Wales ports French-Atlantic business has loomed large, but has not had the absolute monopoly reported a week ago.

A general meeting of the members of the Midland Institute of Mining, Civil and Mechanical Engineers will be held at the Queen's Hotel, Leeds, on Thursday, September 27, 1917, at 3 p.m. A paper will be read by Prof. P. R. Kendall, M.A., F.G.S., on "The Co-relation of Seams in the West and South Yorkshire Areas," followed by a discussion on "The Areas of Deposition of the Coalfields of North-Western Europe," introduced by Mr. G. Blake Walker.

An ordinary general meeting of the South Wales Institute of Engineers will be held at the Metal Exchange, Swansea, on Tuesday, September 25, 1917,

commencing at 5 p.m. The paper for discussion is, "Coal Briquetting, with Special Reference to Anthracite Coal," by John A. Yeadon (Leeds).

Many of the leading colliery firms in Manchester, Bolton and Wigan districts intend putting down plants at their collieries, which will cost in the aggregate millions of pounds, for the manufacture of chemical and other by-products, with a view to competing with Germany after the war.

The Enginemmen and the Miners' Federation.

THE proceedings at the recent Trades Union Congress were marked by an interesting protest presented on behalf of the National Federation of Colliery Enginemmen, Stokers and Kindred Trades against the attempt of the Miners' Federation of Great Britain to compel all colliery workmen to become members of that body. Mr. PARKER urged the Congress to assist in resisting what he described as coercion by the Miners' Federation, on the ground that it was this spirit which fostered dissensions and, in international affairs, led to wars. Mr. SMILLIE made a rather uncompromising reply, expressing the determination of the Federation to bring every colliery worker into its fold. The Federation, he said, was not Prussian in its methods; but at the same time he implied that it was not disposed to recognise the claims of these smaller unions. The discussion that ensued disclosed the depth of the differences which divided the parties concerned. Mr. CLYNES, representing the General Workers' Union, repudiated the right of any organisation, however powerful, to dictate to the smaller unions, and he deprecated the exposure to the public gaze of these long-standing domestic quarrels.

Considerable light was thrown upon the present situation in an interesting article contributed to *The Observer* on September 2, by Mr. W. A. APPLETON, the secretary of the General Federation of Trade Unions. There are two forms of trade combinations in this country, known respectively as industrial and craft unionism. Industrial unionism ignores the workman's occupation, and takes as the basis of organisation the district rather than the character of his employment. Craft unionism, on the contrary, aims at binding together all workers of a particular grade. There is a distinct difference in the aims of these two kinds of union, and in the methods advocated for their attainment. Mr. APPLETON says: "In deciding which form of organisation is best, one must have regard to the psychological characteristics of the people, and to the standards of skill and intelligence which obtain in the areas the organisation is to cover. In Britain, where people are inherently individualists, and where the standard of skill and intelligence is above the average, where also the desire for autonomous self-government amounts almost to passion, the craft union offers that form of organisation most likely to succeed," and it is the craft union and its logical development that Mr. APPLETON expects to prove most suitable to the workman's industrial needs. Here we appear to have the kernel of the dispute between the Enginemmen and the Miners' Federation. It is a difference upon the fundamental point of individualism *versus* collectivism. The craft union elects to its executive men who understand their business, and who are capable of negotiating technical agreements with employers. The craft union naturally resents being obliged to merge its identity in other organisations whereby it sacrifices its autonomy and perhaps other benefits also. The position has no doubt been aggravated by the introduction of the political Labour party into the general movement. The result has been to give prominence to all sorts of questions having little connection with trade union interests. In the meantime, the Miners' Federation appears to have assumed a somewhat overbearing attitude towards the smaller craft unions embracing the surface workers. Mr. SMILLIE appeared to attempt to justify this course, as the Prussians have done, by the plea of necessity. They had often found, says Mr. SMILLIE, during the fighting of the last 20 years, that their strength and ability to cope with the employers was seriously interfered with because there was not a solid organisation at the collieries. Again and again they had seen the engine-winders stand at the engines and raise and lower blacklegs. Mr. STEPHEN WALSH tried to argue the matter by reminding the engine-

men of the benefits which they derived from the work of the Federation, instancing the *cost of living* day, and every bonus and wage advance during the war; but, he added, "we will not allow this sectionalism when the war is over. We must have genuine trade unionism." Which leads us to ask, What is genuine trade unionism? The quarrel has a distinctly humorous side at the present time, when the miners themselves are fighting for the rights of small nations, and against the principles that might is right and necessity knows no law. It is difficult to avoid the conclusion that the Miners' Federation has only itself to thank for the aloofness of the Enginemmen. As far as can be judged, the latter are not blind either to the advantages or to the disadvantages of industrial unionism, but they have not been able to bring themselves into agreement with the policy adopted by the Miners' Federation. The attempt at unification of trade union interests has resulted in much political intrigue, often with little regard to the legitimate objects of trade unionism. It will be interesting to follow the development of this contest between craft and industrial unionism, which appears to have a deeper foundation than mere rivalry between underground and surface workers.

Work of the Fuel Research Board.

THE second annual report of the Advisory Council, which has just been published, contains some interesting details of the work of the Fuel Research Board. The Board is under the direction of Sir GEORGE BEILBY, and possesses executive powers within the limits of an annual budget approved by the Committee of the Privy Council. It has also been laid down that the Board shall place its knowledge and the results of its investigations at the disposal of others, unhampered by the chances of exploitation. Thus the work of the Board will be truly national in character, and any results that may be obtained will be rendered available for the use of industry in general. Much of the work so far undertaken has necessarily been in the direction of organisation. The problems concerned are of considerable complexity, and can only be successfully investigated by a careful and systematic approach. The Advisory Council very truly state that every home in the land and almost every industry is directly concerned in the economy of fuel. It is just, therefore, that these researches should be conducted at the national cost, and paid for by general taxation. The inception of the project of organised fuel research dates from the year 1916, when a memorandum on the subject was prepared under the supervision of Sir RICHARD REDMAYNE. Following this, a Sub-committee on Coal Conservation was appointed by the Reconstruction Committee, and to this body the Advisory Council referred six researches for their opinion. The Coal Conservation Sub-committee in the meantime had been impressed with the need for a chemical survey of the coal fields. It was convinced that, in order to secure the most economical use of British coal, both at home and abroad, there should be available a collection of trustworthy analytical data, prepared upon a uniform basis, of all the different coal seams in the country. In addition to these analyses, it was urged that investigations should be made of the behaviour of these coals in the furnace and their suitability for various economic uses.

The magnitude of such a task is obvious, and in order to carry it out with any approach to expedition the most careful organisation was seen to be essential. In the first place, in order to secure the desired uniformity, it was necessary to co-ordinate the work of the Coal Conservation Sub-committee and the British Association Committee on Fuel Economy. In order to achieve this end, the Advisory Council at first decided to appoint a Standing Committee on Fuel. The disadvantage of this course, however, became obvious when it was realised that it would be necessary, before funds could be allocated, for the Standing Committee to report to the Advisory Council, and that afterwards recommendations should be made to the Committee of the Privy Council. This procedure would be too cumbersome for any rapid progress to be made. For this reason the machinery was replaced by the Fuel Research Board, under a director immediately responsible to the Lord President, and with power to expend funds placed at its disposal.

At the preliminary work may seem not a little those who are unfamiliar with the great spending departments of the appear at first sight that the practical chemical survey of the coal fields was being obscured in a maze of committees and sub-committees. In fact, however, the evolution of the Fuel Research Board has been a thoroughly practical step, which will much facilitate the progress of the great work in hand. Already, this Board has outlined its scheme for the systematic investigation of every coal seam now being worked in this country, as well as others possessing potential workable value. By the assistance of the coal owners, typical samples will be taken to be submitted to chemical and furnace tests. Neither will the theoretical side be ignored. It is in contemplation to carry out investigations also into the nature and origin of the various types of coal. There are still, doubtless, some sceptical persons who will regard with indifference the work which the Fuel Research Board has taken in hand. The attitude which too many coal owners have taken in regard to coal analyses is well known. In proof of this we need only recall the fact that Great Britain, the pioneer of the coal industry, and the possessor of the finest qualities of coal in the world, is still lamentably behindhand in the knowledge which it is now sought to obtain. From the strictly commercial point of view it may be true that many British coals will not be easier to sell with an analysis than they have been without. But that is not the point. It is the consumer who requires to know what he is buying, and how to utilise fuel in the most economical way. No other mineral substance in the world has been bought and sold in such a haphazard way as coal. In connection with the question of by-products, which have now assumed so much importance in almost every phase of national life, the new researches will probably throw much light upon the suitability of coals of different kinds for the recovery of these valuable substances. It would be a scandal and an everlasting reproach if we allowed ourselves any longer to lag behind other nations in this respect.

THE IRISH COAL TRADE.

THURSDAY, SEPTEMBER 20.

Dublin.

There is, so far, no change of any importance in the coal trade at the port, demand being well maintained in most branches, and prices remaining unaltered, at late rates. A notable feature is the large increase in the imports of coal during the past week, which will help to replenish the stocks. Current quotations are: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount. Scotch steam coal, 41s.; Welsh steam, 48s.; coke, 45s. per ton. Irish coals at Castle-comer Collieries, co. Kilkenny, are: Best small coal, 28s. 7d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d.—all at the pithead. It is stated that there is not likely to be any decrease in the present prices of coal at this side unless there is a reduction in freight rates, and unless the Controller can secure lower charges by British colliery owners. It is probable that special regulations will be drawn up for the Irish trade with regard to the sale of coal, as difficulties of transport have to be taken into consideration. In response to an invitation from the Controller of Coal Mines, the Lord Mayor has arranged for a conference in the Mansion House to-morrow (Friday) of members of the Municipal Council and representatives of the Dublin coal merchants, to meet two members of the Coal Controller's Department, for the purpose of arranging the retail prices of coal in Dublin to be fixed for the winter.

Belfast.

Business is described as being about normal in this port, and prices of all qualities remain unchanged, at late rates, viz.: Best Arley house coal, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Cheapest Scotch steam coal is about 29s. per ton; and best qualities up to 35s. and 37s. 6d. per ton. Gas coke ranges from 37s. 6d. to 40s. per ton; foundry coke, from 60s. to 65s. per ton for best beehive oven. Freights remain firm.

The South Wales collieries require about 1,250,000 tons of timber a year.

The Committee of the National War Museum wish to receive portrait photographs of all British officers and men who have served or are serving in any capacity whatever with H.M. Forces during the present war. The photographs should be on bromide paper and preferably unmounted (the name, regiment or ship, rank, decorations and date being written on the back), and should be sent to the secretary, National War Museum, H.M. Office of Works, Storey's Gate, Westminster, S.W. 1.

The report of the departmental *prefet* gives the output of coal in Saône-et-Loire as follows:—

1915.	1916.	1917
Tons.	Tons.	(half-year). Tons.
54,000	2,015,000	1,295,875
160,188	198,418	120,218
66,872	68,453	39,213
19,919	49,042	33,341
-1	35,426	39,028
		83,783
2,266,405	2,360,941	1,512,430

THE COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 20.

Scotland.—Western District.

COAL.

Nothing of a fresh nature is reported regarding the Scotch coal trade. Conditions during the past week were similar to those in evidence for a considerable time now. The new scheme for the distribution of coal is already in operation, but no opinion has yet been offered as to the likely effect on the trade as a whole. The scheme involves so much readjustment that some little time must necessarily elapse before everything is in working order. In the west of Scotland district business continues to move on quiet lines. Industrial requirements are steadily maintained, and household demands are increasing, but orders from other sources are of little account. Shipments during the past week amounted to 108,030 tons compared with 107,145 in the preceding week and 135,121 tons in the same week last year. Good cargoes have recently gone to France and Italy, but business of this nature is fitful, and the greater proportion of the shipments are coastwise.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	20/-25/
Ell	26/6-28/	26/6-28/	24/-25/
Splint	28/-30/	28/-30/	25/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The demand for all classes of iron materials on war account is undiminished, and producers are finding it increasingly difficult to meet their obligations. Consequently, the supplies available for ordinary distribution have reached a low ebb. Pig iron makers have a constant call for hematite for consumption at local steel works, and in spite of all efforts to increase the production, outputs are still below requirements. Forge and foundry iron, too, are rather scarce, but home users are managing to secure fair supplies in most instances. Practically nothing is being done in the export department. Prices remain firm. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. In the malleable iron trade makers are almost entirely devoted to naval and military work, and the best indication of the situation is the increased turnover in shell-discard material. Bars of this quality are now being extensively used in place of "Crown" and other quality iron bars, which are almost unprocurable. Sheet makers are in a strong position, and common black sheets are quoted £18 5s. and upwards per ton f.o.b. Glasgow. Engineers are fully employed in all branches.

Scotland.—Eastern District.

COAL.

The situation in the Lothians coal trade cannot be called satisfactory. Admiralty orders are heavier than they have been recently, but business from other quarters is very slow. Shipments were 19,084 tons against 18,066 in the preceding week and 39,082 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	25/
Secondary qualities.....	25/6	25/6	24/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

There is no indication of an improvement in the Fifeshire district, where collieries are experiencing a considerable amount of idle time. This district has been severely hit by the restrictions on the export trade, and prospects of a change for the better are remote. Shipments were 36,269 tons against 31,771 in the preceding week and 53,468 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	40/
Unscreened do.....	24/-25/	24/-25/	30/-35/
First-class steam coal.....	28/	28/	33/-34/
Third-class do.	24/	24/	25/-26/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 163,383 tons, compared with 156,982 in the preceding week and 227,671 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

So far as the volume of ordinary private export business is concerned, the market has not shown a great deal of change during the past week. The supplies of "free" tonnage have been only moderate, with the inevitable result of great restrictions of outward operations. Poor as tonnage supplies have been, however, they have shown some little improvement as compared with those of the previous week, and to that extent the market has benefited. It is noteworthy that rather more chartering has been done for more distant destinations than has recently been the rule. There has continued to be a very satisfactory demand on official account, and vessels in respect of these requirements have, of course, been forthcoming. The request in regard to inland consumption also has been well maintained. At the time of writing, superior qualities of coal, both gas

sorts and steams, are very fully taken up, and tonnage supplies in respect of these are satisfactorily large. The demand for steam seconds also is good, but smalls are neglected and continue to pile up. Gas seconds, too, are much sought after in the absence of transport facilities. The trade in coking coal and smithies for inland consumption is brisk, and the tone of these fuels is very firm. The bunker market is dull, with prices upheld mainly by the operation of the schedule. All descriptions of coke are in keen enquiry, with a demand which is really in excess of the supply. Gas coke has advanced by 1s. on the week. The Norwegian State Railways have contracted with a Newcastle firm of coal exporters for the supply of 18,000 tons of—at the option of the Department—Northumberland and/or Durham steams, for delivery over October and November, at the scheduled figures of 30s. for D.C.B.'s and 29s. 6d. for Tyne primes, plus 5 per cent. for merchants' profits. The railways are now enquiring for a similar quantity of like fuel for shipment over the last two months of the year. The Stavanger Gas Works have invited immediate tenders of 4,000 tons of gas bests or specials, for shipment from November to January inclusive. The Christiania Gas Works have received tenders, based on the scheduled minimum figures, of 20,000 tons of gas bests for delivery up to the end of the year. The Swedish demand for fuel appears to have fallen off somewhat. The enquiry from other neutral customers is limited only by the supply of collier tonnage.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	38/-40/
Do. Tynes (Bowers, &c.)	29/6	29/6	38/-40/
Secondary, Blyths	25/6	25/6	30/
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/-35/
Unscreened	23/6-25/	23/6-25/	25/-35/
Small, Blyths	20/	20/	25/
Do. Tynes.....	18/6	18/6	20/ 22/6
Do. specials.....	20/6	20/6	25/-27/6
Other sorts:—			
Smithies.....	25/-30/6	25/-30/6	25/
Best gas coals (New Pelton or Holmside)	25/	25/	32/-33/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	26/-27/6
Special gas coals	26/6-30/	26/6-30/	35/
Unscreened bunkers, Durhams	24/-25/	24/-25/	22/-26/
Do. do. Northumbrians	24/-25/	24/-25/	21/-25/
Coking coals	24/-25/	24/-25/	25/
Do. smalls	24/-25/	24/-25/	20/-22/6
House coals	28/6-30/	28/6-30/	37/6-40/
Coke, foundry	42/6	42/6	38/-45/
Do. blast-furnace	42/6	42/6	36/-40/
Do. gas	30/-31/	29/-30/	33/-35/

Sunderland.

COAL.

There is a fairly steady market for all descriptions of steam coals, for which the demand is good. Official requirements are also heavy, supplies being readily taken up at steady to firm prices. Small, however, are neglected. Stocks excessive and the tone weak. Gas coals are steady, coking kinds are quiet for shipment, but the inland demand is fully sustained. There is still a very poor business in bunker coals. Coke is in steady general request, and stocks are readily absorbed by the home trade, but the export branch is quiet. The Norwegian State Railway has contracted for 18,500 tons best Blyths or Wear steams, shipment October and November, at 30s., plus 5 per cent. for merchants' profit, and now invite offers for a similar quantity, shipment November and December, and for which tenders are to be sent in immediately. Quotations are approximately as follow:—

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	35/
Secondary do.	23/6-25/	23/6-25/	26/
House coals:—			
Best house coals	30/	30/	35/
Ordinary do.	28/	28/	27/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	37/6
South Hetton do.	28/6-30/	28/6-30/	37/6
Lambton unscreened	24/	24/	23/
South Hetton do.	24/	24/	23/
Do. treble nuts	20/	20/	25/6
Coking coals unscreened	25/	25/	22/
Do. smalls	25/	25/	20/6
Smithies.....	25/	25/	22/6
Peas and nuts	24/6-26/	24/6-26/	25/6
Best bunkers.....	25/	25/	26/
Ordinary bunkers.....	24/	24/	20/6-21/
Coke:—			
Foundry coke	42/6	42/6	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	32/6-35/

There is no improvement in the supply of tonnage, and chartering continues to be conducted under great difficulties. Orders are plentiful for all destinations, the coasting section is firm on a large enquiry, and schedule figures are firmly quoted for the limitation area.

Middlesbrough-on-Tees.

COAL.

There are no important alterations to record in the various branches of the fuel trade. Working at many of the Durham collieries is still irregular. Moderate enquiry for coal for neutrals—chiefly for Scandinavia—continues, and from time to time results in a little business. Volume of business generally is confined to small dimensions, and orders are not obtainable above the official minimum quotations for coal, at which producers eagerly seek business. Gas coal is moderately taken up at 25s. for best, 23s. 6d. for second quality, and 26s. 6d. for special. There is a decidedly easy feeling as regards bunker coal. Unscreened Durhams are quoted 24s. to 25s. All kinds of special manufacturing coal are in heavy request for home use, and the quantities of this class available for export are very small. Household coal is firm. Coking coal continues to be fairly well taken up. Coke shows little change. There is slightly more export business passing, and both beehive and patent oven remain at 42s. 6d., whilst gas-house product is in good request at 30s. to 31s. All descriptions

of blastfurnace coke are in good request for local use. Average kinds continue to command the fixed maximum of 28s. at the ovens, and low phosphorus qualities remained at the limitation price of 30s. 6d. at the ovens.

IRON.

Output of pig iron has been enlarged by the recent blowing-in of an additional furnace on Cleveland pig, and the starting of an extra furnace on hematite. This increases the number in operation in this district to 76, of which 34 are turning out Cleveland pig, 28 are making hematite, and 14 are producing special kinds of iron. Values of all descriptions of pig iron are well upheld. For home consumption, purchases of Cleveland pig are, for the time being, few and small, users being very well placed, but there is insistent demand from abroad, and some expansion of foreign trade is noticeable. All kinds of Cleveland pig are plentiful, and the October allocations, which will probably be issued next week, promise to be on a very liberal scale. For home consumption, No. 3, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to France and to Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. The stringent situation of the east coast hematite branch has been very little relieved by the slightly increased make. Consumers accessible by rail continue to absorb so much of the output that very little surplus indeed is left for sale to the Allies. Further moderate home sales are reported, but new export business is as difficult as ever to put through, and is on a very limited scale. Nos. 1, 2 and 3 are 122s. 6d. for home use, and are put at 141s. f.o.b. for shipment to France and Italy, the export quotation, however, being subject to certain additional charges difficult to explain and understand. Manufacturers of finished iron and steel are so very busily engaged coping with Government requirements and shipyard needs that they are indifferent to ordinary commercial enquiries.

Cumberland.

Maryport.

COAL.

The Cumberland coal trade is now in a remarkable state of activity, and requirements on all hands are increasing more quickly than they can be dealt with. Business is brisker in all branches, home needs are expanding, and the demand on both local and export accounts is so keen that there is not enough to go round. The home market is very firm, and the clamour for coal for local consumption is bigger than ever this week. The outstanding feature is the enormous call for fuel for manufacturing and coking purposes, and local needs have been so large that there has been a marked shortage, both for shipping and landsale. There is a phenomenal demand for fuel on all accounts, the collieries are pressed with orders, and requirements are now very much in excess of production. The bulk of the output of works fuel is going to the iron and steel works, the iron ore mines, the by-product coke ovens, and the engineering shops in West Cumberland, and after these and other important consumers have been satisfied, there is very little surplus left for local landsale or the Irish market. Irish customers are, therefore, on short commons, and the situation may be even more stringent towards the end of the month. Landsale is busier, and some of the depots have booked more business than they can comfortably deal with. Best sorts are not quite so plentiful, and merchants are scarcely receiving sufficient to satisfy the needs of their customers. Gas coal is in firm request and engine fuels are very steady, but local users are practically taking all the supplies that are available. All the collieries in the county are now working regularly, and outputs are probably larger than they have been for some weeks. The shipping trade is healthy, and there is a very heavy demand for both house and works fuel for Ireland. Irish needs, however, are growing more difficult to meet, and some consumers could almost take twice as much as they are at present receiving. During the week, 14 vessels have sailed with coals all for Irish ports, and the shipments have amounted to 3,580 tons, compared with 3,320 tons at the corresponding period of last year, or an increase of 1,260 tons compared with the previous week. The largest cargoes have been consigned to Dublin, Waterford, Belfast, Londonderry, Carrickfergus and Portrush. Coke makers are feverishly busy, and all the by-product ovens in the county are in full blast. The whole of the production of local coke is going to smelters in West Cumberland and Millom. Business is very brisk in the local by-products trade, and all the plants in this locality are in full operation. Prices are very firm, and there has been no change in either local or coastwise quotations. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal " ...	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts "	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	28/6	28/6	25/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

IRON.

A very firm tone continues to prevail in the west coast hematite pig iron trade; smelters are busier than ever, and there is intense activity in both the iron and steel industries. The Lowther ironworks at Workington were restarted at the beginning of the week, and all the plants which were affected by the trouble in the iron ore industry, are now in full swing again; and the output of hematite pig iron will soon be as large as, if not larger, than at the end of July. The demand for metal is overwhelming, and the needs of both local and outside consumers are still expanding. Prices remain at the maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at

cash at 115s. per ton. Special iron is 140s. per ton, with semi-special iron at 135s. per ton f.o.t. There are 29 furnaces in blast, and all the iron smelted in this district is going to home users. All the ordinary Bessemer iron is going to the steelworks at Barrow and Workington; and the entire make of special and semi-special iron is being distributed to users engaged exclusively on national work in Scotland, the Midlands, etc. The steel industry is intensely busy, and all the plants are securing heavy outputs. Very little railway material is being rolled. There is a steady demand for billets, but ordinary commercial sorts are still rather quiet. Heavy rails are quoted at from £10 17s. 6d. to £11 10s. per ton, with light sections at from £14 to £14 10s. per ton. Heavy tram rails are £14 per ton, boiler plates £12 10s. per ton, and ship plates £11 10s. per ton. The iron ore industry from Cleator Moor to Millom is very busy, and all the mines are working at top pressure. There is a very heavy demand both for high grade ores and ordinary sorts, and the whole of the output is going to smelters in the district. The imports of foreign ore for the week have amounted to 8,170 tons.

South-West Lancashire.

COAL.

In the inland house coal trade the new arrangements necessitated by the operation of the Coal Transport Re-organisation Scheme have scarcely got into smooth working order. There is a very large demand for fuel. With regard to shipping, the position is much as last reported. Bunkering requirements are fully maintained, and there is active enquiry for export to Allied countries especially. Available supplies of coal are not equal to the demand. Prices, of course, are according to schedule. As regards the coastwise and cross-Channel trade there is enquiry for more than can be provided for this avenue. As regards slack, demand and production are about equal. For whatever quantities may have been thrown on the market in consequence of local holidays there has been a ready market.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/- 22/	21/- 22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/- 20/	19/- 20/	19/- 20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	23/- 24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. Practically, there was no house coal on offer, and stocks in the neighbourhood of Manchester are very small. Manufacturing fuel meets with good demand, save that slack is still on the easier side owing to short time working at cotton mills. There is a fair enquiry for shipping coal. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/- 23/	22/- 23/	22/- 23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/- 18/6	18/- 18/6	18/- 18/6
Furnace coal	17/6-18/	17/6-18/	17/- 18/
Bunker (f.o.b. Partington)	—*	—*	25/- 26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/6 upwds	14/6 upwds	14/6 upwds

* As per official list.

IRON.

There is nothing of interest to report. The Government take every ounce of iron and steel produced. Material that does not pass the various inspectors is immediately disposed of for outside work.

Yorkshire and Derbyshire.

Leeds.

COAL.

All sections of the trade were fully represented in the large attendance on the market on Tuesday, and found plenty of matter for discussion in the recent activities of the Coal Controller. The recently expressed anxiety of factors and merchants as to supplies, particularly of house coal, for Yorkshire and other provincial centres, consequent upon the special attention which the collieries are required to give to deliveries to London is less evident than it was a fortnight ago, and although London is still receiving heavily increased deliveries, necessarily at the expense of other places, it cannot be said that any real shortage has yet arisen in consequence, in the West Riding at all events. The conversation on the market centred mainly round the Orders affecting the prices and factors' and merchants' margins, and the state of confusion which both coal owners and distributors are just now experiencing as a result of the abrogation of contracts and the necessary readjustment of prices, the latter being a slow process likely to occupy many weeks before the position again becomes clear. In the meantime it is not easy to prophesy the result, but the general expectation is that both the stricter application of the Limitation Act and the fixing of factors' and merchants' profits will tend towards a more or less general reduction. So far as the demand is concerned, it is as strong as ever, and far more than equal to the maximum output of the pits, working as they are full time. The supply of empty wagons is satisfactory. A few collieries are short, but these are exceptional cases. Fewer London representatives than usual were on the market, but this is probably due to the difficulty of securing increased deliveries than to any lessening in the pressure on the collieries. The instructions of the Coal Controller in regard to London supplies, not only of the best kinds, but also inferior qualities, is adversely affecting the shipment of Hartleys and similar kinds from Humber ports to abroad, with the

result that ships are being considerably delayed. House coal merchants in the West Riding are being employed as their limited supplies will permit. The demand is increasing faster than the supply of the merchants to cope with it, and they are being asked for whatever qualities they can get. With regard to gas coal, there is very little change week by week. The restoration of Greenwich time will increase the requirements of the works, which at once absorbs all the output. There is very great scarcity of the better grades of manufacturing fuel, such as washed nuts and rough slacks, but the smallest slacks are quite plentiful, except the coking qualities, of which there is a marked shortage. The weakness of the inferior grades of slacks is attributable to consumers who in normal times used these qualities having turned their attention to the better kinds. Washed furnace coke keeps in strong demand, there being no surplus whatever. The market closed rather earlier than usual in order to permit of a meeting of factors and merchants, of whom there was a specially large attendance. It was decided to form an organisation under the title of "The Northern Coal Factors and Wholesale Merchants Association," with the object of securing united action in conjunction with the Inland Factors and Wholesale Railborne Merchants Association, and to protect the interests of factors and merchants generally. Mr. J. Shaw (Messrs. M. Whitaker Limited) was appointed the first chairman, and a committee of ten representing northern districts was elected. In view of the readjustments which are taking place, the prices in the appended list must be regarded as based on recent values:—

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ...	20/- 21/	20/- 21/	20/- 21/
Wallsend & London best	19/- 20/	19/- 20/	19/- 20/
Silkstone best	19/- 20/	19/- 20/	19/- 20/
Do. house	17/- 18/	17/- 18/	17/- 18/
House nuts	16/- 17/	16/- 17/	16/- 17/
Prices f.o.b. Hull:—			
Haigh Moor best	23/- 24/	23/- 24/	23/- 24/
Silkstone best	22/- 23/	22/- 23/	22/- 23/
Do. house	20/- 21/	20/- 21/	20/- 21/
Other qualities	19/- 20/	19/- 20/	19/- 20/
Gas coal:—			
Prices at pit:			
Screened gas coal	16/- 17/	16/- 17/	16/- 17/
Gas nuts	15/6-16/6	15/6-16/6	15/6-16/6
Unscreened gas coal ...	15/- 16/	15/- 16/	15/- 16/
Other sorts:—			
Prices at pit:			
Washed nuts	17/- 18/	17/- 18/	17/- 18/
Large double-screened engine nuts	16/- 17/	16/- 17/	16/- 17/
Small nuts	15/- 16/	15/- 16/	15/- 16/
Rough unscreened engine coal	15/- 16/	15/- 16/	15/- 16/
Best rough slacks	14/- 15/	14/- 15/	14/- 15/
Small do.	12/- 13/	12/- 13/	12/- 13/
Coking smalls	12/6-13/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

The changes in the supply of coal under the new scheme are claiming a good deal of the attention of those engaged at the collieries. The new order of things is not expected to greatly affect this area, and meetings have been held to consider the fixing of new contracts which will fall for execution in this district. It is understood nothing of a definite character has yet been done. Meanwhile, the heavy demand for practically all classes of coal is unabated, and probably it will be found the district will have a larger tonnage to provide, so far as the demand goes, on the readjustment. There is not the slightest difficulty in disposing of the whole of the production without seeking buyers for any surplus which may be available over contract tonnage. The demand for all classes of steam coal continues to be exceptionally large. The export is still of an extensive character on behalf of the Allies and for the purposes of the Admiralty, the district collieries being called upon to forward a substantial tonnage. A good enquiry prevails for the neutral countries, but supplies are scarce for this purpose. The home demand also continues to be exceedingly large, and there is practically no surplus quantities of fuel offering. A strong demand is also experienced for steam nuts, but the production of this class of fuel continues to be absorbed by the munition and engineering concerns. All classes of small steam fuel are again in heavy request, and the pressure for nut slacks for electricity plants is of a heavier description. The supply is carefully distributed, though deliveries are somewhat irregular. The search for extra lots of coking slacks is unabated, and continued efforts are necessary to keep the by-product plants fully at work. There is an increasing pressure for supplies of gas coal, with the heavier requirements coming along. The production is hardly sufficient to satisfy contract requirements, and pressure is again experienced for the Controller to obtain extra supplies for certain areas, which interferes with the distribution generally. In regard to house coal, the operations of the Coal Controller are still of an active character. The continued extra diversion of all classes of coal to London is causing a good deal of chaos, but the protests from nearer areas are useless so far as collieries are concerned,

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	20/- 22/	20/- 22/	20/- 22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/- 17/6	17/- 17/6	17/- 17/6
Best house nuts	16/- 17/	16/- 17/	16/- 17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/6-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

far no alteration has been effected. The position in anxiety, and merchants are being placed in a hopeless position. The enquiry for continues to be of a very active character, and the production of the plants is readily continue to be largely of a nominal

COAL.

The very big drain upon the Yorkshire and North Midland output for London and the south, coupled with Admiralty and other official requirements, continue to have an adverse effect upon shipments and the export trade generally. Supplies over rail are irregular, and this, of course, gives difficulty in arranging steamers for loading. At the same time, there is practically no coal to be had in the open market, except through contractors. Large steamers are in request for neutrals, and the small business done is on the basis of 31s. to 32s. for best Yorkshire steam hards. Nuts and manufacturing fuels are fully absorbed inland, as are also Derbyshire and Nottingham steams, nothing being left for export, even if licences could be obtained. Merchants here are pressing for their first winter supplies of gas and house coals, the demand for which is stronger every week. In the freight market only a limited amount of business is passing, at fixed maximum rates for Allies and at late rates for non-scheduled ports.

Chesterfield.

COAL.

The strong demand for every class of coal is steadily maintained. Supplies, however, are still difficult to find in anything like adequate quantities. Orders for house coal are plentiful, and every effort is made to deal with them. Prompt execution of these cannot be looked for. Fuel for manufacturing purposes is urgently required, and the iron and steel works of Sheffield and district are clamouring for increased deliveries of cobbles and nuts for gas-producers. Slack for boiler firing is fairly plentiful, owing to the slightly less pressure for this fuel for the Lancashire cotton mills. Gas coal continues in great demand, and steam coal for locomotive use is also much wanted. There is very little doing in the way of export so far as this district is concerned; the bulk of the coal now being shipped is drawn from the South Yorkshire and West Yorkshire coalfields. The coke market maintains its active condition. The demand is strong for all qualities, and the output of the ovens of the district goes forward for consumption day by day. Prices are firm at scheduled rates.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/-	17/-	17/-
Secondary do.	16/6	16/6	16/6
Cobbles	16/-	16/-	16/-
Nuts	15/-	15/-	15/-
Slack	12/6	12/6	12/6

IRON.

The iron trade is active in every department, and buyers are eager to procure supplies. Work is abundant all round.

Nottingham.

COAL.

With the winter season approaching, the pressure on collieries is increasing. Fortunately, there is no rush by the public as was the case about a year ago, but merchants are doing a fairly brisk trade in household fuel. They have a difficulty, however, in securing hard coals for domestic use, and customers requiring this grade of households have in many cases to be satisfied with small supplies even after a period of waiting. The new conditions regarding distribution is causing additional work to colliery staffs, but every effort is being made to comply with the requirements of the various districts so far as output will permit, as there are no surplus lots to draw upon at the collieries. The same remark applies to the steam coal branch in which considerable activity is manifested. Here again the demand is becoming keener and all classes of hards find a ready market. But after supplies are allocated for firms on war work, the surplus is practically absorbed by contracts. Slacks of nearly all grades are in growing demand.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/-	17/-18/-	16/-16/6
Best hard coals.....	16/9-17/6	16/9-17/6	17/-17/6
Secondary do	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/-	12/-13/-	12/-13/-
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/-	11/-	11/-

Leicestershire.

COAL.

The multiplicity of orders, their object and their interpretation, instead of producing "order," have, up to the present, only succeeded in creating "disorder" and widespread confusion. In the practical administration of a colliery the output and distribution of coal are the things that count, and with the best will in the world to facilitate the theories which form the basis of the official orders, there is no time or staff to form an "interpretation" department. "We are in a state of chaos," is the report that comes from colliery after colliery, and it is evident that the responsible managers are in a state bordering on collapse in consequence of the increasing and intolerable strain to which they are being subjected. In the midst of all this constant increase of the work of returns and statistics, it is most discouraging that the invaluable time of managers should have to be devoted to humbly pleading before recruiting tribunals to have the skeleton of the staffs preserved for an utterly essential work. More work is being done, and a curtailment of the staffs is being demanded. The colliery sidings are so over-crowded that the waiting for coal, that it is quite impossible to get on. Coal of all classes for London and the south is in great demand for urgent delivery than for the north, and the maximum must be maintained for all kinds, deep and main cobbles and small nuts for mechanical stokers

are all taken up day by day with remarkable keenness. Country merchants are now insisting that they have larger supplies, but however urgent they may be it is impossible to meet them. The position is more serious than at any time during the war, and there is no prospect of any material relief in the near future.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/-	16/6-18/-	17/-19/-
Second, hand picked	15/6-16/6	15/6-16/6	15/6-17/-
Deep screened cobbles ...	16/-17/-	16/-17/-	16/6-17/6
Deep large nuts	16/-16/6	16/-16/6	16/-17/-
Bakers' nuts	15/-15/6	15/-15/6	15/-16/-
Small nuts.....	14/6-15/-	14/6-15/-	14/6-15/6
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Peas	12/-12/3	12/-12/3	12/-12/3
Small dust	6/-7/-	6/-7/-	6/-7/-
Main nuts for London:			
kitcheners	13/6-14/-	13/6-14/-	13/6-14/6
Steams, best hand picked	14/-14/6	14/-14/6	14/-15/-
Steams, seconds	13/-13/6	13/-13/6	13/-14/6
Main cobbles for kitcheners	13/6-14/-	13/6-14/-	13/6-14/6
Main breeze	12/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

People engaged in the coal trade continue to have an anxious time. A certain amount of dislocation was inevitable by reason of the diversion of fuel from this district to London, and this difficulty is still felt in full force, though some relief is expected shortly. Local merchants are kept short, and are quite unable to secure stocks to meet prospective needs, which will be heavy, although for the time being the public are a trifle less clamorous. The supply of fuel for industrial purposes is well maintained, and this makes a big demand on the output of the pits. Naturally, the new Order for the regulation of retail prices has come in for a great deal of adverse criticism in the trade. The new prices are considered absolutely inadequate, if coal merchants are to conduct their businesses even at a small profit. There has been little, but very little, exploiting of the public in this district in the past, and merchants naturally resent the new regulations, which they declare are unreasonable. The Coal Merchants' Association are taking steps to fight the matter out with the Coal Controller, and further information is awaited with considerable interest.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/-	22/-	22/-
Do. seconds deep	20/-	20/-	20/-
Do. best shallow	19/-	19/-	19/-
Do. seconds do.	18/-	18/-	18/-
Best hard	18/6	18/6	18/6
Forge coal	16/-	16/-	16/-
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/-	19/-	19/-
Do. hand-picked			
cobs	18/-	18/-	18/-
Best hard spires	20/-	20/-	20/-
Forge (steam)	16/-	16/-	16/-
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

Manufacturers continue to be pressed for deliveries, and the plants are severely taxed to cope with the unabated demand for material, iron and steel alike, required for essential national work. In some of the branches customers are willing to pay big prices for prompt deliveries. A very heavy business is done in bars, hoops, sheets and strip; and in the steel branches every ton of raw material, the allocation of which is under the rigid control of the authorities, is promptly sent to the mills. The scrap trade is not developing as might be wished. The fixing of one maximum price of £6 5s. for all grades of wrought iron scrap is not considered satisfactory. Some of it is valued at more than the maximum, the lighter qualities at considerably less. It is said merchants are not bound to pay the maximum, but experience in the trade goes to show that the maximum generally becomes the minimum. Basic pig iron has recently been on offer on the market, not in large quantities certainly, but these will gradually increase, as developments are in progress in South Staffordshire and Nottingham districts which will materially increase the output. The maximum price of 97s. 6d. is readily obtained, and steel makers are glad of the material. Foundry and forge sorts are becoming restricted, and the demand is maintained to such an extent that some smelters are not in a position to entertain new customers, and having regard to their present obligations are chary about committing themselves unduly. Maximum values are firm all round. An active trade is done in bar iron at £15 10s., less 2½ per cent. for marked qualities, £13 15s. net for unmarked, and £14 5s. to £14 11s. 3d. for nut and bolt iron. Few galvanised sheets are being turned out, and then only in response to urgent Government orders. Scarcity of sheet bars affects the production of sheets generally, and in a few instances corrugated iron sheets are being substituted for steel. The lack of puddle bars and of scrap is, however, a hindrance to any very large output. Moreover, there is a heavy call on the available supply of puddled iron for manufacture into billets, which are urgently wanted, and which sell at from £13 5s. to £13 10s.

Forest of Dean.

Lydney.

COAL.

The market for the house coal of this district has been very strong during the week, the demand for every quality being exceedingly keen. The collieries are all running full time and deliveries are heavy, but far short of the requirements of merchants, consequently delay in forwarding is unavoidable, and there is a long list of arrear orders awaiting attention. There is great pressure for steam qualities from all quarters; collieries are naturally giving preference to orders having to do with pressing Government work.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/-	24/-	21/6
Forest	23/-	23/-	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/-
Rough slack	13/6	13/6	13/-
Steam coal:—			
Large	20/-21/-	20/-21/-	18/-19/-
Small	16/-16/6	16/-16/6	16/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

COAL.

Messrs. W. Wade and Son report that the wholesale supplies of house coal are coming forward only very slowly to the various stations in the south-western district, and considerable anxiety is expressed by merchants as to their being able to obtain the usual autumn stocks of fuel. The feeling is also general that the restrictions recently published respecting the retail distribution of coal are unjust and oppressive while they are also quite unworkable. Without questioning the patriotic intention of the framers of the regulation, it is certain that the coal merchants have done nothing to justify such an overt attack on their means of livelihood. Relatively to its price, coal is about the heaviest merchandise to handle, and the proposal to allow the retail merchant a profit of only 1s. a ton—to include interest on his capital and the long credit which he often has to give—is a proposition which has only to be stated to be dismissed as being crude and impossible. Many country merchants sell about 1,200 tons per annum, and the above plan would leave them only £60 a year, including the use of their capital. The coal trade of England could assert that its members are as loyal, and have sacrificed to the war as much as those of any other branch of the community, and can therefore confidently claim to be freed from unnecessarily harassing legislation. It is expected that this matter will be influentially placed before the Controller, and that he will recognise the need of dealing justly and drastically with the whole situation.

THE WELSH COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 20.

North Wales.

Wrexham.

COAL.

The general state of the coal trade in this area, during the past week, has been steady in character; all pits have been worked full time, and no difficulty has been experienced in disposing of the output. Interest has been shown in the interview which the executive committee of the Miners' Federation of Great Britain had with the Coal Controller in regard to the question of wages paid to colliery workers throughout the kingdom, and the result is now awaited by those interested. In regard to house coal, the question in people's minds is whether the new coal prices Order will make household coal cheaper or dearer during the coming winter than it is at the present time. The general opinion seems to be that prices will be little changed, as present retail figures are from 5s. to 7s. 6d. per ton higher than ruled in the year 1914. The chief difficulty appears to be the question of stocks and supplies. At Birkenhead and neighbouring towns, though stocks have improved somewhat just recently, it is stated that they are less than has been the case for many years past. The Bootle Corporation have appointed a coal committee, and so have the Birkenhead Council, but, although consultative meetings have been held with the merchants, the result has not been issued to the public as yet, neither have prices been published. There is nothing new to report in reference to the gas coal trade. The demand is fairly steady, and supplies appear on the whole to be satisfactory. There are still a number of contracts to be definitely settled under the reorganised distribution scheme, but these should now soon be completed. There is a ready sale of gas coke at the local works. Wrexham Gas Company have announced their intention to increase the price of gas for all purposes by 3d. per thousand cubic feet, owing to the increase in the cost of coal and other expenses. The pressure in steam coal business still continues, though it has been varied a little since the new distribution scheme came into operation. Good supplies have been sent from local pits to railway companies, Government-controlled works, and the Mersey ports for shipment, and on the whole the demand has exceeded the supply. Slack maintains a steady market, the demand being good, and very little appears to have been taken into stock. The following is a complete list of the week's quotations.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit f.o.r.:—			
Best house coal	21/-23/-	21/-23/-	—
Secondary do.	20/-22/-	20/-22/-	—
Steam coal.....	19/-22/-	19/-22/-	—
Gas coal	18/-21/-	19/-21/-	—
Bunkers	19/-22/-	19/-22/-	—
Nuts	18/-20/-	18/-20/-	—
Slack	12/-14/6	12/-14/6	—
Gas coke (at works).....	21/8-23/4	21/8-25/-	—
Prices landsale:—			
Best house coal	27/6-30/-	27/6-30/-	—
Seconds	25/-27/6	25/-27/6	—
Slack	15/-16/8	15/-16/8	—

Monmouthshire, South Wales, &c.

Newport.

COAL.

There has been nothing special to report for the past week. The arrival of tonnage has been fair to moderate, but not of sufficient quantity to greatly reduce stocks, which are still large, especially of small coal. All the best qualities of large have been in great demand, and so also have been gas and house coals, which could easily have commanded higher prices than those fixed by the Controller had the market been free. There has been no change in patent fuel and coke. Work at the collieries has been intermittent in consequence of the uncertainty and shortage of wagons.

Prices f.o.b. cash 30 days.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Black Vein large...	30/	30/	44/-45/
Western-valleys, ordin'y	29/	29/	44/-45/
Best Eastern-valleys ...	29/	29/	44/-45/
Secondary do.	28/	28/	39/-42/
Best small coals	21/6	21/6	28/ 30/
Secondary do.	20/	20/	26/-28/
Inferior do.	18/	18/	21/-22/
Screenings	23/	23/	29/-30/
Through coals	27/	27/	27/-30/
Best washed nuts.....	30/	30/	30/-32/
Other sorts:—			
Best house coal, at pit ...	33/	33/	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/
Patent fuel	32/6	32/6	45/-47/6
Furnace coke.....	47/6	47/6	50/-55/
Foundry coke	47/6	47/6	60/-65/

IRON.

There has been unabated activity in all departments of the iron and steel trades of the district. The Government control having been extended to the tin-plate trade, both as to prices and the supply of raw material, that section of the trade is now in a position of less elasticity and freedom than before. There are considerable orders, but there is still difficulty in getting sufficient raw material. Pitwood arrivals have been moderate, with prices steady at from about 58s. 6d. to 60s. 6d.

Cardiff.

COAL.

There is very little change in the general state of the market, although the tonnage position varies from day to day, and the market is buoyant or depressed as the case may be. At the latter end of last week anticipations with regard to tonnage were more hopeful, and vessels arrived in fairly satisfactory numbers over the week-end. The result was that all the collieries were able to resume work on Monday, and it was expected that the improvement would continue. These prospects, however, were soon falsified, and on Tuesday there was not sufficient tonnage available to meet requirements, with the result that a number of stoppages were reported from the collieries through inability to clear wagons. Stocks have again become excessive, particularly of the ordinary and lower grade descriptions, and even of the better classes the stocks on the surface have been so abundant that it has been possible to secure permission to ship odd cargoes to neutral destinations. For the main part, however, business has been chiefly confined to the transaction of official orders, and whatever vessels have been available have been utilised for the transport of coal required by the authorities. The classification list is still unpublished, and all negotiations are on the basis of the schedule prices, subject of course to any alteration that may be sanctioned by the Controller when the classification has been officially assented to. There has been some confusion with regard to the working of the inland transport regulations, but it is believed that in the course of a few days a better understanding of the rules will have been arrived at, and that the present causes of friction will be avoided. When the Order was first published, a stipulation was made that South Wales coals should be used exclusively in South Wales and the south-western counties, and Forest of Dean coal was ruled out so far as South Wales is concerned. Now a variation has taken place whereby the south-western counties are enabled to draw their supplies from the Midlands and the south-eastern counties. In other instances, collieries which had received instructions to supply dry coals had had their orders cancelled, and other coals have been substituted as being more suitable to the requirements of the particular consumers concerned. These are drawbacks which militate against the success of the control scheme, and although there is considerable grumbling, the hope is expressed that matters will run more smoothly after the regulations have been given a fair trial. Small coals are in excessive supply, and there is little demand at present prices, because other coals are obtainable at such rates that even better results can be obtained. Representations have been made to the Controller on the subject, but so far no alteration has been made in the schedule, although there is reason to believe that an amendment is imminent. The coal owners are becoming

Prices f.o.b. Cardiff (except where otherwise stated).

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	44/-46/
Ordinary	30/	30/	42/-44/
Best bunker smalls	23/	23/	30/6-31/6
Best ordinaries.....	21/6	21/6	29/-30/
Cargo qualities.....	20/	20/	21/-26/
Inferior smalls	18/	18/	20/-23/
Best dry coals	30/	30/	42/6-45/
Ordinary drys	28/6	28/6	40/-42/6
Best washed nuts	30/	30/	36/-38/
Seconds	28/6	28/6	34/-36/
Best washed peas.....	27/6	27/6	33/-35/
Seconds	26/6	26/6	31/-33/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	45/-46/
Western-valleys	29/	29/	43/-45/
Eastern-valleys	29/	29/	41/-43/
Inferior do.	28/	28/	39/-41/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	40/-42/6
Through-and-through	—	—	34/-36/
Small	26/	26/	32/-33/
No. 2 Rhondda—			
Large	27/	27/	35/-36/
Through-and-through	25/	25/	28/-30/
Small	20/	20/	24/-25/
Best patent fuel	30/	30/	44/-46/
Seconds	—	30/	42/-44/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	52/-57/6
Pitwood (ex-ship)	59/-61/	58/-60/	44/-45/

* Nominal.

much disturbed at the frequency of unauthorised strikes, and they complain that the men are getting more inclined to take matters in their own hands and go their own way, despite the advice of their acknowledged leaders. Mr. F. L. Davis pointed out at a meeting of the Conciliation Board a few days ago that since July there had been 30 unauthorised stoppages, which was a far greater number than in any corresponding period, and he referred to the necessity of the Government exercising more disciplinary control of the men as well as the mines. Patent fuel and coke are in abundant supply, quotations being on the fixed levels. Pitwood is scarce, and the problem is becoming more difficult week by week. It is stated that the quantity of English timber coming forward is not nearly sufficient to meet requirements, and the authorities are being pressed to allow more tonnage to be employed in the importation of mining timber. Prices remain steady on the basis of 59s. to 61s. per ton.

IRON.

There is firmness in all departments of the iron and steel market, and outputs are being maintained at their maximum. In the tin-plate trade particularly, makers are so fully booked, that they are disinclined to entertain further business. The supply of steel bars is irregular and restricted, owing to the demands made in other directions. Prices remain on the basis of 30s. per box for standard sizes. Receipts from works were not quite so heavy, being 17,781 boxes compared with 20,588 boxes the previous week, and 33,861 boxes in the corresponding week of last year. Shipments on the other hand were heavier, being 11,735 boxes against 9,946 boxes the previous week and 39,020 boxes a year ago. Stocks in hand at the docks warehouses and vans now amount to 71,306 boxes compared with 104,304 boxes at the corresponding date of 1916. All blast-furnaces and rolling mills are fully employed, and the output is steadily increasing. Iron ore supplies are satisfactory. In the galvanised sheet trade there is no change, and works are chiefly employed in the execution of work for the British and Allied governments. Prices in all cases are nominal. The scrap metal market is firm, and maximum rates are being obtained.

Swansea.

COAL.

The trade of the port last week showed some improvement, the shipments of coal and patent fuel amounting to 69,516 tons. The anthracite coal market continued very firm this morning. There was a good demand for large, and machine-made sizes were very difficult to obtain. Culm and duff are in slightly better request. Steam coal and bunkers were unchanged.

Llanelli.

COAL.

Collieries are at present having fewer idle days each week than was the case some weeks back. Tonnage arrivals are, however, still short of the requirements of the market, and until there is an improvement in this respect it will be difficult to give anything like prompt clearance to orders. In the anthracite section of the market, large kinds of the better grades are still a good enquiry, and supplies are on the short side. Nuts and beans are in strong demand, and buyers are unable to secure all their requirements. Cobbles are inclined to be easy, and peas are also rather slow. Culm and duff show no improvement, and stocks are on the heavy side. In the steam coal section, large kinds of the better grades are firm, but owing to the unfavourable tonnage position, throughs and smalls are irregular, and stocks of the latter quality accumulating.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/6
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-42/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-31/
Seconds	34/	34/	—
Thirds	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm.....	13/	13/	14/6-15/
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	26/-29/6
Smalls	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

The Controller of the Foreign Trade Department has issued a new list of additions to the statutory list of firms of enemy nationality or enemy association with whom persons in the United Kingdom are forbidden to trade. Copies of this list can be obtained at a trifling cost from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C.

Prospecting in the Litry (Calvados) Coal Area.—The French Minister of Public Works has notified the President of the General Council of Calvados that two boreholes will be put down near St. Martin-de-Blangy on the advice of the French Geological Survey, and under the direction of M. Bigot, of Caen. Funds have been provided for this undertaking. In addition, Messrs. Schmieder et Cie., of Creusot, have been authorised to carry out a series of borings to the west of the old Litry concession and to the east of Plessis (Manche). Work will shortly begin at St. Froment on the presumed westward extension of the Litry basin, which is believed to be very rich in coal of superior quality.

THE LONDON COAL TRADE.

THURSDAY, SEPTEMBER 20.

Very little change has taken place in the London coal trade on the London Coal Exchange. The demand is as strong, although the quantities coming forward are undoubtedly improving. The merchants at all the various depots are strenuously endeavouring to obtain a fair amount of stock coal, in anticipation of the winter demand. The balance of unexecuted orders has kept the delivery trade busy, and consequently the amount which the traders are enabled to put on the ground as a reserve is comparatively small. The Controller has, however, in a multitude of cases substituted coal from Derbyshire, Nottinghamshire, and Leicester collieries for the quantities formerly sent from Durham and Lancashire, and the merchants are eagerly pressing for the new coal to come forward; but up to the present time very little of this has been received. The conglomeration of untried coals has naturally led to much confusion, but the shortage has inclined everyone to make the best use of the qualities offering; and the keen desire to work with the Controller in his difficult position makes light of what in ordinary circumstances would be overwhelming difficulties. In the seaborne market, a good demand prevails for tonnage, but vessels are scarce, and chartering is very slow. Freight rates have slightly advanced during the week, and fixtures have been made at 19s. to 20s. from the Humber to London, and 20s. from the Tyne to London. A total of 32 contract cargoes arrived in the River Thames for Monday's market, and 10 for Wednesday. All seaborne house coals are selling freely, and the vessels arriving, which are principally loaded with gas coals, are enabling the various gas companies to lay in a good stock. Hard steam coals continue scarce. Bakers' nuts are in good demand. Slacks are moving freely, and although fine slacks are a drug on the market, the nutty slacks are selling well. The reports from the various depots show that the volume of trade doing is somewhat better than during the earlier summer months, and supplies are more satisfactory. Merchants generally are more hopeful now as to the back orders, and also as to securing a fair quantity for stock purposes. Already some of the undesirable qualities have straightened out, and concessions have been made which would tend to change the allocation of some of the coal originally intended to take the place of coal so well known in the London markets. The new arrangements as to loading and commandeering private owners' wagons for munition and public institution orders has been felt very keenly by the owners of the wagons, especially where they are in districts and areas outside the range of the new regulations; and in order to keep control over their own wagons special arrangements are being made for the empties to run only to the collieries which can supply coal for their own distinct area. Prices are unaltered, but the new scale of prices for factors' profits is at the present time absorbing a good deal of attention, and considerable care is exercised now in dealing with the small quantities available. The régime of buying coal on speculation is to a very large extent dead, and factors are careful in dealing with anyone who is likely to re-sell the coal again. The Norwegian State Railways are reported to have bought the 18,500 tons of hard steam coal for delivery over October and November, and the prices given range from 29s. 6d. to 30s. per ton f.o.b., plus a small percentage for merchants' profits. All the coal bought is from the Tyne district. Negotiations are reported for a further quantity (probably 18,500 tons) for delivery over November and December.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, SEPTEMBER 14. — The seaborne house coal market was rather quiet to-day, but no sales reported. Cargoes, 24.

MONDAY, SEPTEMBER 17.—There was a good enquiry for seaborne house coal at to-day's market, but nothing pressing for sale. Cargoes, 32.

WEDNESDAY, SEPTEMBER 19. — The seaborne house coal market was quiet to-day, with no cargoes pressing for sale. Cargoes, 10.

THE BY-PRODUCTS TRADE.

Tar Products.—The demand for pitch is well maintained, at about 47s. 6d. f.o.b. London, but provincial makers are still unable to take advantage of the export business on account of transport difficulties and lack of shipping facilities. Provincial quotations range from 16s. 6d. to 20s. per ton, with offers below these figures, which are promptly declined, with the result that stocks are accumulating. Crude benzol and dehydrated tar pass under official control as from the 1st proximo, but the embargo placed on these products is already causing difficulties. There is increasing demand for solvent naphtha in big lots, but it is difficult to see where supplies are coming from, and a further improvement in price has taken place. Creosote remains unchanged. Average quotations are as follow:—Coal tar, 23s. 3d. to 28s. Pitch, east coast, 17s. to 18s.; west coast, Manchester, 17s. 6d. to 18s. 6d.; Liverpool, 17s. 6d.; Clyde, 19s. to 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 4½d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 2s. 1d. to 2s. 3d. Heavy naphtha, north, 1s. 4d. to 1s. 6d. Heavy oils, in bulk, north, 3¾d. to 4½d. Carbollic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 4½d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The quantity of sulphate exported during last month was just over 7 000 tons, and there seems no reason to expect any expansion in this branch of the trade. The home outlook is hopeful. The coming season will see a greatly increased use of the fertiliser, with every likelihood of a marked improvement in the permanent home trade. Quotations: £15 7s. 6d. prompt; October-December, £15 15s.; January-May 1918, £16 7s. 6d.

THE TIN-PLATE TRADE.

Liverpool.

There is nothing new to report. Merchant transactions are being paid as a rule, net f.o.r. at works, and there transactions were made at a shade below the ruling mainly in "lights." A fair amount of Government tin was again reported for the needs of our Allies. Works are now comfortably booked up for the next three months, and are not anxious to commit themselves further ahead.

MINING EMPLOYMENT STATISTICS.

The *Trade Labour Gazette* reports that coal mining during August was good in Cumberland, Durham and Fifeshire. There was a decrease of 441 (or 0.1 per cent.) in the number of workpeople employed at collieries making returns compared with July, and an increase of 22,298 (or 4.3 per cent.) on a year ago. Of the 536,662 workpeople included in the returns for August, 266,339 (or 49.6 per cent.) were employed at pits working 12 days during the fortnight to which the returns relate, while a further 136,532 (or 25.4 per cent.) were employed at pits working 11 but less than 12 days.

Districts	Work-people employed in Aug. 1917.*	Average No. of days worked per week by the collieries in fortnight ended					Inc. (+) or dec. (-) in Aug. 1917, on a	
		Aug. 1917.	Aug. 25, 1917.	July 21, 1917.	July 26, 1916.	Aug. 26, 1916.	Month ago.	Year ago.
<i>England & Wales.</i>		Days.	Days.	Days.	Days.	Days.	Days.	
Northumberland	32,305	4.36	4.04	5.34	5.34	+0.32	-0.98	
Durham	87,971	5.14	4.93	5.56	5.56	+0.21	-0.42	
Cumberland	4,173	5.50	5.56	5.54	5.54	-0.06	-0.04	
South Yorkshire	63,045	5.71	5.91	5.73	5.73	-0.20	-0.02	
West Yorkshire	23,337	5.64	5.85	5.72	5.72	-0.21	-0.08	
Lancs. & Cheshire	51,837	5.69	5.63	5.67	5.67	+0.06	+0.02	
Derbyshire	32,137	5.84	5.75	5.87	5.87	+0.09	-0.03	
Notts and Leicester	32,568	5.68	5.69	5.53	5.53	-0.01	+0.15	
Staffordshire	27,994	5.60	5.64	5.75	5.75	-0.04	-0.15	
Warwick, Worcester and Salop	8,171	5.87	5.87	5.84	5.84	—	+0.03	
Gloster & Somerset	6,247	5.42	5.22	5.96	5.96	+0.20	-0.54	
North Wales	8,040	5.92	5.95	5.73	5.73	-0.03	+0.19	
South Wales & Mon.	109,196	5.92	5.44	5.93	5.93	+0.48	-0.01	
Total	487,021	5.56	5.42	5.71	5.71	+0.14	-0.15	
<i>Scotland.</i>								
West Scotland	22,328	5.39	3.61	5.37	5.37	+1.73	+0.02	
The Lothians	1,471	5.37	4.15	5.44	5.44	+1.22	-0.07	
Fife	25,386	4.90	2.57	5.42	5.42	+2.33	-0.52	
Total	49,185	5.14	3.09	5.40	5.40	+2.05	-0.26	
<i>Ireland</i>	456	5.04	5.45	5.50	5.50	-0.41	-0.46	
Total, U.K.	536,662	5.52	5.20	5.68	5.68	+0.32	-0.16	

* At the collieries included in the table.

† Time was lost on account of holidays.

The following table shows the numbers employed and the average number of days worked, distributed according to the principal kind of coal raised at pits at which the workpeople were engaged:—

Description of coal.	Work-people employed in Aug. 1917.*	Average No. of days worked per week by the pits in fortnight ended					Inc. (+) or dec. (-) in Aug. 1917, on a	
		Aug. 1917.	Aug. 25, 1917.	July 21, 1917.	July 26, 1916.	Aug. 26, 1916.	Month ago.	Year ago.
		Days.	Days.	Days.	Days.	Days.	Days.	Days.
		1917.	1917.	1917.	1916.	1916.	ago.	ago.
Anthracite	6,462	5.68	5.62	5.87	5.87	5.87	+0.06	-0.19
Coking	28,080	5.47	5.34	5.72	5.72	5.72	+0.13	-0.25
Gas	32,910	4.97	4.73	5.59	5.59	5.59	+0.24	-0.62
House	55,023	5.56	5.51	5.71	5.71	5.71	+0.05	-0.15
Steam	187,098	5.60	5.26	5.76	5.76	5.76	+0.34	-0.16
Mixed	227,089	5.53	5.13	5.62	5.62	5.62	+0.40	-0.09
All descriptions ...	536,662	5.52	5.20	5.68	5.68	5.68	+0.32	-0.16

* At the collieries included in the table.

† Time was lost on account of holidays.

Iron Mining.—Employment continued very good at iron mines; returns received for each of the three periods named below, relating to the same mines and open works in each case, show that 18,119 workpeople were employed at mines included in these returns in August 1917, an increase of 580 (or 3.3 per cent.) compared with July, and of 2,183 or 13.7 per cent. compared with a year ago.

Districts.	Work-people employed in Aug. 1917.*	Average No. of days worked per week by mines in fortnight ended					Inc. (+) or dec. (-) in Aug. 1917, on a	
		Aug. 1917.	Aug. 25, 1917.	July 21, 1917.	July 26, 1916.	Aug. 26, 1916.	Month ago.	Year ago.
		Days.	Days.	Days.	Days.	Days.	Days.	Days.
		1917.	1917.	1917.	1916.	1916.	ago.	ago.
Cleveland	7,393	5.91	6.02	5.98	5.98	5.98	-0.11	-0.07
Cumberland and Lancashire	5,005	6.00	6.00	5.93	5.93	5.93	—	+0.07
Scotland	709	6.00	3.90	5.93	5.93	5.93	+2.10	+0.07
Other districts	5,012	5.91	5.79	5.82	5.82	5.82	+0.12	+0.09
Total	18,119	5.94	5.87	5.92	5.92	5.92	+0.07	+0.02

* At mines included in the returns.

† Time was lost on account of holidays.

Pig Iron Industry.—Employment continued good. It showed a slight decline compared with the previous month, but was better than a year ago. Shortages of materials and of labour were reported from most districts.

District.	No. of furnaces, included in the returns, in blast at end of			Inc. (+) or dec. (-) in Aug. 1917 on a	
	Aug. 1917.	July 1917.	Aug. 1916.	Month ago.	Year ago.
	Days.	Days.	Days.	Days.	Days.
<i>England & Wales:</i>					
Cleveland	75	77	71	71	-2 ... + 4
Cumberland & Lancs.	31	34	33	33	-3 ... + 2
S. and S. W. Yorks	13	13	11	11	— ... + 2
Derby & Nottingham	32	32	26	26	— ... + 6
Leicester, Lincoln and Northampton	29	29	23	23	— ... + 1
Staffs and Worcester	30	30	30	30	— ... —
S. Wales & Monmouth	12	12	11	11	— ... + 1
Other districts.....	5	5	5	5	— ... —
<hr/>					
<i>Scotland</i>	227	232	215	215	- 5 ... +12
.....	61	61	63	63	— ... - 2
.....	58	293	278	278	- 5 ... +10

Steel and Galvanised Sheet Trade.—The number of mills making steel and galvanised sheets, working at the end of August, showed an increase of one compared with the previous month, but a decrease of eight on a year ago. The decline compared with a year ago was chiefly due to the restriction in the supply of steel bars.

August 25, 1917, was 676,471, showing an increase of 16,226 (or 2.5 per cent.) as compared with the previous month, and of 52,065 (or 8.3 per cent.) on a year ago.

Engineering Trades.—These trades continued to be extremely busy during August, and a great amount of overtime was worked. The usual August holidays, however, were commonly observed, works being stopped for two or more days.

Trade unions with 293,508 members (mostly in skilled occupations) reported 0.1 per cent. unemployed at the end of August, compared with 0.2 per cent. a month ago and a year ago.

Tin-plate.—The number of tin-plate mills working at the end of August showed an increase of seven compared with the previous month, but a decrease of 104 on a year ago. The decline compared with a year ago was chiefly due to the restriction in the supply of steel bars.

Steel and Galvanised Sheet Trade.—The number of mills making steel and galvanised sheets, working at the end of August, showed an increase of one compared with the previous month, but a decrease of eight on a year ago.

Nuts, Bolts, Nails, &c.—With nut and bolt makers employment continued good at Birmingham, Smethwick, Darlaston and on the Tyne, and very good at Blackheath and Halesowen. It was again very good with shoe rivet and wire nail makers at Birmingham.

Tubes.—Employment was fair at Wednesbury; it continued good at Birmingham and in South Wales and Monmouthshire.

Chains, Anchors, &c.—At Cradley Heath employment continued good with chain, anchor, &c., makers, and very good with block makers. It was good with anchor-smiths on the Tyne and Wear. Employment was good with anvil and vice makers at Dudley, and with axle and spring makers at Wednesbury.

Sheet Metal Workers.—Employment generally continued good, and a large amount of overtime was still worked.

Wire.—Employment continued fairly good, but was still hindered in some districts by a shortage of materials.

Disputes.—Eleven new disputes in coal mining occurred, affecting 22,500 persons directly and 13,500 indirectly.

Fatal Accidents.—The total number of fatal accidents at mines was 100, a decrease of 17 on a month ago and of 10 on a year ago.

SOUTH WALES MINING TIMBER TRADE.

The South Wales mining timber trade has been unusually quiet recently, particularly as regards foreign supplies. The quantity brought to this district last week totalled only 4,783 loads, all of which came from France, one cargo alone consisting of 3,120 loads, and out of the total of 4,578 loads delivered at the port of Cardiff, no less than 4,098 loads were for the agents which supply the Admiralty collieries. Private firms, therefore, have done very little. The actual returns and the consignees were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Sept. 8	Lysberg Limited	144
" 10	Lysberg Limited	114
" 10	Lysberg Limited	3,120
" 12	Morgan and Cadogan	480
" 13	Lysberg Limited	564
" 13	Lysberg Limited	156
Total		4,578

Swansea:—

Sept. 10	Not named	143
" 11	Not named	62
Total		205

No imports were reported at Newport.

The market has ruled quietly firm at 60s. to 61s., though up to 62s. has been obtained for supplies of special lengths, and that was for Irish wood. Naturally, as collieries have not been working at all regularly and well, their requirements in the timber line have not been so heavy, but this fact has been set off by the diminished supplies of pitwood available, with the consequence that the market has kept firm, though showing very little life. Irish timber is reported to give very great satisfaction to the collieries in South Wales, and it is probable that an increasing quantity will be brought over, but in view of the fact that cutting during the winter months will be more restricted and that the supplies obtained nearer the South Wales coal field will scarcely keep up to the quantity now being provided, it is expected that serious representations will later on be necessary to induce the Import Restrictions Department to permit larger quantities to be imported from France and Portugal, otherwise the supplies for the collieries will be inadequate.

Imports of Pit Props.—In August, 77,763 loads of pit props, of the value of £351,609, were imported into the United Kingdom. The imports in August last year were 199,158 loads, value £775,563, and in August of the preceding year 200,206 loads, value £461,500.

Imports and Exports of Coal Products.—In August, the imports of coal products, not dyestuffs, amounted to 5,000 cwt., of the value of £65,139, compared with 3,792 cwt., value £58,270, a year ago. The total imports in the eight months just ended was 33,868 cwt., value £406,222, compared with 22,150 cwt., value £179,347, in the corresponding period of last year. The value of coal products, not dyestuffs, exported during August was £235,605, thus bringing the value of such exports during the eight months to £2,049,435.

Japanese Coal Exports.—During the first four months of this year, the export of Japanese coal amounted to 983,429 tons, valued at 8,149,110 yen. Compared with the corresponding period of last year, these figures show a decrease of 124,125 tons, but an increase in value of 847,041 yen. The following were the largest buyers, with quantities and values of product taken:—China, 355,081 tons, 2,596,149 yen; Hong Kong, 278,341 tons, 2,231,815 yen; Straits Settlements, 173,444 tons, 1,677,727 yen; Philippines, 111,191 tons, 1,001,899 yen.

THE AMERICAN COAL TRADE.

The condition of the bituminous market is chaotic (says *Coal Age*, September 1). The fixing of prices by Presidential order at a level approximately one-third lower than that agreed upon by the operators has had the effect of practically withdrawing all spot coal from the American market. Prior to the announcement of price fixation, many contracts were entered into at prices considerably higher than those named, the idea of the consumers in entering into these contracts being that it would be better and more to their interest to pay a higher price for their fuel and receive preference in delivery than to enjoy a lower price but not get their coal. The result has been that as soon as prices were fixed, what coal has been produced has been applied to existing contracts, and none or only small quantities placed upon the market. The prices as fixed, it is claimed, are so low that many mines, even some of fairly large size, will be driven from the coal business unless some readjustment is made. Delegations from various parts of the country have proceeded to Washington in an endeavour to get the prices on bituminous coal increased, and save themselves from financial ruin. Meanwhile, of course, existing contracts are in full operation, and coal will continue to come forward for those who arranged for spot deliveries prior to the day the President's order became effective. In the Pocahontas and New River fields, the new schedule will probably allow a fair margin; but for the reasons outlined above, we are not in position this week to report any quotations on bituminous. The market is practically at a standstill.

The fixing of prices on anthracite has had but little effect upon the market. It seems to be the consensus of opinion among all concerned that the Government has been decidedly fair in the matter of prices accorded to the anthracite industry. These prices coincide closely with those of the larger companies, and they have consequently not affected the general market to any appreciable degree. Anthracite mines are working with fair steadiness, and the output is perhaps larger per day and per man than any time before in the history of the industry. Considerable quantities of this fuel are moving northward to the Lakes for transshipment west and north-west, while the supply to the Atlantic seaboard would appear to be about the same as in previous weeks. The prices per gross ton f.o.b. cars at mines for line shipment are as follow:—Broken, 5.10 dols.; egg, 4.35 dols.; stove, 4.60 dols.; nut, 4.70 dols.; pea, 3.30 dols.; buck, 2.90 dols.; rice, 2.40 dols.; boiler, 2.20 dols.; barley, 1.90 dols.

Freights.—Whether or not the recent Washington ruling as to the price of coal will have any effect on the export coal freight market is as yet undetermined. None of the recent fixtures for export coal have been reported. Rates on coal to Europe by steamer are as follow:—Marseilles, about 100 dols.; Spain (Atlantic), about 42.50 dols.; Spain (Mediterranean), about 45 dols.

BOOK NOTICES.

Compressed Air Practice in Mining. By DAVID PENMAN. 221 pp. 7½ in. x 5 in. 113 figs. London: Charles Griffin and Company Limited; 1916. Price, 5s. net.

The author states that this book is an endeavour to supply a text-book suitable, in the first place, for students in mining schools and colleges, and also serviceable to those in practice. It is, in fact, based upon lectures given to students, and aims at affording a thorough understanding of the principles underlying the generation and use of compressed air in mining practice. Into these he at once plunges, and before the first 10 pages are traversed the student will find himself at grips with the theory of isothermal and adiabatic compression and expansion. This subject is clearly explained, and its practical bearing is illustrated by a number of numerical examples, the solution of which involves no higher mathematical knowledge than the logarithmic solution of exponential equations. When we come, however, to the second chapter, dealing with the efficiency of compressors and air motors, the integral calculus is introduced in connection with finding the work done in compressing air. The methods of testing a compressor are then described. The value of indicator diagrams in showing the defects of compressors is clearly explained, and methods are described for determining the index of the compression curve. Various types of reciprocating air compressors are next described, and are followed by a chapter on the turbo-compressor, with a summary of their advantages over the piston type.

The author next deals with the transmission of power, including sections on testing for leakage and on frictional losses calculated by D'Arcy's formula. Various methods of measuring the rate of flow of air in pipes are also discussed.

In connection with the practical installation of compressors in mines, there are several advantages in inbye compression, but these are somewhat offset by a number of objections which the author clearly sets forth. Amongst the compressors well suited for underground work, the Reavell two-stage and single-stage quadruplex are mentioned; while the machines by Broom and Wade, the Ingersoll-Rogler, and the Temple-Ingersoll are all to be regarded as fitted for inbye work.

A chapter is given on coal-cutting machinery, the various types of which are described in some detail, and the conditions affecting their air consumption are explained. The applications of compressed air to underground conveyors, haulage, and rock drills are illustrated, and the book concludes with a comparison between compressed air and other modes of power transmission. In an appendix is a list of 50 questions selected from mining examination papers. It is an admirable students' book, and should have a large demand.

HIGH-TENSION CURRENT IN MINES.*

By J. R. BROWN.

In a recent technical paper of the United States Bureau of Mines, a tension of 300 volts or less is termed "low"; greater than 300 and up to 650 "medium"; above 650 "high." The peculiar conditions existing in mines make necessary the use of "low" or "medium" voltages for haulage and other portable motors. Moreover, if we are trying to live up to the spirit of "safety first," only voltages of 300 or less, such as are described by the United States Bureau of Mines as "low," should, except in special cases, be used for haulage or portable machines.

With "low" voltage, the distance that electric current can be transmitted without excessive loss or

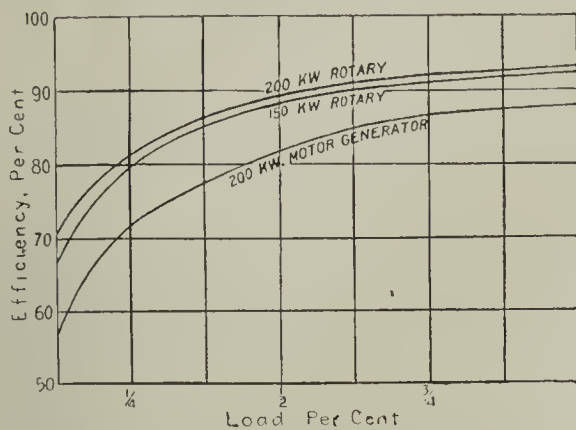


FIG. 1.

a serious reduction in voltage is limited. As the current is inversely proportional to the voltage for a given connected load, and the losses are proportional to the square of the current, it is easy to show marked savings by the use of the higher transmission voltages. These savings show up in the amount of copper required in the circuit, the size of coal pile, the output of the machines and the cost for the maintenance of the motors.

Reduced voltage causes motors to operate at low efficiency and at underload and underspeed. With reduced voltage the current is increased, and as the heating is proportional to the square of the current, the motor soon overheats and burns out, causing high repair charges, and rendering the equipment unproductive for many hours. With reduced voltage at a cutting machine, the output of coal per shift recedes and the motor makes frequent trips to the repair shop. With reduced voltage, the haulage motor hauls fewer cars per trip or makes fewer trips per shift, and is often out of service for repairs.

It is not possible to state a rule for finding the economical limit of distance for "low" voltage transmission because it will vary with the nature of the connected load. A mine that cuts and hauls on the same shift has a very different transmission problem from one that cuts on one shift and hauls on another. The nature and development of the mine also have a very definite bearing, so that the only way to determine the economic value of a given electrical system is to figure it out for any mine in question.

It may be easy to show that the losses are much reduced as the voltage is increased, but on a given property the cost of producing, insulating and transforming the higher voltage may more than offset the saving due to reduced losses. High voltage should be considered only in alternating current, as it does not appear practical to use high voltage direct current for mining.

Where power is purchased, or where a central station serves several mines, there can be little question but that the high tension alternating current transmission system is the one to use, but beyond this it is impossible to make a broad statement. Assuming a high tension supply to the mine, the next step is to determine what to use inside the mine. At the present state of development, alternating current should not be considered for haulage motors, and if electric haulage locomotives are used with a trolley, 250-volt direct current may be furnished by converting the high tension alternating current through a rotary converter or motor generator set. Cutting machines and portable pumps can be operated either by direct current from the haulage circuit or by "low" voltage alternating current, induction motors being used. The "low" voltage three-phase alternating current circuit is connected through a bank of three transformers to the high tension system. The three-phase induction motor is more rugged and freer from troubles than the direct current motor, as it has no commutator or brushes, and will "quit" when overloaded or subjected to a reduced voltage, and so is not likely to be burned out like a direct current motor. This feature of the induction motor of not operating when the voltage has dropped is really more of an advantage than a fault, as it demands better voltage regulation, which in turn means efficiency and increased production.

For the fans and hoists, "high" voltage alternating current of 2,200 volts can be used economically without special transformers. For tippie motors and for operating the shop, "low" voltage alternating current induction motors served by a bank of transformers will give good service. All permanent lighting circuits can be furnished with "low" voltage alternating current through transformers. Temporary light circuits in the mine may be connected with the haulage circuit.

For a new development it is often the best policy to purchase power and instal the transformers above ground, and lower a low voltage three-wire cable to the mine through a borehole to feed three-phase induction motors on the cutting machine. Such a scheme

gives good results at a minimum cost of equipment where the mine has not been developed to a degree making electric haulage necessary.

For a mine of moderate size, where the distance from the power house or sub-station to the most distant load is not great, it would hardly prove profitable to use high tension alternating current in the mine. For a large development, the use of high tension alternating current will probably be most economical. If the power is purchased from a distant power house, 33,000-volt current will probably be delivered to a sub-station, where it will be transformed to 2,200 volts. The 33,000-volt line must be equipped with disconnecting switches and electrolytic lightning arresters, and if the 2,200-volt secondary circuit passes outside the sub-station above ground, it must be equipped with lightning arresters. It is best, however, to carry this secondary circuit underground in a three-wire lead covered or armoured cable.

When high tension power is generated at the mine, the voltage is usually 2,200 volts. Where power is purchased, an extra independent transmission line should be connected up, capable of operating the fan at not less than half-speed, and of running the hoist

synchronous converter will carry a momentary overload about twice that of a synchronous motor. If, however, it is possible to use a smaller unit, with the necessary transformers will cost less than the equivalent motor set. In nearly all cases of mine load the peak determines the capacity of the machine, and this overload feature of the converter is important.

The motor set would give the best power factor correction if it were possible to make adjustments for load variation, but this is rarely done, and when it is not, the rotary converter can be made to give an average power factor higher than that of the motor set.

Well Installed 2,200-volt Circuit is Safe.

On an installation for a larger mine the 2,200-volt three-phase alternating current circuit is carried underground. There rotary converters are connected to supply power for the haulage, and transformer stations, distributor at load centres, supply the "low" voltage alternating current induction motors on the cutting machines and pumps. This makes a satisfactory and efficient system of distribution when conditions are right for its installation.

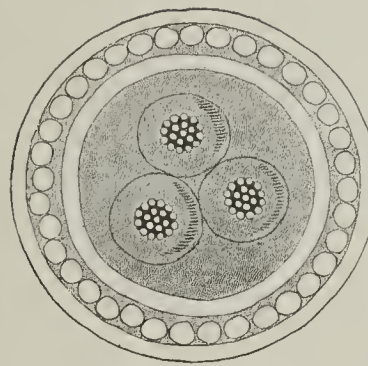


FIG. 2

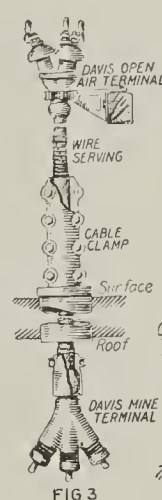


FIG. 3

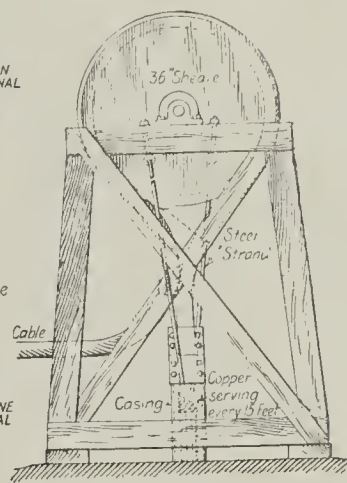


FIG. 4

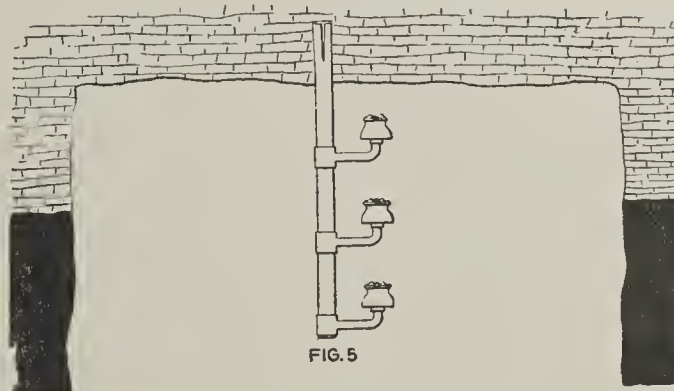


FIG. 5

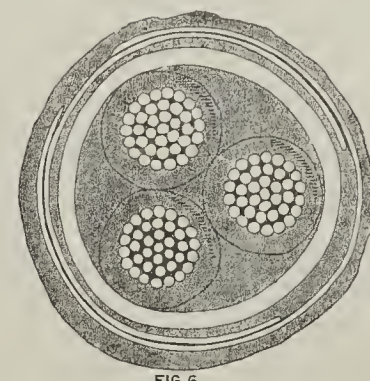


FIG. 6

FIGS. 5 AND 6 THREE-WIRE SUPPORT IN AIRWAY AND INSULATED TRANSMISSION CABLE

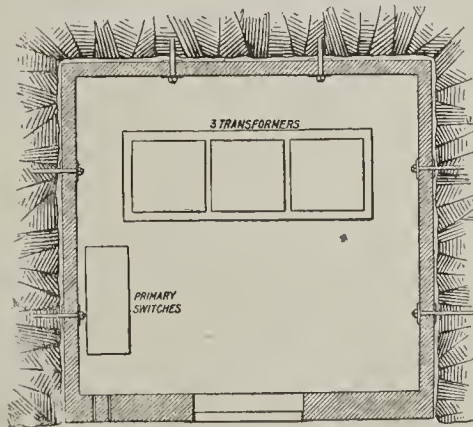


FIG. 8

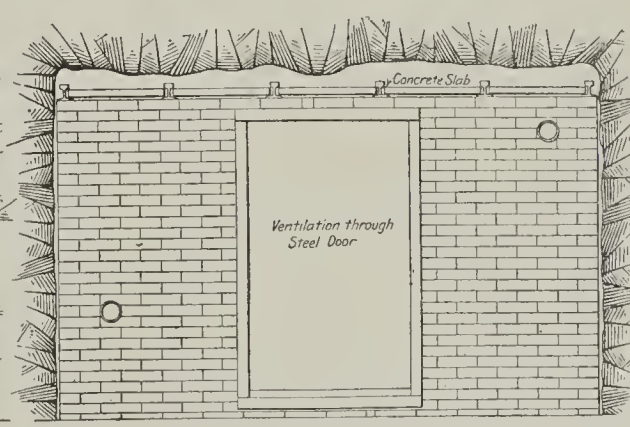


FIG. 9

FIGS. 8 AND 9. PLAN AND ELEVATION OF AN UNDERGROUND TRANSFORMER ROOM

under reduced load, so that the men can be safely drawn from the mine should an accident on the main line temporarily shut off the current.

In lieu of this, oil engines may be installed to meet such emergencies. Where power is generated at the mine, the hoist and fan should be operated by steam engines, or else steam units should be installed that can be used as reserves in case of necessity.

For mines already equipped with direct current cutting and haulage motors, but changing to purchased power and alternating current supply, the entire load underground should be supplied through rotary converters or motor generator sets. The question, then, is whether the converters are to be placed outside the mine or underground. Where the load can readily be handled by one machine, it should be placed outside, but where two or more machines will show economy, then they should be placed inside, and carefully located, so as to give the best load distribution. In the latter case, it will be necessary to carry 2,200-volt alternating current underground.

It is now considered good practice to use several converters connected in parallel on the direct current side and operated without continuous attendance. By using an automatic re-closing circuit breaker on the direct current side, and introducing a time element into the switch on the alternating current side, an attendant for closing the feeder breakers upon short circuit or overload is not necessary, and practically automatic operation is secured. The converters are inspected, oiled, cleaned, and adjusted when started on a shift, and again when closed down, and at all other times the door is locked.

As shown by the curves in fig. 1, the latest designs of six-phase inter-pole rotary converters, with their attendant transformers, will give higher efficiency than a synchronous motor generator set, and as a

A 2,200-volt circuit can be introduced into a mine with perfect safety if it is properly done. With "low" voltage it is possible to keep the motors turning with poorly installed circuits, but with "high" tension only the best work and design will give any service

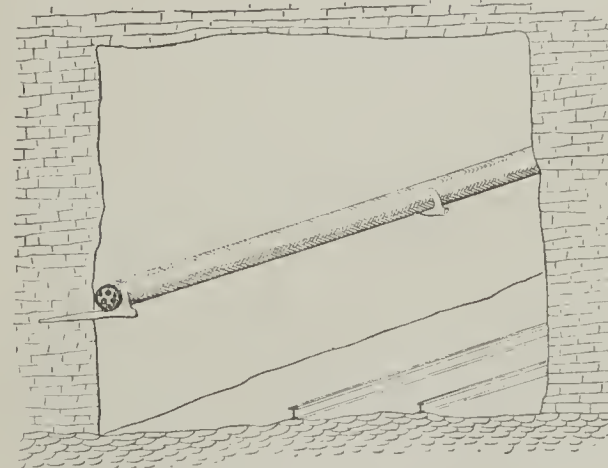


FIG. 7 CABLES SUPPORTED BY HANGERS TO RIB

whatever. It pays even with "low" voltage to make high-class installations, but with "high" voltage not only pays, but is absolutely essential.

For some mines where the rotaries for the haulage system are on the surface, it is best to carry the 2,200-volt circuit for the cutting machines above ground and enter through a borehole located at the centre of the cutting machine load, transformers being installed at the bottom of the borehole. For all

* From a paper read before the Kentucky Mining Institute.

three-phase circuits entering the mine, it is necessary to use a three-wire cable insulated for twice the voltage, generally 5,000 volts. The insulation must be of great mechanical strength, and does not need to be very high in cost, is varnished and is protected from moisture by a lead sheath about $\frac{1}{2}$ in. thick. For the lead sheath is covered with jute and compound. A layer of steel wire (see fig. 2) is then wound with a slight twist around this, and another covering of jute and compound surrounds the whole. The steel wires act as an armour, and also carry the weight of the cable. At intervals of about 20 ft. these steel wires are served with wire to hold them in place and make them grip the lead sheath. A good mounting for a "high" tension borehole cable is shown in fig. 3. Fig. 4 shows a method of holding a heavy borehole cable using two steel strands served to the outside of the cable every 15 ft. and carrying the mechanical load which might be too much for the standard cable.

"Low" or "medium" voltage cables entering boreholes have the same mechanical difficulties to overcome, but, of course, need not have insulation of equal resistance. A cable entering through a deep shaft must meet the same mechanical loads as one entering through a borehole.

Bare wire circuits carrying 2,300-volt three-phase alternating current have been installed in air courses, the circuit being supported on porcelain insulators. This, of course, is a cheap installation, but it does not offer the safety afforded by an armoured cable (fig. 5).

The best plan is to use a three-wire armoured cable (fig. 6), which has a steel tape wound over the lead sheath and covered with jute and compound. It should either be laid in a trench or carried by hangers let into the rib. All cables should be large enough to carry continuously twice the working voltage. The lead sheath and armour of all cables must be grounded effectively. Before installing cable feeders, whether buried in the floor or supported on the rib or from the roof, they should be located on a map kept expressly for this purpose. After installation, an inspection should be made, and the map should be checked to be sure it is correct. Cables carried on the rib should hang about 2 or 3 ft. from the floor, and must have steel armour. When so installed, they will rarely be injured by falls. When installed in a trench, they should be drawn through a pipe or duct laid in concrete, provided with small manholes every 300 to 500 ft. so that in case of trouble only that amount of cable need be removed.

These manholes should be spotted so that all splices and branches are located in them. In making splices and branches in cables, a much better grade of work must be done than is usual on mine circuits. The individual wires of the cable must be carefully spliced, soldered, and insulated. The group of wires must then be enclosed in a lead sleeve, the joints wiped, and the sleeve filled with compound—a careful job, but well worth doing thoroughly. With careful installation the "high" voltage circuit can be operated with entire safety, and few or no interruptions.

Converter or transformer stations in the mine should be installed with care, and according to plans and drawings. Placing transformers where most convenient without first making a careful investigation of the load is bad practice, and will not give good results. The converter or transformer room should be closed to all persons except those authorised to care for or repair the apparatus, and must offer such protection that an ignorant person, even one who disobeys rules, cannot be injured by the current.

Transformer Room Should be Fireproof.

Some mines have used a wood lattice with locked door to protect transformers, but it is much better to build a fireproof room. The room may be made with concrete or brick walls, floor, and roof, and provided with a locked iron door with ample openings for ventilation. The door sill should be raised a sufficient height above the floor to keep the transformer oil from flowing out into the mine in case of an explosion in one or more transformers. The transformers should be raised so that they may easily be drained.

A bucket of clean, dry sand should be placed in each room for fire fighting, and one, or better two, Pyrene, or similar, fire extinguishers, suitable for extinguishing oil or electric fires, should be mounted on the outer wall near the door.

The "high" voltage armoured cable should enter the room through the wall or floor, and connect with the high tension oil switches, and fuses mounted on the inside face of the wall. Where there are few stations, the cost may be lowered by having only fuses and no switches on the high-tension side of the transformers, but this requires cutting out the main feed to work on one transformer station.

Three transformers are required on a three-phase circuit, and are connected in delta. With this arrangement one transformer may fail and be cut out without interrupting the service, which will be taken care of by the other two.

In some mines the transformers are wound for 2,200 volts primary and 250 volts secondary, but as alternating current cutting machine motors will not operate under a greatly reduced voltage, some transformers are wound with two secondary taps, one for 240 volts and one for 275 volts. When the machines are cutting near the station, the 240-volt tap is used, but when the distance to the machines is great enough to cause a serious voltage drop, then the other tap is connected.

The secondary or low voltage feeders pass through the wall of the room to oil circuit breaker switches, mounted on the outside where the circuit can be controlled without entering the room. Three-wire low voltage cables may then be carried to the cutting face. The cables may then be attached to the machines by means of connectors, and as the machines are moved the points may be re-insulated. The benefits from the use of high voltage alternating current, it is essential to keep a

map of all circuits, and by careful records and tests change the stations from time to time so that they are near the centre of their load. It is necessary, therefore, to anticipate the load centre, and place a station beyond it, thus preventing too frequent changes. High voltage alternating current circuits and apparatus are now in successful operation in many mines, and those who operate them seem well satisfied with the results and state that they would instal alternating current again when developing new work.

The safety problem has been solved and now depends on careful installation; and the economy of the system depends largely upon the skill and planning of the electrical engineer.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The executive council of the South Wales Federation met in Cardiff on Saturday, and discussed a report by the Miners' Federation of Great Britain committee on the interview with the Chancellor of the Exchequer with reference to the levy of income tax. It was decided to ask the Chancellor to meet a deputation of the council to consider the matter further, and also to ask the Miners' Federation of Great Britain to put the question on the agenda of the conference to meet in London on September 26.

A mass meeting of workers of the Glamorgan Collieries, in the Rhondda, on Saturday, called for total abolition of the income tax, and a conference to demand 25 per cent. increase of wages.

The report issued by the South Wales Colliery Examiners on the private meeting in Cardiff on Saturday, states that the Coal Controller has intimated that until the Coal Owners' Association met to consider the matter in dispute, it would be inadvisable for him to take action. Notices which have been given by members of the association terminate at the end of the current month.

At the Federation executive meeting in Cardiff on Saturday, it was reported that attempts which had been made to settle the price-list dispute at Plymouth Colliery had failed. The Coal Controller had asked the council to appoint a deputation to meet him, with a view to trying to effect a settlement. Mr. Ben Davis, Mr. W. L. Cook, and Mr. B. Williams, with the secretary (Mr. T. Richards, M.P.), have been appointed.

A meeting of the South Wales Central Trimming Board on Monday considered an application for an additional $3\frac{1}{2}$ per cent. war bonus at two of the South Wales ports, which would make their payment to be 75 per cent. above tariff rates. The employers' section would not agree to the increase, but it was stated that the men could, if they wished, refer the matter to the Committee on Production.

Between 1,800 and 2,000 men were idle at the Llanbradach collieries on account of a grievance respecting the lamps. The men held a meeting on Sunday, and decided to stop work on Monday. Arrangements having been made with the agent of the company for four representatives of the men to examine the lamps and set aside those which were defective, the men went in on Monday, but the resumption was not general.

The Gwaun-cae-Gurwen dispute came before the Federation executive on Saturday, and the council decided that it should be brought before the emergency committee of the Conciliation Board. There was a great demonstration in the Amman Valley on the subject of the Gwaun-cae-Gurwen dispute, about 8,000 miners taking part. A resolution was passed supporting the men, and urging the workmen of the anthracite district to adopt a down-tools policy in the event of the Joint Emergency Committee not effecting a settlement. In this dispute, the case of the men is that, as the employers base their rate of wages on Lord St. Aldwyn's decision in 1912, it is lower by about 2d. per day than it was under the agreement of 1908, and that under a clause in the Minimum Wage Act, the agreement should still operate in their favour. The employers' case is that the men have accepted the Act in substitution of previous agreements, thus abolishing the Mabon arrangement; and this issue will doubtless be determined by the arbitrator whom the Coal Controller is appointing.

About 1,000 steel workers ceased operations because of a dispute as to dismissal of a foreman electrician from Briton Ferry Steel Works. On Saturday a meeting of members of the Steel Smelters' Union and other unions decided to stop work until the dismissed man has been reinstated.

Particular consideration was given at the meeting of the Conciliation Board to the numerous unauthorised strikes which have recently taken place in the coal field. Mr. F. L. Davis said that since July 23 there had been 30 stoppages without notice, and that the employers would be quite prepared to consider favourably any suggestion from the workmen's representatives for avoiding such stoppages and devising a method to expedite enquiries into disputes. The workmen's representatives agreed that strikes without notice should not take place. Ultimately, it was arranged that the general secretaries (Mr. F. A. Gibson and Mr. T. Richards, M.P.) should appoint representatives to enquire into questions of dispute, with authority to settle and to call in assistance from the General Emergency Committee if necessary.

The Conciliation Board had also before it the situation at Gwaun-cae-Gurwen Colliery, and it was argued out that the men should have referred the question to the Board for investigation before stopping. The workmen's representatives pointed out, in reply, that there were special circumstances in this case, and they desired that representatives should be at once appointed to investigate the dispute. Mr. F. L. Davis said that, ordinarily, the Board held that men who were idle contrary to the terms of the agreement should first return to work; but as there appeared to be special facts in this instance, the employers were agreeable to appointing representatives, without prejudice to their rights under the agreement, or establishing a precedent. Accordingly, four representatives were appointed to enquire into the dispute.—Other disputes came before the Board in the ordinary course, and were referred for investigation.

A mass meeting of miners employed at Cwmbran Colliery, Monmouthshire (Messrs. Guest, Keen and Company), was held on Sunday at Pontnewydd, Mr. Herbert Lewis presiding. Several matters of local interest were dealt with, and Mr. Gus Jenkins, who had been working in the "Billy" machine to check the amount of small coal contained in trams filled by the colliers, submitted his report. On an appeal for financial assistance on behalf of the Y.M.C.A. funds, it was decided that each full member of the lodge should contribute 6d. per week, and each half-

member 3d. per week, for 20 weeks. The question of calling for a levy for the Elled Colliery workmen, who are still on strike, was deferred, but it was decided to make a substantial grant forthwith.

A correspondent understands that the chairman of the Varteg United Colliery lodge of the South Wales Miners' Federation, Coun. W. L. Cook, J.P., Blaenavon, and Coun. W. Charles Watkins, J.P., Garndiffaith, have been negotiating with the management of the colliery for a settlement of the differences in regard to wages existing between craftsmen employed on the surface.

North of England.

With a view to the better distribution of work at two adjoining pits—the C and D and the Old pit—of the Seaton Delaval Coal Company Limited, it has been agreed to introduce the three-shift system there, from Monday last. Practically speaking, the Old pit will be laid idle, and the men will be given employment in the C and D pit, where the hewers will be cavilled in sixes instead of fours, as at present. The coal-drawing hours will be 16 per day.

Sir Wm. Job Collins, M.P., has consented to act temporarily as neutral chairman of the Cumberland Coal Conciliation Board, and will sit at Workington this week to adjudicate upon the surface workers' demand, including an increase in wages of 1s. per day.

Federated Area.

The threatened strike of 3,000 miners employed at Messrs. Andrew Knowles and Sons' pits in the Pendlebury and Pendleton districts of South-East Lancashire has been averted by the decision of the Lancashire and Cheshire Coal Wages Board that the men shall cease work at noon on Saturdays.

Mining delegates, representing the Alfreton and district section of the Derbyshire Miners' Association, have discussed alleged irregularities under the Eight Hours Act. It was reported much unnecessary work was being done on Sundays. A resolution, deprecating such labour as illegal, was passed, and workmen were requested to refrain from doing such unless it was seen that such labour was absolutely necessary. In regard to the lamp grievance at the Shirland Colliery, it was reported the ballot had resulted in favour of handing in notices.

At a mass meeting of colliery workers at Normanton last Sunday, a report was made concerning negotiations between the National Federation of Colliery Surfacemen and the coal owners on the subject of the advance of war wages. The men asked for a 25 per cent. advance. The Coal Controller suggested an advance of 1s. 3d. per day for men over 18, and 7½d. per day for those under, the offer to be retrospective, if accepted, from September 17, 1917. The offer was declared to be reasonable, and worthy of acceptance. The Yorkshire Miners' Association was severely criticised at the meeting for the endeavour of its officials to absorb the surface workers, it being stated the surfacemen were fighting for equal representation with the miners on the Coal Controller's Advisory Board, and for the right to negotiate and organise on the wages and other questions. The meeting decided to loyally support the Federation.

The council of the Derbyshire Miners' Association, at Chesterfield on Saturday, passed a resolution referring to the unjust methods of taxing the necessities of life, and to income tax anomalies, and calling upon the Miners' Federation of Great Britain to interview the Chancellor of the Exchequer, and to convene a special conference to adopt a "down tools" policy failing a satisfactory answer. It was decided to establish a bureau at Chesterfield for obtaining work and lodgings for miners migrating from the North of England to the Midlands, in consequence of the suspension of the export of coal.

No settlement was arrived at last week at the conference at the offices of the Board of Trade in connection with the dispute between the coal owners and members of the Leicestershire and South Derbyshire branch of the National Association of Colliery Deputies, Examiners, and Shot-Firers. The meeting was arranged on the initiative of the Coal Controller, who will communicate with Sir G. Askwith with the view of an arbitrator being appointed.

Some 11,000 miners employed at the Gresley pit (Moir Colliery Company) came out on strike last week on account of abnormal conditions in certain of the stalls, for which they claim higher wages. The dispute has been before the South Derbyshire Miners' Association, and the strike was officially recognised, although Mr. Buckley (the agent) urged the men to continue at work. The matter will now, it is understood, be taken up by the Coal Controller.

Scotland.

At Meadowbank Colliery, Stirlingshire, there has been friction over excessive dirt in the coal.

Difference has arisen at No. 17 pit, Redding, Stirlingshire, in regard to the drawing scale. The men contend that the company have taken too much off the tonnage rate in proportion to the shortening of the drawing roads. Negotiations are in progress.

At Douglas Castle Colliery, Lanarkshire, the men protested against the threatened ejection of an employee from one of the company's houses. As a result of a meeting between the representatives of the owners and the men, it was decided that the workman should continue to reside in the company's house.

Friction has arisen at Bardykes Colliery, Blantyre, through the alleged unfair dismissal of a workman. The manager has now agreed to the reinstatement of the workman, provided he is willing to perform the same work as other men at the job.

The threatened strike at Nackerty pit, Uddingston, has been averted, in consequence of the manager allowing the old conditions to continue in the Blackband seam.

The dispute regarding the drawing roads at Knowton Colliery, Shotts, Lanarkshire, is still unsettled. The executive committee of the Lanarkshire Miners' Union have asked to be furnished with an exhaustive report on the subject.

Work throughout Stirlingshire is very good. The majority of the collieries are getting 11 days per fortnight, the exceptions being one or two of the small collieries in the south of the county, and Manor Powis, in the north.

The notices of the Scottish colliery enginemmen, which were lodged last week, have now been withdrawn, the men having been offered a war bonus at the flat rate of 1s. 3d. per shift for every member of the association. This increase brings the winding enginemmen's wages up to 10s. 7d. per shift.

Iron, Steel and Engineering Trades.

The Wages Board of the South Wales and Monmouthshire Iron and Steel Workers' Association met at Aber-

gavenny on Saturday, to deal with the request of the workmen that their finishing time on Saturday should be 1 o'clock instead of 4 or 5 o'clock, as at present. The employers pointed out that they could not accede to the request, having regard to the needs of the Government for an increased output, but they promised to give the matter immediate consideration after the war. The result of the joint audit of accounts for the past month does not lead to any change in the wage rate, which will remain at a percentage of 89½ above the standard, there having been no variation in the price of steel rails and tin bars during the past quarter.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Wholesalers' Interview with Controller—Swansea Housing Committee's Scheme—Monmouth Eastern Valley: Proposed Trades and Labour Council.

Mr. G. F. Evans, Mr. C. H. Pullin, Mr. G. Ferguson (of Cardiff), with Mr. T. Cooke and Mr. V. Gray (of Swansea), and Mr. E. A. Bliault, their secretary, have had an interview with the Coal Controller on behalf of the South Wales and Monmouthshire Wholesale Coal Factors' Association, together with representatives of other smaller bodies. Several questions, such as the detention of wagons and the export of South Wales coal to Ireland, were discussed; and the Controller promised to give careful consideration to the different points submitted.

The Pontypridd and Rhondda district of miners had before them a suggestion that they should hold a meeting of demonstration on Monday, protesting against the high prices of food, etc., but their agent said that no arrangements for any such demonstration had been made, and that there would be no idle day at the collieries.

The Swansea Housing Committee has had under discussion the necessity of increasing the number of working class dwellings, the borough architect having presented a report which states that the number of houses needed in the borough is 2,000. Plans have already been approved for the erection of 500. It was stated that the dearth of houses affects particularly the dock workers.

A checkweigher was prosecuted at Swansea Police Court on Wednesday of last week for unlawfully making a false statement on an application for exemption of a collier from military service. The defendant was chairman of the workmen's committee at Maesmarchog Colliery, and the men's representative before the colliery tribunal. It was stated that he filed an application for exemption which stated that the man was an underground workman employed at the colliery; whereas at that time the man was actually engaged on the land through having sustained an accident. The defence was that the claim had been made for exemption on good faith upon information supplied; but the magistrates imposed a penalty of £5, including costs.

A gathering of exceptional interest took place at Aberaman Park on Saturday, when over 700 officials under the Powell Duffryn Company met to make a presentation to Mr. E. M. Hann, general manager, and to Mrs. Hann, upon the occasion of their removal from the Aberdare district to Llanishen, near Cardiff, after a residence of 38 years. Mr. Hann is a director of the company, as also of the Bedwas Navigation Company, and is consulting engineer of the Penrhiwceiber Company, of which his son, Mr. F. P. Hann, is the agent. He has held the position of chairman of the Coal Owners' Association, and has also been president of the South Wales Institute of Engineers.

A number of men employed at the Cynon Colliery and Oakwood Colliery, near Port Talbot, were summoned for breach of contract by stopping work; and about 1,200 from these two pits, and also from the Tormynydd Colliery, marched to Port Talbot, headed by a band; but on the advice of their agent, Mr. W. Jenkins, J.P., who advised them to disperse quietly, no further demonstration was made, except that, as the managers of the collieries entered the courthouse, there was loud booing and hissing. Thirty-five of the employees at Oakwood were summoned for damages; and Mr. Prosser, who appeared for the employers, stated that the colliery was stopped from April 21 to April 25. The hearing of the cases had been adjourned on a previous occasion with a view of settlement, and agreement had been arrived at and signed, but unfortunately it was not carried out. The owners had summoned only 35 men, in the hope to avoid a further stoppage—but their effort in this respect had proved abortive. The stoppage had reference to claims under the Minimum Wage award, and the employers claimed £2 each from the day men and £1 from the night men. On April 21 the manager had refused to pay these claims under the Minimum Wage award, on the ground that the claimants were not entitled to it; and the next day, at a pithead meeting, the men decided not to work until the claims were paid. Subsequently, it was arranged that five of the claims should be met, but not the sixth; and the deputation with whom he made this arrangement thought this to be fair; but the men did not return to work. There was also a question as to dismissal of a man, but this had arisen before the dispute for the minimum wage. After the men resumed work, the manager invited a deputation to examine the place of the sixth, stating that if they were satisfied the man was entitled to what he claimed, the manager would pay him; and, after examination, the deputation stated that the man's working place was normal, and they expressed regret at the stoppage. As a result of stoppages, there had been a standing charge of £278; and this amount divided among the men came to 10s. per shift per man. Hence the claim. The general manager of the colliery stated that he had refused to see a deputation of the men until they resumed work, and by doing so he did not think he committed error of judgment; but he saw the deputation immediately they had resumed work. Mr. Nicholas, who appeared for the defence, stated that the men were under a great sense of grievance, and there was something which required adjustment in the relationship existing between the parties. The Bench awarded a sum of £178, to be divided between the 135 employed at the colliery who stopped work, this being 25s. per head.

The Pontypool Colliery Examiners' Association, at a special meeting on Saturday, decided to affiliate with the North Monmouthshire Labour Party.

Two colliers were fined at Bridgend on Saturday, for travelling on foot along the main haulage road at Celtic Colliery while the haulage was in motion, they having left off work before the proper time.

At the same court, a collier was fined £1 for removing from his stall in the Rhondda Main pit two cross pieces of wood which had been set up as a danger mark. His defence was that he had ascertained that the gas had

cleared away before he removed the cross pieces. Other men at the same court were fined for carrying tools or timber in the cage at Cacan.

The extent of the house famine in South Wales may be gauged from the fact that in a report upon housing which has been prepared, the Swansea borough architect provides for the eventual erection of 5,000 houses, and recommends that the whole of the Corporation Town Hill estate should be laid out for building purposes.

At Swansea, under the house coal Order, merchants will be allowed 7s. 6d. per ton to cover their costs and profit, with extra for cartage in hilly districts and also for bagging. The price delivered will work out at 36s. 6d. to 37s. per ton, as compared with the pre-war price of about 28s.

Mr. E. Steer, just appointed as Deputy-Lieutenant for Monmouthshire, is connected with Guest, Kcen and Nettlefold's great undertaking. He has previously held the position of High Sheriff of Monmouth.

The feature in present-day experience in the South Wales steel industry is the heavy demand on the different works, which they are scarcely able to meet. Indeed, the tin-platers complain that they cannot even get their allotment of supplies, owing to the urgency with which steel makers have to meet demand in other directions.

Miners, iron workers, railwaymen, and shop assistants in the district comprising Cwmbran and Pontnewydd, in the lower portion of the Monmouthshire Eastern Valley, have jointly resolved to consider a proposal to form a district trades and labour council, and a special meeting is to be held, when addresses will be delivered by Mr. Wm. Harris, Pontllanffraith, and Mr. Z. Andrews, Talywain, who will explain the objects and work of trade councils, and will offer advice as to the formation of a council on effective lines. Although the trades councils already existent in the valley have not been receiving a flattering amount of public attention, it is urged that even they would become more important as a "suggestive" body when linked up with Cwmbran. There are over 800 miners, who are members of the South Wales Federation, employed and resident in the district. It appears that the desire to create a labour council has its root in the alleged action of the urban authorities of Cwmbran and Pontnewydd in appointing a preponderance of tradespeople on their Food Control Committees.

A collier employed at Oakdale Colliery was fined £5 and £3 3s. costs at Blackwood Police Court on Friday of last week, for marking another collier's tram of coal with his own number. The value of the tram of coal to the workman was estimated to be 3s.

Northumberland and Durham.

Miners' Houses at Coxlodge—Nationalisation v. State Control—Greenside Housing Scheme Postponed.

Capt. J. Bradley Phillipson, M.C., R.E., whose wedding took place last week, is the son of the cashier at Dean Bank Colliery, and, before joining up, was an electrical engineer at the Dean and Chapter Colliery.

When the death of John Old, 15, a driver at Wearmouth Colliery, was enquired into, it was stated that the lad had been riding on a tub, and that his head had come into contact with a low part of the roof, inflicting fatal injuries. A mines inspector stated that there was no fault to find with the roof, but it was intimated that steps would be taken to heighten the roof at the point where Old was killed. A verdict of "Accidental death" was returned.

Castle Eden magistrates fined William Pearson, miner, South Hetton, 40s. for having failed to fence off a place round a mis-fired shot. William B. Hunter, miner at the same colliery, was fined 5s. for allowing a removable handle of an electrical apparatus to pass out of his custody in the mine. It was stated that, in each instance, the defendant had been suspended, in consequence of the breach of the Regulations, from acting as deputy-overman.

A common idea in mining districts of the county of Durham, that wreckage washed up on the beach is the property of the person who cares to remove it, received a rude shock at Castle Eden last Saturday, when a number of miners were fined 6s. each for having failed to deliver wreckage to the Receiver of Wrecks. A large number of barrels of oil had been washed ashore, and a good many of these were appropriated by the miners to their own use. In some instances, the oil was lost by the manner in which the barrels were buffeted by the waves on the rocks; in other cases, however, the men had knocked out the bungs, wasting the oil, because the empty barrels were more easily got away. In each instance, the miner declared that he did not know he was doing wrong, and that it had been his intention to use the barrel as a rain water barrel.

Mr. William Swaddle, traffic manager for the Washington Coal Company Limited, who has just completed 50 years' service with the company, has been presented by his employers with a chiming clock and a cheque, and by his fellow officials with a gold watch.

It was stated at the September meeting of the Gosforth Urban District Council, that the Burradon and Coxlodge Coal Company Limited had offered to co-operate with the Council in the laying out of the colliery field near Coxlodge village for the erection of workmen's houses; half of the field to be taken up by the erection of houses for the colliery workmen, and the other half by the class of houses which the Council might deem it advisable to have erected.

Messrs. Simon-Carves Limited, contractors, of Manchester, who are erecting new by-product ovens at Broken Back Colliery, St. Helen's, county Durham, have been missing timber for some time. Recently, Gardiner Stoddart, one of their labourers, was caught with 5s. worth of their timber in his possession. The Auckland magistrates fined him 15s. At Stanley, Luke Fletcher, charged with having stolen a quantity of wood and slate, the property of the Craghead and Holmside Collieries, was bound over to be of good behaviour, and was ordered to pay 15s. costs. It was stated, in this case, that defendant had offered a policeman 10s. to "square" the case. Twelve small boys, ages ranging from 12 to 14 years, were each fined 6s. 8d. by the Spennymoor magistrates for having done wilful damage to doors, windows, books, etc., at the Rock Colliery, North Close, Spennymoor, by breaking into the cabins and helping themselves.

Mr. Geo. Wilkinson, of Bishop Auckland, who has retired from the service of Messrs. Pease and Partners Limited, had been with the firm for 63 years, for 46 years of which period he was an official at St. Helen's Colliery. He was one of the founders of the Northumberland and Durham Miners' Permanent Relief Fund in 1862, and was secretary of the St. Helen's Auckland branch for 20 years. Another veteran miner was Mr. Thos. Walton, who has died at Burnhope at the age of 91. He was banksman at Hobson Colliery for over 40 years.

William Laverick, 18, was fined £2 by the Houghton magistrates for particularly mean thefts from the wives of two ex-miners now in the Army. In each instance, the women had trusted Laverick to draw, on her behalf, an

allowance of 2s. 6d. weekly from the Houghton Colliery. The defendant had on several occasions been fined for this, and informed the woman that it had been sent to the colliery office.

Mr. William Straker, in his September 1917 speech to the Northumberland miners, defines the difference between nationalisation and State control of large industries. In advocating the former, he says: "The opponents of nationalisation point to what they call the failure of State control during the present war. I would point out that State control was rendered necessary by the failure of private ownership to meet the country's needs when the real testing time came. Moreover, I would point out that State control, adopted at a time when the nation was engaged in a struggle of life and death, and State ownership, established when all the best thought of the nation can be given to it, are two vastly different things. In State control it was necessary to appoint either a controller who was independent of the industry to be controlled, and consequently knew too little of the work put into his hands, or it was necessary to appoint a controller who had a large personal interest in the controlled industry, and consequently knew too much about the work put into his hands, so far as the interest of the country is concerned. In State ownership, there would be no such division of interests, and all the best brains and expert ability would be employed by the State in industrial management and agency. The mere fact of the ownership being changed would not prevent the new owner from securing all the highest services of those who now devote these services to the private owner."

An impression has gained ground that Mr. Joseph Cowen and Miss Cowen have dropped their scheme for the provision of dwellings at Greenside for workmen, mainly miners, which was approved by the Ryton Council 2½ years ago. Mr. Cowen has authorised the announcement that the building scheme is merely deferred until after the war. This postponement was reluctantly decided upon by Mr. and Miss Cowen owing to the impossibility of getting sufficient workmen and the paucity and prohibitive price of materials for so extensive an undertaking, while the Defence of the Realm Regulations practically limit the outlay to be incurred to £500, unless special permission to carry out the work is obtained. It is added that the land on which it is intended to build is under tillage, and, therefore, the country at large is not losing anything by the delay.

At a special meeting of the Newcastle City Council, held to consider the retail coal prices Order, a committee of seven was appointed to assist in the local administration of the Order. The Lord Mayor said that, if the Order was fairly and honestly carried out, protection would be afforded to the very smallest buyers of coal, those who had to buy by the bag or bucket. Only two of the gentlemen appointed on the committee have any association with the coal trade. One of these, Mr. G. T. de Lorient, is a coal exporter; the other, Mr. John Chapman, is a miners' checkweighman.

The manager of Hartford Colliery has been officially informed that the King has awarded the Edward Medal to William Fish, for gallantry in assisting to release a fellow workman, overwhelmed by a fall of roof at the colliery, on January 19 last.

At the inquest touching the death of Thomas James Mugridge, 33, miner at Kibblesworth Colliery, it was stated that he was in good health until about 10 weeks ago, when, after having been struck by a piece of stone whilst at work, he developed a lump on his back. He worked for two days after the accident, and died after seven weeks in hospital. The infirmary doctor said that death was due to a malignant internal tumour. If the man had the tumour at the time of the accident, the fall of stone might have aggravated the tumour, but it certainly did not cause the growth. A verdict in accordance with the doctor's evidence was returned.

At an inquest concerning the death of a miner, named Storey, who died as the result of a fall of stone in the East Shield Row seam of the Thomas pit, Craghead, Mr. W. Wainwright, assistant inspector of mines, said that the old practice of "jowling" alone must give way to more modern methods. In this case, a plank hid the fissure, but, being underneath the edge of the stone, was not strong enough to keep it from falling. A verdict of "Accidental death" was returned.

Cumberland.

On Friday of last week, Sir W. J. Collins, M.P., sat as neutral chairman of the Cumberland Coal Conciliation Board at Workington, to consider the Cumberland surfacemen's claim, among others, for an advance of 1s. a day in their wages. Mr. Thos. Cape, the miners' agent, presented the case for the men, and Mr. T. P. Martin for the owners. Sir William reserved his decision.

Early on Friday morning of last week, an outbreak of fire occurred in the workshops belonging to the Lonsdale iron ore mine at Frizington, and considerable damage was done to the blacksmiths' shop, repair shop, and saw mill and offices before the flames could be overcome. The damage is covered by insurance.

Yorkshire.

Winter Coal Supplies—House Scarcity in South Yorkshire—Miners and Income Tax.

The Bradford Board of Guardians have accepted the tender of Mr. Joshua Smith, for the supply of house coals during the next three months.

At Batley, Mr. Henry Whiteley was nominated by the local coal merchants to serve on the committee for local coal supply, and one representative was also appointed for the Batley Co-operative Society.

At Scarborough, Coun. Baines said, in connection with the question of coal for the poor during the winter months, which was brought up at the Town Council meeting last week, that he had been able to secure 300 tons at 22s. per ton, and had been promised 200 tons more at the same price. Coun. Baines was thanked for his efforts.

The Bradford City Council have declined, by 23 votes to 20, to confirm the Food Committee's appointment of Ald. Wm. Warburton, who is one of the best-known coal merchants of the city, as local food executive officer, at a salary of £300 per annum.

At a recent meeting of Bradford City Council, Ald. H. M. Trotter drew attention to a committee recommendation to the Council to apply to the Coal Controller for such quantity of house coal as the city is entitled to on the basis of population to be allocated to Bradford. He held in reserve for use in emergency, and the Finance Committee be asked to meet the cost of such provision. He asked: Was it intended that all this should be done through the channels of the coal trade, subject to the Controller? Ald. Fawcett, chairman of the local Coal Control Committee, said the intention was that the coal should be used only in extreme emergency, and not that

It be doled out unless there was special need. It is probable that it would not be required until at least the end of the year. The committee's intention was that it should be distributed through the usual local trade channels. The committee did not propose to itself a distribution of coal. The minutes were

The Coal Controller has decided, as a tentative measure, to allow a supply of 500 tons of coal to be stored for the use of the poor if the ordinary sources of supply fell short. The coal is to be stored at the gas works.

From all parts of the South Yorkshire coal field complaints continue to come of the serious shortage of houses for the miners, and of the necessity of extensive housing schemes being taken up in every direction. Urban councils in the Barnsley district intend to take advantages of the offer of the Government to render substantial financial assistance to local authorities prepared to carry through, without delay, housing schemes upon the conclusion of the war. Wombwell, one of the largest urban districts in the country, is also giving the matter serious consideration. A large number of houses are required at Darton to meet the opening up of a colliery there; another 100 houses are required at Ardsley; and in the borough of Barnsley alone, if 600 new houses were immediately forthcoming, they could all be tenanted at once. A short time before the war, the Pontefract Corporation erected 250 houses, but, this notwithstanding, the housing question is already acute. It has now been decided to prepare two schemes for the erection of a further 300 houses in the Pontefract area.

In the district immediately around Doncaster, the shortage of miners' houses appears to be even more acute than elsewhere. Many are required at Stainforth, to meet the demands of the new colliery at Hatfield; whilst in Carcroft and Adwick-le-Street district hundreds of miners' dwellings are urgently needed. This was shown last Saturday, when, at the Doncaster West Riding Police Court, the Urban District Council of Adwick-le-Street prosecuted a man for an alleged nuisance against the public health. It was shown that, because of the scarcity of houses at Carcroft, and his failure to secure one, he took a holding of eight acres, and he and his wife were living in a caravan in one of the fields near the public road. The Council quite failed to prove a nuisance, and the contention of the clerk to the authority that if this sort of this was to be permitted, half Carcroft would be living in wooden huts on wheels, failed to move the Bench. Two miners called for the defence declared they would sooner live in caravans than in the Carcroft houses. The Bench dismissed the case, and ordered each party to pay their own costs. This decision is regarded as a very important one.

The Yorkshire miners do not at all seem to relish having to pay income tax. Thirty-nine of them, hailing from the Royston, Hensworth, and Cudworth districts, were summoned at Barnsley last week for neglecting to pay the tax. Several of the men questioned the accuracy of the collieries returns, and one showed that he had already paid the amount claimed. The remainder of the men were ordered to pay up.

Lancashire and Cheshire.

Improvements and Extensions of Plants—Manchester and Salford Winter Supplies—Walkden Town Planning Scheme.

Although summer time has now come to an end, the colliers—there are over 3,000—in the employ of the Earl of Ellesmere intend, it is understood, still going on with their new working hours, viz., from 7 a.m. to 3 p.m., instead of 6 to 2 which were previously worked. At several collieries in the Atherton and Tyldesley areas the men work from 7 to 3.

New engine houses and other surface buildings have been completed at the Astley and Tyldesley Colliery Company's Kermishaw Nook pits, where new mines are being opened out.

The Manchester Coal Supplies Committee on Friday of last week, received the official Order fixing the retail price of coal. Owing, however, to the failure of the local dealers to make the necessary returns indicating the quantity of coal they require, no announcement can yet be made as to the price consumers will have to pay. Mr. Godfrey Kaye has been appointed secretary to the committee.

A correspondent says it is reported that the public authorities in Manchester, Salford, and surrounding districts will be called upon to fix maximum prices for coal sold in their areas. Both Manchester and Salford corporations have arranged schemes for the sale of coal to the poorer sections of the community during the coming winter months.

The Eccles Corporation have declined to commit themselves to any scheme of coal distribution during the coming winter. It is stated that excellent local supplies will be available during the winter.

According to a syllabus issued this week, amongst the subjects included in the programme arranged by the Worsley Higher Education Committee for the coming session are mining mathematics and drawing, firemen's course (for older students), and mining science, mine surveying, engineering science, ventilation and lighting, and mine working. The classes are held at the Walkden Technical School.

Improvements have recently been effected in connection with the by-products plant at Lord Ellesmere's Brackley Colliery, Middle Hulton, and further extensions are expected there in the near future.

Lieut. Norman Fletcher, of The Hollins, Bolton, and of the Ladyshore Colliery Company, Little Lever, has just received a further mark of appreciation for the work he is carrying on in the French Army with a convoy of ambulance cars under the British Red Cross Society. He has been awarded the Croix de Guerre Medal with the Silver Star.

A serious accident occurred on Thursday of last week at the Lostock Colliery, Westhoughton, near Bolton. John Holden (21), of Chew Moor; John McTaggart (46), Church-lane, Westhoughton; and John Pilkington (23), Albion-street, Westhoughton. It was stated that a shot unexpectedly exploded after previously mis-firing, with the result that all three men, who were working together, were injured, and had to be taken to the infirmary. Pilkington was blinded by the accident.

At a meeting of the Worsley District Council held last week, it was stated that the Council was willing to pre-empt the offer of additional houses, proposed to be made by the Government, for the purpose of a factory. A committee was appointed to consider the town planning scheme for the Worsley area.

From reliable sources that the Government has determined to contest the next General Election. It is

probable that a dozen or more candidates will be put in the field, in addition to those who are already representing their interests in Parliament.

The Midlands.

The Black Country towns are now rapidly getting their arrangements in order for extra supplies of house coal for the poor during the ensuing winter. Wolverhampton, Walsall, and Dudley are each requiring 1,000 tons extra-ordinary, and, judging by reports, a good deal of trouble is attending the securing of even this small addition. At Walsall this week, the Corporation Committee reported that they had been in communication with coal owners "up and down the country," but so far they had not been successful in securing promise of the needed super-supply. If necessary, however, the Gas Committee would, it was announced, hand over to the authority who would have charge of the municipal poor stores the 1,000 tons out of their own contract deliveries. Here, therefore, would seem to be a way for solving municipal difficulties; and it will very probably be that Walsall's example will be followed in other parts of Staffordshire. The Board of Trade have so far only allotted 500 tons of extra-ordinary coal to the poor of Dudley, where are situated the extensive historic collieries of the Earl of Dudley's rich mining estate. The Corporation have, however, replied that at least double this tonnage will be certain to be required, and correspondence with the Department with a view to doubling the allocation is proceeding. The committee at Dudley for regulating the winter coal supply have now fixed the maximum price to be charged by dealers and merchants. This for the present is to be 1s. 9d. per cwt., with a charge of 3d. per cwt. extra for delivery in sacks or otherwise. The figure now fixed is to be revised later should circumstances demand.

Kent.

Coal from the Snowdown Colliery is now being exported to France, in addition to the regular supply which has been going across from the Tilmanstone Colliery for the past few months.

The Snowdown Colliery output has again reached about 3,000 tons weekly; and the amount of coal raised at Tilmanstone Colliery reaches nearly the same tonnage.

Scotland.

Hamilton Valuation Appeals—Coal Shipment Figures—Improved Lothian Outlook.

The miners in Stirlingshire have, at all the meetings held throughout the districts, decided in favour of the recruiting scheme at present under consideration, as being the most effective for securing fair play for those concerned.

In Mid and East Lothian, the executive committee of the County Union have considered the uniform deductions for upkeep of mine, maintenance of tools, etc., which the district assessors are prepared to allow in connection with the payment of income tax. It has been decided to approve of these deductions as being fair and reasonable.

At the county of Lanark Valuation Appeal Court, a noteworthy point was raised in connection with the appeal by Mr. Wm. Templeton, of Torland, and the Darnagill Coal Company, who desired that a valuation of £80 13s. made in respect of minerals in the estate of Torland and Ashgill should be deleted. They claimed that the valuation referred to a mine which was exempt under the Act, and also that no working had taken place this year, or would take place. The assessor contended that the assessment was not in respect of the mine, but related to minerals and was based on the lordship of the preceding year. In the first year of the minerals being worked, no valuation was made, and that was why the lordships of the preceding year were taken. He also pointed out that there was a base which was not terminated. The court upheld the assessor's argument, and dismissed the appeal, holding that, as this was a lease of minerals, it could not disappear from the roll. In the event of there being no working during the year, the entry on next year's roll would be nil.

Mr. John Stewart, manager of Dykehead Colliery, Larkhall, has been promoted to the post of assistant mining manager with the Summerlee Iron Company Limited.

At Hamilton Valuation Court, the trustees of the Duke of Hamilton, jointly with their mineral tenants—Messrs. Arch. Russell, Thomas Barrs, trustees, and Messrs. Hamilton and McCulloch—appealed against the assessors' valuation of the minerals worked by these owners on the Hamilton estates. These mineral tenants have recently paid to the Duke of Hamilton's trustees large sums as compensation for anticipated surface damage occurring during the term of their lease. The assessor maintained that these sums should be treated as rent, and should appear so in the valuation roll. The appellants held that the lordships paid were fair and reasonable, and were in no way affected by the payment of compensation for damages, and that the assessor was not entitled to go beyond the fixed lordship for valuation purposes. The court sustained the appeal.

The coal shipments from Methil last week were 26,119 tons, against 21,699 tons the previous week. Burntisland exported 15,490 tons, as against 10,300 tons the previous week.

At a meeting of the Lothian miners held on Saturday, it was stated that the coal trade of the counties during the last four weeks had considerably improved, and that the prospects of steadier work were favourable. Fully 80 per cent. of the miners had obtained nine to 10 days' work during the past two fortnights. This was a marked change from the long periods of stoppage experienced in former months. There were large orders in hand at most of the pits.

Working time at the Fife collieries has improved lately, owing to the supply of empty wagons being plentiful.

It is understood that a meeting of the Coal Merchants' Association of Scotland will be held shortly to consider questions connected with the operation of the retail coal prices Order. It is not anticipated that the Order will cause any material change to be made in the existing retail coal prices.

A report from Kharkoff says that 77 coal mines and as many anthracite mines have shut down.

French Coal Production.—France consumes, on an average, from two million to nearly two and a-quarter million tons of coal per month. This quantity is made up from home production and English exports. It is important that these sources should provide regular supplies as at present. In July the importations amounted to 1,783,000 tons, and the home production to 2,410,000 tons. For the autumn, a slight fall in the imports may be anticipated, but production will probably increase sufficiently to cover that. In short, there is plenty of coal in France for everyone, and the only anxiety felt at present relates to the arrangements for its carriage and delivery.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Addie (Robert) and Sons Collieries Limited.—It is announced that no dividend on the preference shares is being paid at present.

Brown (John) and Company Limited.—The report for the year ended March last states that the net profit is £194,029, making, with the sum brought in, £641,826. The dividend for the year is 12½ per cent., less tax; £150,000 is appropriated to contingencies account; and £176,451 is carried forward. The profit last year was £485,120, and the dividend and appropriation were the same as now, while £147,795 was carried forward.

Curtis's and Harvey Limited.—The directors announce an interim dividend of 5 per cent. (actual), less tax, upon the ordinary shares.

East Kent Colliery Company Limited.—The report for the year 1916 states that during his term of office the Receiver, who was discharged on November 30, 1915, had dismissed about two-thirds of the workmen previously employed, reduced the output in about the same proportion, denuded the colliery of nearly all the coal that had been opened up before his appointment, and was working it at a substantial loss when the directors resumed its management. The process of replenishing the staff of workmen, more especially in the absence of sufficient local housing accommodation, and of opening up new reserves of coal, was necessarily a slow one, and the colliery was thus inevitably worked at a loss for a time. This loss decreased by degrees as the output rose, until the end of June, when the turning point was reached. The quantity of coal raised during the week ended January 8 was 1,469 tons, June 10, 2,053 tons, and December 16, 2,741 tons. The result of working during the second half of the year wiped out the loss incurred during the first half, paid for all works of development properly charged to revenue, reduced an old debt of £1,455 due to the Inland Revenue by £400, paid for all incidental and unforeseen expenses, and left a small profit of £1,002. The payment of interest on loans and on certain first mortgage debentures under the scheme, amounting together to £4,545, absorbed this £1,002, and accounts for a loss of £3,542. The condition and prospects of the colliery as a whole are satisfactory.

Hardy Patent Pick Company Limited.—The directors announce that they are unable to present the balance-sheet and accounts for the year owing to the amounts payable under the Finance Act and special taxation not having yet been agreed upon. They are, however, satisfied in recommending a dividend of 8 per cent. on the ordinary shares, less tax; placing £6,000 to depreciation of plant; and £1,000 to depreciation of tools and patterns.

Pearson and Knowles Coal and Iron Company Limited.—The directors report that they are again unable to present the annual balance-sheet as usual. The negotiations with the Treasury in regard to excess profits are still unsettled, and until a definite adjustment is arrived at the directors consider it inadvisable to publish figures. The accounts, subject to final audit, after making all necessary provisions, show a balance of profit which the directors consider to be sufficient to warrant the payment of a dividend and bonus at the same rate as was paid for 1915-16, and they recommend that the usual dividend at the rate of 6 per cent., less income tax, be paid on the first and second preference shares, and a dividend of 6½ per cent. on the ordinary shares, less income tax, for the past half-year, together with a bonus of 5s. per share, free of income tax, making a total distribution of £93,800 for the year.

Sheepbridge Coal and Iron Company Limited.—The report for the year ended June 30 last states that the net profit amounts to £200,605, which added to £42,633 brought forward, less dividend paid on February 1, leaves a balance for disposal of £193,043. The directors recommend a final dividend of 10 per cent., making 15 per cent. for the year, free of income tax, payable 1st proximo; to place for development of new properties £50,000; and to carry forward the balance of £42,654. The amounts payable for special taxation and excess profits duty have not yet been agreed, but provision has been made in the accounts for the company's estimated liabilities. The output of coal has been fairly well maintained, having regard to existing circumstances. The Board of Trade assumed control of the collieries on March 1 last. The permanent plant at Rossington is practically completed, a large number of workmen's houses have been erected, and the output of coal is gradually increasing. Owing to the war, sinking operations at Firbeck have not been commenced. The company has acquired agreements for leases of the Barnsley seam of coal underlying a large area of land at Finningley, on the eastern boundary of the Rossington coal field.

Wigan Coal and Iron Company Limited.—The directors regret that in consequence of the prolonged delay in determining the amount of excess profits duty and the munitions levy, which still exists, they are unable to present to the shareholders the usual balance-sheet, but they think it necessary to invite a meeting on September 26 for the purpose of sanctioning the dividend paid on February 21 last, and also the interim dividend paid on August 22, 1916, the two together making 10 per cent., free of tax, for the year ended December 31 last.

Windsor Steam Coal Company (1901) Limited.—For the year to June 30, 1917, after charging all expenses, including interest on debentures, there is a profit of £26,502, which, with the balance brought forward from last year, leaves a disposable balance of £29,975. The directors recommend to place £6,000 to reserve for excess profits tax, etc., and to pay the dividend due on 10 per cent. first preference shares for the year 1915, leaving a balance of £16,482 to be carried forward to next account.

NEW COMPANIES.

Brinton (R. C.) and Company Limited.—Private company. Registered September 8. To acquire and take over as a going concern, and carry on the business of iron and steel merchants, etc. Capital, £35,000. Director, J. N. Field.

Carden Engineering Company Limited.—Private company. Registered September 8. To carry on the business of mechanical and electrical engineers, iron founders, etc. Capital, £50,000. Directors: G. J. Thomas, H. Burroughs, and G. A. Peck.

Chambers Engineering Company (South America) Limited.—Private company. Registered office, 34, King-street, Chapside, London, E.C. Registered September 8. Nature of business indicated by title. Capital, £2,000. Directors: T. N. Chambers, J. Stevens, and A. Argles.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

CONTRACTS OPEN FOR COAL AND COKE.

advertised in this issue received too late
in this column, see LEADER and LAST

The Corporation invite tenders for the
to their Electricity Supply Station. Parti-
obtained upon application to the borough
electrical engineer. Sealed tenders, endorsed "Tender for
Coal, Electricity Works," should be sent to the town clerk,
town clerk's office, Municipal Offices, Southampton. No
pledge is given to accept any tender.

Abstracts of Contracts Open.

BARMING HEATH AND CHARTHAM (KENT), SEPTEMBER 24.
Coke for the Asylums Committee. Tenders to the clerk
to the Committee, 9A, King-street, Maidstone.

BRADFORD, SEPTEMBER 24.—For the supply of coal for
the North Bierley Guardians, Bradford, for the period
October 1 to December 31.

BURTON-ON-TRENT, SEPTEMBER 24.—Coal for the Guar-
dians. Forms of the clerk.

CHESTER-LE-STREET, SEPTEMBER 25.—Coal and coke for
the Guardians. Tenders to the clerk.

COLWYN BAY, SEPTEMBER 25.—Coal for Colwyn Bay and
Mochdre Council Schools. Tenders to Mr. H. Lewis,
Boys' Council Schools, Colwyn Bay.

DUMBARTON, SEPTEMBER 26.—Coal for the School Board.
Particulars from the clerk to the Dumbarton (Burgh)
School Board.

GATESHEAD, SEPTEMBER 24.—Coal for the Guardians of
the Gateshead Union. Tenders to the clerk.

HECKINGHAM (NORFOLK), SEPTEMBER 24.—70 tons best
steam coal for Loddon and Clavering Union. Forms from
the master of the Workhouse, Heckingham.

HOLLINGBOURN (MAIDSTONE), SEPTEMBER 27.—Coal and
coke for the Guardians of Hollingbourn Union. Forms of
the clerk, 33, Earl-street, Maidstone, or master of Work-
house.

MERTHYR TYDFIL, SEPTEMBER 24.—Coal for the Guar-
dians. Tenders to the clerk, 134, High-street.

SOUTHAM, SEPTEMBER 25.—Coal and coke for the Guar-
dians. Forms of the clerk, Market Hall.

TALGARH (BRECON), SEPTEMBER 25.—Coal for the Visit-
ing Committee. Tenders to the Asylum.

WESHAM (LANCASHIRE), SEPTEMBER 25.—Coal and slack
for the Guardians of Fylde Union. Tenders to the clerk,
Union Offices, Wesham.

WREXHAM, SEPTEMBER 24. — Coal for the Guardians.
Tenders to No. 10, Temple-row, Wrexham.

The date given is the latest upon which tenders can be
received.

THE FREIGHT MARKET.

Although the shortage of collier tonnage on offer in the
outward freight market is still embarrassingly great, there
has been some little improvement during the week under
review, and rather more business has been possible. On
the north-east coast, most of the business done has been
for near destinations, the French Atlantic in particular, at
the scheduled rates. Coasting business is firmer, at 20s.
from Tyne to London. Scandinavian business is very
strong, at 200 kr. to Gothenburg, at which rate two fix-
tures have been arranged. Baltic directions are less press-
ing for tonnage, but 207½ kr. to Stockholm could be
repeated. Portuguese business has been neglected,
although 90s. is offering for Lisbon, and Oporto is listed
at up to 105s. Gibraltar is quoted at from 97s. 6d. to
100s. All these are record rates. The Spanish Mediter-
ranean, on the other hand, is easier, Barcelona having
been done at 210s., following a fixture at 215s. Port Said
still stands at 165s. At South Wales, French Atlantic
business has loomed large, but has not had the absolute
monopoly reported a week ago. Thus, Gibraltar has been
done, for Cardiff or Newport loading, at 100s.; Western
Italy has been arranged for at Cardiff, for discharge at
Genoa or neighbouring ports, at 59s. 6d. for a 7,000-ton
vessel; Newport to Bilbao has been fixed for at 145s.; and
Cardiff to Valencia has been done at 220s. Business done
at the Mersey includes the fixing of sailing tonnage for
the River Plate at 85s., and two fixtures for Gibraltar, one
at 87s. 6d. and one at 92s. 6d. Business at the Humber
and Clyde has been of very small dimensions.

Homewards, the River Plate is dull, at 145s. from up-
river and 140s. from down-river ports to the United
Kingdom. At the United States, coal freights are steady,
at 12s. from Virginia to Buenos Ayres or La Plata, with
33 dols. for Rio discharge. Net charter business is quoted
at from 200s. to 210s. to the United Kingdom, and 250s. to
the French Atlantic from the Northern Range. For wheat
cargoes, on Committee account, 35s. from Gulf to Mediter-
ranean, 30s. from Northern Range to French Atlantic, and
32s. 6d. from the Range to the Mediterranean, are typical
figures. Deal freights from British North America are
quoted at from 400s. to 420s. The nitrate ports are slow,
at 25 dols. to the United States, 185s. to the United
Kingdom or North France, and 200s. to the Mediterranean.
At the Far East, Bombay to West Italy is unaltered, at
400s. Kurrachee to the United Kingdom or France is
listed at 250s. From Madras Coast to Marseilles with
kernels, the rate is still 500s. Haiphong-Saigon to France
with rice is quoted at the same figure. Quotations for ore
and phosphate tonnage at the Mediterranean ports are
strongly maintained.

Tyne to Barcelona, 4,000, 215s.; 3,500, 210s.; Calais or
Dunkirk, 250, 50s.; coke; Dunkirk, 350, 45s.; coke;
Fecamp, 1,200 and 600, 62s. 6d.; pitch; Gothenburg, 1,300
and 1,800, 200 kr.; London, 1,100, 20s.; North French
Range, 500, 45s.; coke; and Treport, 500, 72s. 3d., coke,
neutral, sail.

Cardiff to Cherbourg, 130, 110s.; sail; Caen, 700, 48s.,
neutral; 1,100, 46s. 6d., neutral; Gibraltar, 5,800, 100s.,
Genoa, with options, 7,000, 59s. 6d.; Honfleur, 500, 48s.,
neutral; Havre, 1,700, 45s. 9d., neutral; La Pallice, 1,800,
61s. 6d., neutral; Rouen, 1,500, 48s. 9d., neutral; 2,100,
49s. 6d., patent fuel, neutral; St. Nazaire, 1,600 and 1,800,
29s.; and Valencia, 2,600, 220s.

Swansea to Rouen, 1,100 and 1,500, 48s. 9d., neutral;
Caen, 1,300, 46s. 6d., neutral; Trouville, 700, 47s. 6d.,
neutral; 700, 48s.

200, 220s.
1,200, 43s. 6d., neutral.

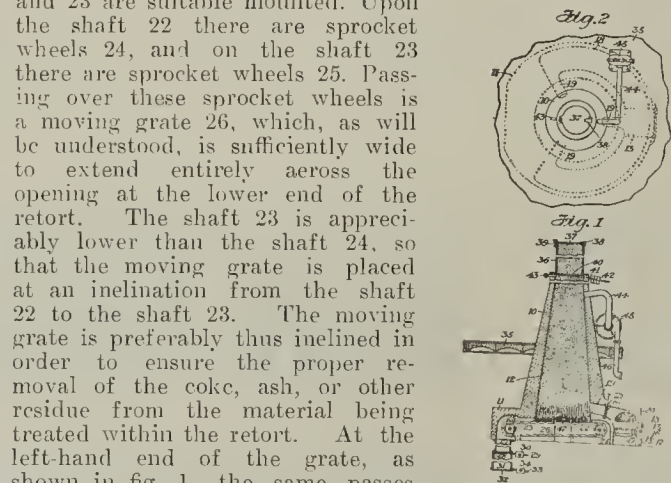
1,500, 92s. 6d.; 4,400, 87s. 6d.

1,000, 100s.; and Bilbao, 3,200,
200, 220s., d.w., 85s., sail.

ABSTRACTS OF PATENT SPECIFICATIONS
RECENTLY ACCEPTED.

100968. *A method of Improving Coke as Heating Medium.* The firm Schollkohl-Gesellschaft m.b. H., Dusseldorf, Germany.—The object of the invention is a method by means of which the coke is so improved in an inexpensive way that its effect is very similar to that of good pit coal. The method is as follows: The coke, which is in suitable medium or small size pieces, is introduced into a fluid material, which contains a mixture of 30 parts of coal dust and 20 parts of clay mixed with water. This is vigorously stirred up with the coke, and is taken up by the highly porous coke, so that all the pores of the coke are filled with the coal and clay mixture. The coke remains in the bath from 12 to 24 hours, according to the size of the pieces, and after it has been taken out it is treated with material which likewise consists of coal dust, clay, and water, but is less fluid. Equal parts of coal dust and clay may be used, and be stirred up into a pulpy state with the thickly liquid residue from the bath previously used. In this the coke is stirred with the assistance of a paddle or a rotary drum, until this material forms a complete coating for the coke. Hereupon, the pieces after being somewhat dried, are sprinkled with unalloyed coal dust in order to improve the appearance. The coal dust conveyed to the coke by means of the bath and the coating serves as a substitute for the fuel material eliminated from the coke, whilst the clay or some other kind of refractory earth prevents any too rapid combustion. If coal dust alone were employed for filling up the pores and coating the coke, the coke would retain the greater part of the undesirable properties, which make it unserviceable for the intended purpose. The drying process is suitably carried on in free, warm air. Powerful heat must not be employed. The treatment as above described approximately restores to the coke the properties of pit coal. The coke burns slowly and produces a clean sootless fire, which can be treated like a pit coal fire; the fuel, however, having the advantage of being extraordinarily cheap. Through the treatment the coke is freed from the disagreeable crackling sound which has always been observable hitherto when it is burning. (Two claims.)

107824. *Improved Apparatus for Extracting Volatiles from Coal, Shales, Lignites, etc.* C. C. Bussey, 238, Lafayette-avenue, Brooklyn, New York, U.S.A.—This invention relates to an improved method of and apparatus for extracting volatile matters from bituminous coal, shales, lignites, and other similar materials containing hydrocarbonaceous ingredients. In the accompanying drawings, fig. 1 is a diagrammatic sectional elevation illustrating an apparatus by which the improved process is carried out; and fig. 2 is a diagrammatic plan of the same. The apparatus comprises a retort 10, built upon a suitable base 11, both of which may be made of any suitable material and of the required dimensions. The inner walls 12 of the retort 10 are preferably divergently inclined from the top, or a point adjacent the top, downwardly, in order to provide not only for the ready distribution of the materials to be treated, but also to permit of their proper expansion while under treatment. A fireplace, indicated at 13, is fitted with suitable grate bars 14, beneath which there is a space providing an ash pit 15. The fireplace is fitted with a suitable door 16, and the ash pit with a door 17. The fireplace 13 communicates with a circumferential flue 18, extending any desired distance around, within the base 11, and this flue 18 has branch flues 19, making communication between the same and the interior of the retort at the lower end thereof. In the mouth of each of the flues 19 there is a screen 20, and within each flue 19 there is a damper 21. Within the base at the bottom of the retort there is a space in which shafts 22 and 23 are suitably mounted. Upon the shaft 22 there are sprocket wheels 24, and on the shaft 23 there are sprocket wheels 25. Passing over these sprocket wheels is a moving grate 26, which, as will be understood, is sufficiently wide to extend entirely across the opening at the lower end of the retort. The shaft 23 is appreciably lower than the shaft 24, so that the moving grate is placed at an inclination from the shaft 22 to the shaft 23. The moving grate is preferably thus inclined in order to ensure the proper removal of the coke, ash, or other residue from the material being treated within the retort. At the left-hand end of the grate, as shown in fig. 1, the same passes immediately over a passage-way 27 at the bottom of which there is a door 28 fitted with an arm 29 and a counter-weight 30 suitably connected thereto in order to normally hold the door in its closed position, as shown in the drawing. At the bottom of the passage-way 27, and beneath the door 28, is a coke or ash pit 31. At the bottom of the ash pit there is a door 32, which is also provided with an arm 33 and a counter-weight 34, in order to normally maintain this door in a closed position, as is also shown in the drawing. The base of the retort rests upon a suitable foundation, and the walls of the retort pass through a floor 35, so that a portion of the apparatus is below the floor and a portion thereof above the floor. At its upper end the retort 10 is provided with a hopper 36, at the top of which there is a door 37 hinged or otherwise connected thereto, as indicated at 38. This door is normally maintained closed by a bolt 39 provided with a thumb screw. At the bottom of the hopper, and at the top of the retort, there is another door, indicated at 40. This door is suitably hinged to the hopper, and is provided with an arm 41, and a counter weight 42, in order to normally maintain it in a closed position, in which position it may be secured by a lock bolt 43 or otherwise. At a point in the upper end of the retort, adjacent the top thereof, the same is provided with an opening adapted to receive one end of a discharge pipe 44, the opposite end of which is suitably connected to the suction side of an exhaustor 45. The discharge side of this exhaustor is connected by the pipe 46, to a suitable vessel for receiving the volatiles as they are withdrawn from the retort. (Four claims.)



108044. *Improvements in Apparatus for Trimming and Distributing Coal, etc.* A. Musker, 1, Charing Cross, London, W.C.—This invention has reference to the trimming or distributing of coal or other material in bulk in ships' holds or bunkers or other rooms by apparatus of the type in which endless or continuous conveyors are disposed under a deck and distribute the material; and for convenience will be described mainly as applied to trim-

ming or distributing of coal in ships' bunkers. In the drawings, 1 are decks of a ship, 2 are bulkheads, and 3 bunkers which are filled with coal; 4 are the trimming or mechanical moving means. The hatches or openings through which the coal is fed or delivered into the bunkers 3 are marked 5, and they are preferably disposed directly over the trimming appliances 4, but may be more or less to one side of the same; and the appliances 4 are shown disposed closely under the deck of the bunker, and are supported, and the work in hanger bearers 6, fixed to the deck. In fig. 1 the appliance 4 is a bladed or spiral conveyor of any known suitable kind, and adapted to move the coal from one end of the bunker 4 towards the other end and fill it, the hatch in this case being dis-

posed at one end of the bunker. This moving and distributing action takes place as soon as the coal falling through the hatch reaches the level of the conveyor 4. The conveyor is rotated by gearing 7, worked by an electric motor, or other suitable means.

In fig. 2 the conveyor 4 is of the same kind as that specified with reference to fig. 1, but the two parts of it have the spiral blades or worms oppositely pitched or arranged, while the hatch 5 is in or near the middle of the bunker, and above the point where the two portions of the conveyor blades or worms are oppositely pitched or disposed; and the coal will be moved from this point in opposite directions, towards the two ends of the bunker. In fig. 3 the conveyor consists of an endless band, chains, or the like 8, running over barrels or wheels 9, one of which is rotated by the gearing 7; and the upper run of the band, chains, or the like 8 passes through a casing 10 fixed to the deck 1. This conveyor is provided with a multiplicity of hinged blades, plates, or forks 11, one part of which is attached to the band or chains 8 by chains or the like 12, so that they can take the inclined position shown on the lower run of the band or chains 8, or fold down into the position shown on the upper run of the band or chains 8. The coal moving or trimming action in this case is the same as in the other modifications. The upper run of the conveyor being enclosed in the open ended casing 10, the blades 11 on it cannot act on the coal in their return to the hatch 5. (Two claims.)

108073. *Improvements in Trucks, Transporters, etc.* F. W. Vickery, 10, Devonshire-grove, Old Kent-road, London, S.E.—The present invention relates to that class of machine, transporter, or truck in which a frame is capable of having its height varied relative to the road wheels by the operation of the steering handle. Fig. 1 is a sectional elevation of a truck, transporter, or the like in the line a-a of fig. 3, the main frame being in the raised position; fig. 2 is a similar view on the line b-b of fig. 3, the main frame being in the lowered position; fig. 3 is a plan of a truck, transporter, or the like. Two main side frames 1, 1, connected together by rods 2, 2, 2, to constitute a main frame, are pivotally attached at 3, 3, at the front end to a cross frame 4, and at the rear ends to bell cranks 5, 5, carrying the rear wheels 6, 6. In the centre of cross frame 4 a member 7 carrying the steerable wheels 8, 8, is vertically pivoted by a pivot pin 9, the handle 10 being suitably attached to the member 7 carrying the wheels 8, 8. The handle 10 is also suitably constructed, and connected to its carrying member 7 so as to enable it to be moved in a vertical direction for moving the machine about, and also for engaging its member 7 to allow of actuating the cross frame 4, to lift or lower the main frame, on which the load is positioned. The handle 10 is provided with two pins 11, 12, one of which 12 rides in grooves 13, 13, of a bifurcated projection 14, of the member 7, whilst the other pin 11 can engage slots 15, 15 in the end of the member 14, for operating same. When the handle 10 is required for steering and pulling purposes only, it is placed in its inoperative condition by removing the pins 11, 11, from the slots 15, 15, in which state it is used as an ordinary truck, the pull being on the pin 12, but when it is desired to raise or lower the load supporting portion of the machine, the handle 10 is placed in its operative condition, i.e., by inserting the pin 11 in the slots 15, 15, when by raising or lowering the handle 10 the cross frame 4 is made to move round the axle 16 of the steerable wheels 8, 8, and the load carrying surface raised or lowered. The pivots 3, 3, in the side frames 1, 1, are so arranged relative to the wheels 8, 8, that for a 90 degs. turn of the cross frame 4 the desired amount of vertical movement is imparted to the main frame. When the cross frame 4 is vertical, the main frame is preferably at its highest position. The position of the pivots 3, 3, in the side frames 1, 1, is such that the load tends to force the frame to its lowest position. To prevent this, in either or both of the side frames 1, 1, a pawl-shaped member 17, 18, is pivoted, each of which engages a projection 19, 19, or projections on the cross frame 4. One of the pawls 18 is provided with a second member 20 preferably pivoted thereto, and sliding on the second member 20 is a pawl 21, which is normally kept towards the main locking pawl 18 by a spring 22. The locking pawls 17, 18, are carried by a shaft 23 carried on the side frames 1, 1, and the locking pawl 18 itself is also under the influence of a spring 24 to normally keep the pawls 17, 18, out of the track of the projections 19, 19, on the cross frame 4. The main locking pawls are so shaped, i.e., with noses 25 engaging the top of the projections 19, 19, and the pawl 17 has also a nose 26 at the bottom front corner, as shown at fig. 2 (but the nose 26 may be on both pawls 17 and 18) so that once they are engaged with these projections 19, 19, on the cross frame 4 the nose or noses 26 prevent them being disengaged until the load has been raised slightly higher, when, provided the sliding pawl 21 has been disengaged from the cross frame 4 (explained later), the main locking pawls 17, 18 will disengage themselves from the projections 19, 19, on the cross frame 4, and so allow the cross frame to revolve on the axle of the steering wheels 8, 8. The sliding pawl 21 engages the cross frame 4, when the cross frame 4 is moved to its highest position, and the sliding pawl 21 through the action of its spring 22, pulls

TRADE

The Pulsometer

Steam Pump

MARK.

For Lifts up to 150 ft.

A STRONG SIMPLE PUMP

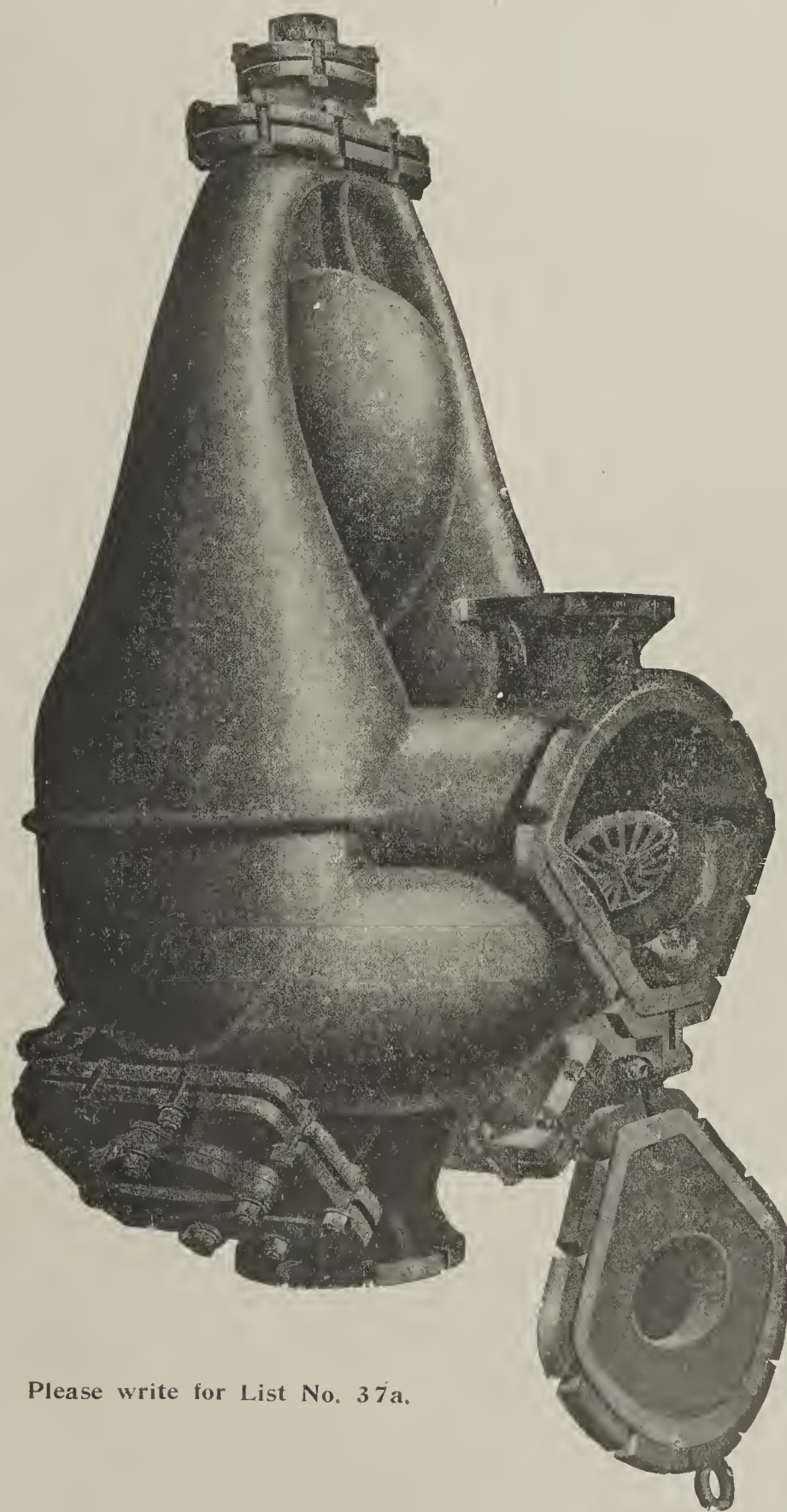
That needs no oil or packing, has nothing to get out of order, and can be left at work for weeks without attention.

FOR PIT SINKING &

The absence of exhaust steam, the facilities for slinging, and its capacity for pumping dirty water render it unsurpassed for this work.

COAL WASHING

Having no frictional parts, it will pass large quantities of coal dust, grit, &c. To withstand the wear, special patterns are made for this work.



Please write for List No. 37a.

Pulsometer Engineering Co., Ltd.

Offices—11, Tothill Street,

LONDON, S.W. 1.

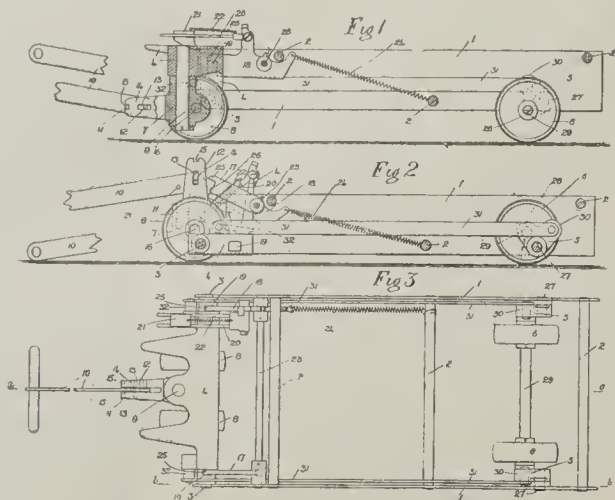
Nine Elms Iron Works,

READING.

Telegrams—"Pulsometer, Vic. London."
"Egyptian, London."
Telephone—4565 Victoria.

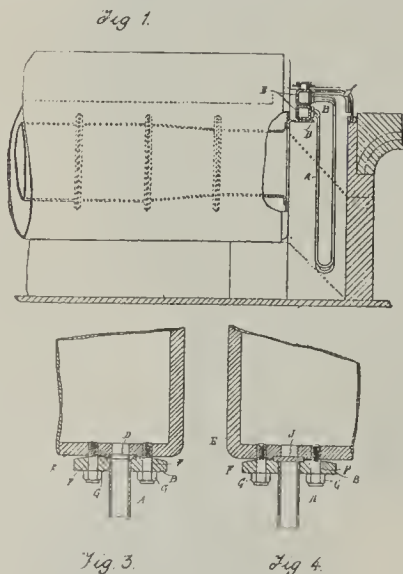
Telegrams—"Pulsometer, Reading."
Telephone—583 Reading.

locking pawls 17, 18, into the track of the projections on the cross frame 4, and, of course, holds the pawls in position so long as the cross frame 4 is in the vertical position, but it will be understood that the sliding pawl 21 can be lifted out of the track of the cross frame 4, when desired, as the sliding pawl 21 is suitably pivoted on the lock-rod 20, and as soon as the sliding pawl 21 is lifted clear of the cross frame 4 the spring 24 actuating the locking pawls 17, 18, lifts them out of engagement with the projections 19, 19, provided the main cross frame has been slightly moved beyond the vertical position to enable the safety lugs or noses 26, 26, to clear the projections 19, 19. The sliding pawl 21 can be lifted out of engagement with the cross frame 4 at any time, but is only able to influence the main locking pawls 17, 18, when the main cross frame 4 is moved at slightly further distance. The back end of



the frames 1, 1, are compelled to rise parallel to the front end by the following mechanism. Pivoted at 27 to the frames 1, 1, one on each side, are bell cranks 5, 5, or equivalents, one end 28 of each of which carries a shaft 29 for the back wheels 6, 6, while the other end 30 of each bell crank is attached to a connection rod 31, which is also attached at its other end to a pivot 32 on the cross frame 4; the proportion of such pivots and bell cranks are such that an equal amount of radial movement is imparted to the bell cranks as is imparted to the front cross frame; by this means the main frame is raised bodily to an equal amount each end, and no auxiliary raising platform is required. The cross frame 4, resting against the shaft 23 when the main frame is lowered, acts as a stop to prevent any further lowering of the main frame. (Four claims.)

108074. *Improvements in Steam Superheaters.* T. Sugden, 180, Fleet-street, E.C.—This invention relates to steam superheaters, and in particular to an improved method of connecting the superheater tubes or elements to the headers, which method allows of ready detachment of the tubes or elements, and of effectively and readily stopping off any defective tube. Fig. 1 shows the invention as applied to a Lancashire type of steam generator; fig. 3 is a section on a large scale of a portion of a header and of the improved device for connecting the superheater elements to the header; fig. 4 is a similar section showing the means for stopping off a superheater tube. Like letters denote corresponding parts in the several figures of the drawings. The ends of the superheater tubes A are provided with strong flanges



B, screwed, expanded, or otherwise fastened thereon in a known manner, and adapted to be secured to the headers E by studs F and nuts G, as shown more clearly in figs. 3 and 4. Each of the flanges B is formed with a recess on its outer face to receive a washer, which is interposed between the flange and the face of the header E to which the flange is bolted. These washers may be made of copper or steel or other metal, and may be faced on each side with a suitable packing material, and they are thicker than the depth of the recesses in the flanges, so that when the nuts G are tightened up a secure steamtight joint is made between the washer and the header, and between the washer and the flange without the flange coming into contact with the header. In some cases the washers, instead of being circular, are made with an extension on one side, such extension being of sufficient length to reach to the side of the flange on the superheater tube, and serving as an indicator to show when the washer is properly home in the recess. When it is desired to stop off a superheater tube, the corresponding nuts G are slackened back, and the joint washer removed and replaced by a plain solid disc J, which when the joint is tightened up again, blocks the end of the superheater tube. (Three claims.)

108200. *Improvements Relating to the Destructive Distillation of Carbonaceous Substances.* S. N. Wellington, 62, London Wall, London, E.C.—This invention relates to the destructive distillation of coal and similar carbonaceous substances at comparatively low temperatures, and has for its object to effect the further decomposition of the constituents of the gases and vapours evolved in the distillation, and to avoid the presence of paraffin bodies in the resulting gas and tar. The distillation is effected within vertical retorts gradually tapering outwardly towards the lower end, the retorts being advantageously formed of an elliptical shape. The distillation is conducted at a relatively low temperature, and the heat is graduated in two or three zones, the retort may be divided into four zones, of which the heat applied to the lower zone may be about 450 degs. Cent. In the zone next above it the heat applied may be greater, for example, 550 degs. Cent.; while in

the uppermost zone a free space may be left and the heat there applied may be from about 980 to 1,200 degs. Cent. Within this space a grid may be suspended from the top cover plate of the retort. The grid may be suspended by means of a rod cased in firebrick, and the grid may be made of any suitable form, with a view to present a considerable area for contact. The grid may be formed of metal, fireclay or of carbon, or of metal oxide. By such means the rich hydrocarbon vapours containing paraffin bodies are subjected to heat, by which these bodies are partially or wholly converted into aromatic bodies. By such means also the gases produced undergo decomposition. The free space may be of any suitable dimensions. A depth of 2½ ft. answers well with a horizontal grid of metal or fireclay extending across the retort. The invention is not limited to the application of heat to the charge in zones as before described, as heat may be applied to the charge at a low temperature in any convenient way. (Three claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Adams, C. H. and S. H. Pumping plant, and apparatus connected therewith. (13059)
Adams, W., and Watkinson, J. Devices for controlling intensity of electric currents. (13098)
Akt.-Ges. Brown, Boveri et Cie. Turbines. (13020)
(Ashford, J.). Reciprocating pumps. (13203, 13204)
Automatic Telephone Manufacturing Company. Electric signalling systems for mines, etc. (13260)
Bennett, I. W. Furnace firebars. (13103)
Boeck, J. Internal combustion engines. (13182)
Bowling, J. D. Preventing ropes being chafed. (13189)
Brough, J. Oil burners. (13144)
Centrum Syndicate. Internal combustion engines. (13034)
Corthesy, J. H. Turbines. (12926)
Curtis, J. W. Clinometers for measuring vertical or horizontal angles, and surveying, levelling, and setting out work. (13053)
Dowson and Mason Gas Plant Company. Open-hearth gas producers, etc. (13049)
(Drägerwerk H. and B. Dräger). Breathing devices for diving apparatus, etc. (13030)
Eagle, H. Internal combustion or explosion engines. (13162)
Emblem, O. Condensing apparatus. (13114)
Farley, J. Smoke consuming furnaces and water heaters. (13206)
Fitzpatrick, H. D. (Fitzpatrick). Steam engines. (13062)
Foulstone, H. Coal washing plant. (13045)
Gravenhorst, E. J. M. Internal combustion engines. (13182)
Heyl, G. E. Compound liquid fuels. (13211)
Ikin, W. G. Internal combustion engines. (13007)
Kirby, A. Burners for pitch. (13205)
Law, A. H. Dynamo electric machines. (12959)
Love, N. B. Revolving cylinder engines. (13039)
McAuley, J. Rope, etc., hauling and binding lines. (13120)
Marks, E. C. R. (Ashford). Reciprocating pumps. (13203, 13204)
Musker, A. Discharge of cargo in bulk from barges, etc., and delivery thereof. (13043)
Nuttall, J. Fire lighting, etc., device. (12994)
(Otis Elevator Company). Inclined endless conveyors or escalators. (13032)
(Otis Elevator Company). Truck conveying apparatus. (13088)
Parsons, Sir C. A. Dynamo electric machines. (12959)
Prosser, H. Production of motive power. (12943)
Remington, C. Electric signalling systems for mines, etc. (13260)
Scholey, H. Apparatus for automatically regulating supply of feed water to steam boilers, etc. (13012)
Sizaire, M. Internal combustion engines. (13086)
Smith, P. Centrifugal pumps or blowers. (13235)
Soc. Anon. pour l'Exploitation des Procédés Westinghouse-Leblanc. Internal combustion engines. (13097)
South Metropolitan Gas Company. Burners for pitch. (13205)
Spencer, R. Furnace firebars. (13103)
Tacchi, P. G. Internal combustion engines. (13034)
Thompson, A. C. Internal combustion engines. (13007)
Turner, W. de C. Gas producer. (13041)
Varley, G. P. Condensing apparatus. (13114)
Varley, G. P. Centrifugal pumps or blowers. (13235)
Webb, F. A. Open-hearth gas producers, etc. (13049)
Weidknecht, A. Explosion motors. (13263)
Woodroffe, F. N. Apparatus for automatically regulating supply of feed water to steam boilers, etc. (13012)

Complete Specifications Accepted.

(To be published on October 4.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
8903. Jacks, T. Gas holders. (109274)
10169. Algrin, R. Rotary compressors. (101210)
10936. Gronvall, J. Mechanism for reversing internal combustion engines. (109278)
12373. Tredegars Limited, and Morris, J. M. Construction of gas generating apparatus. (109284)
12528. Shepherd, J. Electric generators and motors. (109294)
12539. Salway, A. E. Multi-cylinder internal combustion engines. (109295)
12564. Parker, C. H., and Court Works Limited. Chain grates. (109296)
12580. Mond, A. (Schmidt, W. A.). Process of electrical precipitation of suspended particles from gases. (109297)
12666. Thomas, R. B., Thomas, H. S., and Davies, W. R. Machinery or apparatus employed in the manufacture of tin-plates and sheets and other like metal-coated plates or sheets. (109302)
12828. Bowling, J. P. Excavating machines. (109312)
13687. Tully, C. B., and Yeo, O. E. Gas producers. (109323)
13341. Jones, G. Driving arrangements of electric motors. (109367)
13384. Glover, S., West, J., and Wild, W. Mouthpieces and doors for retorts. (109368)

1917.

121. Krienitz, F. H. Internal combustion engines. (109370)
701. Moorley, T. Haulage clips. (109379)
1000. Sutton, L. H. Stamping machines for compressing coal. (109380)
1225. Wedge, U. Furnaces and like structures. (109381)
1571. Iki, O. Feed water purifiers. (108301)
3059. Westly, J. Process of and apparatus for conveying materials by means of a current of air or other gas. (104512)
4689. Farquharson, W. Drill socket. (109408)
6255. Igranic Electric Company (Cutler-Hammer Manufacturing Company). Controllers for electric motor circuits. (109418)
6498. Gill, H. A. (Vereinigte Hüttenwerke Burbach-Eich-Dudelingen Akt.-Ges.). Smelting furnaces. (109419)
7409. Weir, G. and J., and Weir, J. G. Control device or governor for rotary pumps. (109421)
11571. Parker, C. H., and Court Works Limited. Chain grates. (109427)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
16085. Morrison, W. Power systems. (109428)
1917.
11629. Binche, G., Dupuis, C., and Prignol, H. Two-stroke explosion motors. (109439)
12424. Tillotson Manufacturing Company. Fuel mixers. (109442)
12842. Mack, H. Process of mining coal or other rock. (109451)
12863. Basset, L. P. Process and apparatus for treating ores in the blast furnace. (109452)
12896. Bone, D. R. Process of producing and conserving heat for furnaces, kilns, etc. (109453)

GOVERNMENT PUBLICATIONS.

* * Any of the following publications may be obtained on application at this office at the price named **post free.**

Annual Colonial Reports: (No. 928), Cayman Islands (Jamaica) Report for 1915-16; September 1917. Price, 1½d. net.
Seventh Annual Report of the Road Board; July 30, 1917. Price, 8d.

PUBLICATIONS RECEIVED.

"The Mining Magazine" (Vol. xvii., No. 3), September 1917; "Diesel Engine Design," by E. Mortimer Rose (Emmott and Company Limited), price 5s. net; "University of Illinois Bulletin" (No. 51, Circular No. 5), by E. A. Holbrook, price 20s. (European agents, Chapman and Hall Limited, London); "Journal of State Medicine," September 1917, price 2s. net; "Russia," (Vol. 1, No. 8), August 1917 (Messrs. R. Martens and Company Limited), price 6d. net.

CATALOGUES AND PRICE LISTS RECEIVED.

Boving and Company Limited (Imperial Buildings, 56, Kingsway, London, W.C.2) have sent us a copy of their latest pump catalogue. This firm states that they specialise in pumps of low, medium, and high pressure, and that at the present time the total output of the driving motors for their high-pressure multistage turbine pumps is above 15,000 horse-power. Extensive arrangements have been made for testing the efficiency of the pumps, and interested parties are invited to be present.

Fastnut Limited (115, Newgate-street, London, E.C.) have forwarded one of the handy "Security Note Cases" which they are presenting to customers, and which prevent two notes being passed together as one, a contingency liable to arise from their sticking together, especially when new. The case, which folds, and has two compartments, for £1 and 10s. notes respectively, with a pocket to hold a stamp book, is provided with narrow strips or fingers, of the same material as the case, to separate the notes. These latter are put in from the top, first lifting up the fingers, then putting one finger between each note. In pulling them out again, only one can be drawn at a time, because those underneath are held by the fingers.

Exports and Imports of Mining Machinery.—The value of imports and exports of mining machinery during August is given below:—

	August.		Jan.-August.	
	1916.	1917.	1916.	1917.
Imports	£ 9,537	£ 21,884	£ 87,958	£ 132,609
Exports	£ 86,839	£ 46,144	£ 448,998	£ 483,017

These figures are not inclusive of prime movers or electrical machinery. The following shows the value of exports of prime movers other than electrical:—

	August.		Jan.-August.	
	1916.	1917.	1916.	1917.
All prime movers (except electrical) ..	£ 366,145	£ 291,944	£ 2,913,288	£ 2,601,093
Rail locomotives	£ 99,187	£ 135,281	£ 826,687	£ 1,093,854
Pumping	£ 38,049	£ 21,964	£ 347,826	£ 273,617
Winding	£ 2,798	£ 4,566	£ 9,425	£ 10,201

Miners' Wages in Germany.—"While in Upper Silesia the demands of the miners for increased pay may be considered to have been satisfied," says *Soziale Praxis*, of August 16 (quoted in the Board of Trade *Labour Gazette*), "in Lower Silesia, Saxony, and Upper Bavaria fresh demands have recently been put forward. In Lower Silesia, hewers were granted a wage of 6s. 11d., and the workmen did not press for more, as the Administration proved that the mines did not pay. In the Oelsnitz-Lugau district, the rate per shift was increased by more than 6d., and a new war bonus of 7d. was also granted. At Upper Bavarian mines (Penzberg, Hausham Marienstein, and Peissenberg), a hewer's rate of 6s. 4d. was demanded, the rates of other workpeople to be increased in proportion. Besides war bonuses, a supplement of 30 per cent. on overtime and an increase of 50 per cent. on the Sunday shift rate were also demanded. The employers refused to grant the last-named, as they consider this would encourage the practice of not working on Monday. The miners, however, still persist in all their demands."

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COAL MINES INSPECTION IN 1916.

SCOTLAND DIVISION.

Mr. H. Walker, reporting upon the inspection of mines and quarries in the Scotland Division for the year 1916, states that during the year 1,565 inspections were made underground at mines, and 438 quarries were inspected. Eighty fatal accident enquiries were attended. At least one inspection underground was made of every mine, and all the smaller and 104 of the bigger were inspected in every part. Inspection and enquiry was made into the circumstances surrounding all the fatal and the most serious of the non-fatal accidents and into matters referred to in all complaints received. Wages at the coal mines have been raised by 31½ per cent., and were at the end of the year 150 per cent. above the standard rates of 1888. In addition certain special advances have been made to certain classes of workers, and in the case of certain boiler firemen the hours per shift have been reduced from 12 to eight. The number of persons employed during the year was 127,104; the output of minerals was 40,121,054 tons, of the value of £29,114,614.

Effect of the War.—Employment has been good, and whilst mines have been idle on occasion due to lack of railway and shipping facilities, having regard to the circumstances, such a condition is not surprising. If the traffic could have been dealt with, the men could have worked more time and more coal would have been produced. The output compared with 1913 and 1914 was 7,313,233 and 3,565,360 tons less respectively, but was 430,927 tons more than in 1915. The output per person employed underground in 1913 was 321 tons; in 1914, 290 tons; in 1915, 325 tons, and last year 315 tons. The number of coal cutting machines has, compared with 1913, increased by 111. With regard to accidents, these cannot actually be attributed to the conditions due to the war, although, indirectly, the war is, of course, to blame for the heavy increase recorded.

Each inspector has, when investigating an accident, considered the relation, if any, of circumstances surrounding the accident and the conditions of work brought about by the war. In no case does any direct connection between the two appear to have been reported, but so many of the workers have joined the Forces, and there are few left behind who have not near relations fighting on some front, so that the war, even if sub-consciously, is thus always present in the minds of those men and it is to this intrusion that a number of accidents are attributed.

Ventilation.

The sampling of air in mines whilst making some progress has been retarded by the absence on active service of three of the inspectors, and by the additional extraneous work due to the war, which the inspectors remaining at home have been called upon to do. Ventilation of the mines cannot be considered to be in a satisfactory condition so long as so many accidents due to accumulations, however small, of inflammable gas continue to occur. The number of these accidents in the year was very high, and, apart from what is considered in Scotland to be a drastic remedy—viz., the entire prohibition of naked lights in the seams where such accidents occur, many should be prevented by the exercise of ordinary pitmanship. In other districts pitmen have learnt by painful experience the danger of inflammable gas, and have taken the lesson to heart. In Scotland, whilst many years have passed since an individual explosion, attended by the loss of many lives, has occurred, numbers of men have been fatally and non-fatally injured, owing to a great number of separate explosions of firedamp, and although these accidents, occurring as they do in dribbles, have not the effect that a single big disaster has, the total of the individual accidents is a very grave one.

Coal Dust.

The question of coal dust is confined in Scotland to a few of the mines, the remainder, forming a large majority, being naturally wet. In those mines where the natural conditions are such as to encourage the occurrence of coal dust, steps are taken by watering, cleaning up, and stone dusting to combat the evil.

Support of Roof and Sides.

The necessity for using straps set in a systematic manner to support the roof in all longwall faces cut by machine has been previously pointed out, but must again be mentioned. Additional supports, in the shape of chocks or wooden pillars, should also be set at regular intervals on the waste side of longwall faces. In mines where this is done few accidents occur, and the face is seldom closed between roads. In taking out pillars of coal much more use should be made of hard wood chocks. To see the roof of a newly completed lift standing on props is not a sight to give confidence. The chocks can be used over and over again, and though, perhaps, more costly in the first place, would eventually prove to be cheaper than props, which get broken.

Rescue Work.

The buildings in connection with the three central stations to complete the number required in Scotland have been finished, and the necessary equipment pro-

vided, with the exception of motor-cars; these it is expected will be delivered shortly. There has been considerable delay owing to the prevailing war conditions, but nearly 400 men from the mines, which will eventually be served from the stations at Coatbridge, Larbert, Lesmahagow or Bathgate, have been trained at the Coatbridge station.

Treatment of Horses.

Mr. A. McArthur, inspector of horses, examined 1,740 horses at 105 mines. Prior to his appointment as an inspector of horses in mines, he had a broad experience of the conditions under which horses are worked and of their treatment in large and other towns, and reports that now that he has had four years' experience of the conditions underground, he has had to change the opinion which he held prior to his appointment, namely, that horses were overworked and ill-treated in mines, and is satisfied that both the treatment and conditions of work of mine horses compare favourably with those generally obtaining on the surface. His chief complaint is that of the stables. It is not that these stables do not comply with the law, but are dotted about at all parts of a mine, and are anything but substantial. Stables should be of a permanent character of brick or stone, with proper drainage arrangements.

Supply of Materials.

The supply of materials has been equal to the demand. It is surprising how many cases have occurred where, by a little forethought, orders for certain articles need not have been issued. The necessity to make the greatest possible use of all the timber is most imperative, but until an actual shortage occurs at the mines it is doubtful if every piece of timber will be used to the utmost extent. Where it is not the custom to withdraw timber from the waste and old roads, special men should be appointed to do this work, and as much timber recovered for further use as is consistent with safety.

Accidents.

One hundred and eighty-four accidents, causing the deaths of 194 persons, occurred during the year. This is an increase of 39 accidents and 45 deaths compared with the preceding year. The death-rates from accidents per 1,000 persons employed were (a) below ground 1.62, (b) above ground 1.19, and (c) below and above ground 1.53. The figures for the previous year were 1.35, .73 and 1.22. Per million tons of mineral raised, the death-rate was 4.84, as compared with 3.75 in 1915, 3.64 in 1914, and 4.36 in 1913.

Explosions of Firedamp.—Seven persons were killed by six accidents, and 101 persons were injured by 61 accidents. Whilst the number of fatal accidents and the number of deaths were respectively two and four less than in the preceding year, the number both of non-fatal accidents and persons injured thereby was very much greater. Each of the six fatal cases was preventable and should have been prevented.

Falls of Roof and Sides.—Ninety-two accidents caused 96 deaths, or 18 more accidents and 21 more deaths than during 1915. Of these accidents 68, causing 70 deaths, occurred at the working face; ten, causing 11 deaths, on roads to repairers; and 14, causing 15 deaths, to persons passing along roads or engaged in work other than repairing or enlarging; of the 96 persons killed, 15 were under 21 years of age.

Shaft Accidents.—Seven accidents resulted in seven deaths, being one more accident and death than in 1915. Each of the seven accidents should not have occurred. Two were due to men pushing tubs into blind pits when the fence gates were not in position, and falling to the bottom; one was due to the non-use of safety belts when repairs were being done in an old shaft, one to a winding enginemaster lowering a cage before he had received a signal; one to a winding enginemaster raising a cage and a man getting into that cage at a shaft bottom before a signal had been completed; one to the non-use of cage gates; and one to an onsetter removing the fence at the shaft bottom and falling beneath the descending cage. Many mid-landings and shaft bottoms could and should be more efficiently lighted, and a liberal use of whitewash at such places in cases where it can be efficiently applied is very desirable.

Miscellaneous Accidents Underground.—There was an increase of nine accidents and 14 deaths as compared with 1915, the totals in 1916 being 47 accidents and 52 deaths. A number of these accidents were due to want of care, others to the methods employed. Of the eight deaths caused by explosives, two were those of firemen who had lamps on their heads whilst handling open boxes of detonators, and four to the practice of firing more than one shot in one place at one time—a dangerous practice unless electricity be the firing medium. The fatal accidents due to haulage show an increase as compared with 1915, but were fewer than in 1914.

Two men were killed when walking on haulage roads when the haulage was in motion, and two were illegally riding on tubs. By machinery underground five persons were killed, four of them being coal-cutting machine attendants. The number of persons killed by accidents on the surface was 13 more than in 1915, the number

being 32. Ten were due to machinery, 11 occurred on railways, sidings, or tramways, one was due to electricity, and 10 to miscellaneous causes.

Dangerous Occurrences.—There were 46 dangerous occurrences reported during the year, 10 of which were due to explosions of firedamp; one was a fire on the surface; 17 were underground fire; 13 were breakages of ropes, chains, or other gear used for lowering and raising persons; four were cases of overwinding and one was an inrush of water.

Prosecutions.

Sixty-four charges were preferred against owners, agents, managers, and other officials during the year. In 45 cases convictions were recorded; eleven charges were found to be not proven; two were withdrawn; one found proven but dismissed under the Probation of Offenders Act, and in five cases the defendants were found not guilty. The penalties inflicted amounted to £77.

Proceedings were taken against 147 workmen during the year; 128 were convicted and fined, 15 were admonished, three cases were found not proven, and one was dismissed under the Probation of Offenders Act. The total amount of the fines imposed was £155 11s. 6d.

The work throughout the year has been arduous. The colliery recruiting courts have involved a greater amount of work than actually there need have been if the various forms had been fully filled in at the stated dates. Apart from the serious amount of extra labour thus caused, the courts have worked smoothly, and, in addition to their immediate object, the courts have served a most useful purpose by bringing the various parties concerned so often together.

NORTHERN DIVISION.

Mr. J. R. R. Wilson reports that all the coal mines have again been inspected underground at least once, and many of them several times during the year. Jointly the members of the staff in the division paid 3,141 visits to mines, of which 2,507 were underground inspections; and 1,412 inspections were made at quarries. There was again a general rise in the rate of wages paid to all classes of workers. At coal mines in Northumberland there was an increase of 48 per cent., the rate at the end of the year standing at 131 per cent. above the standard of 1879. In Durham the wages were raised from 75 per cent. to 107½ per cent. above the same standard. At Cumberland coal mines the wages were raised 8.33 per cent., plus a war bonus of 13.8 per cent. At the close of the year, the wages in the Cleveland ironstone district were 82 per cent. above the standard of 1879, being an increase of 35 per cent. Iron ore miners' wages in Cumberland are regulated quarterly in accordance with the price of hematite warrants as recorded by the Glasgow iron market. In the two first quarters there were advances of 1s. 1d. and 7d. per day respectively; the last two quarters showed no alteration, as the price of hematite had been fixed by the Ministry of Munitions.

General Effects of the War.—The shortage of labour at collieries is still reflected in the condition of many of the roadways. It becomes increasingly difficult to maintain roads a proper size and keep them as clean as one would desire. At mines under the Coal Mines Act in the division the number of persons employed at the end of the year was 191,338, as compared with 184,124 at the end of 1915. This increase is not due to an influx of new labour into the pits, but is mostly accounted for by men returned from the Colours to resume work in the mines, and by a number of men who in the early months of the war volunteered to do munition work and who have since been released for coal mining work. The output of coal was 47,270,124 tons, as compared with 47,030,285 tons for the year 1915. The increase is barely a quarter of a million tons, but it would have been more if the exigencies of shipping had allowed. The total deaths from accidents at mines under the Coal Mines Act was 206, being 21 less than in the previous year. Unfortunately, of these accidents the large total of 95 should never have occurred if ordinary caution or a little common sense had been displayed. If both fatal and serious non-fatal accidents are taken into consideration, there is an increase of eight in the number of reported accidents. About 46 per cent. of the underground fatalities are attributable to falls of roof and side, and the remark made last year applies with equal force to that under review: many of these accidents were due to neglect in not setting sufficient support.

Ventilation.

There is nothing calling for any special comment under this heading beyond what is referred to under the subject of accidents. Generally speaking, more attention has been given to gate-packs and the more extended use of canvas doors, with the resultant improvement in ventilating currents. All the same, conditions seemed to suggest the need for doing more, and the analyses were, as a whole, very satisfactory.

Coal Dust.

Much more attention is being given to this subject than formerly, and the question of the dilution of the dust is being undertaken in a serious manner.

have been urged to make a regular analysis of their mines, and several have done so. By are able to realise where the chief which it is not difficult to apply the

Falls of Roof and Side.

of accidents point to an improvement under this head, as the ratio of fatalities has fallen from 50 to 46 per cent. of all fatal accidents underground. There is no one cause of this class of accident; better methods, better discipline, a keen appreciation on the part of the miner that he must safeguard his own life by constant attention to the condition of his own working place, would all tend to improvement. Colliery officials are finding that the roads are standing better; that is, there is less liability to falls of both roof and sides, when the goaf timber is withdrawn. More attention is being given to this question, though many managers still do not realise all that it means. Safety contrivances, too, are by no means used as frequently as they should be.

Rescue Work.

In spite of difficulties raised by large numbers of men trained in this work joining the Forces, brigade work is still being maintained, and training is regularly carried on at the central rescue stations. The South Moor Collieries in Durham, although affiliated with the central rescue stations, still maintain their own local station and give a thorough training to the members of the brigade. It is saying a great deal when it can be stated that even now there are nearly 50 fully trained men at the mines. The secret of the success is in the fact that the officials and workmen take a keen interest in the work. The practices are extremely thorough, a very interesting item being that periodically each man is given a piece of apparatus which he has to take to pieces, and after the parts have been thoroughly mixed up, assemble them again and describe the uses of the various parts to the instructor. The station, too, is very complete and contains a motor garage, an appliance and repair room, gas testing room and store-house, lecture room, bathrooms and lavatory, and an experimental gallery for practices. The equipment is in keeping with the rest of the scheme, and amongst it is an Oldham gas testing apparatus for instructing the workmen how to test for gas. The special arrangements made to afford protection against air raids continue to be carried out, and at various places fire brigades and trained ambulance men are always on duty.

Treatment of Animals.

As a result of carelessness, and perhaps of ignorance, there are occasional cases of neglect, yet on the whole there is no serious cause of complaint as to the condition and treatment of pit animals. It is suggested that walls and floors of stables in many cases might be of more durable materials so that proper sanitation may be assured.

Edward Medal.

His Majesty was pleased to award the Edward Medal of the Second Class to Christopher Devonport, foreman, and William Walker, deputy overman, for gallant conduct in rescuing a fellow workman from a fall of roof in Harton Colliery, South Shields. Both these men crept beneath a mass of fallen material and then worked to release their comrade who was imprisoned by the fall, while the roof above them threatened to further collapse and cut off their escape.

Accidents.

Explosions of Firedamp.—From this cause 13 lives were lost during the year 1916, as the result of one accident; and there can be no doubt that this loss would not have occurred if the officials concerned had made a proper examination before commencing work. Had they done so they would have discovered the presence of inflammable gas, or would have noticed that there was not a ventilating current sufficient to carry away any firedamp that might be given off. The explosion referred to occurred on Sunday morning, August 13, in the Main Seam at Woodhorn Colliery, one of the Ashington group of mines in Northumberland. The investigation of the cause of the accident disclosed the following violations of the Coal Mines Act, 1911:—(1) Section 29 (1). An adequate amount of ventilation was not constantly produced to dilute or render harmless inflammable gas. (2) Section 64 (1) (3). The deputy or deputies did not ascertain the condition of the mine so far as the presence of gas and ventilation were concerned, nor was a report of the inspection recorded in a book kept for the purpose. Legal proceedings which were instituted against the manager and the engine-wright were dismissed by the justices, but, so far as concerned the manager, their decision was appealed against.

Dangerous Occurrences.—In the 1915 report a serious fire from spontaneous combustion was recorded in the Main Coal seam at Seaton Delaval Colliery, Northumberland. During 1916 there was another fire in the same seam from the same cause, but fortunately it did not attain large dimensions.

Prosecutions.

Legal proceedings were taken in two cases for breaches of the Coal Mines Act.

YORK AND NORTH MIDLAND DIVISION.

Mr. Thomas H. Mottram reports that during the year 1,633 underground visits were made by the inspectors of mines and 336 by the horse inspector, who visited 210 separate mines and inspected 12,238 horses. The total number of inspections made in the division was 1,969, and 337 quarries were inspected. Every mine in the division was inspected once; in many instances where the underground workings are of an extensive character several visits were made during the year. All of the non-fatal accidents 21 inquests were attended. dangerous occurrences, including underground fires, were investigated.

Employment.

Sixty-four persons employed in and about the mines of ironstone at the

end of 1916 was 239,331, showing an increase of 10,259 as compared with the previous year, and a decrease of 21,539 since the outbreak of war at the end of July 1914. The 10,259 increase last year consisted of 9,163 underground workers and 1,096 surface workers. In other words, the shortage of workers occasioned by the war was reduced from 31,789 at the end of 1915 to 21,539 at the end of 1916.

Output.

The output of coal and other mineral from coal mines during the year was 68,471,139 tons, and 67,983,983 in 1915, and the value was £46,702,553, as compared with £37,519,849 in 1915. There was, therefore, an increase in the output of 487,156 tons, and, owing to higher market prices, the increased value of the whole output amounted to no less than £9,182,704. The increase in output of coal amounted to 501,275 tons, but the total output of the division was only 487,156 tons more, caused by a lesser production of fireclay and ironstone than during 1915. Taking coal alone, the output for the year per person employed underground was 363.3 tons as compared with 379.3 in the previous year. It would be difficult, in fact misleading, to assign any one particular reason for this decrease, but in a measure it was no doubt due to want of transport in many cases, and probably to a resumption of development work which to some extent was discontinued in 1915, but again became necessary in order to secure a continuous output of coal in succeeding years. The output per person employed underground in 1913 (pre-war time) was 360 tons. The proportion of coal produced by coal-cutting machines was 7,700,586 tons, or about 11.3 per cent. of the whole output of the division.

Accidents.

During the year, 1,503 accidents were reported under the Coal Mines Act, 1911. Of these, 289 proved fatal to 295 persons, and the death rates per 1,000 persons employed were as under:—Below ground, 1.36; in preceding year, 1.33. Above ground and below ground, 1.23; in preceding year, 1.16. The 295 fatalities arising out of 289 accidents are made up of: *nil* from explosions of firedamp; 160 from falls of ground; eight in shafts; 87 miscellaneous underground and 40 on the surface. It is pleasing to note that the year passed without any loss of life from explosions of firedamp, but as regards fatalities by falls of roof, this source of accident shows no improvement, and so long as it produces 53 or 54 per cent. of the loss of life from all causes underground should and must, if improvement is to be effected, demand the constant attention of all concerned in the management of mines. Improvement lies in the direction of (1) keener supervision, (2) the tightening of timber regulations, by reducing, as far as practicable, the maximum distances for setting supports, and (3) a more generous use of roof bars, coupled with promptness on the part of those responsible for the actual setting of the timber whether danger is apparent or not. Many air samples have been taken underground and analysed during the year. This system no doubt helps in the maintenance of a fairly satisfactory standard of ventilation (a) in open light mines, where the finding of as low a quantity as $\frac{1}{2}$ per cent. of firedamp jeopardises the use of naked lights, and (b) in other mines where an increased percentage indicates that some remedy should be applied as soon as possible.

Coal Dust.

At some collieries machinery has been installed to provide suitable inert dust for the purpose of rendering coal dust on underground roadways innocuous. In many cases where the dust is of a light or grey colour the proportion of such dust to that of coal dust is easily gauged by the naked eye of the inspector; but where the inert dust is of darker colour and mixed with coal dust, the proportion of incombustible dust cannot be safely arrived at without analysis. Meanwhile, until this matter is dealt with by General Regulation, the inspectors are enforcing the provisions of section 62, which requires the roadways to be cleared of coal dust as far as is reasonably practicable, and encouraging the application of shale dust on all dry and dusty roadways.

Support of Roof and Sides.

Of the 157 fatal accidents from falls, one caused the loss of three lives and another resulted in the loss of two lives; the remainder were all single fatalities. Of the 160 deaths, 34 occurred in Derbyshire, 24 in Nottinghamshire and 102 in Yorkshire. In the three counties respectively, the percentage of deaths under this head to the total fatalities in each county was, Derbyshire 66, Nottinghamshire 65 and Yorkshire 49. Proceedings were taken against six workers and one official for violations of the Timbering Regulations—ten deaths were due to violations on the part of workmen and 24 deaths might have been avoided by the exercise of ordinary caution.

Rescue Work.

Considerable progress has been made in the construction and equipment of the new stations being erected at Chesterfield and Ilkeston for the Midland Coal Owners' Rescue Stations Company Limited, to serve mines in Derbyshire and Nottinghamshire—principally those mines outside the ten-mile radius of the parent rescue station at Mansfield. In the whole division there are now ten rescue stations ready, with the exception of Ilkeston, to render rescue aid in time of emergency. It is to be regretted that the work of the Yorkshire Collieries Ambulance League has been in abeyance during the year owing to increased difficulty in procuring additional men for training purposes. At the Denaby Main branch of the St. John Ambulance Brigade 33 men were trained in the use of rescue apparatus; 31 ambulance brigade men are organised for duty in the mine and 39 for duty on the surface; 20 nurses are told off for attendance at the mine in case of need and 55 for duty at the homes of injured persons. In addition a large number of men, both on the surface and underground, are competent to render first aid, but are not members of the brigade.

Dangerous Occurrences.

Sixty-four dangerous occurrences were reported. These were:—Outbursts of gas, one; explosions of firedamp, five; underground fires, including abnormal

heatings and cases of fire stink, 14; overwinds, seven; breakage of winding ropes, chains or other gear by which men are raised or lowered, 31. Of the 14 underground fires, 11 were due to spontaneous combustion (six in the Doncaster area, four in Derbyshire and one in Nottinghamshire). None were of very serious dimensions and were successfully dealt with either by scouring or by the sealing off method. The other three were due (1) possibly through smoking, as a miner's coat and nothing else was found smouldering; (2) to friction at a brake wheel; and (3) to the heat of lime, generated by absorbing moisture, charring a timber prop.

Prosecutions.

In four instances legal proceedings were taken against owners, agents and managers. These involved 56 charges, and convictions were obtained in all cases, the fines ranging from £10 down to the simple payment of costs, which in many of the charges did not amount to more than 5s. 6d.

The cases against workmen numbered 243. Convictions were obtained in 228 cases; four were dismissed, and 11 were dismissed or withdrawn on payment of costs. The offences were:—Interfering with ventilation, five charges and five convictions; rules about safety lamps, ten charges and nine convictions; rules about matches and smoking, 51 charges and 45 convictions; rules about explosives, five charges and five convictions, rules about timbering, seven charges and seven convictions; rules about trams and tubs, 18 charges and 16 convictions; rules about travelling on haulage roads, eight charges and eight convictions; disobeying orders, 14 charges and 14 convictions; not reporting presence of inflammable gas, one charge and one conviction; cruelty to, and want of care of, animals, 23 charges and 21 convictions; miscellaneous, 101 charges and 97 convictions.

LANCASHIRE, NORTH WALES AND IRELAND DIVISION.

Mr. A. D. Nicholson reports that during the year the number of mines and quarries worked was as follows:—Coal mines 309, metalliferous mines 101, and quarries 1,026. The total output amounted to 29,141,650½ tons, with an estimated value of £20,053,204. These figures show a reduction of 861,282½ tons, but an increase in estimated value of £3,548,255. The coal trade has continued to be particularly brisk throughout the Division, and wages have reached the highest standard on record. Many collieries have worked more than 300 days during the year. With the exception of quarries producing limestone and rock used for road-making, the quarry trade has shown further shrinkage, due to want of labour and the declining building trade. The total number of persons regularly employed in mines and quarries and works connected with them was 124,963, an increase of 1,583 on the figures for 1916. The coal industry employed 89½ per cent. of the total. All mines have been inspected underground at least once during the year, the total number of such inspections being as follows:—Coal mines 2,130, metalliferous mines 203. The majority of the more important mines have been frequently inspected. In addition to the above, there were 291 underground inspections of horses and ponies while at work, which included examination of the roads used for horse haulage.

Quarry inspections to the number of 1,748 were made, the more important quarries being frequently visited. In all cases where an inspection of the scene of an accident was necessary, an inspection and report were made. Out of a total of 570 accidents reported from coal mines, only 44 were not inspected, and these were mostly of a trivial nature, many of which need not have been reported.

Effects of the War.—The total number of persons employed in and about mines, under the Coal Mines Act, was 111,819, and compared with the previous year there is an increase of 5,410, or about 5 per cent. Compared with the total for 1914, there is a deficiency of nearly 13,000 persons. Of this year's increase of 5,410, there were 5,050 employed underground, while the 360 extra surface workers included an increase of 300 females, who have replaced men taken for military service. The increase in the number of persons employed has been largely due to a number of discharged soldiers who have returned to their former employment, and to the influx of persons from other trades. Some of the large newer mines attract workmen at the expense of the older and more difficult mines, and show a considerable addition in the number of persons employed. In spite of an increase of 5 per cent. in the number of persons employed, there is a decrease of 46,605 tons of mineral obtained from mines under the Coal Mines Act, the actual reduction in coal being 10,762 tons. This reduction may be largely accounted for by the fact that the greater proportion of the men who have left the mines for military service are young men who are capable of producing a larger output than the older men who have to some extent replaced them. Cheshire and Ireland both show a slight increase in output, while in Lancashire and North Wales there is a decrease.

Accidents.

The total number of accidents reported was 570, of which 157 were fatal and caused the death of 159 persons. These figures show a serious increase of 22 fatalities and deaths. There is a reduction of three in the number of non-fatal accidents and 31 fewer persons were injured. An analysis of the above figures shows that the large increase in fatal accidents is entirely due to falls of roof and side, by which 96 fatal accidents occurred in 1916, causing 97 deaths, as compared with 74 fatal accidents and 75 deaths in the preceding year, the fatal accidents under the other headings being almost identical in every case with those of the previous year. No accidents caused the death of more than two persons. There were no accidents, either fatal or non-fatal, reported from the coal mines in Ireland. The death-rates per 1,000 persons employed were:—Below ground 1.71, above ground 0.42, above and below ground 1.43, as compared with 1.52, 0.46, and 1.28 respectively in the preceding year. The increase of 22 fatal accidents and

deaths included under the heading of "Falls of Roof and Side" is equivalent to a rise of 7 per cent., and brings the percentage of deaths from falls up to 61 per cent. of the total deaths. Further consideration as to the reason for the augmentation of this already prolific class of accident is desirable. Compared with the deaths during the year 1915, it is found that the increase for 1916 is almost entirely confined to falls at the face and on roads whilst repairing or enlarging. The three most likely causes to which the increase in fatal accidents from falls of ground might be due are:— (1) The increased use of new and unseasoned timber. (2) A slight influx of inexperienced workmen. (3) Increased roof troubles, owing to the working faces not being constantly at work through want of labour. These three causes would account for 13 out of the total increase of 22 accidents. The remedy for (1) is obvious, but difficult to carry out at the present time, as the greater part of the timber now being used has not been kept long enough. In such cases the supports should be placed closer together, and, as far as possible, mixed with seasoned timber. The influx of inexperienced workmen has now practically ceased. The remedy for (3) will continue to be difficult so long as labour remains scarce.

Ventilation.

On the whole the ventilation of the coal mines in the division continues to be kept at a fairly good standard, and at most of the deep mines in Lancashire, where sudden outbursts of gas are occasionally met with, it is imperative that there should be a margin above the amount actually required for efficient ventilation. Comparatively few samples of air have been taken and analysed. In only two cases has the ventilation been such as to render sampling actually necessary. In the one solitary case of an explosion of firedamp by means of an open light, which caused slight injury to an official, safety lamps were at once introduced.

Suppression of Coal Dust.

Considerable progress has been made in the removal of coal dust on the roadways, and also in preventing the deposition of fine dust from the tubs in transit. The majority of the collieries are now well provided with dust-proof tubs, but during the last six months the introduction of new tubs has been severely retarded owing to the difficulty experienced in obtaining suitable steel.

Rescue Work.

All the eight rescue stations in the division have been in constant use for training purposes, and are kept up to their usual state of efficiency. The Denton station has not been used owing to the absence of certain plant and apparatus which it was impossible to obtain on account of the war. This has now been supplied, and at the present date it is expected to get the station into working order very soon. Owing to many trained rescue men being on active service it has been necessary to train more men to fill their places, and probably all collieries now have their teams up to full strength again.

Treatment of Animals.

The total number of horses employed at 126 mines in the division was 1,622, and a thorough inspection of all of them employed at 124 mines has been made by the inspector of horses, and there is no doubt the improvement previously reported has been well maintained. In Lancashire there is a tendency to reduce the number of horses and ponies used by substituting small auxiliary hauling engines, and this is no doubt a step in the right direction which could, with advantage, be extended. In some of the North Wales pits there has been an increase in the number of animals used. It was not found necessary to take proceedings against any persons in connection with the care and treatment of animals during the year.

Dangerous Occurrences.

Of these 23 were reported. One was a slight ignition of gas by shot, seven were underground fires, 14 were due to the breakage of gear, &c., connected with winding, and there was one case of overwinding when a fireman was descending. There were two explosions in connection with the use of compressed air, which, although not strictly coming within the category of reportable dangerous occurrences, are worth recording.

Prosecutions.

No proceedings were instituted against owners, agents or managers during the year under review. Proceedings were instituted by owners against 84 workmen for various contraventions of the Coal Mines Act and General Regulations. In only four cases were the charges dismissed. In one case a sentence of two months' imprisonment was inflicted. The total penalties amounted to £112 9s. 6d., an increase of £27 12s. 9d. upon the previous year.

Pitwood.

A local pitwood committee was formed in June 1916. Only one meeting of the committee was held, as apparently at that time there was no inclination or necessity on the part of the colliery proprietors to deal with the Home-grown Timber Committee. Returns were obtained from colliery owners showing the annual consumption of all classes and sizes of timber, and these returns were summarised for future reference. Since then larger district pitwood committees have been formed, and owing to the shortage of imported pitwood these committees will no doubt be able to arrange for the effective development, regulation and allocation of home-grown supplies of pitwood.

SOUTH WALES DIVISION.

Dr. W. N. Atkinson's report states that during the year 2,384 official visits to mines were made by the inspectors, 1,992 of which were underground inspections, including 592 by the inspectors of horses; 548 visits were made to quarries. The scenes of most of the fatal accidents were examined, and many non-fatal accidents; and nearly all the inquests were attended. Throughout the year the coal trade was dominated by war conditions, but nevertheless it was on the whole a highly prosperous year for the mining industry. Towards

the end of the year the want of shipping caused a considerable and increasing amount of short time to be worked at collieries producing certain classes of coal for export, chiefly anthracite. Wages were increased on two occasions during the year, advances of 15 per cent. being given in each case. On December 1 the Board of Trade took control of all the collieries in the South Wales coal field.

Employment and Output.—The total number of persons returned as employed at coal mines in the division in 1916 was 214,100, being an increase over the preceding year of 11,445 persons, equivalent to an increase of 5.6 per cent. The total output of coal was 52,080,700 tons, being an increase of 1,628,109 tons over the preceding year, equivalent to 3.2 per cent.

Accidents.

The total number of accidents reported was 1,354. The number of persons killed (including four deaths from accidents in the preceding year) was 322, and the number of persons injured was 1,067. The deaths were nine less than in the preceding year. There was no accident of unusual importance during the year. They were all single fatalities, except six accidents, each of which caused the deaths of two persons; two of these were by falls of roof, three by trains running wild, and one by an inrush of water.

Prosecutions.

Six prosecutions of owners, agents or managers were undertaken during the year.

Rescue and Aid Work.

The work of training the brigades has been carried on throughout the year; but many of the best teams were reduced by men leaving for the Army and ambulance work. Negotiations were concluded for a sub-station at Pontardawe, and arrangements were made for the erection of one at Cross Hands—these stations will practically complete the scheme for the western area, the mines in the neighbourhood of Pembrey and in Pembrokeshire excepted.

Dangerous Occurrences.

Twenty-nine dangerous occurrences as defined by the Notice of Accidents Act, 1906, were reported during the year. There were three cases of overwinding with men on, in shafts where automatic contrivances for the prevention of overwinding and detaching hooks were in use. In two cases the controllers were found to have been improperly adjusted, and in the third case it was doubtful; in none of them could it be held that the controller itself was at fault, but rather the person whose duty it was to attend to its adjustment. Two underground fires were reported, and there were two cases of spontaneous combustion in collieries subject to such fires, a considerable reduction when compared with former years; close packing of old roadways to cut off air is the remedy usually practised in South Wales in such cases. Irruptions of water into the workings occurred at three mines.

Horses.

During the year under review 592 inspections were made at 500 mines in which horses were employed; 71 mines were not visited, a large number of these being small mines where few horses were at work. It is anticipated that in succeeding years all collieries where any horses are employed underground will be inspected at least once by the horse inspectors. At many of the larger mines the care and treatment of the horses are all that can be desired, but at others there is room for improvement.

Electricity.

Although the accidents due to electricity were not high, comparatively, considering that more electricity is used in the South Wales Division than in any other, there is nevertheless room for improvement at some of the smaller collieries; and a means of promoting this would be the appointment of more competent electricians at such collieries. Considering the importance to safety of the skilful supervision of electrical plant at mines, it would not be unreasonable to require some standard of qualification for colliery electricians.

Dust-tight Trams.

The ordinary South Wales coal tram is constructed of iron, usually with one open end to which was fitted a couple of bars to prevent the coal falling out, and some of the older type had a partially open bottom, the object apparently being to prevent as much small coal as possible from reaching the screens. The result was that much small coal and dust was deposited on the roads from the face to the shaft. Later on, at some collieries, doors were adopted in place of the bars, but even then the imperfect joints of the trams and doors allowed much small coal and dust to escape. To remedy this state of affairs at some collieries where revolving tipplers are used at the screens, both ends of some of the trams have been closed, the remainder being fitted with doors to facilitate the loading and unloading of rubbish at the coal faces and elsewhere.

The practice of building the lumps of coal 12 or 18 inches above the tops of the trams is practically universal throughout South Wales, and is another cause of the deposit of small coal and dust on the roads.

Home-grown Timber Committee.

This committee was appointed in June 1916, in view of the difficulties attending the importation of pit timber caused by the war, to assist a central joint committee in London, appointed to deal with the matter. The committee met on two occasions at Cardiff—viz., July 12 and December 1, 1916.

At the outset it was hoped that the committee would be able to work in conjunction with a local committee appointed by the Coal Owners' Association, so as to secure equitable distribution of timber at all collieries. The requirements of the South Wales collieries was estimated at 1,250,000 tons of timber per annum. An unsuccessful attempt was made to arrange this, the Coal Owners' Association explaining that the association did not deal with such matters. Some of the colliery companies had bought large areas of standing timber for their own needs, and there was in existence, at the time, a timber committee at the Cardiff Docks,

for supplying the collieries on the Adur and Arun rivers. It appeared clear that the best timber for collieries were the "soft" kinds—larch, spruce, &c.—the "hard" woods—oak and beech—being unsuitable for "packs." The members thought large quantities of timber could be drawn from the faces, gof, and elsewhere in the pits, thus saving about 10 to 15 per cent. of the total quantity used, if the miners could be induced to recover such timber, as is done in most other districts. It was mentioned that "packs" made of ordinary rough bricks were used with success in coal seams up to 2 ft. 3 in. thick in some of the South Wales collieries, the cost of such "packs" being about 6d. each. The question of appointing a properly qualified man to visit collieries for orders was discussed, also the difficulties of railway transit, and use of colliery wagons owing to railway by-laws. It was also thought that more use might be made of prisoners of war for cutting and loading timber.

MIDLAND AND SOUTHERN DIVISION.

Mr. W. Walker reports that trade has been exceptionally good, and the collieries have worked practically full time throughout the year. No serious dispute occurred. During the year all the mines in the division were inspected underground, and many of them had several inspections. The number of underground inspections made was 1,830. In addition, 497 surface inspections and 2,500 quarry inspections were made, and 164 inquests attended. All the fatal accidents and the more serious non-fatal accidents were investigated; 81 dangerous occurrences were reported during the year, most of which required investigation and received attention; 24 complaints were received from workmen and others, all being attended to and investigated, and while some were exaggerated the majority were well founded, and called attention to defects or irregularities which were at once remedied.

Effects of the War.—The total number of persons employed above and below ground was 114,371, being an increase of 4,843 on the preceding year. This increase was made up of 3,993 underground, and 850 on the surface. Of the former, 406 were boys under 16, the remainder evidently being made up of persons from other industries and miners who returned to colliery work in consequence of the war, together with a considerable number who were unfit for general service and were released from the Army to work in the mines. The increase on the surface was largely made up of boys under 16 years of age, and females. The total output for the year was 29,202,297 tons. This is an increase of 283,915 tons as compared with the preceding year, and was due chiefly to the increased number of men employed. The output of coal, ironstone, and iron pyrites showed increases of 312,569 tons, 17,147 tons, and 407 tons respectively, but there was a decreased output of fireclay and red clay.

Accidents.

The conditions produced by the war do not appear to have had any effect upon the number of accidents occurring during the year. The total number of fatal accidents happening during the year was 133, causing 137 deaths as compared with 139 causing 187 deaths in the preceding year. The decrease in the number of deaths is principally due to the absence of any accidents involving the deaths of a large number of persons.

Explosions of Firedamp.—There was no explosion of firedamp having fatal results, but 8 non-fatal explosions occurred.

Falls of Ground.—Sixty-nine accidents from falls of roof and sides occurred, resulting in 74 deaths, as against 66 accidents causing 67 deaths in the preceding year. The more frequent use of foresets or temporary props at the coal face until there is room for the permanent timber would decrease the accidents from this cause, and the attention of all concerned in the management and working of the mines should be given to this matter.

Shaft Accidents.—There were five fatal accidents in shafts causing an equal number of deaths. Two of these accidents occurred to banksmen who, having previously opened the gates and thinking the cage was at the top, pushed the empty tub into the shaft and fell with it down the pit. Both accidents might have been prevented by the use, as an addition to the usual hinged gates, of a rigid bar fixed to the framing just above level of the tub, or by gates operated by the cage.

Miscellaneous and Surface Accidents.—Under the former head there were 42 accidents, causing 43 deaths, this being a reduction of three accidents and 29 deaths; 15 accidents causing 15 deaths occurred on the surface as against 18 accidents causing 19 deaths in the preceding year.

Dangerous Occurrences.

During the year 81 dangerous occurrences were reported. Of these four were ignitions of firedamp, two were fires in winding engine houses, 49 were underground fires, four were breakages of winding machinery, 14 were breakages of winding ropes, six were overwindings, and two were inrushes of water. Of the 49 underground fires, 46 were due to spontaneous combustion, and 34 of these occurred in the Thick coal of South Staffordshire.

Ventilation.

The position with regard to ventilation has been fairly satisfactory. At some of the collieries improvement might be effected by more frequent splitting of the air instead of coursing it through two or more separate areas in one circuit. The installation of a small fan at many of the Black Country pits would also effect an improvement and would enable some of these pits to work regularly instead of having to stop from time to time on account of blackdamp, and by the direction of the air current to be controlled.

Coal Dust.

The dangers of coal dust are now more generally recognised, and steps are being taken to deal with them in a more effective manner by the prevention of accumulations of dust on haulage roads, and by more frequent watering. At several of the collieries fine dust was

used, but the attention of the officials of such has been called to the report of the Explosives Committee with a view to some other inert being constituted. In view of the coming into force of the new regulations on January 1, 1917, of the clause under Section 62 of the Coal Mines Act, the majority of the collieries have taken steps to alter their tubs so as to comply with this requirement. The work, however, has been delayed by shortage of labour and difficulty in obtaining materials, so that at some of the collieries the conversion has only been partial, but the matter continues to have attention. At many of the Somerset and Gloucester collieries open or loose end trams are in use, and very little has yet been done to bring these into compliance with the Act. The attention of the owners has been drawn to the matter, and they have been asked to take steps without further delay to deal with it effectively.

Rescue Work.

The Cinderford Rescue Station has now been equipped with the necessary apparatus, and brigades from the various collieries are now being trained. The North Staffordshire Colliery Owners' Association have recently arranged easy terms upon which the non-associated owners may become affiliated with the Rescue Station at Berryhill. A number of the small mines have taken advantage of the facilities offered by these two stations. The Highley Mining Company Limited, have provided a new station to serve their Highley, Kinlet, and Billingsley collieries respectively. This brings the rescue work in each part of the division into line with the Regulations, except that a number of the small mines in North and South Staffordshire, Shropshire, Gloucestershire, and one in Warwickshire have not yet become affiliated with the Central Stations. At the Dudley Rescue Station very good work has been done during the year in training 170 officers of the Royal Engineers in the use of the apparatus for work at the front.

Treatment of Animals

Horses were employed at 293 mines and 250 of these were visited by the inspector of horses, who made 354 inspections of mines during the year. The total number of horses was 6,108 and of these 4,448 were examined. The general condition of the horses was fairly satisfactory. The construction, ventilation, and sanitary condition of the stables, with few exceptions, which have been remedied, were found to be satisfactory. Competent horsekeepers were not in all cases provided, but on the owners' attention being drawn to the matter more reliable men have been appointed.

Supply of Materials.

Some difficulty has been experienced by the collieries in securing proper and adequate supplies of materials of various kinds to meet their needs. At several collieries in Warwickshire reinforced concrete props are now being used in substitution of timber with satisfactory results. At some collieries greater regard might be paid to the withdrawal of timber from wastes, &c., in view of the prospective acuteness of the timber question. Proper safeguards should, of course, be taken in such withdrawal.

Prosecutions.

Proceedings were instituted during the past year in six cases against owners, agents or managers, and 53 prosecutions by owners against employees for contraventions of the Coal Mines Act, 1911, and General Regulations, and of the Cruelty to Animals Acts were reported. Of these 47 were under the Coal Mines Act and Regulations, in 42 of which convictions were obtained, four being dismissed on payment of costs, and one dismissed; under the Cruelty to Animals Act there were six cases, in all of which convictions were obtained. In one case, defendant was sentenced to one month's imprisonment, and in another, defendant was ordered to pay £10 compensation, the pony he had injured having died.

AFFORESTATION.

In their report on the position of forestry in Great Britain, the Council of the Royal English Arboricultural Society state that the society has made an important representation to the Government, urging that so soon as normal conditions are resumed the Government should carefully consider methods by which the production of commercial timber by private owners may be assisted and encouraged, particularly for ensuring the replanting of woods which have been felled, the improvement of existing woodlands, and the utilisation by afforestation of all land which is better suited for silviculture than for any other purpose. It is suggested that amongst items to which attention should be paid are a reduction of railway rates, making rings of buyers illegal, relief from liability for extraordinary traffic in carting timber, and the readjustment of rates and taxes, especially death duties. The society submit that it is an essential preliminary to the extension and improvement of forestry that a Forestry Council (unpaid) should be appointed, to be elected by the bodies interested in the subject, and responsible solely to the Minister in charge. A strong department should also be formed, and staffed by men intimately acquainted with English conditions. Such department should at once institute a survey of the country, so as to be able to speak and act with authority as to land suitable respectively for silvicultural and agricultural development. In the event of a large scheme of State afforestation being decided upon, the Government should institute a more extensive system of education for all branches of forest service than is available at present; and every encouragement should be given to municipal and other local authorities to plant and, especially in connection with water supply schemes. The society also submit that the planting of woods should be encouraged as a good example for commercial timber upon profitable

OBSERVATIONS ON MODERN COAL WASHING.*

By G. H. ELMORE.

The preparation of coal by the jigging process has been making decided progress during the past few years, both in the anthracite and bituminous regions. This progress has embraced not only an improvement in design, but a decided tendency toward building machines of large capacity. The improvement in design has consisted largely in making the machine much heavier, in order to have every part of the best construction for the purpose it is intended to serve. In other words, it has been profitable to build jigging machines of the best material and sufficiently strong in all details so that breakdowns shall be impossible. This idea has been followed without particular regard to cost.

Undoubtedly the greatest single advance made in the art of jigging has been the development of the automatically controlled machine. It has been the aim of designers for several years to build a jigging machine

that would practically eliminate hand control. Not until within the last year or so, however, has this been attained.

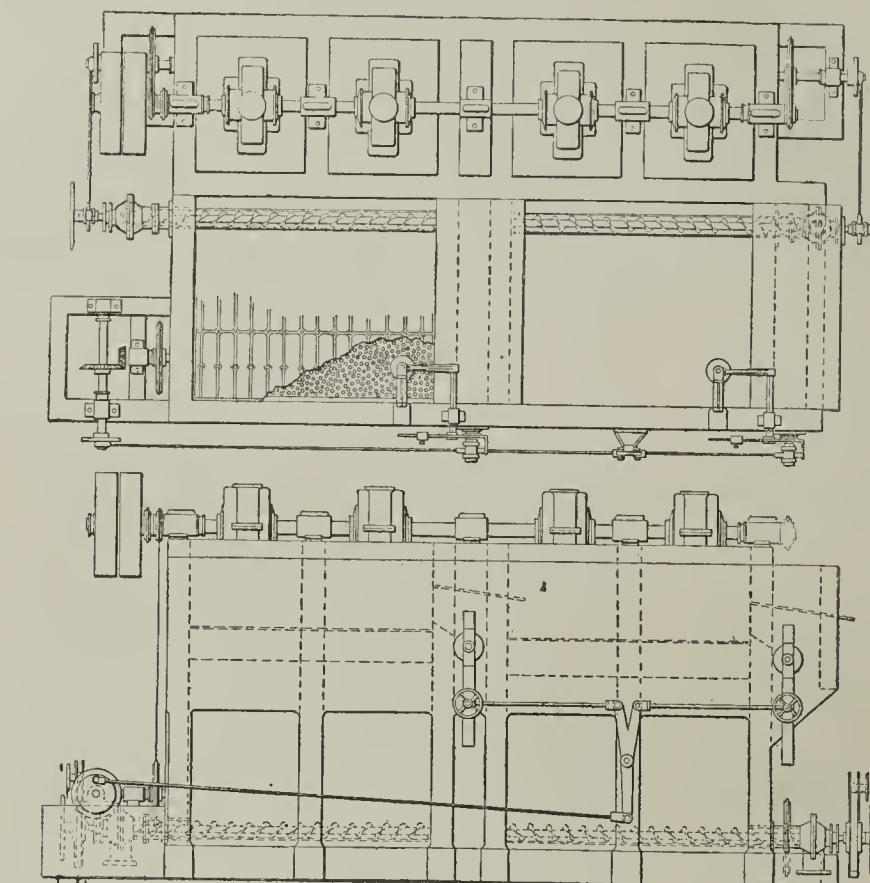


FIG. 1.—PLAN, SIDE ELEVATION AND SECTION OF JIGGING MACHINE OF LARGE CAPACITY PROVIDED WITH A CONCRETE TANK.

that would practically eliminate hand control. Not until within the last year or so, however, has this been attained.

The jigging of coal in the anthracite fields of Pennsylvania, and in the soft coal regions of the balance of the world, are in many respects two distinct operations. They will therefore be here treated separately.

The general tendency in the anthracite fields of Pennsylvania is toward a general adoption of the jig in coal preparation. There are still localities where the dry process can be more profitably employed. Many of the larger companies, however, are rapidly adopting the jig as the best and most economical means for removing impurities. The labour problem has done much to force this procedure. Nothing apparently so simplifies the labour situation in anthracite breakers as the installation of jigging machines. This is doubly true since these machines have now been made automatic in their operation, and have been developed to handle sizes ranging from broken or grate down to the buckwheats.

Moreover, an up-to-date anthracite jigging machine will not only produce a clean coal in the various sizes sent to market, but will at the same time make a cleaner refuse than can be obtained by the old system of hand-picking by boys. Preventing the coal from finding its way into the slate bank, when accomplished by up-to-date jigging equipment, furnishes an item which, expressed in money value, is surprising.

There has never been any tendency on the part of slate bank inspectors to over-estimate the amount of coal delivered to the bank. Under the old system of hand-picking, the reports of these officials would show coal in the slate bank varying from 2 or 3 per cent. up to 10 or 12 per cent. But it is well known that in some of these banks it would not be difficult to find from 12 to 20 per cent. of good coal. Within recent years this situation has been rapidly improved, and the time is not far off when a slate bank will be indeed a slate bank.

As to the saving in labour effected in an anthracite breaker of large capacity, where highly efficient automatic jigging machines are employed, a concrete illustration will be interesting.

The No. 6 operation of the Pennsylvania Coal Company, located near Pittston, Pennsylvania, until January 1917 employed in the breaker an average of 105 men and boys. The installation of four modern automatic jigging machines of large capacity was then begun. All other types of machines, including pickers, elevators, chutes, conveyors, etc., were removed. The result was that during May the breaker was making a larger production than ever before, the product was passing standard inspection, the proportion of coal in the refuse was less than ever, and all this work was being accomplished by 35 men and boys. The simplification of the breaker equipment was so great that it could hardly be recognised as performing the same

* Coal Age.

Jig Used as a Rougher.

Another innovation in the anthracite field is the use of a large capacity heavy jigging machine as a "rougher." The use of machines for this purpose is now restricted to the recovery of some of the culm piles, many of which contain a large proportion of rock. These jigging machines give the material a preliminary treatment, and remove the larger portion of this rock, allowing the better part to go into the breaker for final treatment and preparation.

The economy of this operation is at once apparent; wear and tear on crushing machinery is immensely relieved, owing to the primary rejection of this hard and bulky material before it comes to the crusher. The capacity of the breakers themselves is greatly increased because this material is not taken into the breaker. There is, consequently, substantial economy throughout the entire process.

It is probable that this system of using a roughing jig for rejecting the large, coarse slate will be adopted for handling the freshly mined coal at those mines where a large amount of rock comes out with it. Such a machine will be employed early in the preparation process, and will reject this rock before crushing.

The problem of reducing breakage on the prepared sizes continues to receive careful consideration. This is being attained by the more general introduction of properly designed chutes, the simplification of plants, and particularly by the use of a large overflow type of jig operating with a comparatively short stroke, and producing much less bed agitation, and therefore largely reducing the wear or attrition of the coal as it passes through the machine. This is in marked contrast with the much smaller jigging machines operating with long strokes and with violent bed agitation, and the removal of the coal from the machine by various types of drag conveyors.

The expense entailed through breakage on jigging machines has, until a comparatively recent time, amounted in many breakers to over 5c. per ton on the prepared sizes, and in some cases has run much above this figure.

So far as bituminous coal is concerned, the improvement of this material by the jigging process can properly be divided into two groups of operations: those where the coal is to be used for fuel purposes, and those where it is to be employed for producing metallurgical coke.

From the standpoint of plant design for these two groups, the equipment required is usually quite different. In most soft coal fields the requirement for a good fuel product demands the removal only of the heavy refuse—that is, the slate and rock. There are, however, some fields where the amount of bone coal present is so large that operators sometimes find it to their advantage to remove this bone product. This brings the design of the plant closer to that desired for the production of metallurgical coke.

In a broad sense, two types of jigging machines exist. Firstly, those that make a two-part separation—refuse and clean coal. Secondly, those that make a three-part separation—refuse, intermediate coal, and low-ash coal.

When the two-part separation jig is used, the operator has the choice of throwing the bone or intermediate product either into the refuse or into the coal that goes to market. With the three-part separation jig, the operator may make a fuel for his own plant of the intermediate coal, or he can re-treat it on a separate machine, making a two-part separation, and throwing the best of it into the marketable product, rejecting the high ash portion to the final refuse. Or, still again, he can re-crush this intermediate product, freeing the good coal from the high ash material through re-treatment on a separate machine, making a good product of clean coal and a refuse product sent to final rejection.

The question as to whether or not the three-part separation jig should be employed for the preparation of coal for fuel purposes depends entirely upon the character of the product coming from the mine.

In coal washing, the burden of the final success of the operation rests almost entirely upon the jigging

machines. There is no difficulty in designing transmission, elevating, and conveying equipment so that it will give satisfactory service, but the real cleaning of the coal, the accomplishment of the object for which the plant was built, depends almost entirely upon the jiggling machines; and here, again, the adoption of large automatically controlled jigs has much simplified the problem of building a coal washing plant, making doubly sure its successful operation and the attainment of the object of its construction.

One of the most important improvements in the design of a modern soft coal washery has been the introduction of equipment for more perfectly saving the fine coal. Formerly, it has been the common practice to allow the fine coal to pass out together with large volumes of water. This material thus finds its way into valleys below the plant and into convenient streams. It was taken as a matter of course that such a loss must be expected, and no serious attempts were made to prevent it. It is only within recent years that any serious endeavour has been made to stop this loss. But this result has been accomplished in a remarkable degree in some recently built plants; in fact, so perfectly has this been done, that it is almost true to say that there is practically no loss of fine coal whatever. The saving in money thus accomplished is a large item.

The author was recently informed by the consulting engineer of one of the large operations in Alabama, which during the past three or four years has given special attention to this problem, that during the year 1916 about 13,000 tons of good fuel, which had heretofore been permitted to go to waste in the manner just described, have been recovered from certain of its various operations. All this company's operations where washeries are used are being equipped with proper apparatus for accomplishing this result.

Modern blast furnace practice demands good coke, not only structurally but chemically. Some ideas formerly well accepted as to positive requirements for a good metallurgical fuel have been materially modified. Among them is the idea that a coke must contain approximately 10 per cent. of ash in order to have good structure. The tendency to-day is to reduce the ash just as far as possible. Low ash is naturally accompanied by a low sulphur content.

The economy in the production of pig iron due to the use of a low-ash coke need not be discussed, beyond stating that the saving in cost of pig produced varies from 15c. to 20c. per ton for each unit reduction of ash in the coke employed.

The design of a modern coal washing plant for the preparation of coal for coking purposes involves a careful preliminary study of the coal itself. This investigation must first determine the ultimate possibilities of the coal for producing a low-ash, low-sulphur coke. This determination is made by the well-known "float-and-sink" method, and involves a careful study

The development of the modern jiggling machine has played a highly important part in working out this problem. When the demand for low-ash coke for blast furnace use became urgent about five years ago, and the problem was put up to the builders of coal washing equipment, one of the conditions was that the plants must handle a large percentage of fine material, it having been found that comparatively fine grinding was necessary in order to free the ash and sulphur from the coal. At that time, the author conducted a series of experiments, collaborating with Robert Hamilton, consulting engineer, and Dr. R. H. deHoll, chief chemist of the Tennessee Coal, Iron and Railroad Company, of Birmingham, Alabama. The result of these experiments was the development of large jiggling machines that would successfully operate under a heavy feed of fine coal.

The first plant of this character designed along strictly modern lines with a view to handling finely crushed material and saving the coal slimes, was built by the company mentioned above at its No. 8 operation near Birmingham, where all coal was crushed to pass a $\frac{3}{4}$ in. round hole, and 60 per cent. of it to pass through a $\frac{1}{2}$ in. round hole. This character of material is sent to the jiggling machine at the rate of from 50 to 75 tons per hour, with the results that not to exceed 0.2 per cent. of good coal that is fed to the jiggling machines is lost in the final refuse, and that the coal produced for making coke runs by yearly average close to the ultimate theoretical conditions as to ash and sulphur that were shown possible by the preliminary float-and-sink tests when the problem was attacked.

The disposition of the intermediate product may be made in any one of several ways:—

Firstly, it may be used about the operation, under boilers for producing steam, in gas producers, or at any other point where the burning of a comparatively high-ash coal is permissible. If the washer is located near a steel plant, opportunities of this kind are many. Where the percentage of this intermediate product is not excessive, and power is produced at the mine by burning coal under boilers, it may profitably be used for that purpose.

Secondly, at certain markets this product can be sold as a high-ash coal. This is being done in the State of Washington, where many coal beds contain a large percentage of this intermediate product.

Thirdly, it may be re-treated on separate jiggling machines—the better portion being sent to the coking product and the high-ash portion to the final refuse. It is sometimes profitable to re-crush this product before passing it to the re-treating jig, as the coal and refuse may thus be more easily freed from each other.

It may be interesting to note that the handling of this finely crushed material on jiggling machines employing no foreign substance as a bedding is entirely an American development. The European practice always has been, and still is, the maintenance of a jiggling bed of feldspar or other heavy material, the separation of the fines, and passing them by the jigs without any treatment whatsoever. Nothing has been more clearly and conclusively demonstrated than the possibility of building and operating large-capacity jiggling machines that will handle this finely-ground material, maintaining their own beds from the coarser refuse that comes to them, and at the same time preventing the loss of practically any good coal, as is shown at the operation of No. 8 mine referred to. Since the No. 8 plant was put into commission, other large plants have been erected, and still others are now building.

Concentrating Table.

Another innovation which deserves mention is the use in coal washing of a concentrating table, similar in general design to those that have proved so highly useful in the art of concentrating ores. The particular utility of this device is found in handling finely-ground coal; that is to say, coal that will all pass through a $\frac{1}{2}$ in. round hole, or even finer. This much may be said from the standpoint of the jiggling operation, namely—when all the feed to the jig is ground to $\frac{1}{2}$ in. or finer, the operation becomes delicate, if not difficult. When it is all ground to $\frac{3}{8}$ in. or finer, it becomes practically impossible from the commercial standpoint. When it is all ground to $\frac{3}{4}$ in. or $\frac{5}{8}$ in., the operation of the jiggling machine is entirely practicable.

When these coarse particles are reduced in size to about $\frac{1}{4}$ in., commercial jiggling, on a large scale, with large tonnages on each machine, becomes impracticable, owing to the difficulty in preventing "boiling" of the bed; and the jiggling of this class of material on a feldspar bed is unsatisfactory because of the large losses of coal in the refuse. It has been found that a concentrating table may be used at this point, taking up the task quite satisfactorily. The capacity of such machines varies from eight to 10 tons per hour, depending on conditions, which, while only about 20 per cent. of the capacity of the modern jiggling machine, permits the table to become a useful piece of apparatus.

German Coal and Iron for Switzerland.—The German-Swiss commercial treaty has been ratified, and will stand till April 30, 1918. Germany again does not bind herself to supply Switzerland with coal, iron, and steel, but allows the exportation of 200,000 tons of coal and 19,000 tons of iron and steel per month to that country. The price of coal is fixed at 90 fr. per ton, which sum includes the tax; and any new tax will be borne by the exporter. The former prices for cast and wrought iron are supplemented by a further 200 fr. per ton. In return, Switzerland is to issue a credit of up to 20,000,000 fr. monthly for the coal supplied. If this does not exceed 100,000 tons per month, the advance will be 4,500,000 fr., and for 150,000 tons, 11,250,000 fr. The credit will be granted by a Swiss financial house against three months' drafts, payable in Switzerland, and endorsed by a first-class German bank. The drafts are to be renewed until the credit has been repaid, which is to be done in nine monthly payments from October 31, 1920. Should Germany cease to supply coal after April 30 next, the repayments will commence a year earlier than the date specified.

COAL FIELDS AND COAL INDUSTRY OF EASTERN CANADA.

A report by F. W. Gray on "The Coal Fields and Coal Industry of Eastern Canada," published by the Department of Mines, Ottawa, describes the history and development of the various coal fields, the methods of working, and conditions of employment. In dealing with the economics of the coal mining industry, the author says that, from the standpoint of the investor, the operation of coal mines in Nova Scotia in the past has not been encouraging. Some of the coal companies, during prosperous times, and in the earlier and less expensive operation of their collieries, paid regular and handsome dividends over many years. In very few instances, however, in the history of coal mining companies in Nova Scotia has there been any likelihood of a redemption of the original capital outlay, and a very moderate interest return is all the investor has been able to hope for. The majority of the companies now operating have been compelled to undergo financial re-organisation. Several companies have suffered complete financial disaster, in some cases brought about by physical conditions beyond control, and in some cases by unskilful management, or the unjustifiable optimism of promoters.

Generally speaking, however, the mines of Nova Scotia have been well managed from an engineering point of view, and the meagre financial return in the past has been due to alterations in the fiscal policies of Canada and the United States, resulting in temporary disorganisation of markets, to the remoteness of the principal markets, the interference, or stoppage, of coastwise shipments by ice in the winter, and the comparatively low selling price of coal in Eastern Canada.

Within the past 20 years the price of coal has varied very little, it being one of the few commodities that has not materially increased in selling value.

It is doubtful whether the market for Nova Scotian coal has ever yielded the operators a greater price than 2.50 dobs. per ton at the pit mouth, and the average price realised, after allowing for waste and slack coal, is very much less than this figure. A comparison with normal European pit month selling prices will show how moderate this figure is, if due consideration is accorded to the higher cost of labour and materials in Canada.

The margin of profit has been too small to permit of the accumulation of proper reserves to provide against the troubles inseparable from mining coal, or to allow or adequate depreciation of reserves for the amortisation of capital liabilities and the depletion of coal areas. Therefore, periods of financial depression or mining accidents, have too often forced the abandonment of mining operations, and have involved investors in losses.

The formation of the Dominion Coal Company was an evolution from these conditions, and whether it be a retrograde tendency or not, the logic of events has indicated the chief hope of settled prosperity in the Nova Scotian coal trade to lie in the further development of strong corporations, with adequate financial reserves. There is no reason to anticipate anything but a long and successful career for the coal companies of the province if these essential qualifications are given the consideration they deserve.

Whatever financial stability attaches to the coal companies of Nova Scotia to-day is a testamentary benefit conferred by the General Mining Association; a monopoly that, with all its faults, rendered it possible to conceive mining operations on a comprehensive basis, eliminated suicidal competition in selling prices, and enabled mine workings to be laid out with the maximum of economy, with due regard to the conservation of the vast coal reserves which sporadic individual operations have tended to endanger by unco-ordinated effort.

The price of coal in Eastern Canada has always been dependent on the selling prices in the United States, but it is candidly admitted to-day that coal has in the past been mined in the United States, and sold there and in Canada, at a price actually below the cost of production, when all the factors of that cost are taken into consideration.

Nova Scotia, as a province, has not reached the stage of industrial and manufacturing activity that should have accompanied a coal mining industry 100 years old; an industry that up to 1890 produced three-fourths of the coal mined in Canada, and to-day, notwithstanding the vast resources of the West, is producing well over half the coal tonnage of Canada.

The coal mined in Nova Scotia has, for generations, gone to provide the driving power for the industries of New England, Quebec, and Ontario, and has, in large part, been followed by the youth and energy of the province. For almost a century, Nova Scotia has been exporting the raw material that lies at the base of all modern industry, and it is at least a legitimate subject for thought whether it would not have been possible to export manufactured articles, and to have utilised the raw material within the province, to some extent at least, where safe and roomy harbours and inexpensive water transportation give facilities for the assemblage of raw materials, and for the distribution of manufactured goods, in no way inferior to the other ports that border the North Atlantic coast.

What combination of physical and political causes has brought about this condition of affairs cannot be dealt with here, but no consideration of the economic aspects of the coal industry of Nova Scotia would be just which did not point out the fact that the coal districts of Nova Scotia have not evinced the manufacturing enterprise that is a commonplace of the coal fields situated in civilised countries. For example, Pennsylvania, the British Midlands, Wales, Silesia, and Belgium. Briefly, Nova Scotia has achieved the status of a mining camp, whereas its full stature should be that of a metropolis of industry.

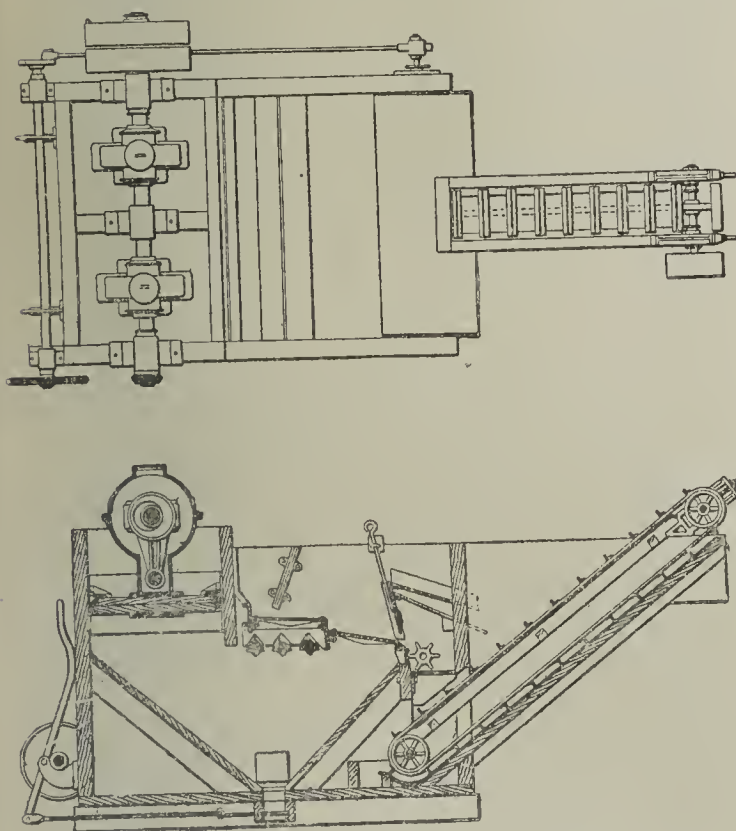


FIG. 2.—PLAN AND SECTION OF ANOTHER TYPE OF JIG.

of the results obtained from various specific gravity solutions with coal which is crushed to pass through various sizes of round holes. For instance, determinations are made on all coal treated and prepared to pass, first through a $1\frac{1}{2}$ in. round hole, then a 1 in., then a $\frac{3}{4}$ in., and finally a $\frac{5}{8}$ in. hole.

When the results obtained from this series of tests are analysed, it will be possible to determine the size to which the material should be crushed in order to free the largest percentage of ash and sulphur from the good coal, the approximate percentages of final refuse, intermediate product, and good coal that will be produced, and the specific gravity at which these divisions should be made. In other words, the economic points involved in the problem may be determined.

Modern plants in the coking field are universally making a three-part separation. Some of them are making a four-part separation, with the following ends in view:—Firstly, that the refuse rejected may be, in fact, nothing but refuse; secondly, that whatever intermediate product may be present in the coal (and by "intermediate product" is meant that portion of the mine output that is too high in ash to be put into the coke and still has too great a fuel value to be sent to the refuse) may be disposed of to the best possible advantage, the exact nature of this disposition to be determined by the conditions at each operation; thirdly, the production of the lowest possible ash and sulphur coal for coke making.

COMPARATIVE TESTS OF HAMMER DRILL BITS.*

R. FORBES and J. C. BARTON.

Many shapes of drill bits are in use with little definite information is available to judge which one of these shapes is the best. The following investigation was undertaken in order to determine what effect, if any, the shape of the cutting edge has on the cutting speed and wearing qualities of drill bits.

The bits tested were those in common use, namely—the 4-point or cross bit, the 6-point bit, the Z bit, and the "Carr" bit. The rock in which the tests were made was the red granite from South-East Missouri. It is a coarse crystalline granite containing an unusually large amount of quartz, and is extremely hard, and on account of its uniform texture is admirably adapted to this work. While tests in other rocks might show somewhat different results, nevertheless it is the opinion of the authors that the relative cutting quality inherent in the shape of the bits would be the same in all rocks. Other qualities, such as mudding freely, freedom from fitching, etc., might make one bit more desirable than another in softer rocks.

Description of Bits Tested.

The 4-point bits were the usual shaped bits commonly made on the Leyner sharpener with 14 degs. taper on the wings and a 90 degs. angle between cutting edges. Some tests were run at 85 lb. pressure with a 4-point bit made with a 5 degs. taper on the wings. This was made by using the Carr bit die. The 6-point bits were the usual shaped bits made on the Leyner sharpener. The Carr bits were made with a 5 degs. taper and an angle of 100 degs. between cutting edges.

The Z bits were made with the regular Z-bit dolly, which makes an angle of about 60 degs. in the centre and an angle of about 45 degs. on the outer cutting edges. The centre is made slightly higher than the outer edges. The Carr bit dies were used in forming Z bits to give them a 5 degs. taper. The Z-bit dolly was for solid steel, so it was necessary to drill out the centre hole.

Several Z bits were tested at 85 lb. pressure, that were filed and hammered down, to give an angle of about 100 degs. on the centre edge and 65 degs. on the outer edges.

The holes in the centre of the bits were the ordinary size with the 4-point and 6-point and Carr bits. The hole in the Carr bit was much larger than those used in the others. A hole of the same size as in the Carr bits was used in the Z bit.

Manner of Conducting Tests.

All tests were made with an Ingersoll-Rand "Jackhammer" drill. In the "down hole" tests the drill was weighted with a 94 lb. weight, thus ensuring a constant pressure on the bit.

Most of the tests were made in vertical "up holes," great care being taken to see that the drill was vertical. The tests consisted of drilling into a large block of granite supported on stringers over a concrete-lined pit. For this work, the drill was mounted on an air feed, which, however, was not large enough to produce the required pressure on the bit, so that it was necessary to counter-balance the weight of the machine by a bucket loaded with 40 lb. of scrap iron, and connected to the machine by a rope over an overhead pulley. Every effort was made to ensure uniform conditions, and to have the drill bit the only variable.

Air Pressure.—A uniform air pressure was obtained by having a "pop-off" valve on the air receiver, which was connected by a 1 in. hose to the drill. The air compressor was regulated to supply sufficient air to keep the pop-off valve open and the drill running at the same time, the gauge pressure remaining constant. The air receiver was drained after every third steel, as it was found in former work that this factor greatly influenced the quality of the air supply.

Lubrication.—Uniform lubrication is most essential in work of this nature, and was ensured by oiling the drill after each one-minute test. The drill was taken apart and thoroughly cleaned and oiled after every third steel.

Steel.—The steel used was all of the same kind, F. J. A. B. 3 in. hollow hexagon, and all comparative tests were run with steel of practically the same length. Lengths of 24, 48, and 62 in. were used.

Sharpening and Tempering.—The greatest source of error in work of this kind is in the making and tempering of bits. It is impossible to make these conditions entirely uniform, and many tests were made and the results discarded, because of non-uniformity in tempering. Any bit with a corner off, or which was chipped in any way (except the Z bit in a few cases), or which showed signs of being too hard or too soft, was rejected and re-sharpened until a perfect temper was obtained.

All bits were made and sharpened in a Leyner-Ingersoll 5A sharpener. The bits were heated, both for sharpening and tempering, in a gas muffle. In sharpening and tempering, the following rules were observed:—

(a) Heat to the usual working heat, taking care to see that the bit is heated uniformly throughout, and making as few heats as possible.

(b) Heat only the end of the bit.

(c) Never submerge a bit entirely under water until cold.

(d) Keep shank end square.

(e) Never let scale form by too much air.

(f) When worked put in lime to anneal.

(g) Heat the bit to at least 800 degs., and be in the furnace long enough to heat to that temperature, then remove from the fire and place in some oil, so that the colour can be seen, and when cooled to about 800 degs. ;

American Institute of Mining

then dip into Sentinel paste which has melting point of 775 degs. Cent., and let white residue form on the bit; place in the furnace immediately. The white residue should melt the instant the bit is inserted into the fire again; if it does not melt at once, re-heat, and repeat the operation.

The Sentinel paste is a trade composition consisting of molecular mixtures of metallic salts which melt at predetermined temperatures. The finely-ground salts are mixed with paraffin wax. Before using, it is heated gently so as to just melt the wax and reduce it to the consistency of thick paint, so it can then be streaked or painted on the work in the cold, or, as in the present case, the work is covered with a thin film of paste by dipping in the paste while the work is at a temperature above the melting point of the salts. When the wax carrying the Sentinel powder burns off, it leaves behind a layer of white salt, and upon the desired temperature being attained, the salt fuses and disappears, or, on a reduction of temperature the paste re-appears as a white coating.

After the bit is put in the furnace and the white residue melts instantly, plunge the bit into cold water to about $\frac{1}{4}$ to $\frac{1}{2}$ in.

All bits in these tests were plunged into water as described above, and slowly moved about in the water until fairly cool; then the steel was left in water until cold.

Experiments with Down Holes.

The first series of tests was made in down holes. The purpose of these tests was to ascertain the effect of gauge or diameter of bit on cutting speed. It was necessary to find this relation in order to compare different bits by reducing them to the same gauge.

All tests were made in shallow holes, about 1 ft. in depth, so that the cuttings could be easily blown from the hole. Down-hole tests were made only with the 4-point bit and at a pressure of 95 lb. In most cases, five one-minute runs were made with a bit. About 30 tests were made altogether. Table 1 shows the results of 12 of the most consistent of these tests.

TABLE 1.—RESULTS FROM DOWN HOLES, 95 LB. PRESSURE.

No. of test.	Gauge at start.	Measure of hole.	Distance per minute.	Gauge at start.	Measure of hole.	Distance per minute.	Gauge at start.	Measure of hole.	Distance per minute.
1	1'600	1'80	—	1'750	4'90	—	1'765	1'35	—
2	1'560	5'60	3'80	1'650	7'60	2'70	1'750	4'45	3'10
3	1'550	9'00	3'40	1'625	9'90	2'30	1'713	7'00	2'55
4	1'530	12'20	3'20	1'625	12'05	2'15	1'710	9'50	2'50
5	1'530	14'20	2'00	1'625	13'90	1'85	1'690	11'50	2'00
6	1'500	16'50	2'30	1'625	15'40	1'50	1'690	13'45	1'95
	—	—	—	—	—	—	1'690	15'25	1'80
1	1'920	1'05	—	2'125	1'35	—	1'580	3'70	—
2	1'875	3'70	2'65	2'125	3'45	2'10	1'560	7'55	3'85
3	1'845	6'00	2'30	2'095	5'30	1'85	1'530	10'75	3'20
4	1'815	7'85	1'85	2'060	7'15	1'85	1'530	13'85	3'10
5	1'815	9'60	1'75	2'060	8'80	1'65	1'520	16'90	3'05
6	1'815	11'35	1'75	2'060	10'35	1'55	1'500	19'75	2'85
	1'800	12'85	1'50	2'047	11'70	1'35	1'500	22'15	2'40
1	1'350	3'15	—	1'330	1'60	—	1'440	1'85	—
2	1'300	8'75	5'60	1'315	6'50	4'90	1'420	6'35	4'50
3	1'300	13'15	4'40	1'305	10'60	4'10	1'400	10'10	3'5
4	1'300	17'45	4'30	1'300	14'80	4'20	1'370	3'10	3'00
5	1'300	21'35	3'90	1'215	18'10	3'30	1'370	16'15	3'05
6	1'240	24'90	3'55	1'240	21'25	3'15	1'370	18'95	2'80
7	1'230	28'30	3'40	1'235	23'80	2'55	1'360	21'40	2'45
	1'225	31'60	3'30	1'230	26'90	3'10	1'350	23'75	2'25
8	1'220	6'95	0'00	1'230	29'70	2'80	1'320	25'95	2'20
9	1'215	10'85	3'90	—	—	—	—	—	—
1	1'470	1'85	—	1'590	2'10	—	1'560	6'10	—
2	1'440	5'85	4'00	1'560	5'80	3'70	1'550	9'80	3'70
3	1'440	9'15	3'30	1'520	9'05	3'25	1'530	1'70	2'90
4	1'400	12'00	2'85	1'500	12'05	3'00	1'500	15'20	2'50
5	1'370	14'55	2'55	1'490	14'90	2'85	1'500	17'45	2'25
6	1'370	17'00	2'45	1'490	17'50	2'60	1'500	19'70	2'25

A curve was plotted, based on the assumption that the cutting speed varies inversely as the square of the diameter. The first point on the theoretic curve was taken at gauge 1.3 and speed 4.3, and the curve plotted accordingly. Points plotted from the second, third, and fourth tests fell close to a similar curve. In order to compare cutting speed of different gauges, every condition, including depth of hole, etc., must be uniform, and it would not be fair to compare the speed of a new bit with the speed of the same bit when run to a smaller gauge. The curves indicated that for small gauges the cutting speed varies inversely as the square of the diameter of the bit. For large gauges the results did not check so well, and from results obtained in former work by H. Vogel, the relation of the $3/2$ power was obtained, which may apply to larger gauges.

Results from Up Holes.

Three different pressures were used in drilling the up holes, 95 lb., 85 lb., and 70 lb. Most of the tests were made at the 95 lb. pressure. Nearly 200 different tests were made in all, but the tabulated results show only those that were most consistent.

All holes were first collared to about $\frac{1}{2}$ in. depth; the bit to be tested was then run at a low pressure for about six seconds. The bit was then taken out, the gauge and the depth of hole measured, and the test was ready to start. One-minute runs by stop-watch were made. All bits were run for four one-minute tests, and in a few cases six or eight one-minute runs were made. No attempt was made to run each bit to its full extent, although in most cases at the end of four runs the cutting speed had materially diminished. The bits, however, probably would have drilled several inches farther, and in the case of the Carr bit, considerably farther. The life of bits seems to be the same at all pressures. That is, they will drill a certain distance and no more, no matter what the pressure is.

Table 2 represents the averages obtained in this test, and also the same averages reduced, for the purpose of

comparison, to uniform diameters by assuming that the cutting speed varies inversely as the square of the diameter.

TABLE 2.—SUMMARY OF RESULTS AT 95 LB. PRESSURE.

Reduced to uniform gauges, assuming speed varies as $\frac{1}{D^2}$									
Kind of bit.	Average diameter, in.	Average distance drilled, in.	Average speed per minute.	Average initial speed.	Average final speed.	Average loss in gauge.	Average loss in gauge per inch.		
A 4-point starter	1'880	8'85	2'212	2'500	1'962	0'0110			
B 4-point second	1'652	11'50	2'865	3'683	2'100	0'0108			
C 4-point third	1'385	15'41	3'853	4'800	3'062	0'0068			
Reduced to uniform diameter.									
From A	1'750	—	2'554	—	—	—	—		
From B	1'750	—	2'532	—	—	—	—		
From C	1'750	—	2'415	—	—	—	—		
	1'750	—	2'507	Average of 4-point					
A 6-point starter	1'869	7'36	1'852	2'200	1'537	0'0189			
B 6-point second	1'662	10'07	2'519	2'812	2'175	0'0109			
C 6-point third	1'426	10'85	2'713	3'112	2'200	0'0068			
Reduced to uniform diameter.									
From A	1'750	—	2'112	—	—	—	—		
From B	1'750	—	2'271	—	—	—	—		
From C	1'750	—	1'802	—	—	—	—		
	1'750	—	2'062	Average of 6-point					
A Carr bit second	1'535	12'42	3'109	4'025	2'775	0'0028			
B Carr bit third	1'695	13'37	3'345	3'500	2'875	0'0032			
Reduced to uniform diameter.									
From A	1'750	—	2'394	—	—	—	—		
From B	1'750	—	2'488	—	—	—	—		
	1'750	—	2'441	Average Carr bit					
A Z bit second	1'609	9'72	2'429	3'275	1'925	0'0104			
B Z bit third	1'447	12'87	3'212	3'850	2'600	0'0049			
Reduced to uniform diameter.									
From A	1'750	—	2'053	—	—	—	—		
From B	1'750	—	2'196	—	—	—	—		
	1'750	—	2'130	Average Z bit					

It will be seen from these results that the comparative cutting speeds of the different bits at this pressure are as follow:—

- (1) 4-point (gauge 1'75) 2'51 in. per minute
- (2) 6-point (gauge 1'75) 2'06 "
- (2) Carr gauge 1'75) 2'44 "
- (3, Z (gauge 1'75) 2'13 "

At this pressure the 4-point bit cuts slightly faster than the Carr. It was very difficult to make the Z bit hold up at all on the high pressure, as the corners would invariably chip off.

Table 3 shows the final average reduced to three different gauges by the square of diameter.

TABLE 3.—COMPARATIVE CUTTING SPEEDS OF DIFFERENT BITS.

Reduced to uniform diameters, assuming speed varies as $\frac{1}{D^2}$									
Kind of bit.	Reduced gauge, in.	Average speed per min., 95 lb. pressure.	Average speed per min., 85 lb. pressure.	Average speed per min., 70 lb. pressure.					
4-point	2'00	1'92	1'39	0'85					
6-point	2'00	1'59	1'23	0'68					
Carr	2'00	1'87	1'56	1'16					
Z	2'00	1'63	1'51	1'16					
Z flat angle	2'00	—	1'54	—					
4-point 5° taper	2'00	—	1'39	—					
4-point	1'75	2'51	1'81	1'11					
6-point	1'75	2'06	1'61	0'88					
Carr	1'75	2'44	2'03	1'51					
Z	1'75	2'13	1'97	1'51					
Z flat angle	1'75	—	2'01	—					
4-point 5° taper	1'75	—	1'81	—					
4-point	1'50	3'41	2'47	1'51					
6-point	1'50	2'82	2'19	1'20					
Carr	1'50	3'32	2'77	2'06					
Z	1'50	2'90	2'69	2'06					
Z flat angle	1'50	—	2'74	—					
4-point 5° taper	1'50	—	2'47	—					

Theory of Drilling Rock.

According to B. F. Tillson, when rock is excavated by a drill bit, three applications of forces seem to be involved—by abrasion, by crushing, and by severing or chipping. Although all of these must take place to a certain degree, the greatest amount of useful work is performed when the percentage of force applied to chip reaches a maximum. According to this theory, the screen analysis of cutting ought to show the most efficient bit. Samples were taken from the up holes when drilling at 95 lb. pressure, and screened in a Tyler Ro-Tap apparatus.

The results of the screen analysis showed that the 6-point bit produced the finest cuttings, the Z bit next finest, the Carr bit next, and the 4-point the coarsest. This corresponds to the relative cutting speeds, the 6-point slowest, the Z next, the Carr next, and the 4-point fastest.

In order to study further the cutting action of the different bits, four shallow holes about 1 in. deep were drilled beside each other under the same conditions and using 85 lb. pressure.

A study of the bottoms of the holes revealed the fact that the 6-point hole was perfectly smooth, the 4-point nearly as smooth, the Z bit and Carr bit holes were quite rough, the Carr bit having a conical-shaped projection in the centre due to the large hole in the bit. The relative cutting speeds at 85 lb. pressure were as follow: 6-point; 4-point, Z, and Carr, which corresponded with the apparent roughness of the bottoms of the holes.

The use of the large hole in the centre of the Carr bit is evidently one of its advantages, and the same idea could be applied to advantage on all other bits. The advantage of the large hole is that it leaves a centre core and diminishes the cutting surface.

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bit apparently increases in cutting speed as the pressure is decreased. This would indicate that the Z bit would be quite efficient in soft rock or at lower pressures, but it is evidently not adapted to extreme high pressures in hard rock. From the standpoint of cutting speed, the Carr and Z bits are the most efficient.

Loss of Gauge.—The average loss in gauge per inch was as follows:—

4-point	seconds	0.010
4-point	thirds	0.007
6-point	seconds	0.010
6-point	thirds	0.007
Z bit	thirds	0.004
Carr bit	seconds	0.003
Carr bit	thirds	0.003
4-point	5" taper thirds	0.004
Z bit	filed	0.003

This loss is almost constant at all pressures. It will be seen from these figures that the loss in gauge with 4- and 6-point bits is considerably more than with Z or Carr bits, and that the 5 degs. taper on a 4-point bit greatly diminishes the loss of gauge.

From the standpoint of loss of gauge, the Carr, Z bit, and 4-point bit with a 5 degs. taper, are superior to others. This factor is one that is often overlooked, and the great advantage of using a bit that loses little in gauge is not generally considered. As an example, the following calculation has been made:—

Drilling Time.—Drilling time for 6 ft. hole in granite, 1½ in. diameter at bottom. Length of changes, 1 ft. Difference in gauges, ⅓ in. with Carr and Z bits, ½ in. with 4-point and 6-point bits.

CARR.						
Length of steel.	1 ft.	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.
Gauge in sixteenths	1½	1½	1½	1½	1½	1½
Gauge in tenths	1.875	1.812	1.750	1.688	1.625	1.562
Distance per minute	1.771	1.897	2.034	2.186	2.352	2.554
Minutes for each foot	7.340	6.270	5.890	5.490	5.102	4.700
Time 34 min. 49 sec. for 6 ft.						

Z Brr.						
Gauge	1.875	1.812	1.750	1.688	1.625	1.562
Distance per minute	1.723	1.839	1.978	2.126	2.295	2.484
Minutes for each foot	6.960	6.530	6.070	5.640	5.230	—
Time 35 min. 16 sec. for 6 ft.						

4-POINT.						
Gauge	2½	2½	2	1½	1½	1½
Distance per minute	1.009	1.230	1.389	1.580	1.814	2.104
Minutes per foot	11.890	9.760	8.640	7.590	6.620	5.700
Time 50 min. 12 sec.						

6-POINT.						
Gauge	2½	2½	2	1½	1½	1½
Distance per minute	0.976	1.092	1.235	1.405	1.613	1.867
Minutes per foot	12.295	11.000	9.700	8.540	7.440	6.430
Time 55 min. 24 sec. 6-ft. hole.						

From these calculations, the Carr and Z bits apparently save one-third in drilling time over the 4- and 6-point bits. This is due more to the fact that smaller gauges can be used than to greater cutting speed. The calculations were based on actual cutting speeds and loss in gauge shown in tests.

Breakage and Ease of Sharpening and Tempering.

There is little difference between the 4- and 6-point bits in respect to ease of sharpening and tempering. The Z bit is more easily made, but it is very difficult to temper so that it will stand up under high pressure. This is on account of the weakness of the outer cutting edges. The Carr bit is by far the easiest of all to make and temper, and can be tempered much harder than others.

Summary.

(1) The results in down holes indicate that the cutting speed varies inversely as the square of the diameter, at least for smaller gauges.

(2) Drilling speed increases almost uniformly with increase in pressure. A pressure of about 85 lb. per square inch seems to be best adapted to all bits for drilling in rock of the hardness of that used in the tests.

(3) Speed of drilling seems to be proportional to the coarseness of the cuttings, as shown by screen analysis and study of the bottoms of the drill holes.

(4) Taking into consideration its cutting qualities, loss in gauge, ease of making and tempering, the Carr bit seems to be far superior to all others, except possibly the Z when used at low pressures.

The Z bit at low pressures and probably in soft rock would equal if not surpass the Carr bit in cutting speed, but on account of the difficulty in its making and tempering, it is doubtful whether it would be as desirable under any conditions as the Carr.

For exceedingly high pressures in very hard rock, the 4-point bit made with a 5 degs. taper on the wings seems to be superior to all others. The 6-point bit apparently has little to recommend it in any circumstances, although it is convenient to use in starting holes.

Coal Prices at Alexandria.—The latest quotations for coal at Alexandria are: Cardiff brands, 350s.; North country, 290s. to 300s. per ton f.i.w.

Lancashire Mineral Oil.—*Apropos* of the passing of the Petroleum (Production) Bill, it is reported that boring for oil will probably be undertaken in the South Lancashire coal fields at an early date. It is recalled that in the latter part of the 18th century petroleum was found in the Worsley district, near Manchester, during the construction of the Duke of Bridgewater's underground canal in that neighbourhood, and oil escapes of varying quality and quantity were subsequently found in the Wigan and West Leigh coal fields.

Welsh Patent Fuel Prices Fixed.—Patent fuel manufacturers have been notified by the secretary of the Coal and Coke Supplies Committee for South Wales that, with regard to the price of patent fuel for consumption at home, this has been fixed at 22s. 3d., while the price to be charged fuel makers by collieries for supplies of small coals for patent fuel for home requirements is to be 12s. 6d., thus leaving the manufacturers of fuel a margin of 9s. 6d. to cover their costs for pitch, wages, working expenses generally, and profits.

SINKING THROUGH WET STRATA AT GREAT DEPTHS.*

By H. MÜLLER.

(Continued from page 495.)

Sinking by the Congelation Process in Stages.

The congelation process can be carried out in three ways. In one method, boreholes are sunk in a ring round the shaft; but where the congelation is only commenced at a depth of, say, 400 yds., the putting down of this circle of holes is, so far as the first 400 yds. are concerned, unproductive, or, at any rate, a burdensome expense. Moreover, some of the holes will be certain to have deviated so far from the vertical as to be useless for congelation; and where the rock is of a particularly unfavourable character, for instance, steeply pitched and extensively fissured, a set of supplementary boreholes will undoubtedly be required. Another point is that, as the congelation progresses, the completion of the frozen wall round the shaft is liable to endanger the lining of the upper part of the shaft.

In a modification of the process, channels are provided in the upper lining for the subsequent boring of the ring of holes. The difficulty in this case is to maintain the verticality of the holes, and to keep the channels open. In the stage between 400 yds. and 500 yds., the boreholes may deviate considerably, either inward or outward; and in the former case, such of them as come within the area of the shaft must be closed up, whilst the holes slanting outward may get so far apart as to be equally useless for the lower portion of the frost wall; so that, in either case, supplementary bores will have to be sunk from the surface. Even in the unlikely event of all the holes being sufficiently near the vertical, they will be quite close to the shaft lining in the wet zone, and consequently will not give a strong frost wall, even with a great expenditure of refrigerating material, experience having shown that the frost wall does not extend very far outside the ring of holes. In this method, too, the lining of the upper part of the shaft is likely to suffer injury, through the possible inrush of water at high pressure. The two methods are therefore only suitable for cases where the widening of the shaft bottom is impracticable.

In the third method, the boreholes are drilled from the interior of the shaft itself, the shaft bottom being widened conically, commencing at a height of about 30 ft. above the wet zone, and lined with masonry, concrete, or tubbing. A number of stand pipes are then set up, with an outward slope, on the widened bottom, the quantity required and the angle being determined, for each case, on the basis of experience. A string of casing is attached to each stand pipe and led up to the surface, the shaft bottom being then flooded, and the boreholes drilled through the casings.

It will be evident that, in putting down these holes, considerable experience will be needed, and that chance plays an important part. Whilst, at first, the holes will follow the direction of the stand pipes, the bits soon begin to get out of line, and draw towards the perpendicular. How soon, and to what extent, this happens cannot be controlled. In some strata they follow the original line so long that the holes get too far away from the shaft; whereas in other holes the bits get into the vertical so quickly that the holes remain close to the sides of the shaft, the unfavourable results already mentioned ensuing.

In all cases, the deviation of the holes from the vertical must be carefully measured with reliable instruments, in order to obtain a proper idea of the thickness of the frost wall. Even if some of the holes are so far out of true as to be useless with a small supply of refrigerating material and moderate freezing temperature, they may still be utilised for the process by increasing the supply and lowering the temperature. Those that are too far out of line cannot be replaced by supplementary holes from inside the shaft, as the shaft is under water; whilst the shaft cannot be pumped out, because the boreholes already sunk afford communication between the water-bearing zone and the shaft itself. It is true that supplementary boreholes can be put down from the surface, but their direction is a matter of chance, and they may even connect with the good holes already sunk, so that more harm than good results.

For the reasons given above, the largest possible number of boreholes should be put down from the start, for then, even if some of them should prove useless, there is the hope that, with good freezing plant and the maintenance of a low temperature, a complete frost wall will be obtained. On this account, a carbonic acid plant is preferable to the ammonia system, by reason of the lower temperature that can be produced; and the plant should have a capacity of 1½ million calories per hour.

Sinking the shaft from 400 yds. to 500 yds. will take about 28 months, divided as follows:—Widening the shaft conically, one month; setting up the stand pipes, fixing the casing, and partially filling up the widened space with sand or concrete, if necessary, three months; putting down and testing the boreholes, and installing the refrigerating and down pipes, six months; freezing, up to the time of commencing the sinking (assuming that the wet zone contains no saline liquors or flowing water), four months; net time of sinking, eight months; drawing the casings (down to 400 yds.), and lining the widened portion of the shaft, four months; and caulking the tubbing rings, two months.

Experience has, however, shown that this calculated minimum time is always exceeded in practice, there being always at least one stoppage of work through inrushes of water. If there is no breakage of the freezing pipes, the damage can be made good in about six months; but if the brine escapes into the surrounding rock, the stoppage may last for years. Some experts even reckon on 12 months as the minimum for repair

after a small inrush of water, because there is always supplementary damage to be made good.

The sinking proceeds as in the ordinary tunneling process, but with great care, owing to the fact that the boreholes are close to the shaft, so that the rock wall is not very strong. It is advisable to commence the sinking by tubbing as quickly as possible, the tubbing being saved, as in the case of the Borth shafts of the Solvay-Werke, by putting in temporary tubbings.

The cost of sinking per yard run fluctuates very considerably, depending on the nature and temperature of the rock and the presence of saline or flowing water; and, of course, the total efficiency of the refrigerating plant and the cost per ton of steam or kilowatt-hour form an important factor. In order to maintain the efficiency of the refrigerating plant at the maximum, accurate measuring instruments should be provided, to enable the progress of the work to be followed closely. Apart from the usual pressure gauges and thermometers, it is advisable to instal self-registering steam meters and thermometers at each engine, with thermometers and self-registering liquid meters in the path of the cooling water and brine.

The loss that may be sustained through uneconomical working of the engines may be gathered from the following calculation: The (condensing) engines of two refrigerating plants for 800 horse-power per hour should have consumed 13½ and 22 lb. of steam per horse-power hour. In the case of the second one, the excess consumption in a run of 18 months was 41½ tons of steam, equivalent to over £5,000, or £50 per yard of shaft sunk.

Similar losses are experienced when the cooling water available is too warm and in short supply. A CO₂ plant, with a capacity of 1½ million heat units per hour and a vaporiser temperature of -25 degs. Cent., has, in one case, an ample supply of cooling water at 10 degs. Cent., and in the other a deficit supply at 25 degs. Cent. In the former case, with a pressure of $p = 60$ atmospheres in the condenser, and the plant running without waste, the output will be 2,472 heat units per horse-power hour, whilst in the other the values will be 80 atmospheres and only 1,578 heat units. If the compressor in both cases has an efficiency of 80 per cent., the output per horse-power hour in the former is about 1,798 heat units, but in the latter only 1,262 heat units. To produce 1½ million heat units per hour, the first engine must develop 758 horse-power, whilst the second must develop 1,188 horse-power; that is to say, the plant would require to be 430 horse-power hour larger, which, in 18 months, would mean an increased steam consumption of 55,728 tons, equal to about £7,200, or £72 per yard sunk.

As regards the question whether steam or electricity is preferable as motive power, the refrigerating plant requires about 633 kw. per hour, assuming the poly-phase motors have an efficiency of 93 per cent. At ½d. per unit, this would cost about 17s. 6d., for which price 6½ tons of steam could be generated. To give the same efficiency, a steam engine would consume 18½ lb. of steam per horse-power hour. With purchased current at ½d. per unit, 653 kw. hours would be required (to allow for transformer losses), at a cost of 32s. 8d., for which about 12½ tons of steam could be raised. In this latter case, the steam engine could consume 34½ lb. of steam per horse-power hour. Since steam engines are now constructed that do not consume more than 11 lb. of steam per horse-power hour, including condensation, steam is the more economical in either case.

The following data have been compiled of the cost of sinking by the congelation process in stages. The first estimate is based on a sinking time of 34 months to completion, including a stoppage of six months. Labour is put down at an average of 5s. 6d. per shift. The number of men averages 115, working an aggregate of 106,300 shifts, and 17 men will be required to dismount and despatch the machinery at the end of the work. The time required for the preliminary work of sinking is taken as four months, making a total of 108,000 shifts, costing £29,700.

ESTIMATE I.

A. Refrigerating plant :	£
1. Interest and depreciation on capital outlay of £18,750, spread over four years = 38.5 per cent.	7,200
2. Refrigerating house and engine foundations, £1,000; depreciation 80 per cent.	800
3. Materials for freezing, at £2 per diem, for 28 months	2,100
4. Cooling water, 1,300 gals. per minute ...	2,340
B. Drilling 32 boreholes:	
1. Foundations for winches and flushing pumps	50
2. Alterations to sinking derrick	50
3. Refrigerating pipes—presumably abandoned—about 120 yds. to each hole, at 10s. 6d. per yard	2,000
4. Depreciation on recovered, but damaged freezing, borehole, and down pipes; 60 per cent. on £22,000	13,200
5. Securing borehole casing to shaft wall, 10 straps for each set, at 10s.	160
6. Depreciation, upkeep, and interest on drilling plant, including requisites	2,500
C. Salaries and wages :	
1. Wages	29,700
2. Salaries: three officials for three years, at an average salary of £180, including bonuses, insurances, etc.	5,400
D. Steam consumption at 2s. 7d. per ton :	
1. For refrigerating plant tons 62,208	
2. For brine pumps „ 9,072	
3. For the winches and flushing pumps „ 13,608	
E. Tools, light, timber, boring tools, etc., and allowance for men's clothing, etc., at £1 per yard sunk	—
F. Carriage both ways on machinery, tools, etc.	—
Total	£80,500

* Glückauf.

According to this estimate, the cost of sinking in the average is £805 per yard.

This estimate is based on the sinking taking place on the rate of wages per shift being considered more in the conditions in industrial districts:

ESTIMATE II.

A. Refrigerating plant	£12,440
Additional materials for the extra six months	450
Extra consumption of cooling water	780
B. Sinking the boreholes	17,960
C. Salaries and wages:	
Wages, 108,000 shifts at 6s. 6d.	35,100
Plus, for the extra six months	5,600
Sunday work, 20 freezers	190
Salaries, 3½ years	6,300
D. Steam consumption, 34 months	11,000
Additional 23,760 tons for the refrigerating plant	3,080
E. Materials for sinking	2,500
F. Carriage, including £150 for the extra six months	1,650
Total	£97,050
(or £970 per yard sunk).	

In neither estimate is any allowance made for profit, nor for any percentage of the cost of the general machinery and appliances concerned in the sinking, such as raising rock, sinking apparatus and engines, derrick, wear of winding ropes, ventilation, drilling machinery, sinking stages, etc., or steam consumption of the sinking engine, stage winch, and fans. The consumption by these machines is approximately equal to that in shaft boring, so that it need not be taken into consideration.

The cost of steam was calculated on a consumption of 13½ lb. per horse-power hour by the main engine, 77 lb. per horse-power hour by the brine pumps, and 66 lb. per horse-power hour by the drilling machinery. Nevertheless, under less favourable conditions, the cost per yard increases very quickly, and may, in exceptional cases, where the sinking takes much more than 40 months, amount to £1,250 and more per yard.

The value of the final tubing is not included in either estimate. This tubing is generally introduced in short lengths, and frequently suffers during the subsequent thawing out, which is effected, almost entirely, by the natural heat of the ground. Artificial thawing, which has proved the only correct method in other cases, is inapplicable with the system under consideration, because the freezing pipes are dismantled on lining the widened portion of the shaft. All that could be done in the matter of artificial thawing would be to assist the natural process from inside the shaft.

Injury to the tubings is liable to occur during natural thawing, on account of the forces released, and in respect of whose dimensions, direction, and points of application there cannot be anything but surmise beforehand. Moreover, should any considerable injury occur to the tubing, it is impossible to replace the damaged portion, because the shaft cannot be re-frozen. In extreme cases, a second ring of tubing must be inserted, inside the first—a proceeding which will reduce the diameter of the shaft to 17 to 18 ft., and at the same time dissipate the only advantage the congelation process has over the boring process, whilst also increasing the cost very largely, the inner cylinder of tubing being very expensive.

In the most favourable circumstances, the sinking of a shaft by the cementation process takes only a few weeks more than sinking through dry ground, and the cost is only a few pounds per yard more. On the other hand, in the worst imaginable case, the sinking may turn out a failure after the work has gone on for years at enormous expense. In hand sinking, with an influx of 2,200 gals. (3,300 gals.) per minute, and raising the water in buckets, the time required will take 17 (27) months per 100 yds., and cost about £800 per yard (method not practised), as compared with only about £500 (£850) for electric pumping with generated current, and £640 (£1,100) with purchased current. Shaft boring with the Stockfish or Deutscher Kaiser methods takes 39 months, and costs £350 per yard; whilst carrying out the congelation process in stages takes 34 to 40 months, at a cost of about £800 to £970 per yard, though in specially difficult cases the time may be increased very considerably, and the cost to over £1,200 per yard.

Rules for Sinking Through Very Wet Ground at Great Depths.

1. On approaching a wet zone of unknown water content, this zone should be proved by advance borings.

2. Unless the cementation process is practically sure to be a failure in the wet ground, this process should certainly be given a trial.

3. In the event of failure, an approximate estimate of the influx of water should be obtained by means of the cementation boreholes.

4. If the influx does not exceed about 2,200 gals. per minute, the quickest method of sinking is by baling out the water with bucket apparatus, the higher cost in comparison with boring being small in view of the saving of nearly two years in time, provided generated current is available.

(a) If the incoming water is not too highly contaminated, electric pumps alone should be used.

(b) In such case, a power house should be erected in good time.

(c) Where current has to be purchased, the decisive factor will be whether the two years' saving in time is of sufficient importance to counter-balance the extra cost of 29,000—as compared with

by many months. Whether, in such event, the saving in time effected argues in favour of baling must be decided from the actual state of the case.

5. When there is a continuous influx of, say, 3,000 gals. per minute, the Stockfish or Deutscher Kaiser boring method will be decidedly the most economical method, the increased time entailed being immaterial in comparison with the cost of raising this amount of water.

6. Only when the rock is very steeply pitched or very hard, and the water comes in quicker than about 3,000 gals. per minute, should the refrigeration process, by stages, be adopted. If this process be employed, then the following points should be borne in mind:—

(a) The lower diameter of the widened portion of the shaft should be large enough to ensure the formation of a sufficiently thick frost wall in the upper part of the wet zone as well; and the widened portion should be of ample length. Given these conditions, the stand pipes can be set at an angle which will ensure the boreholes being not too far away from the shaft in the lower portion of the water zone.

(b) The boreholes should be sufficient in number to ensure that a good frost wall will be obtained even if some of the holes turn out unfavourably in point of direction.

(c) The refrigerating plant should be of ample capacity for the maintenance of low temperatures.

(d) The refrigerating plant should be run so as to maintain the maximum efficiency, for which purpose an abundant supply of cooling water, at the lowest possible temperature, should be available.

(e) The sinking must be conducted with the greatest care. The shaft must be lined with tubings, either temporary or permanent.

Conclusions.

There seems little prospect of effecting improvement, from the economic point of view, in either the pumping method or that of congelation by stages, both having already reached a high stage of technical development. It is therefore improbable that, in either case, sinking can be effected more quickly than has been stated above. Moreover, any further improvement in the total efficiency of the centrifugal pump will not do more than slightly reduce the cost of pumping; nor is any appreciable cheapening of the congelation process to be anticipated. The only point in which any great saving could be brought about is in reducing the chances of the water breaking through.

On the other hand, the high speed, water flush, percussion boring method has considerable prospects of development, in both technical and economic respects, and it is therefore probable that the average monthly rate of sinking can be increased to 21 ft. or more in medium hard rock. The adoption of a rod-changing machine would also reduce the number of men required on the boring plant very considerably.

If this method were more frequently employed in shaft sinking through deep wet zones, there would be a greater chance of improvements being introduced on the basis of the experience gained.

DONCASTER MINING CLASSES.

At last week's distribution of prizes and certificates at the Doncaster Municipal Technical College reference was made to the mining classes which are provided for this now important colliery centre. The principal of the college, Mr. J. Eagles, in his report, stated:—"In the mining department the entries were insufficient to warrant the formation of separate classes, which is greatly to be regretted. The committee are prepared to make this department fully equal to the requirements of the district if students and employers will only respond, but mine owners and managers should be prepared to grant facilities and make suitable shift arrangements for those of their employees who wish to attend the classes. Only in this way will it be possible to secure an adequate supply of men fit for the responsible positions at the collieries. In this section during the year 1916, 116 candidates were examined under the Coal Mines Act 1911; 82 full certificates and 34 partial certificates were issued."

The ex-Mayor of Doncaster, Councillor S. Balmforth, who presided, remarked that a number of students desired to take up mine surveying, but had not a sufficient knowledge of mathematics. If they would take up mathematics, and follow along with practical surveying out of doors next summer, arrangements could be made for a class of that description, and the committee would be only too pleased to follow up that desire. The speaker expressed surprise that the mining classes had not been taken advantage of more fully, considering the mining community by which Doncaster was surrounded. The shift arrangements were the difficulty. If students wanted a first year mining course, and all could attend at the same time, then the committee could manage it, but if four were working on the morning shift, five on the afternoon and three on the night shift they could not manage it. The committee therefore appealed to the managers of the various pits by which Doncaster was surrounded to make it possible for those who wished to take this course of instruction to change their shifts with others who did not wish to attend. This would enable the students to come forward together, not only to their own advantage but to the advantage of the collieries to which they belonged, who would thereby have a larger number of skilled men. The committee believed if this was brought to the notice of the managers of the various pits they would endeavour to make arrangements for the students to attend these classes. At the present time students had to fall back upon coaching institutions. There was no doubt Doncaster was the centre, and was going to become the hub of the universe with regard to coal mining in a few years' time, and that college hoped to become the centre which it ought to be with regard to the technical instruction required in the mines.

COAL BRIQUETTING:

With Special Reference to Anthracite Coal.*

By J. A. YEADON.

The term "briquettes" is applied by the author simply and generally to signify compressed blocks of coal, whether bituminous or anthracite, agglomerated with coal-tar pitch. The question of utilising lignite is not dealt with, as the quantity of lignite to be found in this country is altogether too small to call for any special attention, and therefore the term "coal" is confined solely to coals of (1) the bituminous, (2) semi-bituminous, or (3) anthracite classes. Similarly, "pitch" refers to either one of the residuals from the distillation of gas tar, or a product obtained from the blast furnaces in Scotland where raw coal is still chiefly used for smelting iron. In pre-war times, pitch commanded abnormally high prices per ton, and numerous other ingredients or processes were constantly being introduced and exploited to dispense with the necessity of using the ordinary pitch. So far, however, as the agglomerant for briquetting, pitch holds the field, and as its price has now got once more to its normal level, it stands in less danger than ever of being ousted or replaced. It contains three very important advantages: Firstly, it helps the briquettes to burn; secondly, it adds practically no "ash" to the briquettes; and thirdly, it makes the briquettes weatherproof. Also, briquettes agglomerated with pitch contain a higher calorific power, weight for weight, than the coal from which they are made. In the author's opinion, no other agglomerant or process at present before the public is likely to compete commercially and successfully with pitch.

Various schemes and processes have also been brought out during the last 40 or 50 years, to dispense with the addition of any agglomerant at all: more or less on the principle of heating the ground coal to a certain temperature, so as to develop its tarry consistency, and then to subject it to a very powerful compression in the moulds of the briquette press. To the best of the author's knowledge, these schemes, so far, have not resulted in any commercial success. One very important item seems to have been ignored, or overlooked, in these efforts, so far, namely—that the temperature required to heat the coal by these processes releases and allows to escape a considerable proportion of the volatile matter in the coal, which is absolutely essential to retain so as to secure the highest calorific power in the finished briquettes. In addition, the high initial cost of the machinery required for this process, the excessive wear and tear with the same, and the comparatively small tonnage of finished briquettes produced, have all, so far, combined to prevent this process proving a commercial success.

To attempt to describe the process of manufacturing briquettes to the South Wales mining engineers might appear, at first sight, somewhat superfluous, or possibly presumptuous. This manufacture has been one of the principal local industries for over 40 years, during which time it has always produced a much larger annual tonnage of briquettes than all the other parts of the United Kingdom combined. The superior and suitable qualities of the coals, the nearness of the collieries to the sea coast, the advantages of its geographical position, and the experience gained during these last 40 years, have all combined to develop this industry, and to secure a leading position amongst the nations of the earth for the manufactured product. On the other hand, the author hopes that, as a result of his 40 years' experience in connection with this special branch of industry, he may be able to contribute some suggestions or information which may be of service to the members of the institute.

"Briquetting" may be briefly described as the method or process by which small coal, mixed with the addition of a small proportion of pitch, is converted into compressed blocks, which are called briquettes, or, as in South Wales, patent fuel. The main essential principles of the manufacture of briquettes in South Wales are practically the same as have been in practice for the last 40 years. Small coals, of suitable quality, mixed with 7 to 10 per cent. of pitch (according to the quality of the coal), are ground to the requisite consistency and fineness, then subjected to the action of superheated steam (to soften the pitch) and afterwards fed or charged into the moulds of a horizontal mould plate, in which the materials receive a powerful compression, by means of which they are converted into "briquettes," or compressed blocks, which are then conveyed from the briquette press and delivered into wagons, or stacked in the open. When cold, these briquettes are quite hard and ready for shipment. The general details of the machinery and process of manufacture adopted in South Wales have altered very little in the last 30 years.

The briquettes made in South Wales are almost all of the rectangular shape, this being found to be the most advantageous for shipment, allowing the greatest tonnage weight per cubic yard in the hold of the ship. Almost universally, also, in South Wales the pressure put on the briquettes is exerted from one side only. In the year 1877 (40 years ago), Messrs. Yeadon and Company (Leeds) brought out the "double-pressure" system, by which the briquettes are compressed from both sides, the advantages being greater solidity given to the briquette, and also all the edges of the briquette being rounded off, thus minimising breakage in handling.

The first briquette presses constructed on this "double-pressure" system were sent, in 1877, to the Bernissart Colliery, Belgium, and were recommended by their general manager, Mr. G. Fages, as being the best machines he knew of, after having carefully studied all the briquette machines constructed at home and abroad.

This "double-pressure" system was speedily copied and adopted by French and German makers, and grew so rapidly into favour that, from the beginning

* From a paper read before the South Wales Institute of Engineers on September 25.

of this century, nearly the whole of the briquette presses constructed by the leading makers on the Continent have been on this double-pressure system.

The proportion of pitch required as an agglomerant depends largely on the nature or quality of the coal used; the less "ash" in the coal, the less pitch required. For briquettes intended for general shipment, the "ash" in the coal should not exceed 10 per cent.; for the best qualities, intended for naval requirements, a lower percentage of "ash" is stipulated.

The weight of the rectangular briquettes produced in South Wales for export varies from 9 lb. to 28 lb. each, according to the market for which they are intended. Briquettes made from coal agglomerated with pitch, can be stacked out in the open for years without any damage from heat or moisture. The calorific power of a good quality of briquette should be slightly in excess of that of the coal from which they are made. Prof. Goss has stated that briquettes, weight for weight, raised more heat than the coal itself. This arises from the addition of the pitch.

The briquetting of anthracite coal is a very important subject. Hitherto, in South Wales and also in other parts of the country, the briquettes produced have been chiefly of the "rectangular" form, and made from bituminous or semi-bituminous coals. A great advance has been made in this respect during the last few years by changes both in the shape or form of the briquettes, and also in the materials from which they are now produced. The important question of how most profitably to utilise what have so often hitherto been considered as waste materials, has come rapidly to the front, and has come to stay. No branch of trade is more intimately connected with this question than the coal trade. So far as "fuel" is concerned, we have been the most wasteful nation on earth; and if this war does nothing more for us, it will have aroused us to consider how to mend our ways by using to greater advantage the material resources within our reach.

The form of the briquettes now growing so rapidly into favour is the "ovoid," or, as it is sometimes called, the "eggette." The briquette machine producing "ovoids" is, of course, of a different design and construction from that producing "rectangulars." "Ovoids" have been made on the Continent, and, to a certain extent, in the United States, for a good number of years. The sizes can be altered, as with the "rectangulars." Their ordinary weights vary from 1½ oz. to 6 oz. each. They are admirably suitable for either house fires or for boiler consumption. It has been a matter of surprise to the writer for 25 years that this form has not been hitherto adopted in this country. They have evidently come now to stay.

Of more importance still is the fact that, by the adoption of the "ovoid" form and size, different materials can be profitably utilised, which at one time were almost unsaleable, such as, for instance: (1) some small coals, (2) "slimes" from the coal washers, (3) small coke "breeze" from the coke ovens and gas works, and last, but not least important to the members of the institute—anthracite.

The Clifton Colliery, Nottingham, has in full operation a briquette plant producing "ovoid" briquettes, weighing 5 oz. each, at the rate of 50 tons per day. These are made from small coal and pitch; and are in good demand.

The Wombwell Main Colliery, Barnsley, has a plant of similar capacity producing "ovoids" weighing 1½ oz. each, composed of (1) coke breeze from the ovens, (2) "slimes" from the washer, (3) a small proportion of small coal, and (4) pitch. These have already secured a good sale in London.

At the Beckton Gas Works of the Gas Light and Coke Company, London, is another plant, producing "ovoids" 1½ oz. each, from gas coke breeze alone, agglomerated with pitch. These also have a large sale. The next largest city in England has ordered a similar plant, and there are several others to follow. The above plants have been supplied by Messrs. Yeadon, Son and Company.

There is a great affinity between coke and anthracite, both being nearly pure carbon: one has been "carbonised" by man, the other by Nature herself. What has been already satisfactorily effected with "ovoiding" coke breeze can be equally well secured, all other things being equal, in the "ovoiding" of anthracite small. Lest, however, some might look upon this statement as merely an "opinion," it may be interesting to mention that some months ago a full truck of anthracite duff was sent by one of the leading South Wales colliery firms to Leeds, where it was suitably prepared, agglomerated with pitch, and then converted into "ovoids," which were duly returned to the senders, thoroughly tested, and proved to be so satisfactory that, but for the difficulty at that time in procuring a "priority certificate" from the Ministry of Munitions, that colliery firm would now have had a plant working, producing satisfactory "ovoid" briquettes from their own anthracite duff. These "ovoids" weigh 5 oz. each, and burn well in open or boiler fire. The evaporative value (water at 212 degs. Fahr.) per 1 lb. of the fuel is 13.15 lb., equivalent to 12,717 British thermal units.

Also, there has been recently erected, and is now working in Bordeaux, another briquette plant, producing "ovoid" briquettes at the rate of 50 tons per day, from South Wales anthracite.

In addition to the "ovoid" plants above mentioned, there are other briquette plants already in course of construction, or erection, for collieries in Kent, Derbyshire, Yorkshire, Northumberland, and Scotland—all of which will produce "ovoid" briquettes. Also several others for foreign countries.

In conclusion, it will be readily understood that no one fixed standard type of briquette plant will be suitable for every material. In every case, the design of the plant and the process of manufacture have to be carefully considered and carried out as will be found most suitable for the materials to be utilised; but the author believes, after 40 years' experience,

that, all other things being equal, there is no small coal or coke in this country which cannot be profitably utilised, provided the matter be put into competent and experienced hands, and that the proper and most suitable plant and process be adopted.

After this war, it will be necessary for us to study economy and the utilisation of waste materials in this country much more than we had ever done in the past. We shall not have to throw usable stuff on the muck heap and let it take fire itself. We can utilise it all, and we can utilise it profitably. The sooner this is fully realised and acted upon, the greater will be the benefit to the country.

SOUTH WALES INSTITUTE OF ENGINEERS.

A general meeting of the South Wales Institute of Engineers took place at Swansea on Tuesday, the 25th inst., under the presidency of Mr. HUGH BRAMWELL.

Coal Briquetting.

The chief business was the reading and discussion of a paper by Mr. JOHN A. YEADON, Leeds, on "Coal Briquetting: with Special Reference to Anthracite Coal." (See previous page.)

In the discussion, Mr. DRAPER (Rhondda Engineering Company) commented upon the increased quantity of small coal and slime produced nowadays in collieries, due, he opined, to the greater employment of coal cutters, washeries, and other mechanical devices. At some collieries the slimes were sufficiently good, in respect of low ash content, to be made into briquettes, but at other collieries they were too dirty. The ash ranged from 15 or 16 per cent. to as high as 40 per cent. Ordinary washery slime would run very high in sulphur and also in fine fireclay. This, of course, would not make good fuel. He hoped, however, that by effecting certain improvements in coal washing, for the origin of which he was partly responsible, to solve the problem of this high ash content.

Mr. GUY WARREN (Pantyyfynon) urged that this was the proper time to take up the question of utilising the vast heaps of duff now practically valueless. He gave the result of tests of briquettes made by his firm with the duff of anthracite coal, which were tested on locomotives, Lancashire boilers with forced draught, on slow combustion stoves, and in open fire grates. The test on locomotives proved the briquette a failure, but that on the Lancashire boiler was a partial success, and that on the stoves an entire success, the ovoids lighting up more rapidly than ordinary anthracite, and retaining their shape until they were practically burned away. They were equally satisfactory as a fuel in open fire places that were suitable for the burning of anthracite coal. The fact, however, remained that they had still to educate the people to the use of anthracite fuel, especially where free-burning coal could be obtained cheap. With the utilisation of what was the cheapest form of coal in the country, however, they ought to compete successfully with free-burning coal. It only needed properly marketing.

Mr. E. GEVERS-ORBAN, formerly mining engineer, Montegnée, Liège, now at Upholland, near Wigan, spoke at some length on the general subject of briquette making, based upon an extensive experience in Belgium.

Mr. CHARLES CLEEVES (Swansea) said one of the great difficulties in dealing with this problem was to secure a sufficient quantity of clean anthracite at such a cost after preparation as to make the thing a paying proposition. Some years ago he had tests made in washing ordinary anthracite duff, and found that in order to get 1 per centage of ash down they lost from 23 to 35 per cent. of the bulk, which went away in the shape of slack. Then there was the additional cost of drying; also the problem of disposing of the slurry, because it would be very expensive to put up large settling tanks. The whole question, however, resolved itself into the quantity of anthracite duff that was available. The output of anthracite in this country was about 5,000,000 tons per annum, of which 10 per cent., or 500,000 tons, was duff. A lot of this was sold to spelter and other works, so that the total quantity of duff was not great. For briquetting, a number of small plants should be erected, rather than a large central plant.

Mr. WALLACE THORNEYCROFT (president of the Institution of Mining Engineers) said one of Dr. Haldane's assistants read a paper at Newcastle recently which incidentally referred to the extraordinarily solvent action of pyridine on coal. This, if it could be got cheap enough, might prove an effective binding agent for anthracite or other briquettes. Another problem which had been touched upon was that of making a saleable fuel from the product of low-temperature distillation. At the present time there was a great movement on foot to get more oil in this country for the use of the Navy, and many of the more bituminous coals—cannels, etc.—were being talked of as being used for briquetting. This would throw a vast amount of practically unsaleable stuff on to the market, and something would have to be done with it. If the dust of this could be made into suitable briquettes, it would be an important factor in that economy for which they were all now striving. One of the reasons of his (the speaker's) being at Swansea was to get into touch with the South Wales coal owners and others interested in industrial research work, in order to secure co-operation with the Institution of Mining Engineers in prosecuting an investigation into the various problems affecting the coal industry. One of the things they might jointly do was to adopt the suggestion of sending an expert to America to conduct an exhaustive enquiry into the whole subject of the utilisation of waste minerals.

Dr. W. GALLOWAY wrote citing a case in which the hard particles of breeze had cut away the ridges

between many of the moulds to such an extent that many adjoining briquettes were adhering to each other, and the product was not quite satisfactory. Wear did not occur where coal was the substance employed. With regard to briquetting anthracite dust in the form of ovoids, he was glad to hear that Mr. Yeadon thought he had solved the question in a satisfactory manner. He (Dr. Galloway) understood that the difficulty arose from the fact that the pitch melted out of the briquette when it was subjected to heat, and that the cohesion of the particles of anthracite was thus destroyed, and the briquettes fell to pieces in the fire.

Mr. E. R. SUTCLIFFE (Sutcliffe, Speakman and Company, Leigh) furnished some particulars of pure coal briquettes made without the addition of any binding material, advantage being taken of the binding qualities of coal pressed under heavy pressure, causing the particles to adhere by their natural bituminous contents. In order to obtain satisfactory binding properties, grinding the coal to a very fine state of subdivision was first necessary, quite as fine as where coal dust firing was adopted, i.e., a fineness such that the bulk of the coal would pass through a 200-mesh screen. A pressure of 10 tons per square inch was required on this ground coal to bind it into a hard solid briquette of equal hardness to pitch-bonded briquettes. It could be asserted that briquettes made in this way were harder than lump coal, and would better stand transport and handling than coal in lump form. Before a satisfactory briquette could be obtained, much experimenting had to be undertaken in order to get over the difficulty of the extraction of air, and to obtain a satisfactory means of giving the necessary pressure. All these difficulties had, however, now been satisfactorily overcome, and these briquettes had been made in fair quantities, and of dimensions up to 10 in. by 7 in., weighing 15 lb. each. There being no binding material and no added matter to make it into briquettes, the analyses of the fuel and the small coal from which it was made were identical, thus showing that no chemical change took place in the course of its manufacture. When the briquettes were made from a smokeless variety of steam coal, they proved equally smokeless. Briquettes made from house coal under the process burn admirably in a house fire grate, and were considered superior to the large coal from the small of which the fuel was made, owing to the fact that the briquettes "cauliflower" in burning, and make a most pleasing fire. This fuel was open to none of the objections raised against pitch-made fuel, while it readily passed all the tests usually applied to the latter. Careful boiler tests, each of 24 hours, of best Welsh coal, of pitch-made fuel, and the new fuel respectively (all manufactured from similar coal) made at a South Wales mining school, showed, according to the report, that the new fuel "gives a remarkably high value in the heat transmitted, and the weight of water converted into steam per square foot of heating surface." Further, "that the heat transmitted (per square foot of heating surface per hour), 4.650, as compared with 4.070 for large coal, and the weight of feed water (per square foot of heating surface per hour), 4.81, as compared with 4.225 evaporated per square foot of heating surface, was conclusive proof that this patent fuel would not only give good results as a fuel under ordinary conditions for steam raising purposes, but would be particularly valuable where rapid steam raising was necessary, or where a maximum quantity of steam had to be obtained from a minimum heating surface, as in the case of marine work." Another important point with reference to the combustion of the fuel under test was "the ease with which a regular steady heat would be maintained, and the fires kept clean, when using the new fuel. The clinker formed with the fuel did not have the slightest tendency to adhere to the firebars, as was the case with the steam coal, although the amount of clinker was the same in each case." The process seemed to impart a very special burning quality, inasmuch as the fuel was a particularly active one. Moreover, the remaining coke or cinders seemed to possess qualities of a somewhat similar nature to charcoal.

The discussion was adjourned.

Current prices of French coal, at pit (on rail or barge): Through-and-through (Pas-de-Calais), 32 fr. to 36 fr. per ton; unwashed, 30 fr. to 32 fr.; washed small, 37 fr. to 42 fr.; smithy (Loire), 44 fr.; smithy for coke (Loire), 33 fr.; through-and-through for gas (Blanzy), 31½ fr.; briquettes (Blanzy), 45 fr.; smithy (Gard), 35 fr.; briquettes (Gard), 45 fr. to 48 fr.; large unbroken, 42 fr.; through-and-through screened (Centre), 36 fr.; briquettes (Centre), 46 fr.

Scottish Iron Moulders on Strike.—An "unofficial" strike of Scottish iron moulders has occurred as the result of the workmen's dissatisfaction with an award by the Committee on Production granting to the men employed on munitions of war an advance of 3s. a week as from August 1. The men's union leaders have asked for a re-consideration of the award, but the Minister of Labour has declined to re-open the matter, in view of an agreement last February that awards should stand for at least four months before being reviewed. Mr. Roberts, the Minister of Labour, issued on Thursday a statement explaining the position, warning the strikers that their action is illegal, appealing to their sense of fairness and patriotism, and adding that in his decision he has the full support of the War Cabinet.

Emergency Storage of Coal.—The *Electrical World* (August 18) describes a simple and inexpensive method of unloading coal on open ground. The railway wagons, with hopper bottoms, are run on to a track, and the coal is deposited on the track and between the sleepers by opening the doors. The coal is pushed off the rails when the wagon is withdrawn by a baulk of timber instead of one of the rear wheels. When the whole length of track has thus been covered with coal, the track is jacked up, the rails rest on the coal, and the process is repeated until the pile is 10 or 15 ft. high, when the track is re-laid on the ground and a second pile is begun. To remove the coal, the track is laid on the ground alongside of the pile, and the coal is loaded into wagons by a locomotive crane.

CONTENTS.

ARTICLES:—	PAGE
Inspection in 1916	597
of Spontaneous Combustion	597
Inspection in 1916	587
on	590
Observations on Modern Coal Washing	590
Coal Fields and Coal Industry of Eastern Canada	591
Comparative Tests of Hammer Drill Bits	592
Sinking through Wet Strata at Great Depths	593
Doncaster Mining Classes	594
Coal Briquetting: With Special Reference to Anthracite Coal	594
Coastwise Shipments in August	601
South Wales Mining Timber Trade	601
Miners' Wages	602
Wigan and District Mining and Technical College	602
Book Notices	602
Labour and Wages	603
Open Contracts	605
The Freight Market	608
Abstracts of Patent Specifications Recently Accepted	608
New Patents Connected with the Coal and Iron Trades	610
Government Publications	610
Publications Received	610
REPORTS OF MEETINGS:—	
South Wales Institute of Engineers	595
THE COAL AND IRON TRADES	598—601
The London Coal Trade	598
The By-Products Trade	601
The Tin-plate Trade	601
NOTES FROM THE COAL FIELDS	604
COAL, IRON AND ENGINEERING COMPANIES	605
MONTHLY LIST OF RECENT COAL LITERATURE	606
MISCELLANEA:—	
German Coal and Iron for Switzerland	591
Coal Prices at Alexandria—Lancashire Mineral Oil—Welsh Patent Fuel Prices Fixed	593
Scotch Iron Moulders on Strike—Emergency Storage of Coal	595
The Cockerill Works—Coal Prices in Paris	600
West Australian Coal Output—Re-examination of Colliery Firemen	603
Coal Exporting to Italy	605
Coal in Dutch East Indies—French Coal Production	606
Refractory Products in Germany—Calcium Carbide—Tar Products in Switzerland—Holland's Fuel Shortage	608
Coal Licences for Italy—Twefontein United Collieries	610

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J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc. M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, SEPTEMBER 28, 1917.

The London coal trade has been better supplied lately, but the demand is still far ahead of the supply. Emergency coal is coming forward very slowly, and the varieties are causing a good deal of confusion. Hard steam coals are increasingly scarce, munition works and local factories claiming all the output. Gas coals are brisk. Household qualities are in good demand. Kitchen cobbles and double-screened nuts are difficult to obtain. Slacks are selling freely. The Controller's regulations have benefited London, but has given rise to strong objections by traders at the south-western and west of England stations.

The Northumberland trade is very brisk, and supplies are well taken up. There is no improvement in the position of Durham coals, tonnage continuing very scarce. Supplies of all classes are plentifully offered at minimum scheduled rates.

Yorkshire and Lancashire centres continue to experience a very keen demand for supplies, and considerable difficulty is arising regarding wagon supply, which is preventing the full carrying out of the Controller's instructions relating to deliveries to London and the south.

Business at Humber ports is still affected by the demand upon output for home requirements, especially for London and the south, and the utmost difficulty is experienced in getting even modest current demands satisfied.

South Wales markets remain without appreciable change, conditions generally being dull without material improvement in any particular section; anthracite descriptions are in fair demand, but steam sorts are a slow market.

The Scotch coal trade continues quiet all round, collieries finding great difficulty in maintaining employment, even though industrial requirements are comparatively heavy. Irish conditions are unchanged.

Freight conditions show no variation. At north-east coast ports no tonnage is available, and the

official supply extremely limited, while in South Wales enquiries for neutral ports continue numerous but receive scanty attention. Allied business is also limited.

Mr. Finlay Gibson, secretary of the South Wales Coalowners' Association, has prepared a statement showing that the men employed on the afternoon and night shifts now receive six days' pay for five worked. Since July 1914 the wages of timbermen employed at day rates have been increased by 27s. 4d. per week, night haulers 25s., and labourers 23s. 1d.

An ordinary meeting of the Refractory Materials Section of the Ceramic Society will be held in the Societies' Room of the Royal Technical College, George-street, Glasgow, on Tuesday and Wednesday, October 3 and 4. The following papers will be discussed:—"The Distribution and Geological Position of the Valuable Fireclays and Ganisters of the South of Scotland," by Messrs. Lionel W. Hinxman, B.A., F.R.S.E., and Murray Macgregor, M.A., B.Sc.; and "The Testing of Refractories," by Dr. J. W. Mellor. There will also be papers on "The Rate of Reaction (Vitrification) of Different Forms of Silica," by Messrs P. S. Devereux and J. E. Foster, and "The Refractory Properties of Silica," by Messrs. H. le Chatelier and B. Bogitch.

Coal Mines Inspection in 1916.

THE publication of Part I. of the Home Office General Report on Mines and Quarries enables us to take a general survey of the position of coal mining in this country last year. The inspectors' reports are presented in the abbreviated form which was adopted a year ago. The outstanding feature of the statistical portion is the increased output of coal in all the divisions except one—viz., Lancashire and North Wales, where there was a small deficiency over last year's figures. The total output of coal from all sources was 256,375,366 tons, showing an increase of above 3,000,000 tons over that for 1915, a satisfactory result under existing conditions. The work of mines inspection has to some extent been curtailed owing to the depletion of staff caused by the war. This has reduced to some extent the amount of air sampling that has been done in certain districts, but it is believed that the analyses carried out have had a useful effect in maintaining the standard of ventilation. The progress of measures taken to obviate the dangers of coal dust is variable. In the Scotland division, where the majority of the mines are naturally wet, dangers from coal dust are confined to a few cases only, where satisfactory steps are taken to deal with the matter by watering, stone dusting and cleaning up. In the Northern division, Mr. WILSON reports that colliery managers are devoting more serious attention than formerly to the question of dilution of dust, and some have adopted the precaution of having regular analyses made of their mine dust. In this way, it is usually a simple matter to devise the most appropriate remedy. The general character of mine dust is sometimes conspicuous to the eye, especially where the shale dust is of a light colour. But where it is darker in colour, it is impossible to determine without analysis the proportion of incom-bustible dust that is required to produce conditions of safety. Considerable progress is reported in the removal of coal dust from the roadways, and in some cases the inspectors are enforcing the provisions of Section 62 of the Coal Mines Act, which requires the roadways to be cleared of coal dust as far as reasonably practicable.

With regard to the provision of dust-proof tubs, it is important for all colliery managers to bear in mind that since January 1, 1917, this has been compulsory. The period of five years allowed by the Act actually expired on December 16, 1916. In some districts, however, the work of altering the tubs to comply with this requirement had been delayed by shortage of labour and the difficulty in procuring materials, especially of steel. Mr. WALKER states that in Somerset and Gloucester very little had yet been done in this direction, and open or loose end trams were still in use during the year in many pits. Dr. ATKINSON complains that in South Wales the results of altering the trams so as to be in compliance with the Act have been disappointing; many of the altered trams have been so roughly used that they cannot be regarded as dust tight, since they allow even small coal to escape. Progress has been made in stone-dusting by compressed air, and Mr. NICHOLSON

calls particular attention to the injector used so successfully by Mr. ARTHUR RUSHTON at Abram Colliery.

The timbering question has been one of considerable perplexity in some districts. Mr. H. WALKER calls attention to the need for more use being made of hard wood chocks when taking out pillars of coal. To see the roof of a newly completed lift standing on props is not, he says, a sight to give confidence. Similarly, chocks should be set as additional supports at regular intervals on the waste of longwall faces. Some increase in fatal accidents from falls of ground have possibly been due to causes directly attributable to the war, such as the increased use of new and unseasoned timber, the employment of inexperienced workmen, and certain roof troubles arising from the fact that working faces have not always been kept constantly at work owing to labour shortage. In some South Wales pits brick "packs" have been used with success in some thin seams. The progress in rescue work was well maintained in spite of difficulties caused by the war. Thus, in Scotland, the three central stations have been completed at Coatbridge, Larbert and Bathgate, and nearly 100 men have been trained at the Coatbridge station. Some collieries in the Northern district still maintain their own local station, notwithstanding the fact that they are affiliated to the central rescue stations. Thus, the South Moor Collieries had nearly 50 men fully trained at their own station, which was very complete in its organisation and equipment, possessing also an experimental gallery for practices, which are carried out with particular earnestness. In the Midland district there are now ten rescue stations, including those at Chesterfield and Ilkeston erected by the Midland Coal Owners' Rescue Stations Company Limited, to serve mines in Derbyshire and Nottinghamshire, which are mostly outside the radius of the parent station at Mansfield. Mr. NICHOLSON reports that all the eight stations in his division had been in constant use except the Denton station, which had suffered from delay in equipment owing to the war. Several small collieries have taken advantage of the easy terms arranged by the North Staffordshire Colliery Owners' Association for the affiliation of non-associated owners with their rescue station at Berryhill. The Highley Mining Company Limited have provided a new station for their pits, and only some of the smaller collieries now remain unprovided for in this respect.

The work of the inspectors is particularly arduous in these times. The war has been responsible for many additional demands upon their time for services having little connection with colliery inspection. Of this nature are the colliery recruiting courts, numerous applications for certificates of priority in connection with colliery machinery, and an unusual pressure of official correspondence. Fortunately the year was remarkably free from serious accidents, as well as from many other causes of abnormal dislocation of work. There were no matters of outstanding significance; and in spite of many difficulties the year seems to have been, on the whole, comparatively uneventful from the official standpoint.

The Problem of Spontaneous Combustion.

It is a distinct relief in these strenuous times to have our thoughts directed to so peaceful a problem as the nature and composition of coal, about which so much remains to be discovered that it may well be questioned whether any of the methods of investigation hitherto adopted will eventually lead to the complete elucidation of the mystery. The paper by Messrs. IVON GRAHAM and J. HILL, presented last week at the Newcastle meeting of the Institution of Mining Engineers, seems certainly to have cleared up certain points which had hitherto been in doubt; but, as is generally the case, it has also raised new problems, and this contribution undoubtedly adds further lustre to the invaluable work emanating from the Doncaster Coal Owners' Research Laboratory. The difficulty of the problem of the chemical constitution of coal is readily understood. Even in the case of purely inorganic substances, such, for example, as a piece of granite or basalt, where the material is composed of easily identifiable minerals, it is seldom possible to reconcile the mineral composition with the bulk analysis of the mass. Certain chemical elements known to be present appear to

hide themselves away in a mysterious manner, leaving any trace of their place of concealment. In the case of a substance such as coal, which appears to be a simple glomeration of organic substances, which up to the present time it has not been possible to differentiate with any certainty, the difficulties are greatly increased when we endeavour to assign molecular constitutions to the elements known to be represented in the ultimate analysis.

Some persons may be tempted to ask whether the prosecution of this elusive research is really worth the labour that is being bestowed upon it. In its practical application to spontaneous combustion and the production of gob fires, the ulterior motive which prompted these researches, there may, perhaps, be a disposition in some quarters to rest content with the information already obtained as to the causes underlying the phenomena, and attributable, without any doubt, to the heat developed by oxidation. Can any further assistance be expected from the discovery of the particular constituents of coal which are responsible for this oxidation? Even if we now know that the oxidisable constituents are insoluble in pyridine, does that knowledge assist us in the practical question of dealing with gob fires?

These questions cannot be answered either in the negative or affirmative. It is not the business of the research chemist to concern himself with the ultimate utility of his investigations beyond the extent to which they add to the sum of scientific knowledge. Probably 99 parts out of every hundred in scientific researches are barren in a practical sense. But the remaining portion, even if it should be only a fraction of 1 per cent., may still be worth the whole of the labour bestowed upon the investigation. Let us look at this matter in another way. It is a common experience in research that in looking for one thing, which may, perhaps, defy the best efforts of the investigator, another is found which transcends in importance the original object in view. It is taking too narrow a view of any research to measure its value solely with reference to its immediate bearing upon a particular problem. The sum of human knowledge is a function of the efforts that have been made to attain it, and the whole coal industry is deeply indebted to the work of those who are laboriously seeking to solve such problems as those which have been investigated in the Doncaster laboratory and elsewhere.

It is interesting to know, as Dr. R. V. WHEELER stated in the discussion of this paper, that Mr. C. B. PLATT's experiments at Eskmeals fully confirm the author's conclusions that the oxidisable constituents of coal are contained in that portion which is insoluble in pyridine. The details of these experiments, which are said to have been already communicated to the Spontaneous Combustion Committee, have not yet been published, and apparently the results have been to some extent forestalled by Messrs. GRAHAM and HILL. It seems to be a pity that such important researches, which are stated to have taken place in 1913, should have been kept so long from the public eye. It looks as if the Doncaster work might possibly have been advanced even a stage further if these facts had previously been available. For we take it that Messrs. GRAHAM and HILL have still to proceed further in their researches, and they might have been spared some preliminary work, or, at least, have modified it to the advantage of the research, if they had known the details of Mr. PLATT's experiments.

From another point of view, however, it is perhaps fortunate that the important conclusions arrived at by Messrs. GRAHAM and HILL have been obtained independently; for some curious facts have been disclosed, which do not appear to harmonise with those obtained at Eskmeals. Apparently there is a distinct difference in the behaviour of Barnsley soft coal when extracted by pyridine as compared with Silkstone and other coal investigated by Messrs. WHEELER and PLATT, if we may judge by the action of the pyridine extract on a photographic plate. Photo-chemical action is presumably connected with oxidation, and upon this assumption the Doncaster experiments point to a diametrically opposite conclusion to those obtained at Eskmeals. There may be some explanation of this discrepancy, but it is scarcely likely that Barnsley soft coal is fundamentally different from other coals, and we shall look with interest to further investigation in this direction.

The whole question of the extraction of coal by the pyridine process is of supreme interest. A short time ago attention was called to the activity in this respect on the part of certain German chemists.* The results of their experiments with liquid sulphurous acid in Germany are believed to possess a practical application of some importance. We should like to know whether there is any relation between the pyridine extract and that obtained with anhydrous sulphurous acid. Apart from the question of gob fires, researches by means of solvents may possibly throw light upon the difference between coking and non-coking coals, and upon the possibility of improving the coking qualities of coal by mixing, as Prof. O'SHEA has pointed out. There is every reason, therefore, for the further prosecution of these researches, which have already disproved the prevalent notion that the so-called resinic portion of the coal substance is responsible for the rapidity of its oxidation and heating tendency.

* See *Colliery Guardian*, June 15, 1917, pp. 1129, 1130.

THE LONDON COAL TRADE.

THURSDAY, SEPTEMBER 27.

The London coal trade shows at present no abatement of the keen pressure for all qualities of coal. The supply has to a certain extent improved, but the demand is as strong as ever, and the efforts of the merchants to get a better stock on the ground is absorbing every available truck. The period for stocking is rapidly drawing to a close, and the efforts of the Coal Controller to bring an additional quantity into the London area has not yielded anything like the tonnage originally anticipated. The bulk of the household cellars are better supplied this year, but there are still a large number of unexecuted orders on the books of all the London traders. Steam coals are particularly scarce, and very little of this class of coal is on offer. The munition works and local factories are claiming the whole of the output. Some of the qualities of coal offering in substitution of the kinds usually sent into London have not proved acceptable to the trade, but as a whole the new qualities have been well received. Slacks are freely sold, but the finer qualities are not moving readily. The seaborne market has been well supplied; 29 contract cargoes arrived in the River Thames for Monday's market, and 10 for Wednesday. The shipping demand continues very firm, but vessels are scarce, and the export trade has been seriously crippled of late. Freight rates have realised 19s. to 20s. from the Humber to London. The bulk of the vessels arriving in the river are loaded with gas coal. The Commissioner of Police has intimated to the Borough Council of Kensington that he is about to institute some novel street problems, and to supply motor vehicles with fuel, water, and power on the roadside. Arrangements are being made for the supply of gas, petrol, and electricity by installations on the footway. Already lamp posts, pillar boxes, and signposts are occupying a portion of the pavement, and he thinks that the installations for a supply of power, etc., would not encroach much on the limited space. The Board of Trade and the London County Council special committee are conferring as to a comprehensive scheme for the County of London. Some of the London gas companies have given notice that they are about to increase the price of gas. Wandsworth area after the Michaelmas quarter will advance from 2s. 6d. to 2s. 10d. per 1,000 cu. ft.; Wimbledon, 3s. 1d. to 3s. 5d.; and Epsom, 3s. 6d. to 3s. 10d. The increase is said to be necessary on account of the higher cost of materials and freight. On the other hand, the North Middlesex Gas Company have announced their intention of reducing the price of gas from 3s. 7d. to 3s. 6d. from October 1; and the Hornsey Gas Company will reduce from 3s. 1d. to 2s. 11d. The waterways, by bringing coal to London, are still having a good deal of attention, but at present no serious movement has taken place to bring the canals into closer touch with the Metropolitan area, and so relieve the transport services of the various railway companies. Many of the traders at the South-Western and West of England stations are complaining very bitterly about the action of the Coal Controller in withdrawing coals from the Durham, Yorkshire, Derby, and Nottinghamshire districts, and substituting Welsh steam coal, Somerset, Birmingham, Shropshire, and Monmouthshire qualities in the place of them. Some of the Welsh coals are costing them 8s. to 10s. per ton more, and they are practically useless for the ordinary grates and stoves used in their neighbourhood. From the recent communications, they are anticipating some of the Nottinghamshire and Leicester qualities may be reinstated for the South and Western districts. Some instances have arisen where the prices to be charged for the substituted coal cannot be ascertained. The Port of London Authority announce that the works and improvements at the Royal Albert Dock Extension are approaching completion, and now ready for the installation of the lock gates, road bridges, and necessary machinery. At the West India and East India Docks the improvements have been completed, and the docks are now in full use. The increasing number of collieries which are now sending nothing but unscreened coal to London has aroused a strong opposition on the market, as the merchants find the loaders and carmen are resenting the extra labour necessitated by the screening, although they are paid extra for the slack produced, and, in fact, in some cases the men have refused to deal with the contents of certain wagons.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, SEPTEMBER 21.—There was no seaborne house coal pressing for sale to-day, but the demand still continued good. Cargoes, 30.

MONDAY, SEPTEMBER 24.—The seaborne house coal was again in good demand to-day, but the supply coming forward was not equal to the enquiry, and no cargoes appear to have been disposed of. Cargoes, 29.

WEDNESDAY, SEPTEMBER 26.—The seaborne house coal was again in good demand to-day, but the supply coming forward was not equal to the enquiry, and no cargoes appear to have been disposed of. Cargoes, 29.

Dansk-Islands Kulmineselskab, of working coal deposits in Iceland, and a Danish engineer named

THE COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 27.

Scotland.—Western District.

COAL.

Conditions in the Scotch coal trade are still of an unsatisfactory description. Collieries are finding great difficulty in maintaining employment, and idle time is all too frequent. The position is also further complicated by the new distribution orders, and business generally is very unsettled. In the west of Scotland district trade is none too good, and the outlook is no more than fair. Shipments for the week amounted to 91,899 tons, compared with 104,770 in the preceding week and 134,505 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	26/-25/
Ell	26/-28/	26/6-28/	23/-25/6
Splint	28/-30/	28/-30/	25/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

As week follows week the conditions in the Scotch iron trade present little alteration. The struggle to maintain and increase outputs continues as strenuous as ever, and, despite all efforts, requirements generally are far from being fulfilled. In the pig iron department the call for hæmatite for consumption at local steel works still occupies first attention. In forge and foundry descriptions a surplus supply is sometimes available, but for the most part deliveries of these qualities are difficult to arrange. Licences for export are rarely granted, and only materials for Allied countries are dealt with in this department. Prices are firm and unchanged. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloath, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. In the malleable iron trade the position of ordinary mercantile customers has become very acute. The mills are almost entirely engaged on munitions, and after Government demands have been met very little is left for ordinary distribution. The position, too, is made more difficult by a growing shortage in shell-discard material which many have been using in place of the usual brands of malleable iron. The engineering trades are exceptionally busy.

Scotland.—Eastern District.

COAL.

The situation in the Lothians coal trade is not inspiring, but there are signs of improvement. Employment has been somewhat better during the last two weeks, and orders are coming in with greater regularity. Shipments were 15,564 tons, against 19,084 in the preceding week and 28,735 tons in the same week of last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	25/6-26/6
Secondary qualities.....	25/6	25/6	24/
Treble nuts	23/	23/	25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Conditions in Fife are least promising of all. The collieries experience considerable difficulty in disposing of their outputs, and stocks are accumulating. Shipments amounted to 33,553 tons, against 42,382 in the preceding week and 54,351 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	35/-40/
Unscreened do.....	24/-25/	24/-25/	26/-30/
First-class steau coal.....	28/	28/	30/-35/
Third-class do.	24/	24/	25/-26/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The aggregate shipments from Scottish ports during the past week amounted to 141,016 tons, compared with 166,236 in the preceding week and 217,591 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The continued briskness of the demand on the part of the Admiralty and of inland consumers is saving the market from the slump which, in the absence of anything approaching a sufficiency of transport facilities, would otherwise be its lot. It is true that "free" tonnage arrivals have shown some little improvement during the present week, but they are still far from adequate. However, as things are, steamers are very well taken up for loading during the present week, and unscreened sorts are being absorbed fairly satisfactorily. Steam smalls, however, are in very heavy supply and very slight demand. The enquiry for gas bests and specials is good, but some of the pits are sorely embarrassed for lack of ready tonnage. Gas seconds are only in poor request. The good home trade is making the market for coking coals and smithies very active. Bunkers are largely neglected. In the coke section, best foundry sorts are scarce and firm, gas coke is in active enquiry and well taken up, but other makes are in larger supply and not quite so strong. So far as the forward market is concerned, there has been rather more stir. Contracts have been allotted to collieries in Northumberland and Yorkshire producing best steams for 120,000 tons of these coals, for delivery at Woolwich Arsenal during the next six months. No details have transpired as to prices, but these are understood to be on the Government official

scale. Several sales of patent coke, for delivery over the ensuing three months, are said to have been made to Teesside iron masters. The Stavanger Gasworks are stated to have purchased 4,000 tons of Durham gas bests, Holmside quality, for delivery from November to January inclusive. Scheduled prices are understood to have been paid. The Christiania Gasworks have contracted for 25,000 tons of Durham gas coals for delivery up to the end of the year, at scheduled figures it is understood. Some considerable time ago, the Swedish State Railways placed extensive orders for steam coals in this district. It would appear that, for certain reasons, the orders were never fulfilled, and the contracts lapsed by reason of the effluxion of time. Within the last few days, however, the railways have bargained with some of their original tenderers for supplies on the basis of scheduled prices, plus the usual 5 per cent. for merchants' profit, for named brands of Northumberland and Durham steams. The quantity arranged for has been stated at various figures, but appears to be only two or three cargoes. There is, apparently, the likelihood of purchases of other quantities being made by this department, provided that it is found possible to deliver the cargoes already contracted for. It is officially announced that, in response to representations made to the authorities, conditional licences for coal export unexecuted by September 30 will be automatically extended until October 31.

Later.—The Swedish State Railways are reported to have made purchases of considerable additional quantities of best steams and to be sending tonnage in this direction for the carriage of these cargoes. The Norwegian Marine is stated to have contracted with South Wales for the supply of from 4,000 to 6,000 tons of best steams recently enquired for.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	38/-40/
Do. Tynes (Bowers, &c.)	29/6	29/6	38/-40/
Secondary, Blyths	25/6	25/6	30/-32/6
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/-32/6
Unscreened	23/6-25/	23/6-25/	25/-35/
Small, Blyths	20/	20/	24/
Do. Tynes.....	18/6	18/6	20/22/6
Do. specials.....	20/6	20/6	25/-27/6
Other sorts:—			
Smithies.....	25/-30/6	25/-30/6	25/
Best gas coals (New Pelton or Holmside)	25/	25/	32/6-35/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	27/-27/6
Special gas coals	26/6-30/	26/6-30/	34/-35/
Unscreened bunkers, Durhams	24/-25/	24/-25/	24/-27/
Do. do. Northumbrians	24/-25/	24/-25/	21/-25/
Coking coals	24/-25/	24/-25/	22/6-25/
Do. smalls	24/-25/	24/-25/	20/-22/6
House coals	28/6-30/	28/6-30/	37/6-40/
Coke, foundry	42/6	42/6	38/-45/
Do. blast-furnace	42/6	42/6	36/-40/
Do. gas	30/-31/	30/-31/	33/-35/

Sunderland.

COAL.

The coal market has a fairly steady tone, and there is still a good demand for steam coal on requisition account. The pits are working better, but the pressure is relaxing somewhat. Best gas and special brands are steady, but second class qualities of gas are quiet. Coking and bunker coals are offered in excess of the demand. Household coals are meeting with more attention. Gas coke is in good request. Market values remain without change in any particular. The Swedish Railways have arranged for named brands of Northumberland and Durham steams at schedule prices plus usual merchant's profit. The Christiania Gasworks contract for 25,000 tons of gas coal has been placed for named brands of Durham coal at scheduled prices plus 5 per cent. for merchant's profit.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	34/
Secondary do.	23/6-25/	23/6-25/	28/
House coals:—			
Best house coals	30/	30/	40/
Ordinary do.	28/	28/	28/
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	40/
South Hetton do.	28/6-30/	28/6-30/	40/
Lambton unscreened ...	24/	24/	25/6
South Hetton do.	24/	24/	25/6
Do. treble nuts	20/	20/	26/6
Coking coals unscreened	25/	25/	25/
Do. smalls	25/	25/	24/
Smithies.....	25/	25/	25/6
Peas and nuts	24/6-26/	24/6-26/	27/6
Best bunkers.....	25/	25/	26/
Ordinary bunkers.....	24/	24/	24/9
Coke:—			
Foundry coke	42/6	42/6	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	32/6

Outward chartering does not improve, the supply of boats being quite inadequate, and business much restricted.

Middlesbrough-on-Tees.

COAL.

Very little alteration of moment is noticeable in the various branches of the fuel market. Good enquiries for coal for Scandinavia result in contracts being made from time to time, and it is understood that the Christiania Gas Works have just purchased Durham coal of the usual quality. On the whole, new business in coal is quiet, and, in fact, producers are seeking trade at minimum figures. Best Durham gas coal is 25s., and second quality 23s. 6d. Bunker coal is dull and sluggish. Unscreened Durhams are put at 24s. to 25s. Household coal is steady and firm. Coking coal continues to be fairly well taken up at rates that have ruled for some time past, and a fair amount of business is passing in coke. Values of coke are well maintained, notwithstanding the more than ample supply. Export business shows some little improvement, and home demand is good. All blastfurnace descriptions are in heavy request for local use. For shipment, both

The position here shows no real change. Signs of the unwonted pressure to obtain supplies are becoming more and more apparent so much so that new business cannot be obtained while contractors find it increasingly difficult to deal with their orders. Apart from fair shipments to France little is going abroad, neutral countries having to be content with very small quantities at higher values. It is doubtful whether South Yorkshire can be relied upon to supply Holland's requirements under the recently reported

arrangements to any extent, though Humber exporters are naturally hoping to handle some of the business. Under conditions the prompt market is very firm, Yorkshire hards are quoted 32s. to 35s. to the ton, and the steams are, however, pretty fully taken up by the railway and official account. West Yorkshire is in big demand for France. Nuts, etc., are in great demand for export. Gas and house coal are also in great demand.

Chesterfield.

COAL.

Every class of coal continues in great demand, and buyers find much difficulty in obtaining anything approaching the quantity they require. House coal orders are numerous, and buyers are pressing for supplies. Fuel for manufacturing purposes is urgently wanted, and everything possible is being done to meet consumers' requirements. Cobbles and nuts are in great request for gas-producers, and slack for boiler firing is going off fairly well. Railway companies are urgent in their demand for locomotive coal, and gas companies are in need of gas coal for current use and for stocking purposes. The export trade shows no signs of improvement, the shipment of Derbyshire coal having practically ceased. The coke trade is brisk, every quality of the fuel being in active request.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

The works of the district continue in a very busy condition, pig iron and manufactured iron being in good demand, while kindred industries are in a state of great activity.

Nottingham.

COAL.

In every branch of the coal trade in this district, there is a strong demand, and the output, which is being maintained at a fairly satisfactory level, is readily disposed of. There is a great deal of pressure on owners for delivery of domestic fuel both by local and country merchants, but it is impossible to comply fully with all requirements. According to control arrangements a good tonnage is being allocated to London and the southern counties, and supplies to local merchants are on a limited scale. Merchants are experiencing some difficulty in securing adequate labour for carting, and this in some cases is causing delay in delivery to customers. A strong tone continues in the steam fuel branch. Although pits producing this class of coal are working at full pressure, the output is not commensurate with the demand. All classes of steams are eagerly purchased by ordinary customers in view of the scarce supplies after war work needs have been attended to. Slacks are selling well, particularly better class and medium qualities. Whatever supplies of gas coal are obtainable are absorbed by contracts.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/-16/6
Best hard coals	16/9-17/6	16/9-17/6	17/-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

Lelcestershire.

COAL.

Several interesting points are being raised in regard to the powers of colliery managers to transfer orders sanctioned from one area to another. In quite a number of cases buyers are giving instructions for orders to be sent from a permitted area to London and district without having secured the sanction of the Controller. Although there does not appear to be any clear and distinct prohibition of such a course, colliery managers are acting very strictly according to the spirit of the official instructions, and are declining to recognise any transfer whatever. Orders sanctioned, say to the south-west of England for household must, unless the Coal Controller gives special sanction, be delivered in area 13 and not elsewhere. The reason is obvious. Any large transfer from the south-west of England would have the effect of creating a great shortage in that area, and merchants there would be "starved" to the advantage of London. The balance of supplies would be upset, and an unfair distribution would be established, with a larger profit. The demand for all classes of household for London and district is more intense than ever, and the daily deliveries have to be strictly maintained at the maximum. Both main and deep cobbles and nuts are in very active demand, whilst bakers' nuts and small nuts for mechanical stokers are cleared off as fast as they are available. Country merchants are in a very trying position, and have very heavy arrears of deliveries to make good. There are no reserves at country stations or at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	16/6-18/	16/6-18/	17/-19/
Second, hand picked	15/6-16/6	15/6-16/6	15/6-17/
Deep screened cobbles ...	16/-17/	16/-17/	16/6-17/6
Deep large nuts	16/-16/6	16/-16/6	16/-17/
Bakers' nuts	15/-15/6	15/-15/6	15/-16/
Small nuts	14/6-15/	14/6-15/	14/6-15/6
Deep breeze	12/9-13/6	12/9-13/6	12/9-13/6
Feas	12/-12/3	12/-12/3	12/-12/3
Do.	6/-7/	6/-7/	6/-7/
Do.	3/6-14/	13/6-14/	13/6-14/6
Do.	4/-14/6	14/-14/6	14/-15/
Do.	3/-13/6	13/-13/6	13/-14/6
Do.	3/6-14/	13/6-14/	13/6-14/6
Do.	2/6-13/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The position in the coal trade, already acute, has been aggravated this week by the strike of miners in the Walsall district. It was happily of short duration, the men returning to work on Monday, but at one period it was estimated that 10,000 men and boys were idle in Pelsall and Cannock. Large quantities of coal are still going from the Staffordshire and Warwickshire coal fields to London, and this, of course, involves the reduction of deliveries to other areas. Coal owners are also pressed to meet contract deliveries, so that there cannot be any weight of coal available for the open market. All descriptions of manufacturing fuel are wanted on a heavy scale. Best slacks are in strong demand, but there is not a big market for inferior kinds, which produce poor results, and which the workmen do not care to handle so long as better stuff is available. The public continue to be large customers for house coal, but there are now few people without some stocks. A committee has been formed by the General Purposes Committee of Birmingham City Council to control retail prices of house coal and prepare a schedule of prices.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

Activity at the iron and steel works continues on strenuous lines. Customers are finding it difficult to place new orders on a large scale owing to the extent to which output is already mortgaged, in most branches until the end of the year. With a complete system of control in operation there is not much scope for new developments, and attention is concentrated on meeting national requirements. For a long time manufacturers in the district have ministered to the needs of the Navy and mercantile marine in a subsidiary capacity, but it looks as if the inland city of Birmingham were likely to become a shipbuilding centre. Complete parts of ships are being constructed in the city to standard designs, and are sent to the coast to be assembled. There are hopes that the movement will be taken up by other firms. The bar mills are heavily engaged ahead, and there is practically no material for export. The basis price for marked bars remains at £15 10s., less 2½ per cent., and for unmarked £13 15s., net, but there are many extras and a great variety of lengths for which more money has to be paid. The merchants have numerous applications for material, but orders have to be turned down owing to lack of surplus supplies. This is also the position in small rounds, squares, and flats, for which the demand is large and insistent, and export trade has been greatly curtailed. The basis price for three-eighths sizes is £16 10s. to £16 15s. The demand for puddled iron still outruns supplies, and manufacturers to which it ministers are affected accordingly. Forge and foundry pig, too, is causing some anxiety, owing to the encroachments of basic iron. Representatives of leading pig iron establishments say they are unable to entertain enquiries relating to thousands of tons. The only change in the sheet trade is that net prices are now quoted at £18 10s., instead of £19 10s., less 4 per cent. The change is in favour of the buyer. Supplies of semi-steel remain under rigid control.

Forest of Dean.

COAL.

The house coal trade of this coal field continues to be very brisk, the demand—as has been the case for many months past—being considerably in excess of production. The shortage of supplies is very pronounced, and merchants are pressing for deliveries of orders placed a few weeks since. A firm tone prevails for inland requirements, whilst long stems are ruling in the shipping department. The enquiry for all grades of steam qualities is exceptionally strong, all the collieries having a long list of accumulated orders.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	13/6	13/6	13/
Steam coal —			
Large ..	20/-21/	20/-21/	18/-19/
Small ...	16/	16/-16/6	16/

Prices 2s. extra f.o.b. Lydney or Sharpness.

The Cockerill Works.—*Les Nouvelles*, of Maastricht, states that the Germans are completely destroying the Cockerill Iron Works at Seraing-sur-Meuse. The iron girders have been removed, and all the blast furnaces are being blown up.

Coal Prices in Paris.—The price of household coal for ticket-holders in Paris has been fixed at 5½ fr. the sack of 50 kilogs., and 6½ fr. for anthracite, delivery included. Each ticket entitles the holder to 30 kilogs. per month. A reduction of 45c. per 50 kilogs. is made to those who fetch their coal from the yard or wharf, the cost of cartage being 9 fr. per ton.

THE WELSH COAL AND IRON TRADES.

THURSDAY, SEPTEMBER 27.

Monmouthshire, South Wales, &c.

Newport.

COAL.

There has been very little change in the market here since the last report. The arrival of tonnage has been slightly greater than during the previous few weeks, but not sufficient to reduce stocks materially, especially of small coal, which has become quite a drug in the market, and could be sold at much lower prices to clear. All the best descriptions of large coal are under Government control. There has been a great demand for house coal and gas coal, both of which descriptions might easily have made enhanced prices. The scarcity of wagons has again caused intermittent working at collieries. It is satisfactory to know, however, that the stoppage (which ran unfortunately to three months) of the Elled coal miners in the eastern valleys of Monmouthshire has now terminated and work was resumed this week.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	30/	30/	41/-45/
Western-valleys, ordin'y	29/	29/	44/-45/
Best Eastern-valleys ...	29/	29/	42/-43/
Secondary do.	28/	28/	38/-42/
Best small coals	21/6	21/6	28/-30/
Secondary do.	20/	20/	26/-28/
Inferior do.	18/	18/	20/-23/
Screenings	23/	23/	28/-29/
Through coals	27/	27/	27/-29/
Best washed nuts.....	30/	30/	30/-32/
Other sorts:—			
Best house coal, at pit...	33/	33/	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/
Patent fuel	32/6	32/6	40/-43/6
Furnace coke.....	47/6	47/6	50/-55/
Foundry coke	47/6	47/6	60/-65/

IRON.

There is still a very large output from the iron and steel works of the district, but little outside business is being done. New works or new departments are from time to time being brought into commission and these are all employed to their fullest capacity. The tin-plate trade, being entirely controlled, is now in a quite different position from that which it formerly occupied. There are a fair number of orders, but some difficulty is found in procuring raw material. Pitwood prices have advanced and are up to as high as 65s.

Cardiff.

COAL.

There has been no improvement in the position since last week. Tonnage continues to arrive in fairly moderate quantities, but nothing like sufficient to meet requirements of shippers, and business is almost entirely confined to official orders from the authorities. There is a great scarcity of wagons, and with excessive stocks standing in the sidings, it has been impossible to liberate trucks in such quantities as would enable work to proceed regularly at the collieries. Stoppages have been reported daily, more particularly at the smaller pits, but the difficulty extended to some of the larger concerns, and on one day at the end of last week no fewer than 2,000 men were out owing to lack of empties. The natural and the only inference to be drawn is that the present condition of the coal trade is absolutely dependent on the tonnage position, and this unfortunately is unsatisfactory with little immediate prospect of improvement. Since last week unofficial information has been received to the effect that the Coal Controller has agreed to modify the prices of small coals, and the classification list, which has been submitted to the Coalowners' Committee for approval, divides the collieries into eight classes. The minimum price of 18s. is unaltered, but the classification advances by increases of 6d. until a maximum of 21s. 6d. is reached instead of 23s. This is practically the scale recommended by the Coalowners' Committee, for in their original classification list not a single colliery was placed in the first category commanding 23s. per ton. It was anticipated that there would be some faultfinding and some difficulty in working the new schedule, but in actual practice it has been found generally acceptable, and will probably be approved without further alteration. Attention was called last week to the confusion arising out of the Re-organisation of Transport Order. This has become even more complicated, for a new regulation issued a few days ago provides that coal from South Wales for inland consumption in No. 13 area—i.e., the south-western counties—shall not exceed 20s. per ton at the pithead. This, of course, is much lower than the prices prevailing locally, and colliery owners maintain that they cannot supply at these figures except at a considerable loss. The coals required for the south-western counties will be taken chiefly from Monmouthshire, and the amount unofficially is given as 66,000 tons. By previous orders it has been conceded that colliery owners were entitled to 4s. per ton in excess of pre-war rates, and an additional 2s. 6d. per ton has since been allowed, making 6s. 6d. per ton on the pre-war standard. The new Order prescribing a maximum of 20s. per ton is a contradiction in terms of the previous Orders, for the 6s. 6d. thus provided for has been negated, and it is contended on the part of some salesmen that the Coal Controller has exceeded his powers. It should be pointed out, however, that the Controller, by the original Order, has power to vary the prices from time to time, and the official solicitors to the Coalowners' Association, whose advice was sought on the question, has expressed a decided opinion that the Coal Controller has absolute power to fix any rates that he deems advisable. For many years it has been an anomaly of the trade that Cardiff house coals could be purchased at St. Ives, for instance, at a lower rate than in Cardiff itself, and the same state of things is apparently going to continue. Business generally is quiet, and all transactions are on the basis of the fixed schedule of prices, subject to any amendments that may be made when the classification list is published. Coke and patent fuel are plentiful at scheduled rates. In pitwood, there is a shortage of foreign timber, and prices have advanced, notwithstanding the scarcity of wagons. Current rates are from 65s. to 67s. 6d. per ton.

Prices f.o.b. Cardiff (except where otherwise stated).

THE IRISH COAL TRADE.

THURSDAY, SEPTEMBER 27.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	42/6-43/6
Ordinary	30/	30/	40/-42/
Best bunker smalls	23/	23/	30/-31/
Best ordinaries.....	21/6	21/6	28/-29/6
Cargo qualities.....	20/	20/	21/-25/
Inferior smalls	18/	18/	20/-24/
Best dry coals	30/	30/	40/-42/6
Ordinary drys	28/6	28/6	38/-40/
Best washed nuts	30/	30/	36/-38/
Seconds	28/6	28/6	34/-36/
Best washed peas.....	27/6	27/6	33/-35/
Seconds	26/6	26/6	31/-33/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	42/6-43/
Western-valleys	29/	29/	42/-43/
Eastern-valleys	29/	29/	38/-40/
Inferior do.	28/	28/	37/-38/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	40/-42/6
Through-and-through	—	—	33/-34/
Small	26/	26/	30/-33/
No. 2 Rhondda—			
Large	27/	27/	35/-36/
Through-and-through	25/	25/	28/-30/
Small	20/	20/	24/-25/
Best patent fuel	30/	30/	43/-44/
Seconds	30/	30/	40/-42/
Special foundry coke	47/6	47/6	62/6-65/
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	50/-52/6
Pitwood (ex-ship)	65/-67/6	59/-61/	44/-46/

* Nominal.

IRON.

All departments of the iron and steel trade continue to be exceptionally busy, and outputs are maintained at their maximum. Ordinary commercial business has to give way to war requirements, and very little is being done outside official or certificated orders. Shipments of tin-plates last week were heavier than for some time past, amounting to 20,962 boxes, whilst receipts from works were 14,325 boxes, leaving 64,669 boxes in stock in the docks warehouses and vans, compared with 71,306 boxes in the preceding week and 103,235 boxes in the corresponding week of last year. Prices are on the basis of 30s. per box for standard sizes, with other grades in proportion. There is a strong demand, and many makers report that they have sufficient orders in hand to last them several months, so that they are not over anxious to entertain further commitments. In the galvanised sheet trade there is little change, and mostly the work in hand is on account of the British and Allied Governments. All prices are nominal. Spelter is steady at £54 per ton. Welsh pig iron, the output of which is increasing, remains nominal, and the same applies to steel bars and scrap metals. Iron ore supplies continue satisfactory.

Swansea.

COAL.

There was a good attendance on 'Change this morning, but very little business was transacted, as the coals most in demand are unobtainable. Anthracite large in first and second qualities is very firm and in good request. Culm and duff are inclined to be easier, with little enquiry. Machine-made sizes continue very scarce. Steams and bunkers were in fairly good request.

Llanelli.

COAL.

There is not much change to report as to the conditions ruling on the local market. The shortage of tonnage is still interfering with the free working of business, and occasional idle days are being experienced at some of the collieries. Large anthracite qualities are very active and "free" parcels scarce. Nuts and beans are also very strong and inland buyers in particular are complaining of long delays in execution of orders. Cobbles are firmer and peas also are a slightly better market. Culm and duff are both still slow. Large steams are fairly active but throughs and smalls are unchanged and stocks on the heavy side.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/6
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-41/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best).....	35/	35/	30/-31/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm	13/	13/	14/6-15/
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	26/-29/
Smalls	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

Dublin.

Demand is keeping good upon the whole, and the import trade has shown a considerable improvement for the past week or two. Prices are all unchanged at late rates, viz.:— Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s., all less 1s. per ton discount for cash; Scotch steam coal, 41s.; Welsh steam, 48s.; coke, 45s. per ton. Irish coals at Castlecomer collieries, co. Kilkenny, are:—Best small coal, 28s. 4d. per ton; best large coal, 26s. 8d.; second quality coal, 25s.; bottom coal, 23s. 4d., all at the pithead. At a recent meeting of the Castlecomer District Council and Board of Guardians, dissatisfaction was expressed that the Government had decided against constructing a line of railway to the Castlecomer collieries on the ground that steel rails were not available, and urging the Chief Secretary to have the work proceeded with at once. A conference was held on Friday last at the Mansion House, Dublin, relative to the fixing of prices for coal in the city, in conjunction with the Controller of Coal Mines. The meeting had under consideration the fixing of an addition to the price per ton to cover expenses between the time of discharge in Dublin and delivery to the consumer, such as cartage, loss in filling, weighing, and office charges. It is possible that the figure thus arrived at will be something like 8s. per ton, to be added to the cost of coal f.o.b. freight and profit. The total quantity of coal discharged upon the quays last week from English, Scotch, and Welsh ports amounted to 33,000 tons. The quantity of coal imported into Dublin last year was 1,146,916 tons, as compared with 1,236,990 tons in 1915.

Belfast.

Business is much the same as last reported, and there is no change so far in prices of any of the qualities. Current quotations are:—Best Arley house coal, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Scotch steam coal about 29s. per ton, best qualities up to 35s. and 37s. 6d. per ton. Gas coke ranges from 37s. 6d. to 40s. per ton, foundry coke from 60s. to 65s. per ton. From September 2 to 15 the total number of coal-laden vessels arriving in the harbour was 138. On Saturday, the Lord Mayor of Belfast, accompanied by the members of the General Purposes Committee of the Corporation, met representatives of the Coal Controller and of the principal coal merchants of the city. A schedule will shortly be published, when it is expected matters will be satisfactorily settled from the consumers' point of view.

COASTWISE SHIPMENTS IN AUGUST.

According to the returns issued by the Commissioners of H.M. Customs and Excise the following quantities of coal were shipped coastwise from the United Kingdom during August:—

From	Total cargo.		Total bunker.	
	1916.	1917.	1916.	1917.
	Tons.	Tons.	Tons.	Tons.
Bristol Channel ports	126,267	86,210	8,472	6,690
North-western ports	315,034	165,754	46,012	38,508
North-eastern ports	524,572	489,794	31,212	16,117
Humber ports.....	72,279	28,730	7,327	2,846
Other ports on east coast	1,581	7,882	5,386	2,795
Other English ports	5,911	4,524	1,891	2,232
Total from England and Wales	1,045,644	782,894	100,300	69,188
Ports on east coast of Scotland	46,507	46,670	7,376	6,732
Ports on west coast of Scotland.....	159,898	217,766	17,303	23,003
Total from Scotland	206,405	264,436	24,679	29,735
Irish ports	—	—	1,224	1,767
Total from United Kingdom	1,252,049	1,047,330	126,203	100,690

The destination of cargo shipments was as follows:—

To ports in	August 1916. August 1917.	
	Tons.	Tons.
England and Wales	701,679	618,185
Scotland	52,105	30,367
Ireland	498,265	398,778

THE BY-PRODUCTS TRADE.

Tar Products.—The feature of the market during the week has again been provided by the strength of solvent naphtha, which has been quoted at 2s. 7d. per gal. It is suggested that the demand is the outcome of efforts being made to utilise the product for motor spirit. Naphthalenes remain a good market, refined sorts making £32 10s. per ton, and crudes ranging from £5 to £13 10s., the lower qualities especially being difficult to obtain. The position in pitch has undergone no change, and Continental orders are still being filled at about 48s. per ton f.o.b. London. Shipping facilities here remain fairly good, although insufficient to meet all immediate requirements. The provinces, of course, are still unable to get into the export market on account of lack of shipping and transport facilities, and as the season of heavy production is almost at hand, stocks are accumulating rapidly; for in view of the London position, provincial holders are not willing to accept local offers. Other products remain practically unchanged. Average quotations are as follow:— Coal tar, 24s. 6d. to 28s. Pitch, east coast, 17s. to 18s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 18s. 6d.; Clyde, 19s. to 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 4½d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 2s. 3d. to 2s. 6d. Heavy naphtha, north, 1s. 5d. to 1s. 7d. Heavy oils, in bulk, north, 3¾d. to 4½d. Carboic acid, 60 per cent., east and west coasts, 3s. 6d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 4½d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The trade is well supplied with orders from the home agriculturalist, but in view of the advance in the official price next month, is not specially

anxious to hurry deliveries. There is a tightening up on licences for export, and the output of the country this month will probably be 3,500 tons. It has been suggested that the output will be insufficient to meet the demands of the season, but one can find no evidence for this.

SOUTH WALES MINING TIMBER TRADE.

Foreign Imports Poor.

The imports of foreign mining timber have been very poor during the past few days, and market quotations have consequently shown a much firmer tendency. Best French fir ruled at 65s. ex ship Cardiff at the opening of the week, but towards the close 67s. 6d. was reported as done in one instance. Foreign pitwood is now being assembled in comparatively small vessels; in fact, more sailing vessels are being utilised. For the week ending September 21, the total quantity of mining timber imported amounted to 11,932 loads, of which 4,760 loads were received by the agents supplying the Admiralty collieries. The whole of the wood was received from the French ports, no supplies coming from Portugal. The following is the actual quantity received:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Sept. 15	Lysberg Limited	600
" 15	Lysberg Limited	1,800
" 17	Morgan and Cadogan	144
" 17	Morgan and Cadogan	144
" 17	Morgan and Cadogan	160
" 18	W. H. Williams and Company	225
" 19	Mathew Thompson	96
" 19	Grant Hayward and Company	312
" 19	Grant Hayward and Company	162
" 20	Vivian Kelly and Company ...	132
" 20	Vivian Kelly and Company ...	132
" 20	Budd and Company	150
" 20	E. Marcesche and Company ...	144
" 20	Morgan and Cadogan	108
" 20	Morgan and Cadogan	60
" 20	Budd and Company	144

Total..... 4,513

Newport:—

Sept. 21	Mathew Thompson	243
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Swansea:—

Sept. 15	Lysberg Limited	2,360
" 19	Not named.....	250
" 20	Not named.....	4,149
" 21	Not named.....	417

Total..... 7,176

Home-Grown Timber Supplies Increasing.

It is a noteworthy fact that neither the recognised importers nor the Admiralty agents took the full quantity allowed to be imported through the Controller's scheme

during the past month. This is due to the indifference of some importers who are making little profit on pitwood at the present time, the difficulty in securing tonnage, and also to the larger amount of home-grown timber available. This month it is very improbable that the 50,000 tons allowed by the Controller to be imported will be fully taken up. The deficiency has been met by the greater exploitation of home-grown timber. Much larger deliveries of home-grown wood have been made to the collieries, notwithstanding the disabilities under which the trade has laboured, for shortage of hauliers and the bad weather has prevented the trade from growing to the extent desired. Next month the quantity of timber allowed to be imported amounts to 40,000 tons, of which 25,000 tons will be given to the Admiralty agents, and 15,000 tons to the recognised importers. The figure of 40,000 tons per month will obtain for each month onwards. This will leave about 700,000 tons per annum, or over 58,000 tons per month to be supplied by the home trade, if collieries are to be fully employed in Monmouthshire and South Wales. The question then arises as to whether it is possible to supply this large amount from our woodland areas, and how long the large monthly deliveries will be maintained before it becomes imperative to increase foreign supplies. Imports of Irish and Cornish timber continue on a good scale. In the district the great complaint is the bad state of the roads, which were never designed for heavy traffic. The lack of haulage facilities is still acute, and in Weston-super-Mare logs have been lying idle for some time, whilst in other districts it is noticeable that they are covered with fungus and overgrowth.

THE TIN-PLATE TRADE.

Liverpool.

There is nothing new to report. Works are slow of orders, and it is becoming difficult to procure tin for delivery this side of Christmas. The price is, on the whole, well maintained, comparative light weight specifications only being reported. Work, which have been accumulating to some extent, have all been sold at some allowance where holders wished to clear out their stocks.

MINERS' WAGES.

[FROM OUR MINING CORRESPONDENT.]

The conference of the Miners' Federation of Great Britain, which was held at the Central Hall, Westminster, on September 17th, under the presidency of Mr. Robt. Williams, has unanimously decided to reject the Coal Controller's offer of an additional war wage of 1s. 3d. a day to all workers of 18 years of age and upwards, and instructed the executive to re-open the negotiations on the basis of an advance of 1s. 8d. per day. The men had originally asked for an advance of 25 per cent. on the present wage, and the proposal for the payment of a flat rate increase to all the workmen alike introduces a new method into the industry. The principle was, however, approved by a vote of 126 to 16. The executive were instructed to meet the Coal Controller and press the demand for an advance of 1s. 8d. per day to men and 10d. per day to boys.

As a result of further negotiations between the Coal Controller and the executive, a further offer was made to give a war wage advance of 1s. 6d. per day to all men and youths of 16 years of age and upwards, and of 9d. per day to youths under 16, thus reducing the difference between the parties to 2d. and 1d. respectively.

The revised offer was considered by an adjourned meeting of the men's representatives last evening, and was unanimously accepted. Under the agreement, all the persons working in and about the mines of 16 years of age and upwards (other than mechanics, who have received the advances given to their trades) will receive an additional 1s. 6d. per day, and boys under 16 an additional 9d. per day.

Mobilisation of the Mining Industry.

During the conference it was stated the Coal Controller had suggested the desirability of some method of temporarily transferring coal miners from districts where short time was being worked to districts where more miners are needed; and it was decided to issue the Coal Controller's letter containing his suggestions for the better mobilisation of labour in the mining industry to all the districts, in order to ascertain the opinion of the whole coal field covered by the Federation.

Miners and Income Tax.

The president also reported the committee's interview with the Chancellor of the Exchequer regarding the miners' request for the exemption limit of income tax being again raised to £160. The following resolution was passed: "That having heard the statement of the Chancellor of the Exchequer that he could hold out no hope of the exemption limit of income tax being again raised to £160, we express our deep dissatisfaction with the reply, and we agree to continue the agitation until the amount of exemption before income tax can be claimed is again raised to £160." It was also decided that the districts should send to Mr. T. Ashton (secretary) a statement of the deductions from wages for income tax purposes allowed by the income tax surveyor in each district.

National Council of Trades Unions.

The National Council of all trades unions dealing with colliery enginemens, stokers, underground firemen, craftsmen, and general surface workers met in London yesterday, and unanimously decided that the offer of the Coal Controller was inadequate. A deputation from the council interviewed Sir Richard Redmayne, and arrangements were made for the full body to meet the Coal Controller to-day (Friday), to press for 1s. 9d. and 10½d. per day, and that the 1s. 9d. should apply to all persons over the age of 16.

WIGAN AND DISTRICT MINING AND TECHNICAL COLLEGE.

The governing body of the Wigan and District Mining and Technical College at their meeting last week awarded the following day mining scholarships:—

The "Peace Memorial" (Trustees) Scholarship (£35 per annum for two years, supplemented by Mr. Alfred Hewlett, J.P., to £52 per annum) to James H. Armitstead, of 86, Lord-street, Hindley, Wigan.

The "Peace Memorial" (Alfred Hewlett) Scholarship £52 per annum for three years, provided by Mr. Alfred Hewlett, J.P.) to Lewis S. Buxton, of 8, Springfield-street, Wigan.

The "Richard Christopher" Scholarship (£50 per annum for three years, provided by Mr. Richard Christopher, of Holly Cottage, Haigh, Wigan) to Frederick G. Atherton, of Hall-lane, Hindley, Wigan, and of the Hindley and Abram Grammar School.

The "George Bradshaw" Scholarship (£50 per annum for three years, provided by Mr. George Bradshaw, of 65, Cross-street, Manchester) to Jack Hewitt, of Brownlow-road, Horwich, Bolton, and of the Bolton Grammar School.

The "Osbeck" Scholarships (£10 10s. per annum to Part-Time Day Mining Classes) to John Rutter, of 2, School-close, Aspull, Wigan, and to James Worswick, of 54, Downall Green-road, Bryn, Wigan.

The "Knowles" Gold Medal to Harry Ashurst, of 321, Billinge-road, Peurberton, a student at the Part-Time Day Mining Classes from 1912.

The "Percy Memorial" Medal to Howard H. Winstanley, of Tanpit Cottages, Winstanley, Wigan, (Evening Engineering Course from 1912.)

The "Governors'" Medals to Frank H. Liptrot, of Parliament House, Upholland (Evening Mining Course from 1910); and Norman Smith, of 129, Heath-road, Ashton-in-Makerfield, Wigan (Evening Electrical Course from 1913).

The total enrolment of students reported for the new session of the College, which has just commenced, was 1,002 at the corresponding time in 1916, and 959 for the last session.

The College for the financial year 1916-17 shows an income on general and special funds of £7,430, thus exceeding expenditure of £620.

BOOK NOTICES.

Briquetting: Coals, Brown Coals, and Other Fuels. A Handbook by Prof. G. FRANKE. Translated by F. C. A. H. LANTSBERY, M.Sc. 630 pp. 8½ in. x 5½ in.; with 255 illustrations, numerous plates, and diagrams. London: Charles Griffin and Company Limited. Price, 30s. net.

We have before us a book which calls for the attention of all concerned with the coal industry, whether it be colliery owner, engineer, manager, or student. The author has divided the subject into numerous sections, headings, and sub-headings, which could doubtless have been improved somewhat, as, owing to their number, they are apt to be confusing, and there is repetition of the subject matter to some extent. Tracing back the origin of briquettes, the author mentions that the word is derived from the French, and was first applied in France to hand-made blocks of peat mixed with loam and water which were used for household purposes; and in parts of Germany, Austria, Belgium, China, and the United States coal dust was mixed with clay and loam, rammed by hand into moulds and dried in the air or chimney flue; in Germany lignite was also similarly treated, and sometimes without addition.

The briquetting of coal as a manufacturing industry, however, the book tells us, was not commenced until about the year 1860, whilst briquettes of lignite were not manufactured until 10 years later. The writer, in making this statement, presumably refers to Germany, because later he states that the first factory was established in France (by Marsais, at Bérard, near St. Etienne) in 1842; whilst the first factory in England was at Newcastle in 1846. It is to be observed that the industry has extended most rapidly during the last 15 years, the output in Germany now exceeding the production of any other country.

The chief markets for coal briquettes in Germany are the railways and steamships, the former utilising 50 per cent., whilst there is only a very small demand for household use; lignite, however, is principally briquetted for household requirements and industrial purposes, and as such briquettes will not withstand much handling, they must be used locally, and therefore they have only a small demand for the use of railways and steamships. The application of steam for heating the mixture of coal and pitch, it is of interest to note, was first introduced in England in 1848, and that practice has been maintained until the present time, and become almost general. A reference to the output of different countries is also of interest. In 1885, France produced 1,300,000 tons; England and Belgium, each 1,000,000 tons; Italy and Spain, 150,000 tons each; Germany, 140,000 tons; and the United States, 130,000 tons. In 1907, the production in Germany had increased to over 4,000,000 tons, or more than double the combined output of France, Belgium, and England. Of this total output, the Dortmund district was responsible for about 75 per cent. Under the heading of "Properties and Applications," the author refers to the essential features of briquettes as follow: Shape, size, and weight adapted to transport, storage, and particular use; strength (cohesion) equal to good class coal; loss by attrition and crumbling with ordinary handling and during usual transport not less than 5 per cent.; must not absorb moisture or disintegrate by long immersion in water; mean specific gravity (density) must not be below 1.19; ash content not to exceed 10 per cent.; moisture not exceeding 5 per cent.; and calorific value should equal that of good class coal. To which we would add: must ignite easily and burn freely without falling to pieces. Briquettes can be manufactured to produce less smoke when burning than the natural coal, also to burn without clinkering or excessive caking, and more regularly on account of the even size; further, both breakage and liability to spontaneous ignition should be less. The effect of size and shape is dealt with fully, as well as the cohesive properties and tests for ascertaining these. A large size is advantageous for storage, but small briquettes are preferable from the point of view of combustion, although they are liable to deteriorate by exposure. The cohesion of briquettes is naturally an important feature of their manufacture, and depends on the grinding, mixing, heating and pressing. Excess of pitch, however, it should be mentioned, results in excessive smoke and odour from the briquette when burning. The question of the ash content is also of consequence, and the writer mentions that in Germany, if the coal contains over 12 per cent., it is washed. Washing, of course, adds to the cost of manufacture, to the extent of about 2½d. to 3½d. per ton. Washed coals have not been adopted for briquetting in the United Kingdom, except in a few instances, but the advantage of washing is now receiving greater attention. Washing processes are referred to in the book, and it is to be remembered that washing necessitates not only draining, but a system of drying if the retained moisture is high—the limit being given as 10 per cent. Some authorities consider that the coal should be dried to the extent of 3 per cent. content, others go further and advise 1 per cent. Several types of drying machine—vertical and horizontal—are obtainable, some being automatic, whilst others require power for their operation. Further, some types allow of mixing at the same time as drying. With a drying process, which also provides preliminary heating before the coal or mixture passes into the pug mill or heater, the percentage of pitch binder can generally be reduced, and if the coal is dried improved cohesion of the briquette often results. Cleaning or removing the impurities from the coal by a dry air blast has been tried, and, we believe, adopted to a small extent in America, but it has not proved generally successful. Such a process, of course, avoids the expense of drying attendant on the washing process.

Coming to the question of binding material, which has perhaps attracted greater attention than any other feature, and has resulted in numerous investi-

gations and patents, pitch still remains almost universal, a coal-tar pitch of medium or hard quality being preferable, and in the proportion of 6½ to 9 per cent., depending upon the condition of the coal. Pitch improves the combustion, and does not increase the ash by more than about ¼ to ½ per cent., whilst it protects the briquettes from weather influences by providing a surface coating or skin. It is here noted that England was Germany's source of pitch until 1903, when the development of the by-product coke oven in Germany provided a supply. Although coal-tar pitch is most generally used, water-gas pitch has been found to have some advantages, we believe, on account of its lower content of free carbon, which has no binding property; but, on the other hand, coal-tar pitch possesses more heavy distillate. So-called "sulphite pitch," which has been used in Germany, is obtained from the waste liquors of paper pulp manufacture by the sulphite process, and is claimed to produce a high temperature when burning, without odour or smoke; also it does not soften, but it is soluble in water, although not hygroscopic. Amongst other binding materials which have been experimented with are starch, maize, molasses, soda, clay, lime, cement, and mixtures of two substances: such as a cereal with tar, etc.

The author next proceeds to the process of briquetting, the several stages being described—including crushing, mixing, heating, and pressing; and several of the types of machines obtainable for each part of the process are also described and illustrated. The most used form of grinding machine is the (bar) disintegrator, which serves to mix as well as grind. Very fine grinding, we believe, is not generally considered essential for satisfactory briquetting; in fact, it necessitates the use of a greater percentage of pitch, as well as greater compression to ensure proper cohesion, whilst the briquette does not burn so satisfactorily. Some makers consider ⅜ in. grains suitable, whilst others prefer ¼ in. There appears to be a difference of opinion as to whether it is preferable to heat the pitch to such an extent that it becomes liquid, or to apply only sufficient heat to enable it to combine with the coal. In the latter case, the briquette leaves the press at a lower temperature, and is therefore harder, the pitch being more permanently set, and usually less pitch suffices; insufficient heating, however, may result in lack of cohesion. Much depends on the quality of the coal and pitch and the condition of the former, as well as on the mixture and pressure applied. About 175 degs. Fahr. is an average temperature for the mixture when leaving the heater. Opinions also differ on the question of preliminary heating of the mixture before it reaches the pug mill. If the heat is applied to the pug mill by direct steam, this should be highly superheated—otherwise the moisture added to the mixture becomes excessive. Indirect heating by steam jacket is preferable, but unless the mixture has already attained a fair temperature by preliminary heating, or through a drying process, the amount of steam required is considerable.

Mention is made of the great influence the plan of the factory and the automatic arrangements have on the financial success of briquetting. This is certainly of the very greatest consequence, and we should like to have seen more space devoted to the various features to be studied. Automatic and continuity of working of the several stages without any "weak link in the chain" is essential. Conveyor and elevator equipments and storage arrangements for both the coal and binder are also briefly referred to. As regards crushing, it is noted that much of the Westphalian coal does not require to be crushed, being already sufficiently fine, or so soft as to become so in the course of handling. The actual pressing and the different types of press are next fully described. Single compression, that is, pressure from one side of the mould only, the writer points out, is apt to result in unequal density, and therefore weakness of the finished briquette, and he considers the double-pressure machine essential to obtain uniform density. The shape of the mould, however, has a considerable effect on this, and investigations have indicated that no less than 70 per cent. of the pressure applied is expended on surface friction between the coal substance and the sides of the mould. The pressure to be applied is an important consideration, and depends on the mixture, moisture, and temperature, some authorities considering about 1,420 lb. and 2,130 lb. per square inch the minimum for soft and hard coals respectively, whilst others specify double that pressure as the minimum; and for small ovoid or ball-shape briquettes a pressure of about 710 lb. per square inch is considered sufficient. It may be added that, in this country, at all events, two to three tons per square inch is the most usual pressure, although the practice varies; for example, with some machines the pressure does not exceed 15 cwt. Stratification is a defect of briquetting, attributed to excess of moisture, without provision for its escape when pressing, so that, instead of the briquette being a dense block, the material is in layers, and weakness results. This defect can be partially overcome, however, by additional pitch in the mixture. The author includes amongst the essential features of a satisfactory briquetting press: Mechanical and uniform filling of the moulds; equal two-sided (double) and high compression; mechanical discharge of the finished briquette from the mould without damage; also that the press should be simple in design, but possess great strength, and operate with a minimum of shock and vibration. Some makers claim that single compression is sufficient for small blocks; and reverting to high compression, at least one claim against it is that it reduces the material to dust, and is therefore disadvantageous.

The types of briquetting press may broadly be divided into the following classes: Single compression (one-sided), double compression (two-sided), tangential, and roller presses, the former producing blocks of different sizes and the last-named small briquettes of ovoid or ball shape. The writer mentions that the block-shaped briquette is favoured in Europe, but that

the small eggette or ball-shape has met with greater attention in the United States. We believe we are correct in stating that the double-compression system was first introduced in England.

The next section deals with loading, storage, power, and the equipment and management of factories. The writer states the high cost of hand-stacking of block-shaped briquettes makes storage at the factory undesirable, but this objection does not apply to ovoid or the small-shaped briquettes, which can be handled in a similar manner to raw coal. The equipment of several German factories is described and illustrated, and the working process is explained diagrammatically. As regards the costs and economies of coal briquetting, certainly very important considerations affecting the industry, and on which commercial success or otherwise must depend, the author includes estimates relating to a typical plant and also to particular factories, and comments thereon. Further, the great effect the cost and proportion of pitch used have on the total costs is indicated in tabular form, and mention is made of directions in which economies can be effected. We would add that the commercial success of briquetting is dependent on the combined efforts of the engineer and chemist, with the support of the management, due consideration being given, of course, to the location of the factory in relation to supplies of materials and markets for the production, as well as facilities for transport.

The author next reverts to statistics of production—briefly referred to in the earlier stages of the book—and some interesting and instructive data are given relative to the coal, coke, and briquette production in various districts of Germany, as well as the output of several of the principal coal mining companies; in addition, the markets for German briquette production over a period of years are stated. This is a lengthy section of the book, and includes also statistics concerning other briquette-producing countries. For example, in the case of the United Kingdom, figures are given for the years 1905 and 1906, it being noted that the markets for the British production extend almost throughout the world, and that the output is almost entirely exported. The information concerning the United States includes the names of various companies owing coal briquetting factories.

The second part of the book relates almost entirely to the briquetting of brown coal, which, though of greatest importance in Germany and certain other European countries, does not particularly concern the United Kingdom, although some of the British overseas possessions, including Australia and Canada, have large deposits of such coal. The constitution and properties of German brown coal are referred to rather fully, the methods of mining such coal are described in detail, and are of considerable interest, brown coal being mostly mined from the surface by stripping the overburden, and on that account is more comparable with quarrying. Then follows information concerning the preparation of such coal for the process of briquetting, which is to some extent different from that of briquetting black or pit coal. This certainly affords instructive reading, including, as it does, particulars of the several types of machines used and the transporting arrangements. Also the drying process is extensively dealt with, because brown (lignitic) coals have a very high moisture content—in Germany, 40 to 60 per cent. The percentage of bituminous matter such coals contain enables briquetting to be effected without additional binding material, provided a high pressure is applied (17,067 lb. to 21,334 lb. per square inch). To briquette lignite without a binder, it is generally considered it should have a moisture content of about 40 per cent., which is reduced to about 15 per cent. in the course of the process, the temperature to which the material is raised being about 150 degs. Fahr.

The press almost entirely used for briquetting brown coals is of the single (one-sided) and high compression type, and is known as the rope press, because the compressed substance is discharged from a channel, not in completed sections, but in the form of a long flat rectangular shaped rope, about 3 ft. in length, which is cut later into lengths of 6 in. to 8 in. This size of brown coal briquette is mostly used for household purposes, but smaller sizes are made for industrial requirements, the same type of press still being used, but with a modified form of mould.

The author then proceeds to the question of the dangers of fire and explosion attending coal dust laden atmospheres, a question which also really applies somewhat to the first part of the book, although the trouble is probably more acute in brown coal briquetting. It is mentioned that fine dust is produced during the operation of drying and conveying the coal, and that this dust, which is really over-dried, is very liable to ignition and explosion, and has resulted in disaster to factories in several instances. Special precautionary measures have therefore been devised, and rules issued to prevent or reduce the liability. Not only are these precautions of a structural nature, but devices (which are fully described) have been introduced to catch, exhaust, and extract the dust. Then follows a chapter dealing with the method of handling, loading, and storing the briquettes after leaving the press. An important section concerns power and steam economies, which it is to be noted form considerable items in the cost of briquetting, more especially perhaps with brown coal, on account of the necessary drying process. Tables and diagrams relating to steam consumption and power circuits are also given in the book, together with descriptions and arrangements of working of several factories; reference to economies in briquetting as applied to brown coal; statistics relating to such briquettes and their application; whilst an appendix refers to mixed briquettes produced from a combination of brown and pit coal, brown coal and coke, as well as to the briquetting of peat and waste wood. Finally, a supplementary note is added to the effect that, since the German edition of the book was written a practical stage has been reached by an improved process, in which compression is gradually applied, by

means of an hydraulic press, until the final pressure on the briquette amounts to about 11,220 lb. The object of this process is to render a binding material unnecessary, or nearly so. It may be mentioned that many investigators have been at work on a process having that object, and the reviewer understands that the difficulty has been in connection with the cohesion and lack of strength. To utilise exclusively the binding properties of the coal itself, a highly bituminous coal is, of course, essential; the process is that of very fine grinding and gradual increase of temperature, which latter is very difficult to attain without loss of the volatile properties of the coal. Further, the cost of the process is high, and may be said to have not as yet reached a commercial stage. The author attributes the process he mentions to Rónay, but there are British patents somewhat similar. One which the reviewer has in mind provides for compression in stages, allowance being made for expansion; little or no binder is proposed, and the compression is applied in the cold state; the compressed moisture and air being allowed to escape, thus preventing cracks in the briquette and disintegration. Extreme fineness of grinding is essential for such a process.

The author has amassed a vast amount of information relating to the coal briquetting industry in Germany, which makes interesting reading, and at least some of which must prove of use to those concerned with or interested in the industry and coal economies, whether in the United Kingdom or British possessions overseas. The statistics in the book are in themselves adapted to render it of value. As the author says, no other work on the subject of coal briquetting was available, except, we might add, that Björling issued a book in London in 1903 which dealt with the subject to some extent, and there have, of course, been numerous papers and writings in several countries.

The value of the work is doubtless considerably increased by the numerous illustrations, which unfortunately are not all as clear as one could wish (owing to the fact that the original blocks were destroyed by fire). The book could be condensed without detriment to its value, we think, and repetitions will doubtless be avoided in future editions, whilst the sections, headings and sub-headings could then be improved. To the translator is due almost as much credit as to the author, because he has certainly had a long and difficult task, which he has carried out with merit—translating a German book being no easy matter. The work is certainly a worthy addition to the long list of Messrs. Griffin's valuable technical publications, and we look to a demand which will shortly necessitate a second edition, in which event we offer the further suggestion that it might be advantageous to divide the two parts of the book into two volumes.

Reid's Handy Colliery Guide for Northumberland, Durham and Yorkshire. Newcastle-on-Tyne: Andrew Reid and Company. Price, 2s. 6d.

This guide has been carefully revised from the latest official and other sources, and aims at giving in a concise form such information as will be handy to those whose time is too limited to allow of their referring to the various authorities on the subjects they require. Its purpose seems admirably carried out; the new edition contains lists of the collieries, colliery owners, managers, fitters, and engineers; a reprint of the Coal Mines Act, 1911, with various Statutory Rules and Orders issued since the Act came into force. There is also a map giving the position of collieries as well as the railways and stations for Northumberland, Durham and Yorkshire.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The Elled Colliery workmen, who have been on strike since July 1, met on Saturday, and accepted the recommendation of their agent to return to work on Monday, on the condition that the dispute was settled within a month. It is stated that the men are asking for 3s. 6d. per ton cutting price, while the employers offer 2s. 1½d.

The Avon Valley district of miners, at their monthly meeting on Saturday, in Port Talbot, decided to draw the attention of the Controller to non-unionism at certain collieries. With regard to the comb-out of men for the Army, the men's agent deprecated the action which had been taken at some of the collieries where the men endeavoured to deal with matters themselves, instead of submitting them to the organisations in a constitutional manner. The meeting discussed also the question of income tax, and decided to support the executive in protesting against the present basis. A number of collieries, it was stated, are still working only part time, one pit having been idle for eight consecutive days.

The executive council of the South Wales Steel Workers' Association met in Cardiff, on Saturday, to consider the question of the one o'clock finish on Saturday. The employers having, it was stated, refused to agree to this change at the Bessemer Mills of Ebbw Vale and Dowlais, it was decided to ask the Ministry of Munitions to receive a deputation.

At the Tredegar Valley miners' district meeting on Monday, dissatisfaction was reported at the Tytrist washery because of the refusal of the Tredegar Company to pay bonuses to which the men considered themselves entitled under the agreement of the Steel Smelters' Association. Permission was granted to give notices. As the award of the Committee on Production in connection with the by-product men at Risca did not include retrospective payment, the Federation will be requested to make an effort to get the question re-opened.

The colliery examiners' executive, at a meeting in Cardiff on Monday, chose a deputation to meet the Controller and the coal owners in London, on Tuesday, respecting recognition of their association and the establishment of a uniform wage.

The Cwmillery and Rose Heyworth workmen have been granted permission to tender notices, because they have failed to get an improved price list for working the Black Vein seam.

At Nine Mile Point Colliery, the colliers claim 3d. a day under Lord St. Aldwyn's award, and it has been decided to make a claim in court. Owing to complaints as to the condition of workmen's coaches in the valley, a report was

submitted to the Commission on Industrial Transport, and it was now stated that the Controller will deal with the matter.

The workmen's examiners reported upon the situation at Llanbradach in regard to the condition of the safety lamps, and the agent explained that an agreement existed between the management and the workmen for discarding defective lamps. This matter has evidently been the subject of serious dispute, for on Tuesday about 1,500 men were idle at the Llanbradach Colliery, alleging defective condition of some of the lamps. A deputation waited on the Federation executive stating their grievance, and it was resolved that Mr. T. Richards, M.P., and the local agent of the men (Mr. Jenkins) should seek an interview with the Home Secretary on the subject.

North of England.

On Monday of last week a strike occurred at the Howard Pit, Netherton, and the colliery is still idle, according to late advices. The circumstances are as follow:—Pit room at the Howard Pit having decreased, the manager desires to transfer men to the Levison Pit. To this the workmen object as they have been earning up to 25s. a day at the Howard Pit, whilst the wages at the Levison are not likely to be so much. They contend that, under an agreement come to in September 1915 there is to be no interference with existing arrangements which is likely to cause reduction in wages during the war period. The men have been offered the county average wage, 11s. 9d. per day, but this is not acceptable for them. It has been suggested that the joint board should be consulted but, in view of the agreement already referred to, the workmen are unwilling. Twelve of the hewers at the Howard Pit have been discharged.

Federated Area.

The trouble at the Welbeck Colliery of the New Hucknall Colliery Company appears to be over, and the men returned to work on Monday last, after having been on strike about a week over the question of an allowance for travelling expenses. The management declined to discuss the situation; and the men, apparently tiring of their idleness, have resumed their labours.

At a delegate meeting of the Lancashire and Cheshire Miners' Federation, held last Saturday at Bolton, it is reported that various disputes which had lately arisen at collieries in the Manchester and Bolton areas respecting working conditions had been amicably settled, thanks, in certain cases, to the good offices of the Coal Wages Board. It was mentioned that the membership of the Federation was being strengthened by the addition of new members. Propaganda work was also being carried out with a view to increasing still further the membership of the Triple Industrial Alliance.

Scotland.

The question of contracting for coal getting has now become rather acute at Blairmuckhill Colliery, Harthill. The men were idle for two days and only returned to work on getting a guarantee that the matter will be taken up at once by the executive committee of the Lanarkshire Miners' Union.

At Bothwell Castle Colliery, Lanarkshire, trouble has arisen in consequence of a reduction of sixpence per ton on No. 1 main coal. The executive of the Lanarkshire Miners' Union have decided to report the whole facts to the National Union of Mineworkers.

Some time ago two men were refused employment at Leadhill Mines because of their refusal to sign a contract. As the outcome of representations by Mr. David Gilmour, of the Lanarkshire Miners' Union, the two men have been reinstated.

The inspectors who recently examined the disputed places in the two sections at Knowton Colliery, Shotts, have now issued their award. They report that the management ought to be in a position to set up a tonnage rate in preference to the system prevailing at present.

For some time negotiations have been proceeding between the agent and the management of Bridgeness Colliery, West Lothian, on the question of tradesmen's wages. The management have offered an increase of 3s. per week.

The Coal Controller has not yet made any award in the claim recently debated before him for an increase of wages to the workers at the coke ovens at Dumbreck Colliery, Kilsyth.

At Manor Powis Colliery, Stirlingshire, work has been somewhat irregular of late, the number of shifts worked each week averaging four.

A batch of troubles is again reported from the Glenbuck and Muirkirk districts of Ayrshire. Mr. James Murdoch, of the Lanarkshire Miners' Union, has been deputed to assist the Ayrshire officials in arriving at an amicable settlement of the difficulties.

At Grasshill pit, Ayrshire, the drawers are agitating for an increase of wages. The latter, it seems, are paid on a graded basis of 3s. 7d. for boys between 14 and 15 years of age, to 8s. 5d. for men of 21 years of age and over. The drawers are demanding the same maximum rates as are paid in other districts.

Certain of the grievances at Messrs. Finnie's Fergushill Pits have been satisfactorily adjusted. The trouble regarding the long drawing roads existed in four of the pits, and concessions of from 1½d. a ton to 4½d. a ton have been obtained. The banksmen are to get an increase of 3d. per day, while negotiations in regard to the wages of the banksmen and the firemen are proceeding.

West Australian Coal Output.—According to the advance report of the West Australian Government for 1916, the output of coal that year totalled 301,526 tons, showing a slight increase (14,860 tons) on 1915.

Re-Examination of Colliery Firemen.—In accordance with the Coal Mines Act, 1911, an examination for re-examination of colliery firemen and shot-firers will be held at the Wigan and District Mining and Technical College on Tuesday, Wednesday, and Thursday, October 2, 3, and 4, 1917. By the terms of the Act, all firemen and shot-firers must possess certificates to show that they have passed the prescribed tests not more than five years previously, firemen being required to pass tests for eyesight and hearing, while shot-firers are examined for eyesight only. For the eyesight test, candidates will be required to determine the presence of "gas" by means of a safety lamp. Mr. C. S. Laws, M.A., B.Sc., the principal of the college, has given notice that acting firemen should apply through the authorities of the colliery at which they are engaged, while qualified persons not acting as firemen should apply direct to the college not later than Tuesday (Saturday). All persons having firemen's (or shot-firer's) certificates granted prior to May 1913, should apply for re-examination.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

*Coal Exporters: Their Resentment of Con-
Action. Exchange Opinion on Proffered Wage
Passive Resistance to Income Tax.*

Another stage was reached on Monday in the difference which has arisen between the Coal Controller and coal exporters of Cardiff upon the question of a chairman of the Contracts Arrears Committee. At the first meeting of the owners and exporters, Mr. H. J. Hill (coal exporter) was elected chairman. The Controller, however, has nominated Mr. Evan Williams as chairman, with Mr. North Lewis as vice-chairman; and both these gentlemen are regarded as in the colliery interest. Mr. North Lewis, however, has declined the appointment. The letter of the Coal Controller, which came before Monday's meeting, stated that he had been informed that the appointment of Mr. Lewis was agreed to as only a temporary measure by the coal owners, who were in a minority at the first meeting. He regretted inability to vary his decision, and expressed the hope that the exporters would see their way to co-operate with the coal owners in order to facilitate the settlement of questions affecting the delivery of arrears. The meeting, however, held that Mr. Hill's appointment was not temporary, and adopted a resolution that the exporters' three representatives, namely—Messrs. H. J. Hill, Percy Miles, and E. R. Moxey, as well as the three substitutes, Messrs. P. H. Coward, John Powell, and E. Franklyn Thomas, should resign from the committee. It was also resolved that no other exporters should be appointed as representatives on the committee.

The announcement that the Coal Controller made a final offer to the Miners' Federation in settlement of the men's demand for 25 per cent. advance on net wages, and that his offer was 1s. 3d. a day to men over 18, with 7½d. to youths, has created general surprise and criticism, the more so as the men would be paid on certain days when the pits were stopped. One estimate of the cost entailed by this latest offer is that it will add over £50,000 per week to the wage bill. The South Wales coal owners, it is stated, have not been consulted by the Controller, and some of them aver that it would completely wipe out all profit. In such case, compensation to the colliery proprietors would have to come, not out of the selling price of the coal, but out of the National Exchequer.

Exchange opinion upon the offer, while generally adverse, varies in form of expression. Upon the question of where the burden will rest—whether this will be borne by the colliery proprietors or by the consumers—it is believed that the Coal Controller will treat the colliery proprietor as the railway proprietors were treated, and that at least pre-war dividends will be paid, whilst the difference of working costs will be borne either by the commodity, in the shape of price charged to the public, or by the Exchequer. It is considered singular that just at a time when the Food Controller takes steps to reduce the cost of living, the Coal Controller should grant advance of wages in order to meet increased cost of living. The effect of higher coal prices upon industry generally will be to add to the burden of manufacture, and lead to further demands in respect of wage rates and other expenditures.

Messrs. D. Davis and Son, of Ferndale Collieries, are making a grant of £1,000 to Porth Cottage Hospital for the endowment of a bed. Sir W. J. Thomas, of the Bedwas Collieries, has given a new wing to the hospital, which accommodates 26 beds; and it is hoped that the various colliery companies in the district will endow these—Messrs. D. Davis and Sons having taken the lead. Messrs. Davis and Sons will also take their turn in providing the hospital with a free supply of coal.

At a meeting in Tonyrefail, Mr. Frank Hodges, miners' agent, intimated that the South Wales miners' conference on October 8 would advocate a policy of passive resistance to the payment of income tax, and that the miners of England and Scotland would be equally ready to adopt the same policy. The conference will also consider the "combing out" and wages advance questions.

At Ebbw Vale on Saturday, Mr. Davies, miners' agent, stated that in Yorkshire an investigation had been made in order to ascertain how many men had gone to the Army. The Federation had offered to provide 40,000; and it was believed that more than the Yorkshire quota had already gone. Mr. Davies will, it is understood, take steps to ascertain the actual number of men who have left from the Ebbw Vale collieries.

The difficulty in respect of Gwaun-cae-Gurwen was modified by the decision of the meeting in Swansea on Saturday, where representatives from the Miners' Federation attended to induce an abandonment of the suggestion to "down tools" in the whole of the anthracite district in support of the strikers. The proceedings lasted for several hours in private, but at the end a statement was supplied to the Press stating that Messrs. Vernon Hartsorn and W. Jenkins, of the Emergency Committee of the Conciliation Board, had strongly recommended the meeting to postpone taking a vote upon "down tools" policy until the matter had been dealt with by the Coal Controller. The recommendation was accepted. An appointment is to be sought with the Coal Controller, followed by a general meeting of the Gwaun-cae-Gurwen men. It was decided at the meeting to impose a levy of 1s. per member per week upon the whole of the anthracite district in support of the strikers so long as they were idle.

Mr. Alexander, checkweigher at one of the Gwaun-cae-Gurwen pits, states that under the 1895 agreement a standard rate of 4s. 7d., plus anthracite percentages, is paid colliers or regular piece workers and day wage men; whereas under the Minimum Wage Act colliers who are not regular piece workers are paid 4s. 4d., plus full percentages. He argues, however, that the difference in rates under the 1915 standard is 2-17d. per day lower under the Act than the rate to the same class under the 1895 agreement.

At the monthly meeting of the East Glamorgan district of the Miners' Federation, at Caerphilly on Monday, the dissolution of the Caerphilly lodge and its merging into the parent lodge at Llanbradach was discussed. The agent is to see the workmen of both lodges and report. The terms offered by the Coal Controller for an advance in wages were fully discussed, and the delegates to the Miners' Federation at the Great Britain conference were given a vote on this matter. The agent (J.P.) reported he had met the Coal Controller, who was Colliery agent against whom claims for arrears of wages were being made. The workmen engaged on the coming year had not been settled. It was decided to write to the Coal Controller to a special meeting this week-

At the monthly meeting of the Eastern Valley district of miners, Monmouthshire, Mr. W. L. Cook, J.P., sub-agent, said there had been a temporary cessation of work at the Crumlin Valley Colliery, owing to alleged unsafe working conditions. Mr. T. Greenland Davies, H.M. inspector, who visited the workings, reported in favour of the men, and the company was given a fortnight to re-adjust matters. Consequently, the men decided to resume work on the next day. Negotiations were proceeding satisfactorily for the arrangement of a price-list at the Eastern Valleys Colliery, Pontnewynydd. The Blaenavon by-product workers were claiming time-and-a-half for week-end labour. The officials proposed to refer the matter to the Coke Owners' Association or to the Committee of Supply. Mr. Tom Richards, M.P., the Federation secretary, counselled the men to be patient. The Elled seam men employed in the Blaenavon Company's Big pit were asking for a price-list, and negotiations were proceeding. The hauliers, who demanded a change from the day wage system to the tonnage system, had been advised not to stop work, and it was anticipated that negotiations would shortly be opened.

At the monthly meeting of the Monmouthshire Eastern Valley miners' district, at Pontypool on Monday, an appeal was made on behalf of the Gwaun-cae-Gurwen strikers for financial aid. Mr. Jabez Jones moved that a grant of £10 be made. There was no doubt that distress prevailed amongst the dependants of the strikers. The motion was agreed to. The South Wales Association of Labour Members asked for a subscription equivalent to £1 per 1,000 members of the South Wales Miners' Federation. It was resolved to contribute 2 gs. The question of a refund of the out-of-work pay granted at the last district meeting to a number of Tirpentwys Colliery workmen in respect of the six days' loss of work they had sustained in consequence of a fall of earth during August Bank Holiday week, was postponed until the next meeting. Mr. W. L. Cook, J.P., Blaenavon, said that eight mass meetings of miners at various points of the valley had passed a resolution for the payment of a levy to cover the whole time lost by the Elled Colliery workmen who struck work 12 weeks ago, but that the amount of the levy should be determined by the district. It was decided that the call for the levy should be temporarily deferred, and the district was also requested to provide the National Insurance stamps for the period the men have been idle.

Difficulties have arisen at Blaenavon, where about 150 men at the mills ceased work on Thursday of last week, as a protest against the alleged conduct of an official towards a certain number of employees. A deputation which waited on the principal representatives of the employers (the Blaenavon Company Limited), was advised to prevail on the men to return to work, in which event their grievance would receive full consideration. The men resumed work on Monday on that understanding.

A conference of 14 trade union lodges in the Pontnewydd and Cwmbran district on Saturday evening, resolved to recommend the formation of a district trades and labour council, to serve the needs of the lower portion of the Eastern Valley of Monmouthshire.

Driver J. E. Spencer, R.F.A., of Newbridge, Mon., formerly a fitter at Messrs. Partridge, Jones and Company's Navigation Colliery, Crumlin, has been awarded the Military Medal for carrying despatches under heavy fire. He joined his battery in August 1914.

Northumberland and Durham.

Messrs. J. S. Hindley and G. M. Stamp have been appointed by the Committee of Management of the North of England Steamship Owners' Association to fill the vacancies in the association's representation on the local committee for the supply of coal to France and Italy, caused by the death of Mr. T. H. Catchside and the departure of Mr. George Armstrong for London.

Voting on the recommendation of the executive committee of the Durham Miners' Association that Mr. T. H. Cann should be appointed compensation agent and Mr. W. Whiteley president of the association, to fill the vacancies caused by the death of Ald. William House, is not proceeding smoothly, so far as the adoption of the recommendation is concerned. Several of the lodges are said to be rejecting the proposal, or putting forward nominees of their own, their general feeling seeming to be that Mr. Cann should be made president and Mr. T. Foster compensation secretary.

Yorkshire.

*New Colliery at Finningley—Winter Coal Supplies—Slack-
ing at Denaby—Housing Conference at Wath-upon-
Dearne.*

Skipton Urban Council wish to store coal for the use of needy townfolk during the winter. Investigations by the Gas Committee show that the town has available about 540 tons at present, of which 500 tons are in the possession of the local co-operative society. The private merchants have expressed their readiness to do all they can in the matter, and offer storage for 1,570 tons for this purpose, if the coal can be secured. The Coal Controller has promised to send a representative to Skipton to see what can be done.

Halifax Coal Control Committee asked for 5,000 tons for use in case of need for the poor people during the winter, of which 1,000 was to be forwarded as soon as possible. Arrangements for stacking the coal at five local yards were completed, but it is now learned that there are difficulties in getting supplies to Halifax, as so much house coal is being diverted to London, and local merchants' wagons which used to come from the collieries once a week, are now being held up, and come about once a month.

The latest new colliery projected in the Doncaster district is in the neighbourhood of Finningley, Notts, about seven miles from Doncaster. This project was first mentioned some six months ago, and now the annual report of the Sheepbridge Coal and Iron Company states that "the company have acquired agreements for leases of the Barnsley seam underlying a large area of land at Finningley, on the eastern boundary of the Rossington coal field."

This therefore makes it practically certain that, after the war, the Doncaster district will witness yet another important colliery development. It is rumoured that the shafts are likely to be sunk between the Great North-road and the road leading from Thorne to Bawtry, at a point not far from Bawtry Station. In such event, the pit would link up with the Great Northern Railway, and would also be in touch with the Bawtry and Haxey Light Railway, which connects with the line running through Epworth to Goole. The Sheepbridge Colliery Company already control the fine collieries at Rossington and Maltby, and have also acquired the mineral rights of the Firbeck area, where sinking operations have not yet been able to be commenced owing to the war.

The important coal field housing conference at Wath-upon-Deane has been adjourned until October 14. Ten

urban and two rural districts were represented, and Coun. M. Robson, of Wath, who presided, stated that in the area under consideration there were 20 important collieries, employing 25,000 men, with an output of 200,000 tons of coal per week, or about one-twentieth of the total production of Great Britain. In addition, there were 10,000 other men employed in kindred industries. The conference passed a resolution to the effect that, quite apart from individual applications by local authorities, joint application should be made to the Government for money for housing schemes at the end of the war at interest permitting the erection of houses to let at moderate and economic rates.

There is still much slacking in the collieries of the South Yorkshire area. At Doncaster last Saturday, the Denaby and Cadeby Colliery Company prosecuted a Denaby engine-man, named Abe Fenn, for breach of contract. His duties consisted of looking after haulage and signals underground. Since the middle of June he was stated to have been absent 37 days without any reason or excuse. Damages of £10 were claimed, that being the maximum the court could award, but it was stated that only at the nominal damages of 10s. per day, the claim would have been for £18. Mr. Smith, the manager of the Denaby mine, told the court that through this man's absence the colliery company would some days lose between £20 or £30. The Bench made an order for the payment of £10 at the rate of 10s. per week.

Lancashire and Cheshire.

*Increased Tramway Fares—Winter Coal Prices in South-
East Lancashire—Motors in Place of Horses.*

Various leading coal owners in South Lancashire (including the Earl of Ellesmere and the Clifton and Kersley Coal Company Limited) are now increasing their fleets of heavy motor lorries, and dispensing with horses, which have lately become rather expensive.

The South Lancashire Tramways Company, whose system taps nearly a score of important colliery districts in Southern Lancashire, raised their fares by about 25 per cent. on the average on Monday. Many hundreds of miners and other colliery workers are affected by the increases.

At a meeting of the Irlam (near Manchester) District Council held last week, the clerk (Mr. J. Cooke) said he had received copies of the Order made by the Board of Trade with regard to local authorities and retail coal prices. It was decided to arrange a conference between the Council and local coal merchants.

At a meeting of the Oldham Gas Works Committee on September 19, it was stated that belief amongst the poorer classes that the Gas Works Committee were laying in stocks of coal for distribution in necessitous cases during the coming winter months is quite erroneous, the committee having the utmost difficulty in obtaining sufficient supplies of coal to carry on gas manufacture.

At the Bolton County Police Court on Monday, Wm. Croston, of Westhoughton, was summoned for charging and stemming a shot-hole in a coal mine on September 13, and leaving the same unfired previous to reporting verbally and in writing that all was not safe in the district. For the Westhoughton Coal and Cannel Company, Mr. Greenhalgh stated that defendant had reported that all was right, but it was found that a shot had been charged and stemmed, but not fired. There were 250 men in the pit. Mr. Boucher said that defendant, after stemming a shot, went round the district to warn the men he was going to fire the shot. On his way round he was asked to fire a coal shot, and after he had done it he forgot to go back and fire the shot he had stemmed. Fined £3 and 12s. extra costs.

The accident to J. Pilkington at the Lostock Colliery, Westhoughton, is not so serious as at first reported, only one eye being injured, and it is believed that the sight of the other can be restored by an operation.

Judging from enquiries made in various industrial parts of South-East Lancashire, there is very little likelihood of there being any reductions in coal prices; rather the reverse, for it is stated that many coal dealers there have not raised prices to the extent they were entitled to.

Lieut. B. Norris, of the Lancashire Fusiliers, who has been posted as missing since May, is now presumed killed. Lieut. Norris, who was 23 years of age, was engaged as a draughtsman at Messrs. Walker Brothers' Pagefield Engineering Works, Wigan.

Notts and Derbyshire.

At an inquest at Chesterfield on Saturday, on Thos. Potts, killed by a fall of roof at the Whitwell Colliery, it was shown that deceased was withdrawing a prop with a hammer when the fall occurred. Mr. Danby, H.M. inspector of mines, suggested the ringer and chain ought to have been used, which would not have shaken the roof. The deputy, however, stated that this could not have been used with advantage. The coroner said the accident showed that props should always be drawn with the ringer and chain, and not knocked out with a hammer. The jury returned a verdict of "Accidental death."

At Worksop Police Court last week, the Wigan Coal and Iron Company prosecuted five miners belonging to Manton for breach of contract. For the colliery company, it was stated that nearly 1,000 shifts per week had been lost at the Manton pit, representing 2½ tons per shift per man. In one case, one of the defendants had lost 21 shifts out of a possible 92. The magistrates pointed out that the men had been excused from military service in order that they might get coal. The damages claimed were awarded, with costs, one case being adjourned for medical evidence.

At an inquest last week, at Chesterfield, on Sam Wyer (25), a pit hand, employed at Bolsover Colliery, it was stated that, contrary to regulations, he was riding in a tub, when about 4 cwt. of hard bind fell upon him from the roof and fractured his spine. He was reported to have ridden in tubs whenever he got the chance, notwithstanding the regulations on this point. Three-quarters of an hour before the accident the roof was examined, and appeared perfectly sound. A verdict of "Accidental death" was returned.

The Midlands.

The Staffordshire and Warwickshire coal trade is still disorganised by the diversion of coal supplies to London, and also by the latest Order relating to the regulation of factors' and merchants' charges in respect of the retail trade. Complaint is made that the really necessary thing is an increased production at the pits, in which connection nothing has been done. The colliers are earning big wages as at present employed, but an increase in their hours of working from eight to nine would at once mean an increase of 12½ per cent. in the output, and this would solve the London supplies difficulty. The Staffordshire and Warwickshire coal masters assert that the men should redeem their promises made when the Eight Hours Act was passed, viz., (a) to work 60 hours overtime per year at a

time of emergency, and (b) to waive the Eight Hours Act for the time being, so that further overtime could be worked (even if a special short Act of Parliament was required to bring about the change). Further, the masters declare themselves at the present time anxious that the men's unions should stop the serious amount of under-time still going on at some of the pits in this district. It is not considered a satisfactory answer to say that overtime is awkward to arrange, or that many mines are being worked on the three-shift system. The colliers, it is said, would not have deliberately promised extra time for emergency periods were it impossible to go back a little towards their old rate of individual output, or even to try to do so. The Warwickshire owners point out that Government experts have already proposed that the men's promises should be made good, and they enquire why definite action by the Government does not follow. They hold that 900,000 miners are now working easier hours than any other body of workmen in the kingdom, during probably the most critical time in its history, and that some immediate change should be made. The question of supply and demand, it is pointed out, in connection with the new price control Order, is one which must always decide the matter of price, this last varying only according to districts where raised and the quality of the coal. In Warwickshire, until now there has been no restriction of retail prices, excepting that a couple of years ago the Birmingham Coal Merchants' Association voluntarily restricted the price to 1s. 9d. per cwt. The Lord Mayor of Birmingham, at the present time, is supplied each week with a return showing exactly the tonnage of domestic coal in possession of the members of this association, and current statistics show that the stocks held are very small. The merchants themselves state that a net profit of 1s. per ton for the sale of coal in lots of one ton or over, delivered by road vehicle from a depot or railway siding, as is now proposed by the Corporation to be fixed, is wholly insufficient. With the view of trying to improve the price, detailed information is now being sought respecting existing deductions from the profit margin of 1s. It is pointed out in this connection by coal factors that in many instances interest charges—especially where the credit system on a large scale obtains—demurrage costs, and other expenses must to a great extent absorb the 1s. profit proposed. Application to the local governing authorities for an increase is therefore certain. This week a special committee has been formed by the City Council to prepare a schedule of prices at which coal may be sold retail in the city, and generally to control the sale. The Lord Mayor is chairman.

Kent.

Tilmanstone Colliery output last week was 2,563 tons, and Snowdown Colliery 2,700 tons.

The approval of the Coal Controller has been obtained for the erection of a briquetting plant at Snowdown Colliery. This will enable the large proportion of slack which is raised from the Beresford seam to be dealt with on far better terms than at present. The cost of the plant will be between £7,000 and £8,000, and it is proposed to raise this by means of a small syndicate formed among the shareholders of Snowdown Colliery Limited.

Prof. Galloway, D.Sc., who is intimately connected with the South Wales coal field and the Kent coal field, stated at the Snowdown Colliery annual meeting that the coal of the 4 ft. 5 in. seam entered in the No. 2 shaft at Snowdown Colliery has turned out to be exceedingly clean, without any bands of dirt, and as good as many of the Welsh steam coals. It contains rather more volatile matter than best Welsh, but the quantity of ash is very favourable indeed. The seam has a good roof, and lies in a very favourable position for working.

Scotland.

Remuneration of Colliery Managers—Transfer of Miners to Other Districts—Burntisland and Methil Figures—Edinburgh Coal Supplies Committee.

The remuneration paid to colliery managers was discussed on Saturday night by the Scottish branch of the National Association of Colliery Managers at a meeting held in the Heriot-Watt College, Edinburgh, Mr. J. Balfour Sneddon, Mid-Calder, presiding. Mr. James Gilchrist (Cambuslang) said he took it that it was no secret that as a result of representations made to the Coal Controller, the latter official has recommended the coal masters in Scotland to grant a minimum wage of £4 per week to the under-managers throughout the country. If this concession was granted to the under-managers, then in what position was it proposed to put the responsible colliery manager? 'Personally, he did not believe in the managers being members of a trades union, but if the services of the managers were not properly recognised, then the coal masters had only themselves to blame for driving the managers into such a society. Mr. M. Gunnis (Giffnock Colliery, Glasgow) indicated that it was somewhat of a grievance amongst colliery managers of Scotland that the Coal Mines Act should be founded to a great extent on the customs and conditions pertaining to the English coal fields. As a result of this policy, the injustice to Scottish employers and their managers, and the effect on the Scottish mining industry as a whole, were quite apparent. Was it not possible that the association could use its influence in initiating a movement with the aim and object of seeing that Scotland had a separate legislative mining body, which would be responsible for the safe and economic development of Scottish mining? Mr. John George (Cambuslang) maintained that the one way the association could help the young men who were entering the profession was to recognise a minimum wage. Once a minimum wage was established, ability would tell after that, because there were few colliery companies nowadays which did not recognise ability. On the question of the minimum wage, he would suggest that the claim should be in generous keeping with the nerve-racking and brain-storming responsibilities and duties of the colliery manager of to-day. It was agreed to resume consideration of the subject at a subsequent meeting.

In the Lanark Sheriff Court, before Sheriff Lee, Andrew H. Telfer, colliery agent, Viewfield, Uddingston; John Findlay, colliery manager, New Cottages, Law; Angus McGilvray, Glen Cottage, Law; and Alexander Webb, oversman, Law, were charged with contraventions of the Coal Mines Act at No. 8 Colliery, Law. McGilvray and Webb were charged with working two horses that were suffering from sore shoulders, causing said horses to work in broken and ill-fitting harness, and with failing to keep a record book in which the condition of the horses was entered. Webb, as oversman, was further charged with allowing these alleged contraventions. Andrew H. Telfer, the agent, was charged with failing to lime-wash and keep clean and in a sanitary condition the stables at the colliery, and with failing to provide proper bandages and destruction appliances in connection with the horses. Findlay, as manager at the colliery, was libelled with all the charges set forth against the other three accused. All the respon-

dents denied the charge. The principal evidence for the prosecution was given by Mr. McArthur, assistant inspector of mines. Two interesting points of mining law were brought out in the course of the proof. The mines inspector held that a cattle destroyer had to be provided at each colliery. On the other hand, the Sheriff contended that if it could be proved that a cattle killer was readily available at the neighbouring colliery of Shawfield, that would comply with the regulations in the Coal Mines Act. The question of gates in the stables was also raised. The mines inspector insisted that gates should be on the stables, but the Sheriff did not consider the gates to be necessary at all, as the ponies were all properly secured by binding straps. In regard to whitewashing, it was explained that the stables, which had formerly been constructed of wood, were being replaced by those built of brick. The brick-work had been coated with liquid cement, which was quite as sanitary as limewash. All the prosecutions were dismissed as not proved.

Enquiries are being made at the headquarters of the Lanarkshire Miners' Union regarding the transfer of men where employment is irregular to certain districts in England where there is a demand for miners and ironstone and clay workers. No transfers have as yet been effected, as there is a strong feeling that these should be carried out through the agency of the various miners' unions in Scotland. The executive of the Scottish Miners' Federation have indicated a willingness to instruct the local unions to arrange for the transfers, rather than that these should be undertaken by the National Service Department.

Six contraventions of the Coal Mines Act and Explosives Order were brought before Sheriff Umpherston in Dunfermline Sheriff Court last week. James M'Crorie, explosives storekeeper at Dalbeath pit, was charged with issuing five boxes of detonators to two female surface workers, not being persons entitled to have detonators in their possession. Accused was fined £1. The storekeeper at Donibristle Colliery, who sent the girls, was fined 10s. A fine of 7s. 6d. was imposed upon a miner employed in Mary pit, Lochgelly, for leaving a canister containing explosives at his working place at the finish of his shift. A pit fireman from Glencraig was fined 10s. for neglecting to return seven detonators at the finish of his shift. For having failed to fence off his place at the close of his shift when in an unsafe condition, a miner from No. 1 pit, Glencraig, was fined £2. Accused had failed to set holing props as soon as practicable. He had left the face which was holed to a depth of 4 ft. and a length of 15 ft. at the close of his shift. The fireman employed in the section where above accused was working was fined £4 for recording in his report the false statement that the condition of the section was safe. The Sheriff remarked that if miners were not going to take warning by the fines imposed, he would have to raise them considerably.

The tradesmen employed at Bridgeness Colliery, who have been pressing for an increase in their wages, have now been offered a rise of 3s. per week.

A Committee on Coal Supplies, appointed by the Edinburgh Corporation at the instance of the Coal Mines Department, met last week in Edinburgh, and resolved to ask the large coal merchants to give a guarantee that they would retain, during the winter, certain stocks of coal which would be available for distribution to the poorer classes, through the committee, in the event of a shortage. Another committee under the retail coal prices Order also met and arranged to approach coal merchants and ask them to submit their proposed prices.

The Daylight Saving Act has been the cause of trouble arising at one of the collieries in Fife. It appears that a number of men employed on night time were due to be on the pithead at 9.30 p.m., but owing to the alteration of time and no arrangement being made for them getting up the pit an hour earlier, they did not turn out till 10.30. Notwithstanding that no arrangement had been made for them getting up an hour earlier, the management refused to let them work, and as a result they lost a shift. The men have instructed the union to take steps to recover the value of the lost shift.

The coal exports for the week at Burntisland amounted to 10,890 tons, as compared with 20,060 tons in the corresponding week last year. This was a reduction of 4,600 tons on the preceding week, but is fully above the average for the year. The bulk of the consignment went coastwise. From Methil the output was 22,559 tons, against 26,119 tons in the previous week, and 31,852 tons in the corresponding week last year.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ABERYSTWYTH, OCTOBER 2. — Coal to the Red Cross Hospital. Forms from the Hospital.

BRISTOL, OCTOBER 5. — Coal and coke to the Beaufort War Hospital, Bristol. Tenders to the Hospital, addressed to the Visiting Committee.

CARLISLE, OCTOBER 1. — Coal for the Guardians. Tenders to the clerk's office.

KILLLOUGH, OCTOBER 8. — 70 tons of best household coal to the Charles Sheils' Institution, Killough, to be delivered half November 1, 1917, and remainder February 1, 1918. Tenders, addressed to the presiding chairman, may be lodged with the superintendent.

MELTON MOWBRAY, OCTOBER 8. — Coal for the Melton and Belvoir Hospital Committee. Tenders to the office of the clerk.

NARBOROUGH (LEICESTER), OCTOBER 1. — Coal for the Guardians of Blaby Union. Tenders and samples to the Workhouse.

ROSSLYNLEE (SCOTLAND), OCTOBER 1. — Coal to the Midlothian and Peebles District Asylum, Rosslynlee. Forms of the clerk and treasurer, 19, Heriot-row, Edinburgh.

STOCKPORT, OCTOBER 1. — House coal and engine slack from October 1, 1917, to March 31, 1918, for the Stockport Infirmary. Tenders to the secretary.

THAKEHAM (SUSSEX), OCTOBER 2. — Coal and coke for the Guardians. Tenders to the Workhouse.

THURLES. — For supplying coals. Particulars from the clerk to the Guardians.

WIGAN, OCTOBER 9. — Coal, also carting of coke, for the Education Committee. Tenders to the Director of Education, Education Offices, King-street, Wigan.

The date given is the latest upon which tenders can be received.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Ashton Vale Iron Company Limited. — The year ended June 30 last shows a balance of £1,038 brought forward, made a profit of £1,038, and after payment of debenture interest, and writing off the South Liberty Colliery and £1,000 off the South Liberty Colliery plant, there is left £1,337. It is proposed to declare a dividend of 2½ per cent., and to carry forward the balance of £1,047.

Birmingham Small Arms Company Limited. — The directors recommend the following final dividends for the year ended July last, payable on October 12: On the "A" preference shares, at the rate of 5 per cent., less income tax; on the "B" preference shares, at the rate of 6 per cent., less tax; and on the ordinary shares, at the rate of 5 per cent., together with a bonus of 2s. per share, free of tax. These dividends are the same as those paid last year.

Coltess Iron Company Limited. — The directors recommend a dividend of 8 per cent. per annum, less interim dividend paid in April, together with a bonus of 5 per cent.

Dalmellington Iron Company Limited. — The directors have declared a final dividend on the ordinary shares of 5 per cent. and a bonus of 5s. per share, free of income tax.

International Coal Company Limited. — The report for the year ended June 30 last states that the profit, after providing for excess profits tax, income tax, etc., amounts to £10,112, which added to £4,994 brought forward makes a total of £15,106. The directors recommend a final dividend of 7½ per cent., less tax (making 15 per cent. for the year), and to carry forward £2,356. During the year the shareholders have confirmed the agreement provisionally entered into between the directors and Lysberg Limited for the sale of the company's output, and this arrangement is working satisfactorily and to the advantage of the company.

Lowmoor Company Limited. — The directors announce that an interim dividend at the rate of 5 per cent. per annum, less tax, for the half-year ended June 30 last will be paid on the 15th proximo.

Partington Steel and Iron Company Limited. — The directors, in a circular to shareholders, state they regret they are still unable to publish the balance-sheet for the year ended June 30, 1916, as it has not yet been possible to adjust the accounts with the authorities. A dividend has been declared upon the ordinary shares at the rate of 10 per cent. for the year. The company has acquired two iron ore properties, on one of which sinking operations have commenced, and the other is already in working order.

Radnorshire Coal, Lime and General Supply Company Limited. — The report of the directors states that the balance on profit and loss account at the end of the financial year was £6,116. A dividend of 7 per cent. on the ordinary shares is recommended. This absorbs £700, and leaves a balance of £5,415 to carry forward.

Steel Company of Scotland Limited. — The directors have declared a dividend of 10 per cent., less tax, the same as last year. As the liabilities for special taxation have not yet been ascertained, the directors are not in a position to issue accounts.

St. Helen's Colliery and Brickworks Company Limited. — The directors have declared a final dividend on the ordinary shares of 7½ per cent. (actual) for the half-year ended June 30, free of tax, making 12½ per cent. for the year.

NEW COMPANIES.

Abrasives Limited. — Private company. Registered September 19. To carry on the business of manufacturers, merchants, factors, and agents of and for steel, iron, and other metals, minerals, etc. Capital, £10,000. Directors: J. S. Mitchell and W. M. Rowland.

Birmingham Pitwood Association. — Registered as a company limited by guarantee, with an unlimited number of members. Each member owning, holding, or carrying on collieries, quarries, mines, is liable in the event of winding up for £2 in respect of every 1,000 tons of coal, ironstone, and fireclay gotten or raised at such member's collieries, quarries, or mines in the calendar year last preceding the order or resolution to wind up. Each other member is liable for £1 only. Objects as title. The first directors are: W. F. Clark, The Poplars, Aldridge; P. C. C. Phillips, Broomhill, Castle Gresley, near Burton-on-Trent; E. E. Bramall, 6, Knighton-drive, Leicester; W. Perrott, Faintree, Bridgnorth; G. A. Mitchelson, Trentham, Stoke-on-Trent; H. W. Hughes, Horsley House, Wolverhampton-street, Dudley; C. F. Jackson, The Gables, Bedworth, near Nuneaton. Registered office, 37, Newhall-street, Birmingham.

Dupont and Brand Limited. — Private company. Registered office, High-street, Bures St. Mary, Suffolk. Registered September 20. To carry on the business of engineers, etc. Capital, £3,000. Directors: W. Brand and W. A. Church.

Gctrough Limited. — Private company. Registered September 18. To acquire and take over as a going concern the business of general engineers and dealers in machinery. Capital, £8,000. Directors: F. Harrison, G. Dakin, and Martha Spridgeon.

Hydraulic Gears Limited. — Private company. Registered office, Beaver-lane, Hammernsmith, W. Registered September 20. To purchase or otherwise acquire Letters Patent, brevets d'invention, concessions, etc. Capital, £40,000. Directors: S. Gluckstein and G. W. Booth.

Kintyre Coal and Oil Company Limited. — Private company. Registered office, 2, Austin Friars, E.C. Registered September 19. Nature of business indicated by title. Capital, £15,000. Subscribers: G. M. O. Horsford and C. Rattenbury.

Stoic Steel and Tool Company Limited. — Private company. Registered September 20. Nature of business indicated by title. Capital, £2,000. Director, W. F. Heslop.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

Residents of Weybridge have placed a sum of money at the disposal of the chairman of the District Council for the purchase of 150 tons of coal to be distributed free of charge to the poor during the winter.

Coal Exporting to Italy. — Official information in regard to coal exporting to Italy—in response to representations that have been made to the authorities by Newcastle-on-Tyne traders—to the effect that if a conditional licence for export of coal is unexecuted on September 30, it is automatically extended to October 31.

THE COLLIERY GUARDIAN

Monthly List of Recent Coal Literature.

I.—General.

- The Foundations of the Mining Industry in the Kingdom of Poland (Die Grundlagen der Montanindustrie im Königreich Polen). — Petraschek. "Mont. Rdsch.," Aug. 1, p. 401; illus.
- The Restriction of Our Coal Exports, and Its Effect Upon the Gas Industries of the World. G. F. Zimmer. "Eng.," Aug. 31, p. 217.
- The Coal Industry in Eastern Canada. "Eng.," Sept. 7, p. 257. (From "Can. Dept. Mines Bull. 14.")
- Value of Fuel Economy in the Power Plant. R. Trautschold. "Ind. Man.," Aug. 1, p. 683.
- Synthetic Nitrogen Compounds. "Engin.," Aug. 24, p. 155. (Nitrogen from coal, etc.)
- Report of the Committee of Council for Scientific and Industrial Research. "Colliery Guard.," Sept. 7, p. 446.
- Organisation of Commercial Intelligence. "Colliery Guard.," Sept. 7, p. 451 and p. 457.
- Welfare Supervisors. "Colliery Guard.," Sept. 7, p. 458. (Report of the Ashley Comtee.)

II.—Education.

- The Higher Education of Colliery Managers. G. L. Kerr. "Trans. Min. Inst. Scotld.," vol. 39, pt. 6, p. 152.

III.—Geology.

- The Fossil Coals of Bosnia and Herzegovina (Die fossilen Kohlen Bosniens und der Hercegovina). — Katzer. "Bergb. u. Hütte," July 15, p. 242; illus.
- Notes on Bulgarian Brown Coals (Einiges über die Bulgarischen Braunkohlen). — Herbing. "Braunk.," Aug. 10, p. 157; illus.
- Geological Problems of Brown Coal Deposits (Geologische Probleme der Braunkohlenlager). — Walther. "Braunk.," July 13, p. 125; Aug. 3, p. 149; illus.
- Coal Fields of Pierce County. J. Daniels. "Jl. Geol.," May-June, p. 400.
- The South Staffordshire Coal Fields. "Iron Coal Tr. Rev.," Aug. 31, p. 225; 1 fig.
- The Coal Deposits of Reefton, N.Z. J. Henderson. "Colliery Guard.," Sept. 21, p. 543. (From N.Z. Geol. Survey "Bull. 18, n.s.")

V.—Mining Technology.

- The Elements of Coal Mining. D. Burns. 8vo. 236 pp.; 113 fig. London, 1917; E. Arnold. 3s. 6d. net.

VI.—Working of Minerals.

- Development of Deep Coal Areas in Bengal. G. George. "Colliery Guard.," Aug. 24, p. 345. (From "Trans. Min. Geol. Inst. Ind.")
- American Notes. S. Dean. "Colliery Guard.," Sept. 14, p. 493. (From paper read before Inst. Min. Engin.)

VII.—Boring, Shaft Sinking, and Tunnelling.

- The Cover Rock of the Salt and Coal Deposits of the Lower Rhine, and the Methods of Shaft Sinking Applicable thereto (Das Deckgebirge der Salz- und Kohlenlager am unteren Niederrhein und die darin anwendbaren Schachttaufverfahren). — Landgraeber. "Bergb.," July 12, p. 433; July 19, p. 449; Aug. 2, p. 481; Aug. 9, p. 493; illus.
- Improvement in Twist Boring Drills. "Colliery Guard.," Aug. 24, p. 350; 1 fig.
- Sinking Through Wet Strata at Great Depths. H. Müller. "Colliery Guard.," Sept. 14, p. 494. (From "Glückauf.")

VIII.—Explosives, Blasting.

- Lecture Demonstrations on the Theory of Explosives (Einige Vorlesungsversuche zur Theorie der Explosivstoffe). Eggert und Schimank. "Z. Elektro-Chem.," July 1, p. 189; illus.
- Blasting with Liquid Air at Kladno (Ueber die Erfahrungen beim Sprengen mit flüssiger Luft in den Steinkohlengruben der Buschterader Eisenbahn in Kladno). — Nemejc. "Mont. Rdsch.," July 16, p. 377; illus.

IX.—Timbering, Packing, etc.

- The Future of Forestry. "Colliery Guard.," Aug. 24, p. 347.

X.—Surface Arrangements.

- New Type of American Tipples. "Colliery Guard.," Sept. 7, p. 446; 2 fig. (From "Coal Age.")
- The Frickley Colliery of the Carlton Main Colliery Company Limited. "Iron Coal Tr. Rev.," Sept. 21, p. 325; 6 fig. (Visit of the Natl. Assoc. of Colly. Mgrs., Yorks. brch.)

XI.—Winding and Haulage.

- Notes on Shaft Winding (Betrachtungen über die Schachtförderung). — Macka. "Bergb. u. Hütte," July 1, p. 227; illus.
- New Ignier Winding Plants (Neuere Ignier-Förderanlagen ausgeführt von der AEG-Union-Elektrizitätsgesellschaft in Wien). — Blau. "Bergb. u. Hütte," July 1, p. 219; illus.
- Factors Determining the Prime Cost of Electrical Winding Engines (Ueber den Einfluss der Fördermittel, Förderweise und Maschinenbauart auf die Herstellungskosten elektrischer Schachtfördermaschinen). — Winkel. "Fördertechn.," July 1, p. 97; illus. (Material raised, method of winding, and type of machine.)
- New Fireless Locomotives (Einige neuere feuerlose Lokomotiven). — Willigens. "Z. Dampfk. Betr.," Aug. 10, p. 249; illus.
- Koepe's Whiting Systems of Winding. A. C. Du Pasquier. "Iron Coal Tr. Rev.," Aug. 24, p. 201. (From "Jl. S. Afric. Inst. Engin.")
- Finding the Size of Rope Required. W. B. Crowl. "Coal Age," Aug. 11, p. 228; 2 fig.
- Determining Mine Car Friction. N. G. Near. "Coal Age," Aug. 11, p. 228.
- Mechanical Arrangement for Opening Doors on Bottom-Endless Rope Lifts. "Iron Coal Tr. Rev.," Aug. 11, p. 228.

ery Trans. "Iron Coal Tr.

st Suited to Loads Encomtered
uminous Coal Mines. R. L.
r. Inst. Electr. Engin.," July,

- Location and Construction of Mine Tracks. J. McCrystle. "Coal Age," Aug. 11, p. 230; Aug. 25, p. 315; 5 fig.
- Anti-Friction Bearings in Coal Mine Haulage. P. B. Liebermann. "Colliery Guard.," Aug. 31, p. 399. (Paper read before Amer. Inst. Min. Engin.)
- Automatic Safety Mine Car Cager. N. L. Harmon. "Colliery Guard.," Sept. 7, p. 457; 3 fig. (From "Coal Age.")

XV.—Mine Gases, Testing.

- Estimation of Firedamp by the Limits of Inflammability. M. Brun. "Colliery Guard.," Aug. 24, p. 346; 3 fig. (From "Bull. Soc. Ind. Min.")
- Inflammability of Mixtures of Gases with Air. G. A. Burrell and A. W. Gauger. "Colliery Guard.," Aug. 24, p. 348. (From U.S. Bur. Mines "Techn. Pap. 150.")

XVI.—Coal Dust.

- Coal Mining Investigations: III. "Coal Age," Aug. 25, p. 318; 2 fig. (Work on coal dust explosions at U.S. Bureau of Mines Testing Gallery.)

XVII.—Explosions.

- Some Notes on Explosions of Firedamp and Occurrences of Gob-Fires in Natal. J. E. Vaughan and F. A. Steart. "Jl. Chem. Met. and Min. Soc. S. Africa," June, p. 217; 5 fig.
- The Explosion in No. 12 Colliery of the Dominion Coal Company. F. W. Gray. "Can. Min. Jl.," Aug. 15, p. 324.

XVIII.—Mine Fires.

- Gob-Fires in Natal. J. E. Vaughan and F. A. Steart. "Colliery Guard.," Sept. 7, p. 444; 1 fig. (From "Jl. Chem. Met. and Min. Soc. S. Africa.")

XIX.—Rescue and Ambulance.

- New Rescue Station at Ilkeston and the Manners Colliery. "Iron Coal Tr. Rev.," Aug. 31, p. 230. (Visit of Middl. brch. Natl. Assoc. Colly. Mgrs.)
- Safety and First-Aid Campaign of the Union Pacific Coal Company. T. Gibson. "Coal Age," Aug. 25, p. 333.

XX.—Drainage, Pumping, etc.

- Notes on the Construction of Turbine Pumps. A. E. L. Chorlton. "Proc. Inst. Mech. Engin.," Jan.-May, p. 361; 37 fig.
- Water Barrel for Shaft Sinking. "Colliery Guard.," Sept. 21, p. 543; 2 fig.

XXI.—Preparation.

- The Utilisation of Small Coal. J. N. Firth. "Iron Coal Tr. Rev.," Aug. 24, p. 192.

XXII.—Briquettes.

- Critical Review of the Theories on the Briquetting Process with German Brown Coals (Kritische Erörterung der verschiedenen Theorien, die über den Brikettierungsvorgang bei der deutschen Braunkohle aufgestellt sind). — Joesten. "Braunk.," July 27, p. 141.
- The Utilisation of Brown Coal—I.: The Possibilities of the Victorian Deposits—Briquetting. J. L. Strevens. "Min. Eng. Rev.," July 2, p. 251.

XXIII.—Coke Ovens and By-Products.

- A Source of Frequent Error in the Analysis of Producer Gas (Eine häufige Fehlerquelle bei Generatorgasanalysen). — Kropf. "Z. angew. Chem.," July 17, p. 177.
- The Newest Development of the Gas Producer (Ueber die neueste Entwicklung der Gaserzeuger). — Schapira. "Z. Dampfk. Betr.," July 27, p. 233; Aug. 3, p. 243; Aug. 10, p. 252; illus.

- The Low-Temperature Distillation of Inferior Coals. T. F. Winnill. "Jl. Soc. Chem. Ind.," Aug. 31, p. 912; 2 fig.

- The Carbonisation of Coal. "Eng.," Aug. 31, p. 232; 2 fig.

- Benzene Absorption Oils in Practice and Analysis. L. Shuttleworth. "Gas Wld.," Sept. 1, p. 11 (coking sectn.).

- "B. C. O." Benzol Distilling and Refining Plant. "Gas Wld.," Sept. 1, p. 14 (coking sectn.); 1 fig.

- By-Product Coke and Coking Operations. C. J. Ramsburg and F. W. Sperr, junr. "Iron Coal Tr. Rev.," Sept. 7, p. 252; 3 fig. (From paper read before the Franklin Inst. and Amer. Soc. Mech. Engin.)

- The Refractory Properties of Silica Bricks. H. H. Le Chatelier and B. Bogitch. "Colliery Guard.," Sept. 7, p. 459. (Paper read before Acad. Sciences, Paris.)

XXIV.—Fuels, Testing, etc.

- Firing with Low-Grade Brown Coal (Verheizung von geringwertigen Braunkohlen). — Stauff. "Z. Bayer. Rev. V.," July 15, p. 108; Aug. 31, p. 115; illus.

- Anthracite Coal. W. H. Booth. "Power User.," Aug. 1, p. 142. (Analyses of four general varieties.)

- Laboratory of the Consolidation Coal Company. H. A. Williamson. "Coal Age," Aug. 11, p. 235; 9 fig.

- Combined Coal and Coke Oven Gas Firing. "El. Rev.," Aug. 31, p. 199; 3 fig. (Plant of the Toledo Rlys. and Light Co.)

- Coke Breeze and Gas-Fired Boilers. R. H. Schaller. "Gas Wld.," Sept. 1, p. 10 (coking sectn.).

- Fuel Economy Experiments. "Iron Coal Tr. Rev.," Sept. 14, p. 279; 2 fig. (Report by the Brit. Thomson-Houston Co. Ltd.)

- Fuel Research in 1915-16. "Colliery Guard.," Aug. 31, p. 398. (From "Chem. Z.")

- The Oxidisable Constituents of Coal. J. I. Graham. "Colliery Guard.," Sept. 14, p. 491; 5 fig. (From paper read before Inst. Min. Engin.)

XXV.—Steam Engines and Boilers: Gas Engines.

- Utilising Waste Steam in Mining Work (Die Verwertung des Abdampfes in Bergwerksbetrieben). — Schapira. "Z. Bergb. Betr.," July 15, p. 165; illus.

- Improvements in Grates for Solid Fuels (Neuerungen an Feuerungsanlagen für feste Brennstoffe). — Pradel. "Feuerungstechn.," July 15, p. 233; illus.

- The Thyssen-Röder Steam Turbine (Die Dampfturbinen der Maschinenfabrik Thyssen und Co. A.G., Bauart Thyssen-Röder). — Gentsch. "Z. Turb. Wes.," July 10, p. 187; July 20, p. 193; illus.

- Recent Developments in Air Pump Design. E. Jones. "Eng.," Sept. 7, p. 263; Sept. 14, p. 278; 18 fig.

- The Failure of Boiler Plates in Service and Investigations of the Stresses that Occur in Riveted Joints. E. B. Wolff. (Paper read before the Iron and Steel Inst.)

- Diesel Engine Design. E. M. Rose. 200 pp.; 87 fig. and 6 pl. Manchester: Emmott and Company Limited; 1917. 5s. net.

XXVI.—Compressed Air.

- Safe Air Compressor Operation. M. A. Saller. "Colliery Guard.," Aug. 24, p. 348. (From "Power.")

XXVII.—Electricity.

- The Aluminium Transformer (Der Aluminiumtransformator). — Vidmar. "El. u. Masch.," July 8, p. 321; illus.

- High-Tension Current in Mines. J. R. Brown. "Coal Age," Aug. 18, p. 268; 9 fig. (Paper read before Kentucky Min. Inst.)

- Double-Pressure Testing of Colliery Electrical Apparatus. L. Fokes. "Iron Coal Tr. Rev.," Aug. 31, p. 221; 13 fig.

- Inter-Connection of Electricity Supply Systems in Lancashire and Cheshire. "Colliery Guard.," Sept. 7, p. 459. (Comtee's report.)

- High-Tension Current in Mines. J. R. Brown. "Colliery Guard.," Sept. 21, p. 553; 7 fig. (Paper read before Kentucky Min. Inst.)

XXVIII.—Surface Transport and Storage.

- Development of Appliances for Handling Raw Materials and Merchandise at Ports, etc. Sir J. P. Griffith. 29 pp. Inst. Civil Engin. (Reprint of "James Forrest" Lecture, 1916.)

- Electric Drive for Wagon Tipples (Der elektrische Antrieb von Waggonkippern). — Wintermeyer. "El. Bahnen," July 4, p. 177; July 14, p. 189; illus.

- Method of Stocking Coal with Motor Trucks. C. M. Young. "Blk. Diamond," Aug. 11, p. 108; 7 fig.

- The Handling of Coal by Hydraulic Means. G. F. Zimmer. "Colliery Guard.," Aug. 24, p. 349.

- Car Dumper Plant at Conneaut. "Colliery Guard.," Aug. 31, p. 397; 4 fig. (From "Ry. Gaz.")

- Coal and Shipping—XXI.: Storage of Coal: Overheating and Deterioration. F. J. Warden-Stevens. "Colliery Guard.," Sept. 7, p. 443.

- Aerial Dumping Ropeway at Balgonie Colliery. "Colliery Guard.," Sept. 14, p. 494; 2 fig.

XXIX.—Sanitation, Diseases, etc.

- Health and Sanitation. Dr. S. P. Mengel. "Lehigh Empl. Mag.," June, p. 88.

- Steel Lockers for Washhouses. T. Hiller. "Coal Age," July 27, p. 149; 1 fig.

- The Hygiene of Occupation in War Time. Sir T. Oliver. "Jl. State Medicine," Aug. p. 226.

- Latrines for Mines. "Iron Coal Tr. Rev.," Aug. 24, p. 199; 5 fig. (From "U.S. Bureau of Mines Tech. Paper 132.")

- The Suppression of Rock Dust in Mines. A. C. Whittome and J. H. Veasey. "Colliery Guard.," Aug. 31, p. 395; 2 fig. (From "Jl. S. Afric. Inst. Engin.")

XXX.—Mining Laws, Royalties.

- Rating Reform and Colliery Assessments. "Colliery Guard.," Sept. 7, p. 452.

Coal in Dutch East Indies.—It is reported from Batavia that the Dutch squadron at Sourabaya has made a trial of the coal of the Bockit-Asem mine, in Palembang, with much success. The quality of the coal is said to be equal to that of the Cardiff mines. These coal fields contain sufficient coal to supply the want for many years.

French Coal Production.—The energetic measures adopted by the French Government are likely to produce an average monthly output of 2,500,000 tons from now onwards. This year the monthly returns for February were 1,903,179 tons, the same for July being 2,410,039 tons, an increase of 506,860 tons in six months. The whole production for this year to July is 15,515,058 tons, an increase over last year of 3,116,745 tons. The Pas-de-Calais district, despite the German invasion and nearness to the firing line, contributes almost half—to be precise, 40 per cent.—of the above quantity. The greater part of the mining lies within the danger zone, and the mining population as far back as Bruay have to wear gas masks. Liévin is certainly cleared of the enemy, but its pits here are flooded, and the shaft positions are marked only by heaps of scrap iron, still within reach of the enemy's guns. Lens, the capital of the "Black Country," has been surrounded, and will shortly fall into our hands; but one can imagine what will have happened to the splendid mine equipments of the Lens Colliery Company. In a comparison of this year's output of the three principal coal fields in France, Pas-de-Calais stands first, with 6,030,311 tons (last year 4,744,652 tons); the Loire second, with 2,507,443 tons (2,107,979 tons); and the Gard third, with 1,722,423 tons (1,292,130 tons). The increase for the Loire this year is thus 28 per cent., whilst that for the Gard is 33 per cent., a difference which may be accounted for by the difficulties of working the hard seams of the former, the expert handling and the precautions necessary in propping and shoring. An equal speeding up in operations is taking place in the Tarn, Aveyron, and Saône-et-Loire districts. For example, the ordinary monthly output at Blanzy is from 220,000 to 230,000 tons, but this year it is expected to yield 2,500,000 tons.



The Silent Conveyor

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A Fair Example of Results.

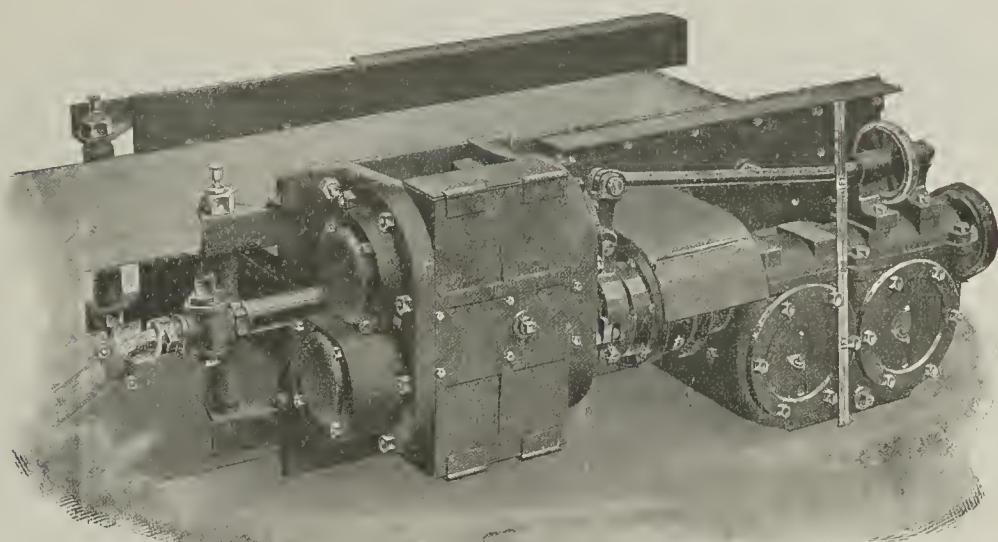
Length of Face - - 80 yards

Height of Seam - - 2 ft. 9 in.

Average Gradient
against load 1 in 12

Average discharge
(5 men) - 60 tons per shift

Average load (input) - 4 B.H.P.



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Perfectly noiseless in operation.

Positive in action, will convey equally well uphill or down.

Most economical in power consumption

Electric or air-driven.

Will take the place of your enlisted men and will increase tremendously your output of coal.

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THE FREIGHT MARKET.

Trading has been done approximately within the limits as during the previous week. On the coast, business has been more restricted by the shortage; but at the Bristol Channel, the business has been maintained. At the Tyne, the business done has been for near destinations. Coasting rates are easier, at about 19s. to London. The French Atlantic has been fixed for, for the carriage of coke and pitch, at the scheduled maximum figure. Gothenburg, at 200 kr., is the one instance of business for a more distant direction. Whilst there is little business being done, it is not because there has been any diminution in the demand for tonnage. Up to 200 kr. is being offered for discharge at any usual Norwegian port, whilst 207½ kr. for Stockholm could be repeated. Portugal is based on fully 90s. to Lisbon, and up to 105s. to Oporto. Gibraltar is quoted at from 97s. 6d. to 100s. Barcelona is mentioned at 210s., and Port Said at 165s. At Cardiff, as at the Tyne, French Atlantic destinations have occupied most attention. Bilbao has been arranged for, in Spain, at 155s. for a 3,000-ton vessel, an advance of 10s. At Swansea, the same port has been fixed for, for a cargo of patent fuel, at 150s. for a 3,400-tonner. These are the only fixtures for destinations other than French. At the Mersey, 85s. has been repeated for a vessel for the River Plate. At the Clyde, 220s. has been paid for Barcelona discharge. It is gratifying to know that employment in the coal mining industry is not solely dependent upon the number of vessels offering in the open freight market, a large quantity of requisitioned tonnage having been forthcoming during the week for the carriage of cargoes on official account, with the result that the collieries have been kept going fairly satisfactorily.

Homewards, the River Plate is firm, at 140s. from down-river and 145s. from up-river ports to the United Kingdom, and is rather more active. Virginia to Buenos Ayres or La Plata with coals is still quoted at 125s., with 33 dols. for Rio discharge. On Committee account on heavy grain basis, the Gulf to West Italy is steady, at 35s. Northern Range to the same destination is quoted at 32s. 6d., with 30s. for French Atlantic discharge. Net charter business is firmer, at 210s. from Northern Range to the United Kingdom. North French discharge is steady, at 250s. To West Italy, the rate is 350s. At the Far East, there is a keen demand for tonnage, but supplies are very small. Haiphong-Saigon to France with rice is steady, at 500s., which rate is still quoted for Madras Coast to Marseilles with kernels. Bombay or Kurrachee on d.w. basis to the United Kingdom is steady, at 250s. Mediterranean ore and phosphate ports are firm, and in need of tonnage.

Tyne to Dieppe or Treport, 250, 51s., coke; 350, 46s., coke; Fecamp, 700, 62s. 6d., pitch; 800, 61s. 3d., pitch; Gothenburg, 1,800, 200 kr.; London, 1,100, 19s.; and North French Range, 800, 60s., pitch; 400 and 600, 45s., coke.

Cardiff to Bordeaux, 1,500, 34s.; Brest, 1,200, 45s., neutral; Bilbao, 3,000, 155s.; Cherbourg, 130, 110s., sail; Caen, 600 and 900, 48s., neutral; 1,200, 46s. 6d., neutral; Dieppe, 2,000, 47s. 3d., neutral; Granville, 120 and 150, 100s., sail; Havre, 2,000, 45s. 9d., neutral; Honfleur, 600, and 500, 48s., neutral; Rouen, 1,700 and 1,550, 48s. 9d.; neutral; 1,500, 48s., neutral; 1,300, 74s. 3d., coke, neutral; St. Malo, 1,000, 21s.; and Tronville, 1,150, 46s. 6d., neutral.

Newport to Rouen, 1,450, 48s. 9d., neutral; Brest, 1,500, 45s., neutral; and Tronville, 1,100, 46s. 6d., neutral.

Mersey to River Plate, 85s., sail.

Glasgow to Barcelona, 220s.

Port Talbot to Honfleur, 1,300, 46s. 6d., neutral; and Havre, 3,000, 21s. 6d.

Swansea to Bilbao, 3,400, 150s., patent fuel, neutral; St. Malo, 1,100, 43s. 6d., neutral; and Brest, 1,400, 45s., neutral.

Briton Ferry to Honfleur, 450, 48s., neutral.

Neath Abbey to Honfleur, 500, 48s., neutral.

LATER. — Since the above was written, the following additional fixtures have been arranged:—

Tyne to Gothenburg, 2,500, 200 kr.

Swansea to Rouen, 500, 51s., fuel, neutral.

Cardiff to Bordeaux, 1,500 and 1,900, 34s.; Bilbao, 3,000, 155s.; Granville, 60 and 150, 100s., sail; Havre, 1,500, 45s. 9d., neutral; and Rouen, 1,400, 1,500, and 1,900, 48s. 9d., neutral; 1,400, 49s. 6d., fuel, neutral.

Refractory Products in Germany.—The German Association of Manufacturers of Refractory Products has been dissolved, the *Ironmonger* reports, but some of the members have formed a new association, with headquarters at Cologne.

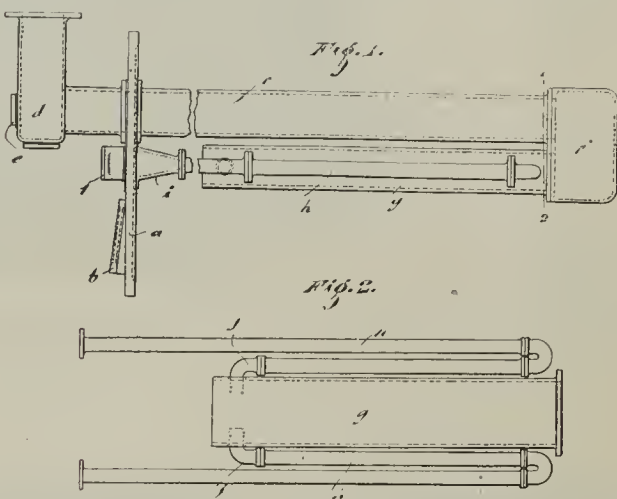
Calcium Carbide.—All calcium carbide, now or hereafter situated in the United Kingdom, except the stocks of persons who do not own more than ½ cwt., has been taken over by the Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Regulations.

Tar Products in Switzerland.—The Swiss Government recently fixed the following maximum prices for tar and tar products:—Distilled or refined tar, in tank wagons, £7 18s. 6d. per ton, increasing to £13 per ton for quantities of less than a single barrel; mixed tar oil, including green oil, £17 9s. 6d. per ton in tank wagons; crude carbolic oil, £18 14s. per ton in tank wagon lots; soft pitch, in wagon loads, £7 18s. 6d. per ton; medium and hard pitch, in wagon loads, £7 14s. 6d. per ton.

Holland's Fuel Shortage.—Advices from The Hague indicate that the lack of fuel is making itself felt more and more in Holland. Railway service has again been reduced—and a number of passenger and freight trains have been taken off. Steam and electric street cars are also diminishing their service, and some of the cars have stopped running entirely. The gas supply is almost entirely cut off from 4 to 9 p.m., and the amount permitted to be used by consumers during other hours has again been reduced. During the coming winter the fuel rations of the households will be at the minimum. These economies in return for Dutch food products is a month contracted for, only a small amount since the beginning of this month under 4,000 tons a day. Dutch exports of 100 to 250,000 tons a month, which is the most pressing needs of the

ABSTRACTS OF PATENT SPECIFICATIONS
RECENTLY ACCEPTED.

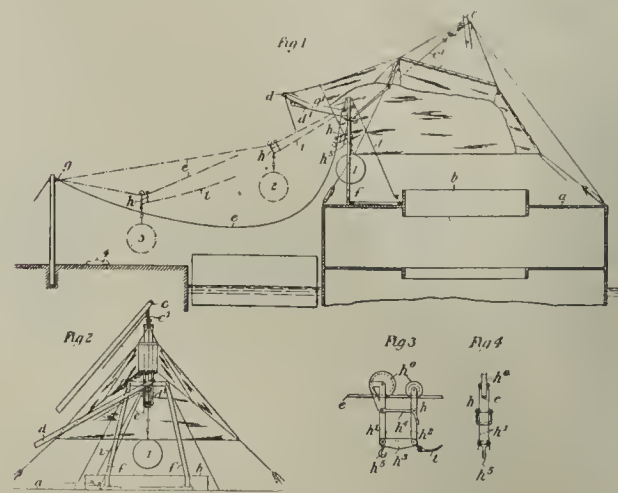
108185. *Improvements in Burners for Boilers, Stoves, etc.* J. J. H. Mackinlay, Priors Lee Hall, Shifnal, Salop.—This invention relates to burners of the type in which the fuel is adapted to enter a retort like conduit located within the furnace chamber. The burner, which is applicable for boilers, stoves, and like heating appliances, is well adapted for use in connection with blast furnace gas or other gas of low calorific value. Fig. 1 illustrates the apparatus in side elevation; and fig. 2 a plan of part of the apparatus shown in fig. 1. In the drawings which illustrate the invention embodied for application to a Lancashire or Cornish boiler, a plate *a* is provided and adapted to be suitably secured to the front of the boiler to close the fire tube. This closure plate may be furnished in its lower part with a cleaning door *b*, and in its upper part two openings are provided, from which gas tubes *c* extend rearwardly, such gas tubes being disposed in the upper part of the flame tube of the boiler, and being arranged in one horizontal plane. These gas tubes are continued forwardly beyond the front plate a suitable distance until they adjoin a common gas box *d*. The latter has a gas inlet conveniently at the top, by way of which the gas is supplied by a suitable conduit, which latter is controlled by a gas valve. On the outer face of the gas box aforementioned, sight holes are provided in alignment with the gas conduits. These sight holes are adapted to be closed by covers or closure members *e* during the operation of the furnace. The gas tubes *c* extend rearwardly within the flame tube of the boiler a suitable distance, equal, for instance, to the distance which a solid fuel furnace might occupy, and at their rear extremities they communicate with a common gas box *f*. The latter at a lower level communicates with a main forwardly extending gas tube *g* disposed in a horizontal plane below that in which the gas tubes last referred to are disposed. This main gas tube may be of oval cross section elongated laterally or horizontally, so as to be of capacity equal to that of the two gas conduits above.



and said lower gas conduit extends forwardly throughout a distance which may, for instance, be about two-thirds of the length of the upper gas conduits *c*, the lower conduit *g* being at its front extremity open to emit the gas which at this point is adapted to burn and flow rearwardly in the vicinity of the external surfaces of the upper gas conduits *c*. The flame or furnace gases are enabled to flow beyond the gas box *f* at the rear of the gas fitting and throughout the length of the boiler flame tube as usual, their heat being thereby diffused into the water. On each side of the lower oval section tube *g* of the gas system, and conveniently disposed in the central horizontal plane of such gas conduit are air supply conduits *h* disposed one on each side. These supply conduits may be of capacity substantially less than that of the gas conduit. At their front extremities they may adjoin the closure plate by conical juncture members *i*, and they extend rearwardly to a point near to the rear gas box *f*. At this point they bend through 180 degs. and extend forwardly in parallelism with, and in the same horizontal plane as, their rearwardly extending parts, and such forwardly extending parts at their fore extremities are bent inwardly as at *j*, the extremities passing through the wall of the gas tube *g* one on each side thereof, and conveniently projecting into the same a short distance, so that the air is admixed with the gas immediately before it issues from the gas system. Air regulators *k* of any suitable or approved form may be provided upon the closure plates appertaining to the front of the boiler, and may be adapted to provide for the control or regulation of the air entering the air conduits *h*. Another sight hole furnished with a suitable cover *l* may be provided centrally in the closure plate at the front of the boiler, this sight hole being aligned with and adapted to permit of access to the oval section gas conduit *g*. (Five claims.)

108188. *Improvements in Lifting or Hauling Gear.* J. H. Walker, 48, Little Heath, Old Charlton, Kent.—This invention relates to lifting or hauling gear of the derrick crane type such as is used for loading and unloading ships, and wherein two ropes are made use of, one of the said ropes being mainly employed for lifting the goods from or lowering them into the ship's hold, whilst the other is used for slewing the load when lifted. Fig. 1 is a diagrammatic sectional view illustrating the arrangement of the present invention in conjunction with hoisting and slewing mechanism of the kind described in the complete specification of Application No. 6173/16, wherein the cableway is so arranged that the loads will travel along the same from ship to quay under the action of gravity; fig. 2 is a view at right angles to fig. 1 looking in the direction of the arrow, fig. 1; figs. 3 and 4 are respectively a side view and an end view of a carrier of the kind shown in fig. 1, but drawn to a larger scale. In the arrangement shown in figs. 1 to 4, *a* indicates the ship's deck, *b* the hatchway, and *c, d* the derricks for the hoisting or lifting rope *c* and the slewing rope *d* respectively. *e* indicates the cableway and *f* the sheer legs temporarily mounted upon the ship's deck and supported by suitable guys, the said cableway *e* being fixed to a rigid support *g* on the quay, whilst the other end of the cableway is passed over a sheave *g* on the sheer legs, and connected to a winch or drum (not shown) on the ship's deck, so that the said cableway may be hauled taut or slackened according to requirements. The sheer legs *f* are fixed in such relation to the hoisting and slewing ropes that the load when lifted above the deck can be slewed to a position between the said sheer legs and hooked on to a carrier *h* designed to run upon the cableway. The carrier *h* may be retained in the desired position upon the cableway during this transfer of the load

by any desirable means. The carrier *h* is connected to one end of a rope *i*, the other end of which is wound upon a winch or drum, not shown, and which serves to control the traverse of the load down the cableway, or to pull a load up the cableway when required. 1 illustrates the position of a load which has been lifted from the hold and is hanging between the sheer legs ready to be transferred to the carrier *h*, and the said carrier is in a position which brings its hook or other supporting device thereon close to the chain or the like connecting the load to the lifting rope,

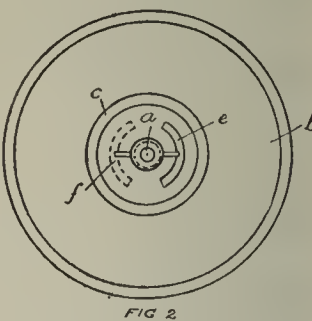
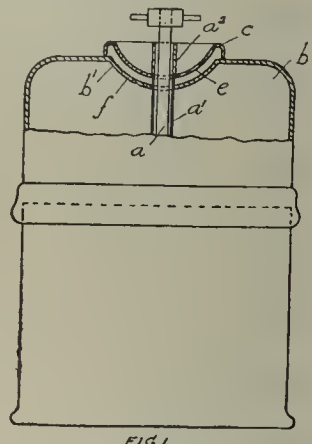


the carrier having been allowed to assume this position by the slackening of the cableway *e* as indicated. When the load has been attached to the carrier, and the lifting rope *c* has been disconnected therefrom, the cableway *e* is hauled taut, with the result that the weight of the load will be taken by the said cableway, as indicated at 2, and allowed to gravitate down the same, the movement being controlled by the rope *i* before referred to. When the load arrives over the point where it is to be deposited, say, at the point 3, the cableway *e* is slackened, and the load deposited. The carrier *h* being now disconnected from the load is again hauled up the cableway by the rope *i*, the cableway being slackened to bring the said carrier into position to receive another load which has in the meantime been lifted from the hold. When the load is deposited on the quay, and before the carrier is drawn up the cableway, an empty sling, as indicated at 4, can be attached thereto if required. (Eight claims.)

108248. *Improvements in Miners' Hand Lamps.* J. L. Conway, 21, Upper Albert-road, Heeley, Sheffield.—This invention relates to acetylene hand lamps, and consists in an improved arrangement of the water regulating spindle

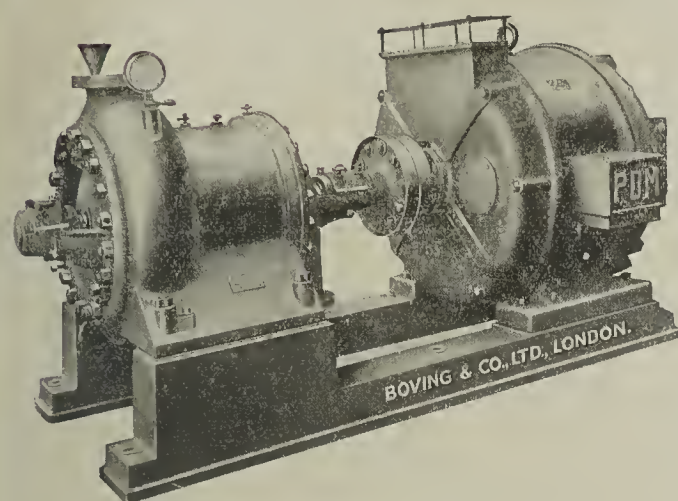
and the filling hole and cap in one combination. The invention will be better understood on reference to the accompanying drawings, in which fig. 1 is an elevation partly in section of an acetylene hand lamp made according to the invention, but showing only such fittings as are necessary to explain the invention; fig. 2 is a plan view of same. The regulating spindle *a* is placed in a centrally placed guide *a*¹, passing through the top of the water vessel *b*; surrounding this spindle guide *a*¹ is a circular cap *c*, which fits in a depression *b*¹, formed in the top of the vessel *b*, but at the same time is free to rotate around the spindle guide *a*¹, said spindle guide having a collar *a*², made integral with or secured thereto to keep the cap *c* in place. The cap *c* has formed in it a filling hole *e*, of any suitable size and shape; a correspondingly shaped hole *f* is formed in the top of the water vessel *b*, and so placed that the hole *e* can by the rotation of the cap *c* be made to coincide with it when the vessel is to be charged with water. It will, of course be understood that the hole *f* in the top of the vessel is normally covered by the unperforated portion of the cap. The cap *c* may be closely on the top of the water vessel, or there may be a space between the two, as shown in fig. 1. Though the cap *c* is described as being dish-shaped to fit a correspondingly shaped depression in top of the water vessel, it will be understood that the cap and the top of the vessel need not necessarily be so depressed, but may be flat, or alternatively the cap and the portion over which it fits may be raised up or dome shaped. (Two claims.)

108213. *Improvements in Electrical Signalling Apparatus for Use in Mines, etc.* H. R. Waddington, 10, Evington-drive, Leicester; and I. H. Parsons, The Croft, Kibworth Harcourt, Leicester.—This invention has for its object improvements in signalling systems, in which the act of originating a signal effects the clearing of the previous signal, the improvements being applicable to signals of the class which may be both audible and visual, such as, for instance, signals which are used for shaft signalling in mines. Fig. 1 shows diagrammatically the arrangement of circuits for instances in which it is desirable to insulate the operating circuit from the maintaining circuit. A shows the low voltage battery, and B, B¹ the high voltage mains. C shows the pushes or contact keys, which are used to originate signals, and D the lamps or other visual indicating signals. E shows the relays, F the operating windings, G the maintaining windings. The contacts of the relays are shown in brush form, J being the brushes, which are preferably insulated from the armatures K, and which make contact with contact blocks L and L¹. M shows the contact breaking and making device, N being the magnet, O an armature (which is pivoted at O¹), O² the driving pawl, P the star wheel, Q and Q¹ the contact springs, which momentarily break the high voltage maintaining circuit. R shows a contact break push or switch for extinguishing the last signal if necessary. S shows a single stroke or equivalent bell, which is connected in series with the magnet N. The signalling apparatus operates as follows: It is first assumed that a signal has

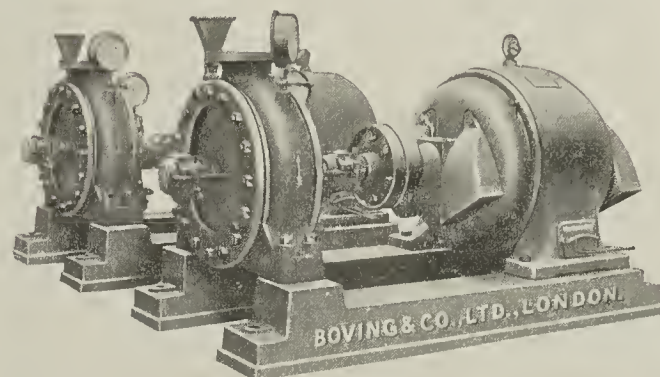


BOVING TURBINE PUMPS.

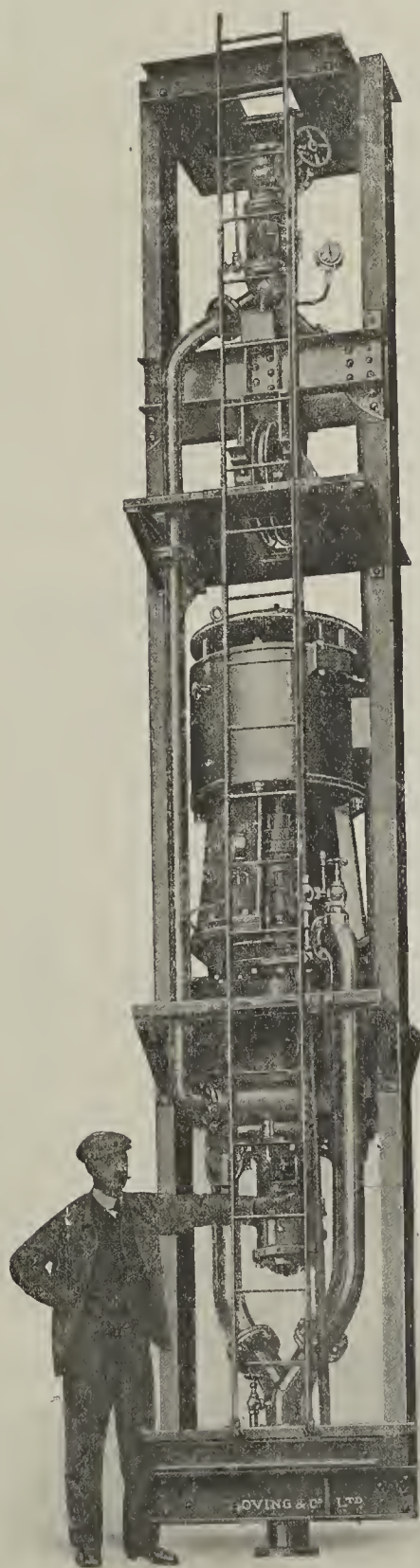
THE MOST RELIABLE AND EFFICIENT
BRITISH MADE PUMP.



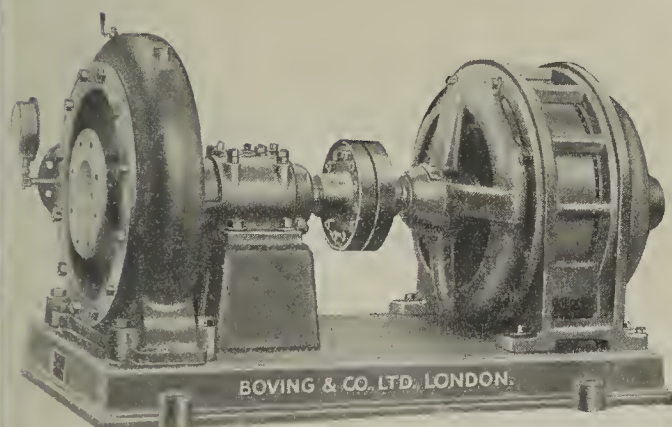
LARGE MINING PUMP
(6 Repeat Orders).
860 g.p.m.
755 feet.
1,450 r.p.m.



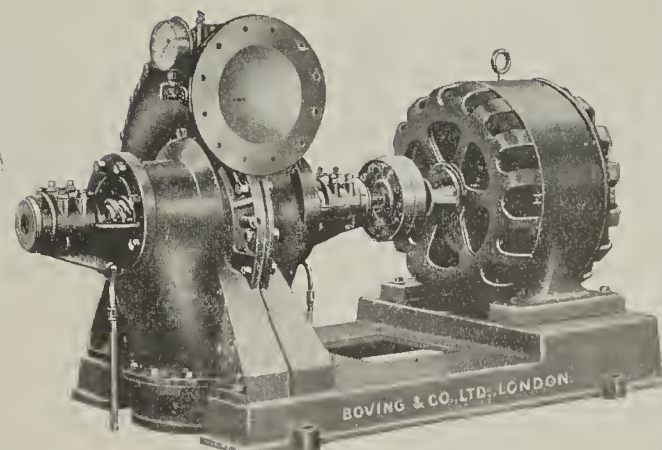
2 SMALL MINING PUMPS.
220 g.p.m.
328 feet.
2,900 r.p.m.



2 SINKING PUMPS
as shown (Repeat Order).
333 g.p.m.
475 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Medium Pressure.
800 g.p.m.
125 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Low Pressure.
3,000 g.p.m.
40 feet.
725 r.p.m.

BOVING and CO. Limited,

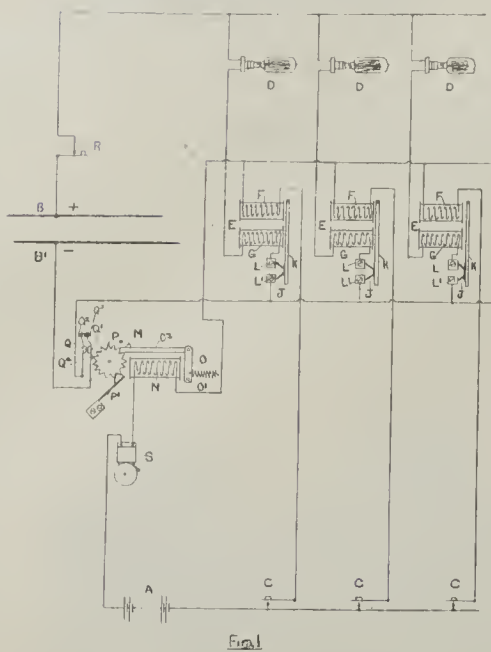
HYDRAULIC ENGINEERS,

Telegrams :
"JENORTEN, WESTCENT."

Telephones :
HOLBORN 6420 (3 lines).

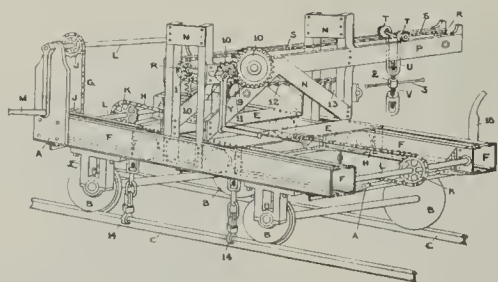
56, Kingsway,
LONDON, W.C. 2.

originated, and that a signalling lamp has been lit. When the pusher C is pressed, the originating current flows through the operating winding F of the relay E. The relay armature K being then attracted, the contacts L and L' are closed by the brush J, and the maintaining current flows through the corresponding winding G of the relay, and the maintaining winding G of the relay, keeping the lamp lit, after the push C has been released.



Meanwhile the electro magnet N of the contact breaking and making device M has been operated, and the common return of the lamp circuits momentarily broken by the separation of the contacts Q, Q'. This breaking and re-making of the contacts is effected while one of the teeth of the wheel P passes from under the supporting block Q', and until the next tooth takes its place. The supporting block Q' is provided with a flat or a slight sink at its apex to form a safe rest for the acting tooth. A jumper spring or back stop click may also be provided, as shown at P'. In consequence of the momentary break of the lamp circuit, the previously lit lamp becomes extinguished, due to the current ceasing to flow through the maintaining winding G of the relay controlling the previously lit lamp, and the breaking of the relay contacts. This series of actions is repeated each time a signal is sent. (Four claims.)

108236. *Improvements in Apparatus for Manufacturing the Doors of By-product Coke Ovens.* E. Blythe and C. Armitage, both of Green-lane, Thornhill-Lees, Dewsbury.—This invention relates more particularly to apparatus for manipulating the doors of by-product coke ovens, but it may be made to serve in applying the quencher to such ovens after the removal of the doors, or for manipulating the doors of other ovens, furnaces, or the like. The drawing is a perspective view of improved apparatus for use on the ram side of by-product coke ovens. The apparatus comprises a framework or truck A on wheels B, which is caused to travel on the customary rails C over the top of the oven doors D in the usual way. Within or upon this truck is a bogie E, caused to travel backwards and forwards upon guide rails or within channel girders F F forming the sides of the main truck A, said movement being imparted by means of chains G, H, and chain wheels J J and K K, shafts L L, and hand lever M or the like. The bogie E carries a gantry or framework N, an arm P of which overhangs the side of the apparatus, with a chain wheel R R mounted at each end, over which passes an endless chain S. Each side of the overhanging arm serves as a race for the wheels T T of a carriage U, to which is suspended a screwed hook bolt V connected by a chain W with the usual eyebolt X of the oven door. The carriage U is also attached upon each side to the chain S, and is moved along the arm or gantry P by a hand lever Y fitting the squared end Z of one of the chain wheel shafts 1 operating the wheels R R. The hook bolt V carries a capstan head or boss 2 operated by lever or tommy bar 3 to raise or lower the hook or the like 4, and ease or raise



the oven door D clear of the ground or of its bearing preparatory to transportation. When desired, the apparatus may also have an additional bearing arm with a ring or the like swivelling upon a bracket attached at the overhung end of said arm. To this ring may be suspended the ordinary quencher, which after the door D has been removed may be swung into position for quenching the coke as it is being discharged from the oven or retort. The apparatus may be anchored to the rails by the clutch irons 14, suspended from the main truck A, or by using twin wheels upon the off side running upon each side of a T or double T girder, all lateral stresses will be prevented from exercising any undesirable effect upon the apparatus. When requiring to remove an oven door, a chain is connected to screw bolt V, and is secured to an eyebolt, and the bar 3 turned to ease the door off its bearing. Immediately the door is suspended the chain wheels R R are revolved by the lever Y, causing the carriage U to move outwardly along the gantry carrying the door D with it until the latter is beyond the brick stays 17, 17, and gas pipes on oven front, when it is transported until opposite the next oven door by the lever M being caused to revolve the chain wheels R R, and chains G, H, as aforesaid, connected to the bogie E on each side of the truck A, and channelled track as desired. The apparatus may remain in this position pending removal of the door from retort. In place of the chain wheels R R, the bolt V may be attached to a pinion on the gantry by a pinion in fixed position, and operated by the hand lever Y. (Four claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

Alley, S. E. Heat exchangers applicable as inter-coolers for air compressors, etc. (13526)
 Andreucci, C. Synthetic production of ammonia. (13630)
 Appleby, E. G., and Bentley, G. H. Apparatus for feeding fuel to gas generators, etc. (13553)
 Appleby, E. G., and Bentley, G. H. Automatic removal of ashes from gas generators, etc. (13554)
 Ashcroft, E. A. Cracking oils. (13593)
 Baumann, K. Axial flow steam turbines. (13532)
 Bell, W. T., and Pitt, C. F. Internal combustion engines. (13682, 13683)
 British Coke Ovens Limited. Regenerative coke ovens. (13618)

British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Armatures for dynamo electric machines. (13311)

Brown, W. Tipping wagons, etc. (13574)
 Casale, L. Synthetic production of ammonia. (13630)
 Chadwick, D. C. C. Reversible rotary engines. (13370)
 Chambers, H. W. Air-driven engines or motors. (13384)
 Charters, J. Portable knee drilling posts, etc. (13453)
 Coadic, J. M. J. Apparatus for removing incrustation from boilers. (13404)

Constantinesco, G. Power transmission. (13326)
 (Cutler-Hammer Manufacturing Company). Liquid rheostats. (13407)

Dahl, H. O. Turbines. (13498)
 Dickie, R. M. Self-indicating shock absorbent exploder bag compressor. (13516)

Easton, R. W. Retorts, coke ovens, etc. (13312)
 Edwards, F. Mill black-plate and sheet opener for tin, etc., works. (13564)

Fletcher, Russell and Company and Fletcher, T. W. Gas burners for furnaces. (13583)
 Foggo, W. Pit props, etc. (13352)

Gorman, F. G. Carriage of gas fuel on vehicles driven by internal combustion engines. (13412)
 Heard, W. H. Internal combustion engines. (13609)

Hill, H. Non-rigid gas holders for motor vehicles. (13283, 13284)
 Hjort, V. F. Purification of water. (13390)

Howden and Company, J., and Hume, J. H. Furnaces. (13382)
 Hutchins, T. W. S. Grabs, etc., for mechanical handling of material. (13396)

Jolly, J. C. Collapsible gas holders for motor vehicles. (13641)
 Jones, T. A. Miners' etc., safety lamps. (13437)

Lassen, J. J., and Menzies, S. H. Purification of water. (13390)
 Lea, E. C. Earth boring apparatus. (13535)

Ligotti, O. Armature without commutator for direct current machines and single-phase motors. (13527)
 Lindley, W. Apparatus for driving tunnels, headings, etc. (13486)

Ludwigsbergs Werkstads Aktiebolag. Rotary pumps or engines. (13561)
 Morris, T. A. Mill black-plate and sheet opener for tin, etc., works. (13564)

Munn, A. L. Current motors. (13559)
 Nesbitt, F. J., and Whittle, R. W. Apparatus for removing scale, rust, etc., from metallic, wooden, etc., surfaces. (13285)

Nobel, A. Air-driven engines or motors. (13384)
 Orlebar, B. O. C. Earth boring apparatus. (13535)
 Paratore, G. Electrical and mechanical apparatus for direct current motors. (13399)

Parsons, H. Gas containers for motor vehicles, etc. (13568)
 Pease, E. L. Extraction of ammonia from gases. (13560)

Pease, E. L. Extraction of ammonia from gases and vapours, and production of nitrogen compounds. (13608)
 Perry, H. B. Air-driven engines or motors. (13384)

(Pirani, S. G.). Method of obtaining motor fuels and light paraffin oils from shale, and benzene, toluene, and solvent naphtha from coal. (13485)
 Poore, P. Treatment of wood, peat, etc. (13321)

Robertson, U. M. Pit prop. (13459)
 Robinson, J. Rotary engines. (13355)
 Russell, C. H. Carriage of gas fuel on vehicles driven by internal combustion engines. (13412)

Santangelo, M. Synthetic production of ammonia. (13630)
 Schmidt, H. F. Turbines. (13491)
 Schuster, F. M. N. Regenerative coke ovens. (13618)

Singleton, J. H. Gas burners for furnaces. (13583)
 Spicer, F. Liquid fuel for internal combustion engines. (13439)
 Spina, E. Lanzerotti. Internal combustion engines. (13570)

Swanell, C. T. Rotary internal combustion engine. (13639)
 Ter Cock, C. Gas receptacles. (13552)
 Thomas, R. P. Mill black-plate and sheet opener for tin, etc., works. (13564)

Thomson, H. J. Internal combustion engines. (13570)
 Topham, W. Regenerative gas furnaces. (13652)
 Tozer, C. W. Retorts, coke ovens, etc. (13312)

United Automobile Services Limited. Collapsible gas holders for motor vehicles. (13641)
 Whitehouse and Oldham. Gas equipments for motor vehicles. (13642)

Wilson, F. D. Carriage of gas fuel on vehicles driven by internal combustion engines. (13412)
 Worrall, H. O. Gas containers for motor vehicles. (13269)
 (Worthington Pump and Machinery Corporation). Centrifugal pumps. (13329)

Zobell, J. Multi-cylinder internal combustion engines. (13555)

Complete Specifications Accepted.

(To be published on October 11.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.

11674. Rhodesian Enterprises, and Molesworth, H. B. Means for the application and transmission of motive power to machinery whereby the direction of rotation may be reversed, and continuous rotary movement converted into reciprocating movement. (109463)

12623. Symons, E. B. Crushing machines. (109464)
 12687. Boving, J. O. Electric furnaces. (109465)

12721. Drayton, T. J. B. Internal combustion engines. (109466)

12784. Bates, C., and Cunis, W. E. Pumping apparatus. (109469)

12809. Ellison, H., and McLay, J. A. Centrifugal or turbine pumps. (109470)

13048. Ross, S. J., and Schofield, H. Blow-down or mud-discharging arrangements for steam boilers. (109483)

13443. Anschutz and Company. Dynamo electric machines. (101554)

15478. Bostaph, H. P., and Bostaph Engineering Company. Process of obtaining coke and by-products from coal. (109523)

16267. Cummins, W. R. Internal combustion engines. (109531)

16455. Gaisman, H. J. Internal combustion engines. (109534)

16559. Spencer, E. Tip wagons. (109536)

1917.

590. Bruce, D. E. Liquid level indicators. (109559)
 1912. Rosenberg, I. Method of converting highly viscous mineral oils or highly viscous residues from the distillation of mineral oils into hydrocarbons of less viscosity. (109572)

2008. Hughes, G. (Buholzer, L.). Flue tube and like fittings for retarding the flow of heating gases. (109573)

4203. Walker, F. Construction of concrete blocks for lining pit shafts and for other suitable purposes. (109582)

5061. Symons, E. B. Crushing machines. (109585)
 8988. Hoover, C. P. Purification of water. (107967)
 10941. Symons, E. B. Crushing machines. (109603)

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1917.

11786. Akt.-Ges. Brown, Boverie et Cie. Method and apparatus for preventing pumping in centrifugal compressors. (109611)

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named **post free**.

Dominions Royal Commission—Royal Commission on the Natural Resources, Trade, and Legislation of Certain Portions of H.M. Dominions: Minutes of Evidence Taken in the Central and Western Provinces of Canada in 1916 (Part I.). Price, 4s. 6d. post free.

Report of the Chief Registrar of Friendly Societies for the Year ending December 31, 1916—Part A, Appendix A: Particulars of Valuation Returns. Price, 1s. post free.

Commissions and Committees on Questions Arising Out of the War: List of Certain Commissions and Committees Set Up to Deal with Public Questions Arising Out of the War (in continuation of Cd. 8256). Price, 3d. post free.

Report of the Departmental Committee on Underground Mining Contracts: Witwatersrand Mines (dated July 5, 1917. Price, 2s. 6d. post free.

Annual Colonial Reports: (No. 929), Seychelles Report for 1916 (dated September 1917). Price, 1½d. post free.

Education (Scotland). Regulations, September 17, 1917. Made by the Scotch Education Department, as to Grants to School Boards in Respect of the Medical Treatment of Necessitous School Children During the Year ending December 31, 1918. (Cd. 8748). Price, 1½d. post free.

National Food Journal (No. 2), September 26, 1917. Price, 2½d. post free.

Statutory Rules and Orders, 1917: (No. 939), Defence of the Realm, Ministry of Food, Milk (Prices) Order, September 7, 1917. Price, 1½d. post free.

Scottish National Building Code: Regulations for Entering Into and Carrying Out Contracts for Building Works in Scotland, together with General Conditions of Contract and Form of Contract. Price, 8d. post free.

County Courts (Plaints and Sittings), 1916, Returns. Price, 3s. 4d. post free.

House of Commons Debates (Vol. 93). Price, 6s. 3d. post free.

PUBLICATIONS RECEIVED.

Memoirs of the Geological Survey of India: (Vol. 45, Part 1), "The Geology of North-Eastern Rajputana and Adjacent Districts," by A. M. Heron, B.Sc., F.G.S., Assoc.Inst.C.E., Assistant Superintendent, Geological Survey of India (London: Messrs. Kegan Paul, Trench, Trübner and Company), price Rs. 3, or 4s.

"The Engineering Review" (Vol. 31, No. 3), Sept. 15, 1917, post free 8d.

Coal Licences for Italy.—Cardiff coal exporters have been notified that it has been arranged with the Italian Government Commission that new licences for the export of coal into Italy shall be issued with validity for the quarter November 1, 1917, to January 31, 1918. In pursuance of the new authorisations to be issued by the Italian authorities, as the existing licences are valid only to September 30, 1917, it has been decided that their validity shall be automatically extended until midnight of October 31 next, and the necessary instructions have been communicated to the collectors of Customs, so that in the case of licences affected by this arrangement, no application to the War Trade Department for extension will be necessary.

Twefontein United Collieries.—This is the title of the company referred to in a paragraph of July 27 as having been formed to amalgamate the coal interests of the Henderson's Transvaal Estates and the Rand Selection Corporation. The properties consist of the freehold of the proved coal farms Twefontein and Waterpan, 13,000 acres in extent; some 1,650 acres freehold at Oogies; 1,640 acres of coal rights adjoining Oogies, and over 1,300 acres of coal rights in the Ermelo district. As a member of the Transvaal Coal Owners' Association, the new company will have an assured output, on the basis of present trading, of 96,000 to 100,000 tons per month, and will thus be in the position of the largest coal producer in South Africa.

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Areas of Deposition of the Coal Fields of Western Europe.*

By G. BLAKE WALKER.

At a recent meeting of the institute,† Dr. Scott described the plants and trees which constituted the forests of the coal age. A lecture on such a subject from so eminent an authority could not very well be either criticised or usefully discussed; but perhaps if it is not possible to say much about the botanical characteristics of the coal-forming trees, it is possible to discuss the forests themselves, and enquire what was their original extent and location. In connection with this, there is the practical question of such concealed coal fields as in all probability underlie portions of England, but where they have yet to be proved. Evidence on this latter subject had been given by Prof. Kendall, and also by Prof. Lapworth, Mr. Walcot Gibson, Dr. A. Strahan, and others. Their conclusions are to be found in the report of the Royal Commission on Coal Supplies, the *Memoirs* of the Geological Survey, the *Proceedings* of the Society of Arts, and other sources, but the writer is afraid that these were not sources available to a good many of the members, especially the younger ones, to whom the subject was presumably of interest.

It is, of course, known to everyone that changes of areas from sea to land and from land to sea caused by the fluctuations of the earth's crust, were going on all through geological time, and that in the earlier epochs of the earth's evolution these upheavals and subsidences were on a larger scale than in more modern times, because the crust was thinner and more flexible. The British Isles must always be regarded as a part of the European continent, with which up to a comparatively recent period they were usually united; and, not only so, but that at certain times the continental area extended far out into the Atlantic—possibly right across to Canada.

Coming now to the epoch immediately preceding the deposition of the coal measures, that is, the devonian age, this was an epoch of great change, upheaval, and denudation, elevation, volcanic action, and mountain building. In fact, the crust movements which took place at this time may be regarded as the first important stage in the building of the British Isles.

Prof. Fearnside had pointed out that the wonderful uniformity and verticality of the cleavage of the cambrian and ordovician shales producing the slates of North Wales was the result of the compression and elevation of that region, during the great crust movement coming from the north-west at the beginning of devonian time. The volcanic rocks (granites and felsitic lavas) on both sides of St. George's Channel, which were the result of great igneous activity, as evidenced by the intrusive sills and dykes in the ordovician rocks of co. Waterford and Pembrokeshire, were also erupted during the lower devonian period. We were thus enabled to realise the fact of the uplifting of great land masses to the north-westward which constituted the geographical conditions which made the accumulations of the succeeding carboniferous period possible.

In the North of Scotland at the same time immense forces were operating. The crumpling up of the north-west area and the piling up of huge masses of material on one another, must have produced a mountain chain of great altitude, perhaps grander and loftier than the Alps.

Carboniferous Period.

According to Mr. Jukes-Browne, the history of the carboniferous period is a great contrast to that of the devonian. The latter is mainly concerned with the building up of a great continent with lofty mountain ranges, immense volcanoes, broad valleys, and large lakes or inland seas. The carboniferous period witnessed the slow subsidence of this continent and the gradual detrition of the mountain ranges, some of which were reduced to islands. As the subsidence decreased, or became intermittent, we have a record of the spreading out of detritus in shallow seas to form the vast swamps in which our coal measures were deposited.

Below the coal measures we have a great mass of lower beds, reaching in the North of England a total thickness of 9,000 ft., which belong to the carboniferous group. They consist of sandstones and limestones. They are very largely developed in Ireland, and we therefore know that a very small portion of what is Ireland to-day was above water in carboniferous times. The growth of the crinoids, mollusca, corals, etc., in these limestones indicate conditions of clear, but not necessarily deep water, whereas the coarse grits and sandstones which succeeded them must have accumulated in the proximity of the shore, borne down by rivers whose considerable currents were capable of carrying down huge quantities of rough sediment. The limestones of the lower carboniferous strata have been subdivided into five groups, accord-

ing to their characteristic fossils, but in most localities several of the groups are usually absent. The organic constituents of the carboniferous limestone of the North of Yorkshire, Cumberland, and Durham consist, according to Mr. Goodchild, of brachiopods, mollusca, crinoids, polyzoa, corals, and foraminifera; but he says none of it can claim to be regarded as a coral reef, although corals flourished there in great abundance. (The massive limestones of Settle belong to the upper part of the lower limestone series.) It seems evident that the northern carboniferous sea extended southwards nearly to Shrewsbury, and its southern shore trended eastward by Lilleshall, Cannock, and Rugeley (where the limestones do not exceed 150 ft. in thickness, the principal fossil being *Productus giganteus*). Still further east, at a distance of about 30 miles, is Charnwood Forest, on the north side of which small patches of carboniferous limestone crop up at the surface, and are known to belong to the highest part of the Derbyshire series. These beds are believed to be bedded against the northern slopes of the pre-Cambrian ("Charnian") rocks, and are the most easterly surface exposures of such limestone in the Midlands. It seems probable that a narrow isthmus of land crossed England and separated the northern and southern sea

local change, but one which affected the whole of the North European region, and led to the formation of that series of shales, clays, sandstones, and coal seams commonly called coal measures. Prof. Green thought the change was caused by the blocking up of the communications between the inner and outer sea, so that the former was converted into a large fresh water lake. The subsidence and ceaseless wear and tear of atmospheric denudation gradually lowered the elevated tracts; and the rivers descending by gentler gradients lost by degrees the power of moving coarse heavy detritus. So with the lapse of years, the amount of sandy sediment grew less and less, and sandstones formed a gradually decreasing item in the deposits in process of formation. All the deeper parts of the carboniferous sea seem to have been filled up by the sediment which had been so continually poured into them, so that practically the whole of England, the greater part of Ireland, and the western part of Germany, Belgium, and the North of France had been converted into one vast area of low-lying swampy flats, riverways, and lagoons.

Most of Southern England was part of the great area of deposition, as also were many parts of the continent, as far east as Russia. Mr. Jukes-Browne therefore concluded that over a large part of what is now Europe there existed large tracts of alluvial land but little above the sea level—the co-terminous deltas, in fact, of the rivers which drained the surrounding land, just as Holland is the co-terminous delta of the Rhine



AREAS OF DEPOSITION OF THE COAL FIELDS OF WESTERN EUROPE.

basins. At Nuneaton, the coal measures have been proved to rest directly on Cambrian shales, the limestones and older intermediate formations being absent.

The coast of the carboniferous continent ran northward from Donegal, in Ireland, to the West of Scotland (Mull), and then, turning eastward, crossed the Central Highlands and through Kincardineshire into the area now covered by the North Sea. From the increase in the thickness of the sediments, he thinks that the Scottish Sea probably terminated in a landlocked gulf, which stretched north-eastward into the land, and into this gulf one or more large rivers must have emptied themselves, bringing much sand and mud from the land to the north and north-east. The entire absence of the carboniferous rocks over the whole of Scandinavia, Lapland, and Finland, renders it highly probable that all this region formed part of the great northern continent which stretched across the North Atlantic, to include Greenland and the greater part of Canada.

The upper carboniferous, which includes the coal measures, represents a period of immense duration and great uniformity of climate and conditions. A great change occurred in the middle of the period, producing a gradual shallowing of the water, and leading to a great extension of those shallow water, sandy, and shaly deposits which had hitherto only been formed round the margin of continental land. This was no

and Meuse and other rivers. It is as if an area as large, or larger, than the Mediterranean Sea were slowly silted up and converted into one enormous swamp. To bring about such a result there must have been many rivers of large size emptying themselves into this sea—rivers comparable to the largest which now exist in the world—and the surrounding continents must have possessed high mountain ranges, and been watered by a copious rainfall.

On these alluvial swampy plains the forests, to which Dr. Scott referred in his recent paper, grew, and their remains accumulated to form eventually the coal which we extract and utilise in our own day.

Subsequent Disturbances.

Coal was originally, of course, laid down in horizontal beds, and over continuous areas of great extent. But we find the beds faulted and dislocated, and the horizontality changed into inclination varying in degree from nil up to the vertical. Coal is found in detached basins separated by barren intervals, in which folded rocks of earlier date intervene, and which show that the coal has been denuded by atmospheric agencies and carried away. These folds are the effect of pressure which seems to have been mainly exerted soon after the close of carboniferous time, during the pre-permian (stephanian) period. It is very interesting to see the evidences of this great crust movement

* From a paper read before the Midland Institute of Mining, Civil and Mechanical Engineers.

† *Colliery Guardian*, August 10, 1917, p. 251.

of France, particularly in Brittany (from the name of the "Armorican" folds was derived this crust movement the existing formation of the basins in the South of England and in France and Belgium is due. Another movement, perhaps contemporaneous, has been styled "Hercynian," from the ancient Hercynian Forest of Central Germany, where it was typically developed. The older rocks of Belgium belong to the cambrian and silurian systems, and form from south to north four successive ridges, which the French call "massives." The three most southerly form part of the Ardennes, while that of Brabant constitutes the basal formation of Central and Western Belgium, overlaid by secondary and tertiary deposits. The study of the cambrian and silurian rocks shows that these underwent a previous displacement after being deposited and before the uplift in devonian times, of which mention has already been made. There is accordingly generally nonconformity of stratification between the cambro-silurian and devonian, which in its turn is overlaid by the carboniferous. Between these ancient ridges the corresponding synclines are found in which are preserved what remain of the coal deposits which once extended horizontally over the whole area. Complete information on these folds is given in the authoritative work of M. Fourmarier, who co-ordinated, verified, and completed by his personal observations the studies of his predecessors, and particularly those of De Walque and Lohest.

The German coal fields of Rhineland and Westphalia are a continuation of those of Belgium to the eastward. Like the latter, they occupy parallel troughs or synclines, and they correspond with the valleys of the rivers Ruhr, Emscher, and Lippe. The coal field of the Ruhr corresponds with the Belgian basin of Hainault, and between them is the coal field of Aachen and Eschweiler. That of the Emscher passes into Dutch Limburg, where it is being developed. Its continuation beneath the Campine of Northern Belgium was surmised, and the pertinacious explorations of M. André Dumont were at last rewarded, in 1901, by the discovery of workable coals, but at a great depth. After this success had been attained the strata of the Belgian provinces of Limburg and Antwerp were pierced by numerous boreholes, to the number of 64 within three years. "However," writes M. F. Schmidt, in his treatise on the Campine basin, "notwithstanding these favourable results, many engineers remained sceptical as to the possibility of working the new area commercially. It was feared it would not be possible to carry pits down through such a thickness of barren water-bearing strata as those of the Campine. But with the advance of mining science during recent years, there was no doubt the difficulties might be tackled with confidence."

Again, the coal measures of the two northern of the Rhineland basins have been proved to pass into Holland, and boreholes have been put down by the Dutch Government on their side of the frontier in Limburg, Gelderland, and Overijssel, the results of which have been recorded in the report of M. Von der Graacht, Director of Exploration. The coals lie deep. At Helenaveen, the coal measures were found at a depth of 914 m. below the surface, and the following seams were proved at the following depths:—

Seam.	Depth.		Thickness.	
	M.	Ft.	Cm.	Ft. in.
I.	987	3,238	60	2 0
II.	1,016	3,333	69	2 3
III.	1,025	3,363	73	2 5
IV.	1,076	3,530	55	1 10
V.	1,127	3,698*	145	4 9
VI.	1,225	4,019	84	2 9
* Three bands.				
Per cent.				
Volatile matters	= 35-28			
Ash	= 9.14-2.85			

This boring was fairly representative of the coals found in others, but in most of the borings at any distance from the German frontier the depths at which the coal measures were reached exceeded the 1,200 m. limit, beyond which it was not considered worth while to push them. M. Von der Graacht remarked, however, that as coal became scarcer, it might be a commercial proposition to go deeper.

It seems, however, highly probable that, as already stated, the coal measures exist under the North Sea along the line of the east to west synclines, and underlie the eastern counties of England, though overlaid by secondary and tertiary deposits. We have, however, to take account not only of the east and west folds, but of those running north and south like the Pennine ridge, which separates the coal fields of Yorkshire and Lancashire, Cheshire, and North Staffordshire. This problem has been carefully studied by Prof. Kendall, Mr. Walcot Gibson, and others, and it is for these gentlemen to say what they think about the probability of concealed coal fields between the present working areas of the North Midlands and the North Sea. If, with Mr. Jukes-Browne, we assume that coal once was laid down over the whole area, it is surely a matter of national concern to prove its existence or non-existence. What it was worth while a small country like Holland to do is surely worth doing by our own Government. In these days there is a good deal of talk about "nationalisation of mines," but it would not be just to take the fruits of their enterprise from the people who had proved and developed our mineral wealth, on whose enterprise the prosperity of the country depended. There would, however, be justice (and expediency) in treating as national property any concealed coal which had been discovered at a great expense. The discovery of a coal field could not only mean an immense increase in the wealth of the nation, but the royalties on such coal would repay over and over the cost incurred in systematic boring, conducted under expert advice.

In my opinion, it is the business of an authority such as the Midland, to study the problem,

and use whatever influence it possesses to induce the Government to take up the work of boring in the most likely areas.

DISCUSSION.

Prof. FEARNSIDES, in opening the discussion, agreed that the points raised by Mr. Walker were of great public importance at the present time. The authorities had already decided that they were going to explore the country for oil, with the idea that the country should have for itself, very largely, the oil that was found by public exploration; and he thought that the idea ought to be carried further, and that the authorities should tell them what minerals existed in our underlying rocks. Turning to the scientific aspect of the paper, he should like to ask Mr. Walker whether he had studied in detail the difference between the boundaries of the area where there was coal and the area where there was no coal—the difference between the character of the boundary around the area which some of them had called St. George's Land, extending from Ireland across the St. George's Channel, including the high lands of Middle England, and possibly extending down into Belgium. He should like particularly to know whether any evidence had been collected for justifying the extension of the ridge into Belgium. In Ireland, and also in England and Wales, the surface against which the coal measures rested was one of old land—the coal seams came up and ended off abruptly. It had never been proved, so far as he could find, how the coal measures ended off against the hill masses in North Ireland, nor yet in the Highlands of Scotland. All the boundaries that they had got on their coal deposition area hitherto known had been faulted boundaries. He thought there was plenty of justification for believing that there was in carboniferous time an old land extending up there, but the evidence was not before them. There was evidence in South Wales and in the Forest of Dean, and extending up northwards into Shropshire, that the South Welsh coal field ended up because there was land in front, and there was no coal deposited over the ridge. But it had not been proved how the South Welsh coal field ended off southwards. There was also a coal field in Dover. It had not been proved, to the north or to the south, whether that coal field ended against a ridge, or whether it was cut off by folding, by the upturning of the edges, or by a fault. He was not sufficiently familiar with the information which had been obtained from the deep borings on the borders of Holland, to know if the boreholes had proved whether the Campine coal field ended southwards against a surface of unconformity, or whether it was a coal basin made by the bending of the rocks. The reason why these things had not been proved was that it had never been worth while for any owner of a mineral royalty in a small area to explore beyond his own boundaries. If matters were taken up on a national basis, it was clear that one of the first things they would have to ask was: "What is the boundary and what was the original area over which the coal seams were deposited?" It was very useful to explore by boring in places where there was reasonable hope that the coal seams were deposited, but if there was scientific evidence that the coal seams ended off before they got so far, then he thought that geologists, having been given the evidence to argue from, might prevent the waste of public money. He himself thought that that was the main question to determine. He thought that Mr. Walker, in presenting that paper, had been bolder than any professional geologist would have ventured to be with regard to putting on his map the area of deposition and the parts outside that area where there was no deposit. Mr. Walker had asked him many times if he could present a map to show what he (Mr. Walker) had shown that day, and the speaker had always asked him in return: "At what epoch during the whole course of the very long period of the coal measures do you wish the distinction of land and sea to be made?" The time from the earliest coal seams growing and being deposited in Scotland, to the latest times when coals were being deposited, say, in the Saarbrück coal field—which was not an area where the coals belonged to coal measures in our ordinary way—was an exceedingly long one. He thought Prof. Kendall would agree with him that the length of the period was probably at least as great as the time which had elapsed since they had the chalk ocean over the whole of Great Britain. It was a very long period indeed, and there were a great many changes in the course of that long period. To generalise, and say that they had an area such as was shown on Mr. Walker's map, was certainly very useful, but whether it was safe was another matter altogether. Geologists would rather somebody else put up a map, and gave them something to shoot at, than make themselves responsible for presenting a pictorial answer to the question in point. He hoped someone would tell them whether the extension, that Mr. Walker showed, of St. George's Land across the North Sea into Belgium was an extension which they could know represented land that existed in the coal measure period, or whether it was merely an extension of land which they knew existed under London and under East Anglia during mesozoic times. He had a suspicion that evidence went to show that that great plateau of Central Belgium—the plateau of Brabant, he believed it was called—dated not to the carboniferous at all, but only to the cretaceous.

Dr. SCHMIDT said that in Central Belgium they had a plateau of silurian and devonian rocks, covered by cretaceous, not carboniferous. Down another tract (which he indicated on the map) it was believed to be caledonian, but possibly it was older. In the south, the coal fields were ended, it was thought before, by a big fault. This fault ended near Liège, where the dip was about 45 degs., whereas in France it was only 20 degs. Near Vimy, they had first the cretaceous rocks, and then they found immediately the devonian and silurian rocks, followed by the cretaceous again, so that when they were going through the older rocks they found the cretaceous rocks, which were folded and coming up. They also found this movement more in the north, in Hainault. He knew of one colliery, for

instance, which was bought by some people who had to pay a certain sum for it six months after having made a borehole to see if the colliery was worth that sum. When the borehole was finished, however, they were not ready to pay the money, and they went slowly boring further on until they found the true carboniferous deposit, so that for a small sum they had a very rich colliery. This happened two or three years before the war. Some 34 holes were afterwards put down in the same district, and much good coal was found just under the folded part. He did not think the Campine coal field was ended by a fault. Many of the boreholes in the southern part had been drilled, in former times, for water, and all ended in the cambrian rocks. The coal measures rose up near Antwerp, so that the first idea was that it would be possible to find coal there at a much shallower depth than in the other part, and, just before the war, the Dutch Government began a borehole near Antwerp. More to the north, coal was found not only near the German frontier, but also in Central Holland. There seemed to be a part near Utrecht where coal was not so deep—about 700 m.—and it was generally thought that there were seams at several depths there.

Prof. KENDALL said it was about 15 years since he looked into the question of the extension of the coal fields into Northern Belgium, and considered their relation to the British coal fields, but he reached no very definite conclusion. But on the question raised by Prof. Fearnside, as to whether the carboniferous rocks were ever deposited over the ridge of ancient rocks that now separated our northern suite of coal fields from the southern, he thought it was possible to arrive at some approximate conclusion. They saw that both from the south and from the north the carboniferous rocks thinned up, but the thinning was also accompanied, at any rate, on the south, by numerous gaps in the succession, so that, whilst individual members of the carboniferous series thinned off, certain of them were lacking. Though that might apply to the carboniferous series as a whole, it need not, however, necessarily govern the coal measures. They might have the lower rocks of carboniferous limestone, millstone grit, and so on, thinning off against the ridge, but the coal measure period was a period of comparatively slow and regular subsidence, and thus it came about that the coal measures transgressed the other members of the carboniferous series, extending as the subsidence progressed, so that the area of deposition increased, and they found coal measures overlapping the other members of the carboniferous series, and resting upon very ancient rocks beneath. Anyone who knew the Dudley district of Staffordshire would know that the coal measures there had overlapped all the lower members of the carboniferous series, and rested upon silurian rocks. In his young days, they could see coal being got by open working on the top of a hill consisting of silurian rocks, with no carboniferous rocks there, and he had a suspicion that similar conditions would be found to prevail rather extensively along the southern margin of the northern area. There was a significance, for example, about the thickness of the coal beds themselves. He had been a diligent reader of the *Transactions of the Federated Institution* and of the several local institutes, and he was much interested in a remark by Mr. Walton Brown, who, in the discussion on a paper, said he believed that the mass of measures intervening between the coal seams was local, that they ought to regard the coal measures as a coal seam, and that, if one could get towards the edges of the area of deposition of the measures, the seams would close up. It was a remarkable thing that, along the southern sides, they had the great main coal of the Leicestershire coal field, and the great thick coal of Staffordshire. The latter, in the course of a few miles, split up into a great many subdivisions, so that he thought, in about $4\frac{1}{2}$ miles, there were 500 ft. of measures between the top element of that seam and the bottom. That was a very striking thing, and it certainly lent some support to Mr. Walton Brown's suggestion. If they traced the millstone grit, they saw how it thinned towards the south. If they traced the old ridge, the individual grit members disappeared, and, so far as they knew, down towards Birmingham the whole series was gone, unless it was represented by shales. The Belgian coal measures were very steeply folded on the south side, but on the north side, in the Campine, they fell away with a very gentle slope. That great *massif*, the Brabantian horst, stood out as a species of buttress against earth pressures operating from the south, and, whilst the southern fields were severely folded against that rigid buttress, the northern field was comparatively little disturbed. The coal seams appeared to proceed towards that barrier, perhaps with considerable variations of thickness, but he was unable to discover any evidence that they showed such a degeneration as would indicate that they were actually coming to an end, and that the barrier which we found between one coal field and another was a barrier between one area of coal deposition and another; so that he thought it was quite possible, and even perhaps likely, that the seams of the south were once continuous, over the top of that anticline, with the seams of the north. When he went to Liège, he was greatly struck with the constitution of the barrier to which Dr. Schmidt had referred. He was shown a number of cores of boreholes which had been put down in that area, and, besides the red rocks of very doubtful age—he did not know what the ultimate decision was as to the age of certain red rocks that ribbed up towards the north, apparently in a long trough; besides these there were certain exceedingly hard slaty rocks which were the most exact counterpart, in appearance at least, of the hard slaty rocks that were found in deep borings in East Anglia—at Harwick, at Weeley and Stutton, near Ipswich, and at Culford. He believed that a comparison was instituted between these and some of the hard slaty rocks that reappeared in the Charnwood Hills. Some years ago, a borehole was put down at Lowestoft, and he had the opportunity of handling some samples of material obtained from the bottom. Dr. Lapworth had expressed the

opinion that the specimens were more of a silurian aspect. That would imply, of course, that they were getting into a different region, and that the ancient fold of Charnwood had apparently thrown off silurian rocks upon the north side, as they knew that the London paleozoic plateau threw off silurian rocks on the south side. These facts of East Anglian geology led him to think that there was no direct connection, across there, at any rate, of our coal fields with the Campine. But he did think that it was highly probable that, under the North Sea, an extensive area of coal measures would ultimately be found. The North Sea was a mere film of water, and he thought it highly probable that the conditions of the Campine and of the Low Countries generally would be found to be continued under that film. However, they had absolutely no evidence of the existence of a coal field there. It had been said that the coal which was occasionally dredged up from the North Sea was from some submerged outcrop, but he did not think there was any justification for that view, much as he should like to believe it. As to the exploration of suspected areas, he quite agreed with Mr. Walker that that was a thing for the Government. It was too precarious for private individuals to undertake. They might, as was done a few years ago at Scunthorpe, put down a very expensive borehole, and get evidence that was chiefly of use to their neighbours, but of no profit to themselves. The Government could undertake that, and could recoup themselves by levying a royalty upon this entirely unproved, and perhaps to individual land owners unsuspected, source of wealth beneath the surface. It would have to be done, of course, with great circumspection, and after very careful deliberation. The sites should be selected not merely with a view to prove whether coal was there or not, but to prove the structure of the country. That was what they did in the South of England, at Battle. A deep borehole was put down there, partly by public subscription and partly by Government grant. That was done not to find coal, as the vulgar supposed, but to prove the structure of the earth, and that was the only purely scientific exploration of the depths that had ever been undertaken in this country, so far as he was aware. It gave them a wealth of information, and, in connection with commercial enterprises in Kent, had enlarged their knowledge very greatly. Reverting to the North Sea, that body of water interestingly illustrated a question concerning the deposition and formation of coal seams. When he was new to the task of expounding geology to miners, he searched the world over to find any deposit of vegetable matter—peat, for instance—at all comparable in area with our great coal seams. After hunting up the records of borings in the Mississippi, the Amazon, the Ganges, and so on, and searching the great deltas of the world, and giving them up because he could not find anything comparable, he found that we had it at our own door. Almost entirely round the British Isles there was a fringe, a submerged forest of peat deposit, that had been lowered beneath sea level by depression amounting to about 60 ft. It might be somewhat patchy in places, but it was almost certain that that submerged forest extended completely across this shallow water area—the fishermen dredged up masses of peat from it—and underlay a great part of Holland. So that there was an area of 50,000 square miles, which would make a very tolerable coal seam, enough to make anybody's mouth water. If it extended also under Holland, it must be an incipient coal seam of even greater extent. Like the North Sea, however, it had plenty of breadth and length, but not very much depth. It was only about a couple of feet thick, he thought.

Mr. A. GILLIGAN (Leeds University) said he wished to say a word or two in favour of some of the lines which Mr. Blake Walker had got on his map. The information which he had upon the subject was not yet published in *extenso*, but he hoped it soon would be. The line that Mr. Walker had drawn for the northern part of the area where deposition went on was more or less correct. It was impossible, as Prof. Fearnside said, to draw an absolutely correct line. Over 50 years ago, evidence was brought forward by Dr. Sorby with regard to the origin of the detrital material which we had in our carboniferous rocks right from the base to the top. Dr. Sorby said that that material came from Scandinavia. He (the speaker) had been working at the subject for 10 years, and he found nothing in which to differ from Dr. Sorby's statement; in fact, he found much to corroborate it. But, in addition to that, he could say that they knew with as great certainty as they could have in some of these geological questions, that the Scottish area represented upon the map certainly contributed a very large part of the material to the detrital deposits of the carboniferous. It had been suggested over and over again by some workers and writers that the central ridge of St. George's Land contributed material both to the millstone grit and to the coal measures. He should like to say that there was not the slightest evidence of it contributing more than a very small quantity, for the reason that it did not contain the rocks. The rocks there were hornblende granites, and so on, which they did not find contributing in any quantity to the material they had in the millstone grit and the coal measures. As to positive evidence, the rocks which they had in the millstone grit, and the types of minerals which they had there—felspars, quartz, and so on—agreed with the material which made up the old land *massif*, the North Atlantic continent, including the North of Scotland and Scandinavia. They found blue quartz. That was never recorded, he thought, till about eight years ago, when he found it in plenty in some of the millstone grits. They found it associated with the older rocks of Scandinavia, and in the old rocks of Scotland; and he agreed that the line represented by Mr. Walker, passing through the North of Ireland and the central valley of Scotland, did extend right along the north of the Atlantic, including Labrador and the other parts, because they found that the corresponding rocks, the archæan rocks of America, contained an exactly

similar type of material to that which the Americans had in their millstone grit. Furthermore, they knew that the derivation was from that northern part, and they found that the material increased in thickness towards the west and south-west. He believed that when they investigated the question of the microscopical structure of the coal seams, it would give them a great deal of light, and would undoubtedly settle the problem as to where the material came from. It had often been supposed that, during the carboniferous period, this country and the north-western part of Europe was undergoing subsidence. It was one of the axioms of geology that if they had a subsidence in one area they would have an elevation in another. We had a big subsidence throughout the whole of the carboniferous period, and the corresponding uplift to that lay in the northern part. That great continent lay away to the north—possibly there were inlets into it, and so on; we could not define them with exactitude, it was true, but there it lay, and contributed by ordinary break-up, by the action of large rivers bringing down material into Yorkshire and the northern part of England. He did not know so much about the other part, because it was too big a business for one man to undertake an examination of the rock series of the whole British Isles, and he was only making himself responsible, so to speak, for Yorkshire. But they had evidence of an enormous river, Mississippian in character, bringing down that material into that part, so that they had a subsidence going on, a geo-synclinal fold or bending-up to a great extent, and a corresponding rise in the north. The volcanic phenomena which they got in Central Scotland in carboniferous times were not quite out of the question. Therefore, he would agree with Mr. Walker's rendering. He would not agree with the loop of the old land southward over the North Sea—he would say there was no evidence for it—but as regarded the northern part of Scotland, Mr. Walker was right. Associated with this question was that of CO₂. The evidence with regard to the great abundance of carbon dioxide in the atmosphere in millstone grit and coal measure times was evidence entirely on the other side—that there was no more carbon dioxide in the atmosphere then than there was now. In the freshness of the felspars, and so on, they found evidence of that. He believed that the gradual covering up of the central ridge was actually the thing which took place. The South Wales coal field was a different problem. The material that made up the millstone grit there was not derived from the same area as that in Yorkshire. They could trace the deposits right through from the base of the carboniferous and the millstone grit, and the only difference in the coal measures from that of the millstone grit and beds that were lower in the series was one of size. The coal measure sandstones, shales, and so on, were of exactly the same mineralogical composition as those which they got in the lower bed, only differing in the fact that they were being drained from a lower land surface, were not being rushed along by such great rivers, and in consequence were much finer in character.

THE PRIVATE OWNERS' WAGONS (No. 2) ORDER, 1917.

Dated September 6, 1917, the above Order was made by the Board of Trade under Regulation 7b of the Defence of the Realm Regulations, for the purpose of making the most efficient use of railway plant with a view to the successful prosecution of the war. Its provisions are appended.

1. Where it appears to them necessary to increase the supply of wagons to any colliery, the Board of Trade may take possession of any private owner's wagons and use them for the purpose of maintaining an adequate supply of wagons at the colliery in question.

2. Where possession is so taken of a wagon, there shall be paid to the owner for the use of the wagon such amount as may be agreed or as may be determined, in default of agreement, by the Railway and Canal Commission or by an arbitrator appointed by that Commission.

3. The Controller of Coal Mines may issue instructions in writing from time to time directing the private owner of a wagon or wagons to place the same at his disposal, and the Controller may take possession thereof on behalf of the Board of Trade.

4. The owner of any wagon and any other person affected by directions given under this Order shall comply with any directions so given and give all reasonable facilities for carrying out those directions.

5. Any person acting in contravention of, or failing to comply with, any of the provisions of this Order, is guilty of a summary offence against the Defence of the Realm Regulations.

6. This Order shall apply to Great Britain, and may be cited as the Private Owners' Wagons (No. 2) Order, 1917.

South African Industrial Developments.—In his report for 1916, the General Manager of Railways and Harbours in South Africa states that the war has forced the people there to realise the extent of their dependence on overseas supplies. This consideration, coupled with the abnormal shortage of tonnage and the diversion of many European factories to the manufacture of munitions, has compelled South Africans to cater for their own requirements, with the result that many new industries have been established in the Union. Thus, an iron foundry has been started at Queenstown, and brass foundries at Benoni and Brakpan. A smelting plant for dealing with high-grade refractory ores has been established at Barberton. Large works for the manufacture of ammonia have been erected near Vryheid, the principal product at present being sulphate of ammonia. The company operating these works has a sulphuric acid plant capable of producing 7,500 tons of acid per annum.

WAGES OF UNDERGROUND DAY WAGE MEN.

On behalf of the colliery proprietors, Mr. Finlay Gibson, secretary of the Monmouthshire and South Wales Coal Owners' Association, has issued a statement on the wage position. It shows that at the outbreak of war the general wage rate stood at 60 per cent. (maximum) above the standard of 1879, and that during the war successive advances have been granted making the wage rate at the present time 133½ per cent. above that standard—a very considerable increase. In addition to which, the minimum rates have been increased, and under the 1915 Conciliation Board agreement all men working five days a week on the afternoon and night shifts are paid bonus turns, thus bringing their weekly wage up to the amount received by the morning shift men for six days' work. Mr. Gibson's statement deals only with underground men and day wage men, and shows the minimum wages for six days' work over 40 grades of labour, excluding extras and allowances, the weekly wage in July 1914 being calculated on the average standard rates ascertained for the Minimum Wage Enquiry by Lord St. Aldwyn in 1912, and in September 1917 on the new standard rates fixed under the 1915 Conciliation Board agreement, on the minimum wage rates, or on the average standard rates (ascertained for the Minimum Wage Enquiry), whichever is the highest. The following are the figures relating to the various classes of labour:—

Class of workmen (underground daywagemen).	Weekly wage. July 1914 (a).		Weekly wage. Sept. 1917 (b).		Increase. Sept. 1917 compared with July 1914.	
	Afternoon and night shift men 5 days excluding bonus turn.	Morning shift men 6 days.	Afternoon and night shift men, and morning shift men (c).	Afternoon and night shift men (d).	Morning shift men.	
Timbermen (day wage)...	s. d.	s. d.	s. d.	s. d.	s. d.	
Rippers	36 4.43	7 63	8 27	4 20	1 4	
Assistant timbermen	33 3 39	11 58	3 25	0 18	4 1	
„ rippers	27 5 32	11 48	1 20	8 15	2 2	
Roadmen	29 6 35	5 51	9 22	3 16	4 4	
Riders (over 18 years)	30 11 37	1 54	2 23	3 17	1 1	
Hauliers (day rate)	31 2 37	5 54	11 23	9 17	6 6	
„ (night rate) (e)	29 10 35	10 54	11 25	1 19	1 1	
Trammers (over 18 years)	26 0 31	2 46	9 20	9 15	7 7	
Labourers	23 8 28	5 46	9 23	1 18	4 4	
Ostlers	24 4 29	2 46	9 22	5 17	7 7	
Underground enginem—						
Main haulage (adults) ..	26 6 31	10 46	9 20	3 14	11 11	
Subsidiary haulage (adults) ..	24 8 29	8 46	9 22	1 17	1 1	
Underground pumpmen—						
Main pumps (adults) ..	26 3 31	6 46	9 20	6 15	3 3	
Small pumps (adults) ..	23 9 28	6 46	9 23	0 18	3 3	
Fitters	27 0 32	5 47	5 20	5 15	0 5	
Electricians	27 10 33	5 48	10 21	0 15	5 5	
Rope splicers	31 4 37	7 54	11 23	7 17	4 4	
Masons	34 4 41	2 60	2 25	10 19	0 0	
Pitmen	34 0 40	9 59	7 25	7 18	10 10	
Shacklers and spragmen ..	23 4 28	0 46	9 23	5 18	9 9	
Lamplockers	21 7 25	11 46	9 25	2 20	10 10	
Lamplighters	22 1 26	6 46	9 24	8 20	3 3	
Oilers (oiling sheaves, rollers, etc.) ..	22 1 26	6 46	6 24	8 20	3 3	
Coal cuttermen ..	36 0 43	3 63	2 27	2 19	11 11	
Airwaymen	31 3 37	6 54	9 23	6 17	3 3	
Watermen (watering roads) ..	24 3 29	1 46	9 22	6 17	8 8	
Cogcutters	27 8 33	3 47	8 20	11 15	4 4	
Timberdrawers ..	30 8 36	9 53	9 23	1 17	0 0	
Bottom cutters—						
Cutting hard bottom ..	32 6 39	0 57	0 24	6 18	0 0	
Cutting soft bottom ..	29 0 34	10 50	11 21	11 16	1 1	
Assistant bottom cutters ..	25 5 30	6 46	9 21	4 16	3 3	
Sheafmen, roller men and pulley men ..	28 6 34	2 50	0 21	6 15	10 10	
Underground banksmen—						
Leading	30 3 36	3 53	0 22	9 16	9 9	
Assistant	28 0 33	8 49	2 21	2 15	6 6	
Underground winding enginem—						
Pipemen	26 9 32	1 46	11 20	2 14	10 10	
Rope changers ..	30 4 36	5 53	3 22	11 16	10 10	
Slummers (at pit bottom) ..	25 8 30	10 46	9 21	1 15	11 11	
Jig hitchers (at top and bottom of incline) ..	28 0 33	8 49	2 21	2 15	6 6	
Waller in working face ..	24 10 29	10 46	9 21	11 16	11 11	

(a) Sixty per cent. above the 1879 standard—i.e., the maximum percentage under the 1910 Conciliation Board agreement.

(b) Based on the percentage at present operative, and which came into force from December 1, 1916—viz., 55·83 per cent. above the 1915 standard, equivalent to 133·75 per cent. above the 1879 standard.

(c) Afternoon and night shift men: five days and bonus turn. Morning shift men: six days.

(d) Did not receive the bonus turn in July 1914, but now do so.

(e) Including allowance for dooring.

(For later information see p. 652).

Household Coal Distribution Order, 1917.—Owing to doubts as to the scope of the Order, buildings not used as private dwelling houses (such as schools, hospitals, bake-houses, public halls and institutions, offices, etc.) have largely failed to make out requisitions for the assessment of their supplies of coal, coke, or other fuel commencing October 1, so as to comply with the terms of the Order. As it is not desirable that a difficulty of this kind should in many cases interrupt the usual supplies to such buildings, it is officially announced that registered coal merchants may continue their deliveries during the month of October, even although they hold no certificate authorising the supply. The merchants should at once give notice to their customers calling attention to this failure on their part to complete the necessary requisitions, so that the supply may be regularised as quickly as possible. It is noted that where a supply of coal, coke, or other fuel is used partly for industrial purposes and partly for cooking, cooking, or domestic purposes, a requisition will be required for such part of the supply as comes within the scope of the Order. The Order came into force on October 1, with regard to all buildings used as a private dwelling house or dwelling houses, and no extension of time is permitted in their case.

ELECTRIC HAULAGE AT DELAGUA COLLIERIES.*

By F. HOSKINSON.

The American Fuel Company has in operation at Delagua, Colorado, three mines—the No. 1, or First North mine; the No. 2, or Second North mine; and the No. 3, or Third North mine. The First North mine is a drift, and the last parting inside is over three miles from the tippie; electric locomotives haul the trips of 30 cars, averaging about two tons of coal per car, from the inside partings to the tippie. The Second North mine is also a drift, and the last inside parting is over two miles from the tippie; electric locomotives haul the coal out to the tippie the same as in the First North mine.

The Third North mine is a slope with three entries, called the Third North, the Fourth North, and the Fifth North. The coal is hauled in trips of 20 cars from the inside partings to the slope, or rope partings, and from the rope partings it is hauled to the tippie by an electric hoist. The Third, Fourth, and Fifth North inside partings are over four miles from the sub-station.

The electric power for the operation of the mine locomotives, hoist, pumps, and mining machines is delivered to the feeder and trolley lines by a sub-station located near the tippie. The sub-station receives alternating current at a pressure of 23,000 volts from the Trinidad Electric Transmission and Power Company, the current coming a distance of over 30 miles. The 23,000 volts are reduced to 2,300 volts through three single-phase transformers, the 2,300-volt lines then being connected to the switch-board busbars. The lines to the mine fans, shops, tippie, pumping plants, and town lights are each controlled by a separate oil circuit breaker, and transformers are located at the mine fans, shops, tippie, pumping plants, and town lights to reduce the 2,300 volts to 440 volts, three-phase, 60-cycles, for the operation of motors, and to 220 or 110 volts for electric lights.

The sub-station equipment consists of one Allis-Chalmers motor-generator set driven by a 2,300-volt synchronous motor; the direct-current generator is rated at 275 volts, 1,090 ampères. There is also installed one Westinghouse rotary converter rated at 275 volts, 1,092 ampères, 300 kilowatts.

Comparison of Rotary Converters and Motor Generator Sets.

The standard practice of operating the two machines is what is referred to in the following as the "old" system; that is, the direct-current sides of the

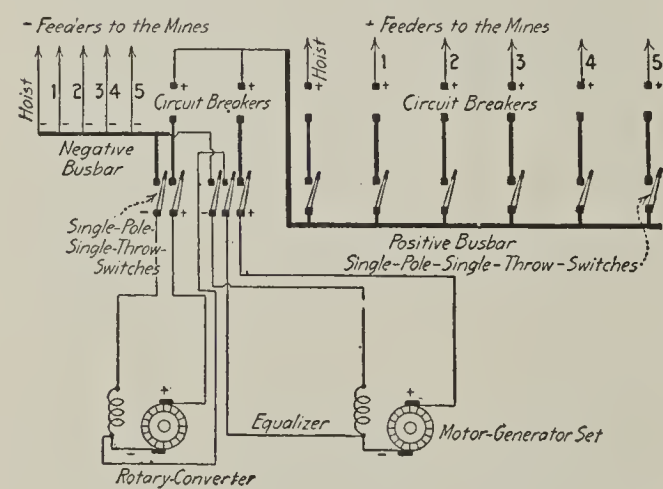


FIG. 1.—MAIN DIRECT-CURRENT CONNECTIONS. Parallel operation of machines, old system.

machines are operated in parallel, which gives a pressure of 275 volts; the ampèreage of the two machines is combined, or added together, thereby giving approximately 2,200 ampères at a pressure of 275 volts.

The sub-station equipment is out of the ordinary, as will readily be seen from the comparison made below. To secure the best results in parallel operation of electric generators, they should be of the same design and construction and possess the same or as nearly as possible the same characteristics.

A motor generator has a decided advantage over a rotary converter in special cases, as in the former there is no electrical connection between the two sides of the system, and independent voltage adjustment over a wide range is possible; also the regulation is not so greatly affected by the fluctuations of the supply current. The ratio of the direct-current voltage and the alternating-current voltage in a rotary converter is practically a fixed quantity, and this is a serious disadvantage where it is desirable to have the direct-current voltage at the machine increase with the load, so as to keep it constant at some distant point.

Adjusting the field strength of a rotary converter changes the phase of the current, and a lagging alternating current passing through an inductive circuit causes a decrease in the voltage, while a leading current will cause a rise. As long as the load was at a certain value, and the alternating current was steady and at a maximum, and the direct-current load was from 25 to 50 per cent. of the rated capacity of the two machines, they operated together fairly well. At no load, full load, or overload, it was necessary to constantly regulate the voltages by means of the field rheostats.

Whenever the alternating current was fluctuating, and the frequency low, it was impossible to regulate the voltage and keep them together, so to speak. It was necessary to shut down the rotary converter and supply the lines with current from the motor generator set. This made possible the operation of the mines, and as it was of frequent occurrence, it caused many delays. The peak

* Coal Age.

load is approximately 1,000 horse-power, or 746 kw., while the combined ratings of the two machines are only a little over 600 kw.

It is much more satisfactory to operate a motor generator set and a rotary converter in series than in parallel. If the power factor is low, it is impossible, in the parallel system, to operate the rotary converter and the motor generator set together; but if the power factor is low in the operation of a motor generator set and a rotary converter in series on the direct-current side, the only disadvantage is that it lowers the direct-current voltage.

In parallel operation it is necessary to constantly regulate the voltage of the machines at all changes in the load, but in the series operation of the machines they are practically self-regulating under almost any load, or at any average power factor.

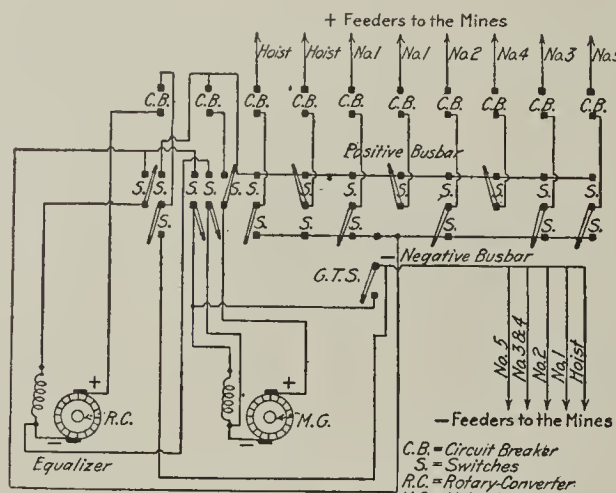


FIG. 2.—DIRECT CURRENT CONNECTIONS AT SUB-STATION. Series operation of machines, new system.

Because of the long distances between the sub-station and the inside partings, the line loss, or drop in voltage, was great; and the rails being a very poor return because of the high resistance offered by loose bonds and broken rails, it was impossible to start trips at times if the voltage was low. Especially was this true at the points more distant from the sub-station. On account of the low voltage and poor return, the armatures and field coils of the locomotives became very hot after a few trips, and in time this charred the insulation to such an extent that the armatures and field coils had to be re-wound.

The standard system of electric haulage at all coal mines is the use of a direct-current voltage of from 250 to 500 volts. Some mines have the 250-volt systems, and others have the 500-volt systems. Each has its advantages and disadvantages.

The advantage in having a 500-volt system at a coal mine is that, with a potential of 500 volts, about one-half as much copper is required to transmit a certain power a given distance as would be required with a 250-volt system. One of the disadvantages of a 500-volt system lies in the fact that it is more dangerous to anyone coming in contact with it than would be the case if the system were of 250 volts. A circuit of 500 volts is classed as a medium voltage only when it is safeguarded against a rise.

In all motors, controllers, resistance, etc., the chances for a breakdown in the insulation are greater with the 500-volt circuit than with the 250-volt. In the use of electric lights in the mines the 500 volts has the drawback that it is necessary to wire the lamps in series, whereas in the use of a 250-volt system it can be wired in parallel, which is in itself an advantage as the wiring of lamps in multiple is easier to maintain.

What is called the "new" system at the Delagua mines is a combination of both the 250- and 500-volt systems with the disadvantage of the 500 volts practically removed, as far as persons coming in contact with the wires are concerned.

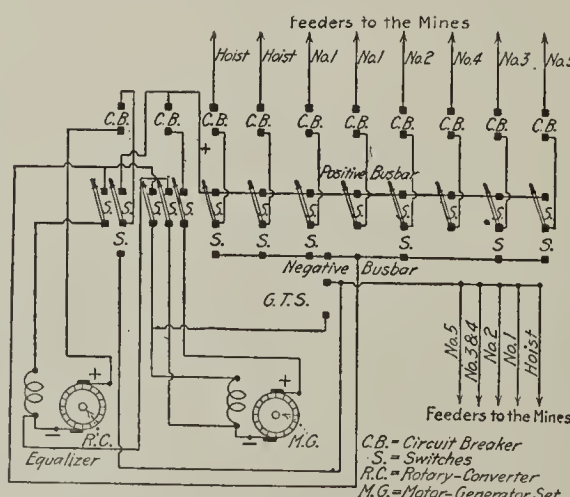


FIG. 3.—DIRECT-CURRENT CONNECTIONS AT SUB-STATION. Parallel operation of machines, old system.

In the operation of the mines on the new system some changes have been made in the wiring of all the mine locomotives, a second trolley line has been put in along the main haulage roads, and another trolley pole has been added to each locomotive. The wiring at the hoist and at the sub-station has been changed. Under the new system, the two machines at the sub-station are operated in series, with the positive of one machine feeding one of the trolley lines, and the negative of the other machine feeding the other trolley wire, while the negative and the positive of each machine are connected together and also connected to the rails. By this arrangement a pressure of 500 or more volts is obtained between the two trolley wires,

and a pressure of 250 volts or more between the rails and either one of the trolley wires.

Locomotives Arranged to Keep Motors in Series.

All electric locomotives using the two trolley lines get a pressure of 500 volts with a metallic return. The locomotives are arranged so as to keep the motors in series when using the two trolley lines. The pumps, mining machines, and all single motor locomotives are connected to the rail and one or the other of the trolley lines, so as to divide the loads up as near as possible.

In fig. 1 is shown all the main direct-current connections at the sub-station, also the positions of all the switches. This diagram shows the connections, switches, and positions at the sub-station for the old system of operation—that is, in parallel—before any changes were made for the new system.

The operation of the electric mine locomotives on the old system was the use of one trolley pole and the rail with a series-parallel reverse switch on all the controllers. In the actual operation of the locomotives the series position was seldom used, for the reason that in series the current was so low for each motor that it would not exert any great effort. Furthermore, the motors have a greater tendency to slip the wheels in series than in parallel; whilst the speed is very slow and the drop in voltage so great that locomotives on the inside partings did not have enough power to start the trips. The parallel position of the switch was used almost exclusively, as this allows each motor to get the full line voltage. Even then the locomotives had considerable trouble in getting the trips started, which was especially the case if the hoist or some other motor was pulling a trip; and if the power factor was low at the sub-station, it was almost impossible to do anything at all.

Under the new system, there is no trouble at all from the above-mentioned difficulties. The sub-station has been operated on power factors that under the old system would have caused it to shut down. The new system of operation was a decided success, as the locomotives hauled the trips with ease.

The output of coal from the mines at Delagua is approximately 2,000 tons per day. In operation there are: One locomotive in the Third North, three locomotives in the Fourth North, one locomotive in the Fifth North, one locomotive in the Second North, and five locomotives in the First North. In addition there are in use five mining machines and 10 electric pumps underground, and the largest load is the electric hoist that pulls the trips of coal from the No. 3 mines or from the slope partings.

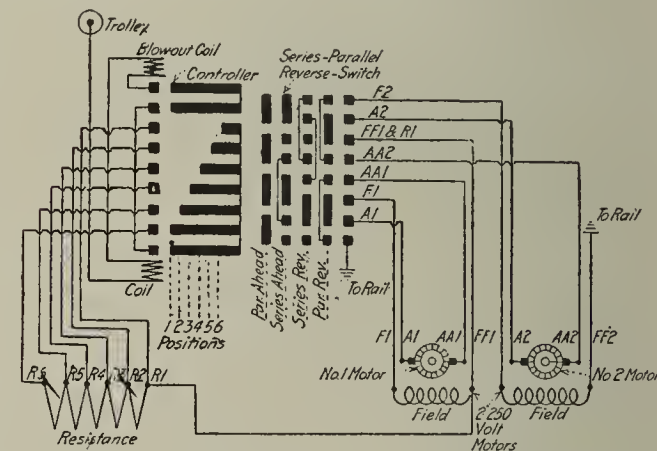


FIG. 4.—ELECTRIC MINE LOCOMOTIVE WIRING For old system of one trolley pole and rail.

The hoist is connected to two 150 horse-power direct-current motors in series-parallel—that is, the control was fixed to start the motors always in series up to the fifth point, and then to change from the series to the parallel points. The average peak load for the hoist is 1,000 ampères at 250 volts = 250 kw. = 335 horse-power. The average load is 800 ampères at 250 volts = 200 kw. = 267 horse-power.

Fig. 1 also shows the direct-current wiring and the positions of all the switches at the sub-station for the operation of the two machines in parallel, the 250-volt positive lines to the trolley wires and the negative lines to the rails. Fig. 2 shows the direct-current wiring and the positions of all switches at the sub-station for the operation of the machines in series. This allows a pressure of 500 volts between the negative and the positive busbars, and a pressure of 250 volts between either the negative or the positive busbars and the rails, or rather the feeders that run from the sub-station and the rails.

The hoist has three feeders—one from the negative and one from the positive busbars, and one from the neutral connection between the two machines. This gives voltages of 250 and 500. No. 1 mine also has the same connections.

Fig. 3 is the same as fig. 2, except that the positions of the switches are for the old system of parallel operation. In fig. 4 is shown the complete wiring of a standard-type electric mine locomotive and controller. The series-parallel reverse switch is so arranged that at position series ahead the locomotive travels forward with the No. 1 and No. 2 motors in series. By moving the switch to parallel ahead, the locomotive travels forward with the No. 1 and No. 2 motor in parallel. This method of wiring is standard for all electric haulage locomotives, and is the same as used on the old system. In fig. 5 is shown this same wiring after all the changes into the new system. In this system, a safety block on the series-parallel reverse switch is so arranged that the switch can only be put to the series positions.

It will be noticed that there is a single-pole double-throw switch marked S.P.D.T. on the diagrams. To this switch are taken the connections G and FF2, and connected to the blade, or hinge, part of the S.P.D.T. The top contact of this switch is connected to the new trolley pole, and the bottom contact is connected to the frame of the locomotive. By this arrangement with the S.P.D.T. in the up position and the two trolley

poles on the two trolley wires, and with the sub-station operating on the new system, the power comes into the motors from the trolley to the controller, then to the resistance; from the resistance it goes through the fields of No. 1 motor, then to F1 (fig. 1), then to A1 (fig. 1), through the armature of No. 1 motor to AA1, to A2, then through the armature of No. 2 motor to AA2, to F2, then through the fields of No. 2 motor to the S.P.D.T. switch, and from there to the new trolley, completing the circuit, 500 volts passing in series through the motors, and having a metallic return.

The sub-station can be in operation on the old system and the locomotives use the two trolley poles by

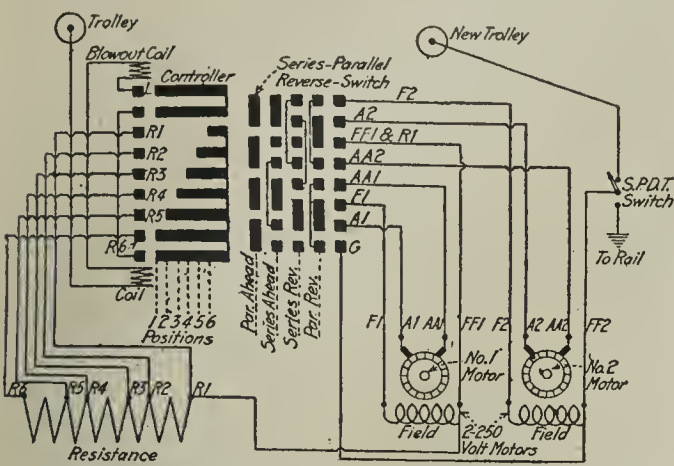


FIG. 5.—ELECTRIC MINE LOCOMOTIVE WIRING
For new system of two trolley poles.

removing the safety block from the controller and putting the reverse switch over to the parallel positions. The locomotives will then be operating on 250 volts with the new trolley as a metallic return, or by fastening the new trolley pole down and putting the S.P.D.T. switch in the down position, the locomotive can be changed back to the old system of one trolley pole and the rail.

In starting on the new system, the motorman can have both trolley poles on the wires and the S.P.D.T. switch in the down position. This permits starting the trip very slowly, and as soon as the trip is in motion the motorman shuts off the controller just long enough to change the S.P.D.T. switch from the down to the up position, then putting the controller on again a notch at a time. This gives him the advantage of starting up his trip of loads in series, and as soon as the trip is in motion he changes to full pressure, or voltage, for each motor.

More Resistance on New System.

It will also be noted that on all the motors used on the new system about 50 per cent. more resistance has been added than was in use on the old system. This was made necessary by the fact that all the resistance

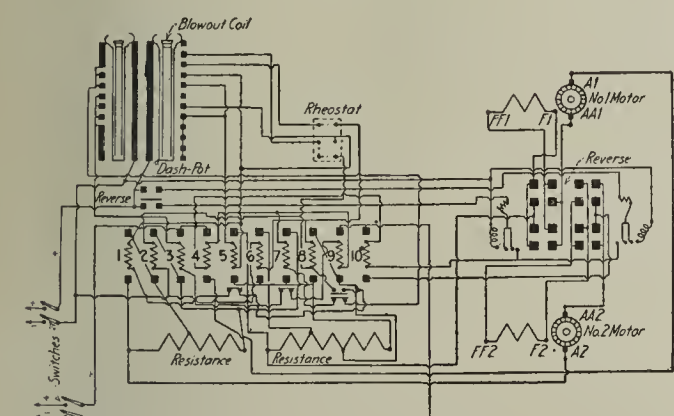


FIG. 6.—CONNECTIONS OF HOIST ON OLD SYSTEM.

formerly on the motors was built for carrying a current at a pressure of 250 volts, and as the current in use on the new system is at a pressure of 500 volts, it was found that the old resistance was not enough to choke the current down when starting if the locomotives were going to be run on the new system all the time, and not figure on changing to the old.

The new resistance that is put on the locomotives for the new system is built to carry only one-half the current that the resistance formerly carried on the motors. It is arranged so that it can be cut out of the circuit, if necessary, in the operation of the locomotives on the old system, but in actual trials it has been found practicable to leave the resistance in when operating on either of the systems, as it is arranged to be cut out on the first two or three points of the controller.

The two-trolley lines have only been put in the No. 1 mine and in the Fourth North entry of No. 3 mine, as these are the places from which the bulk of the coal comes. These places are farthest from the sub-station, and have the largest drop, or loss of voltage. Having them arranged with the two-trolley lines, and also having the hoist arranged with the same system, has made a decided change in the matter of power.

The mining machines cut coal on the night shift, and on the old system with the rail as a return it was a slow-work proposition, as the loss of current was great. At night only one of the machines at the sub-station is operated, and the new trolley line acts as a metallic return. This arrangement provides a metallic return for all the mining machines at night, and gets 50 per cent. more work done; also, as stated before, it is much better for the windings, as the insulation on the windings is burned and charred when the return is poor and the voltage low.

Hoist and Locomotive Control.

The hoist equipment consists of two 150 horse-power 250-volt direct-current motors, operated by a General Electric Type M control and a C-34 controller. This

control has eight points. On the first five the motors are in series; on the sixth point the motors are in multiple with the resistance cut in; on the eighth point the motors are in multiple with all resistance cut out.

The operation of the control on the old system was as follows: First step, with contactors 4, 7, and 10 closed, all resistance is cut in, and the motors are in series on 250 volts. Second step, contactors 2, 4, 7, and 10 are closed. This cuts out two sets of resistance. Third step, contactors 2, 4, 7, 8, and 10 closed cuts out two more sets of resistance. Fourth step, contactors 1, 2, 4, 6, 7, 8, and 10 closed cuts out two more sets of resistance. Fifth step, contactors 1, 2, 4, 5, 6, 7, 8, and 10 closed cuts out one more set of resistance; the motors are now in series across the line. Sixth step, when contactors 3, 4, 9, and 10 close, contactors 1, 2, 5, 6, 7, and 8 open, and the motors are in multiple, No. 1 motor with two sets of resistance cut in, No. 2 motor with three sets of resistance cut in. Seventh step, closing contactors 1, 3, 4, 6, 8, 9, and 10 cuts out one set of resistance on No. 1 motor and one set on No. 2 motor. Eighth step, contactors 1, 2, 3, 4, 5, 6, 8, 9, and 10 closed cuts out all of the resistance, and the motors are in multiple across the line.

In the old system, the hoist used so much power that it was necessary to cut out some of the mine locomotives in order to allow the hoist enough power to operate.

Fig. 6 shows all connections of the hoist on the old system; fig. 7 all connections of the hoist on the new system; fig. 9, panel 1H, all the switches that were in use on the old system, and panel 2H the extra panel and switches. These were arranged so as to be able to cut out either one of the motors and leave the other in operation, in case of an accident to one of them.

In fig. 8 is shown the new panel and all switches that were added to the hoist for changing its opera-

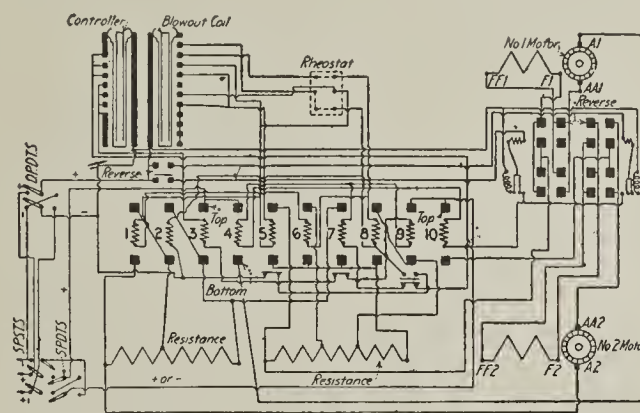


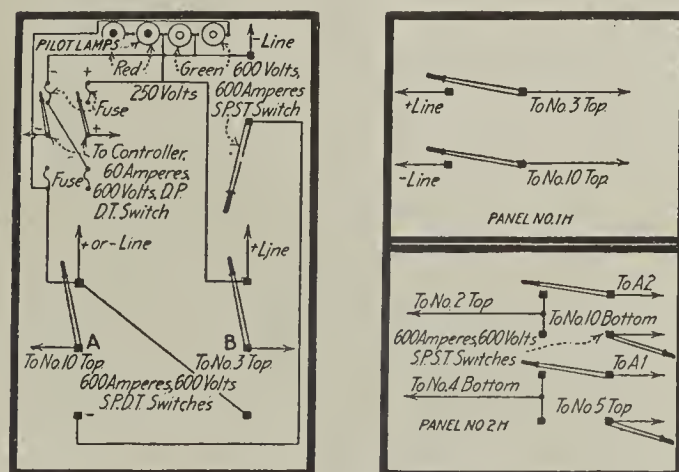
FIG. 7.—CONNECTIONS OF HOIST ON NEW SYSTEM.

tion to either the new or the old system of operation. The pilot lights indicate the kind of voltage that is on the lines, so that the hoistman can set his switches properly. All four lamps burning indicates that the potential is 500 volts, new system, but if only two lamps are burning and these are the green ones, it will indicate that the voltage is only 250 volts, old system. For operation on the old system, it is only necessary to put in the negative switch and change the switch marked A from the up position to the down position. This will allow the hoist to operate on the old system of 250 volts, and it will not make any difference as to how the sub-station is operating, whether new or old system.

More Resistance Added in New System.

In the new system of operation on 500 volts, five more sets of resistance have been added, making a total of 12 sets. A stop is also arranged on the controller so as not to let it go any further than the fifth step.

The operation of the control on the new system is as follows: First step, with contactors 4, 7, and 10 closed, all resistance is cut in and the motors are in series on 500 volts. Second step, contactors 2, 4, 7, and 10 closed cut out two sets of resistance. Third step,



FIGS. 8 AND 9.—SHOWING THE SWITCHES IN USE ON BOTH OLD AND NEW SYSTEMS.

when contactors 2, 4, 7, 8, and 10 close, it cuts out three more sets of resistance. Fourth step, contactors 1, 2, 4, 6, 7, 8, and 10 closed cuts out four more sets of resistance. Fifth step, contactors 1, 2, 4, 5, 6, 7, 8, and 10 closed cuts out three more sets of resistance. The motors are now in series across the line on a voltage of 500. This allows each motor to get its rated potential of 250 volts. The controller is blocked at the fifth point so as not to go any further.

In the operation of the hoist on the new system of 500 volts there is much more power and a little higher speed than was obtainable on the old system. The mine locomotives have never had to be cut out in order to get power enough to operate the hoist on the new system, as there is enough power to operate on peak

loads, and the sub-station will supply the power either for a small amount of power or for a heavy load, and will not have to be regulated. This is a decided advantage over the old system, as in the old system it was necessary constantly to regulate the voltage of the machines for every change in the direct-current load as well as for every change in the alternating-current input, whether it was a variation in the voltage or in the frequency.

The main advantage in the new system is that it makes little difference to the operation of the sub-station in series as to whether the voltage is high, normal, or low. The machines will operate without any attention, and at the same time seem to boost each other; also, the machines at the sub-station will not heat up nearly as much as they did on the old system. This same statement applies to all of the electric mine locomotives in service at the mines.

The troubles resulting from the armatures, field coils and resistance heating up and charring the insulation to such an extent that they needed re-winding have been carefully done away with. This will mean quite a saving in the item of repairs alone. At the same time, the speed of the mine locomotives has been increased, thereby increasing the output of the mines and decreasing the maintenance expense, even though using the same equipment.

MIDLAND INSTITUTE OF MINING, CIVIL AND MECHANICAL ENGINEERS.

Two highly-interesting geological subjects—the variations of the Silkstone seam in South and West Yorkshire, and the areas of coal deposition in North-Western Europe—were discussed at a meeting of the Midland Institute of Mining, Civil and Mechanical Engineers, held at the Queen's Hotel, Leeds, on September 27. Mr. C. C. ELLISON presided.

New Members.

The following elections were made: *Members*—Mr. W. C. Wright, proposed by Mr. J. F. Archer, seconded by Mr. J. H. W. Laverick; Mr. W. W. Finn, proposed by Mr. T. Beach, seconded by Mr. P. Darlington. *Associate member*—Mr. W. Wright, proposed by Mr. W. H. Chambers, seconded by Mr. H. C. Harrison.

The CHAIRMAN expressed his regret at the absence of the president (Mr. W. D. Lloyd), who had been unwell for some little time, and had been ordered by his doctor to take a rest for a few weeks. They all hoped that his rest would do him good, and that he would be able to attend the next meeting.

Presentation of the "Peake" Medal.

Mr. ELLISON went on to perform the pleasant duty of presenting the first "Peake" gold medal to their worthy secretary, Mr. G. Blake Walker. The medal, he reminded the members, was provided out of the fund of £1,000 which Mr. G. H. Peake very generously gave to the institute. The council decided to institute a medal, to be awarded to members who had shown the greatest interest in the institute, and had done the most valuable work, and it was unanimously decided that the first recipient should be Mr. Walker. Everybody appreciated Mr. Walker's great services to the institute and to the mining industry. He often wondered where Mr. Walker got his enormous store of energy—even in times like the present he was able to prepare interesting papers; whereas most of them were apt to make excuses that they had not even time to attend the meetings. There was nobody more worthy of the medal than Mr. Walker.

Mr. BLAKE WALKER, in reply, said he felt quite unworthy of the honour which the council had done him in presenting the first "Peake" medal to him, but he hoped that in the future it might be a stimulus to their members to take a greater and greater interest in the institute, and promote its success in every way. He thought that a silver medal would have answered the purpose equally well, but the council decided that they would have it in gold. Describing the medal, he said that round a rising sun was a Latin inscription, which meant: "We use the sun's strength, and turn the same to the benefit of man." This recalled an anecdote of George Stephenson, who, pointing to a railway train, said it was driven by the light of the sun, turned into vegetation, and stored away in the bowels of the earth for myriads of years, to be afterwards raised and used as fuel.

The first paper on the agenda was "A Note on the Co-Relation of Seams in the West and South Yorkshire Areas," by Prof. P. F. KENDALL.

Mr. BLAKE WALKER said they were very much indebted to Prof. Kendall for giving them a paper of much local interest. The professor had had an immense amount of pressing work, and had not been feeling quite as well able to devote himself to this matter as he could have wished, but in spite of that he was there to tell them what he thought about the co-relation of the Silkstone seam with one or more of the West Yorkshire seams. They knew that the Silkstone seam in South Yorkshire was of excellent quality, and it had been the desire of West Yorkshire people, if they had not got the seam itself, to find one that they could christen the Silkstone. The question, from a geological point of view, was: "Are the West Yorkshire Silkstone and the South Yorkshire Silkstone the same?" Prof. Green, who was the pioneer geologist of the Geological Survey, did not come to quite the same conclusion as their practical colliery engineers, but more facts had come to light. Prof. Kendall had co-related those facts, and they would have the benefit of his consideration of the matter.

CO-RELATION OF SEAMS IN WEST AND SOUTH YORKSHIRE.

Prof. KENDALL said he should prefer to call his "note" one of interrogation rather than one of information, because he stood in need of some enlightenment quite as much as his hearers. But he had been con-

Some problems connected with the seam that came of the Silkstone seam in West Yorkshire. The geographical problems that should have been a counterpart in South Yorkshire; and it was necessary for him to determine, if he was in South Yorkshire was equivalent to the one in West Yorkshire. Mr. Blake Walker had affirmed the fact that Prof. Green, in 1875, published his views, the result of admirable studies whose value could scarcely be exaggerated. The problem was a puzzle, for this reason: that there was a blank area, a sort of neutral zone, between the West Yorkshire coal field and the South Yorkshire. In Green's time, that had not been traversed by colliery workings, and consequently he could not say that there was direct continuity between one seam and another across that tract. Later, Mr. John Nevin delineated the area in which the seam called the Silkstone seam was worked in various parts of its extension in West Yorkshire, and also that of the undoubted Silkstone seam in South Yorkshire. The views that Green enunciated did not receive general acceptance—in fact, in one of the discussions at either that institute or the Chesterfield Institute, a member, on hearing doubts cast upon Green's co-relation, expressed the great gratification it would be to all of them if the geologist should prove to be wrong—whence the speaker concluded that the geologists of those days were scarcely as popular amongst the miners as the modesty that they had developed in later times had now engendered.

The chief point upon which he invited discussion—he had nothing positive to assert, himself—was that Green was right in saying that the seam that went, in some parts of West Yorkshire, by the name of "Silkstone," was the Middleton Main, and was not the equivalent of the Silkstone of the southern area. Thanks to the "Sections of Strata" compiled from the records of borings and sinkings by a committee of the Midland Institute, he had been able to get a series of sections from which certain facts emerged.

In the first place, he had taken as a datum the Haigh Moor, running through, and he thought correctly identified with, the Swallow Wood of the south. At a remarkably uniform level beneath that Swallow Wood or Haigh Moor coal, they had the seam sometimes known as Silkstone, at St. John's, Altofts, Whitwood, Ackton Hall, Wheldale, Fryston; and known more generally as Middleton Main along a northern suite of pits, as at Middleton. At Robin Hood, it was known as the Top Silkstone; at Water Haigh, it was called the Silkstone, following the precedent of Whitwood, and also at Allerton Bywater. It kept a remarkably uniform relative position to the Haigh Moor. It was a seam with an inveterate tendency to split open, and partly as a consequence of that there had been a considerable amount of confusion as to the nomenclature of the seam itself and of the adjacent seams in West Yorkshire.

At Allerton Bywater they had the Silkstone; the Flockton bed above, in a normal position; and the Blocking bed below—the last-named had been regarded as the true equivalent of the Silkstone. At Ledstone they had the Blocking bed appearing under the name of Barcelona, one of its several synonyms, and the Flockton bed above; but he found, in the "Sections of Strata," the Middleton Main with a query given above it. That, however, was clearly not the position of the Middleton Main, above the Flockton seam; and he used that instance simply as an illustration of the confusion that had arisen from the difficulties which occasionally arose in the co-relation. At Fryston, the seam was styled the Silkstone, or Barcelona, whereas at Wheldale it was Silkstone. Going westward, the seam split, and developed such a parting that it could not be tracked as one seam. He thought it was fairly clear that the Middleton Main was identical with the seam called the Silkstone at Water Haigh and at Allerton Bywater. Going on the southern range, Ackton Hall connected the Water Haigh Silkstone with the Silkstone of Whitwood, and therefore if the Water Haigh Silkstone was Middleton, then so was Whitwood. From Whitwood they proceeded in a south-westerly direction, carrying their Silkstone through. At Wrenthorpe, it appeared under the name of Middleton Main; at Low Laithes it was called Silkstone. He would omit Aldwarke, for he confessed he was wholly unable to explain why a seam in that position, at this colliery, had come to be called the Parkgate. He did not deny that it was the Parkgate; he only drew attention to the fact that there was a seam called the Parkgate there, which occupied the same relative position to the Haigh Moor as the Middleton Main Silkstone did elsewhere, and he asked for help in the matter. The colliery was 15 miles further south, and so was not on the line of the section. He only introduced the point because he wanted enlightenment.

At Hartley Bank a seam in this position was known as the New Hard. Then came the great gap. He had not got the Woolley section at present, though he had some expectation of getting it. He passed down to the disastrous sinking at the Falconer pit, which started very nearly on the horizon of the bottom part of the Haigh Moor. There, in its proper position, came the Flockton; the Parkgate, corresponding very approximately to the position of the Old Hards of the West Yorkshire series; and, in exactly the relative position of the New Hards or Middleton Main, they had the Swilley coal. That could be carried on, using the Parkgate as a datum, from there to the true Silkstone. Between the Parkgate and the true Silkstone, at the proper interval for the New Hards or Middleton Main, they had this Swilley coal, and consequently, if that were identical with the Middleton Main, then the Silkstone seam was a lower seam altogether, and a different one.

He had more sections to show the relation between the Swilley, the Parkgate, and the true Silkstone. The Swilley seam was a continuation from the normal at Wheldale. The Parkgate and the Silkstone main—these two seams were identical with the Haigh Moor. The Swilley Bank, which was the linking

section, they had the Parkgate of the southern type setting in, and its relation to the Middleton Main and the Silkstone was well seen. Using that as a datum, they went across to the Falconer pit, and found the true Redbrook Silkstone. At Stanhope they had the Parkgate, the Swilley coal which he thought might reasonably be regarded as the equivalent of the Middleton Main, and the true Silkstone.

This was the main general conclusion that his study of the sections led him to adopt, but it was quite a tentative conclusion, and he stood subject to correction—in fact, hopeful of correction—if anyone could throw any light upon these matters. It was, of course, perfectly easy to see why the seam came to be called the Silkstone. The West Yorkshire miners expected to get a Silkstone coal, and they chose the best seam and the nearest to it. It might be said that to sell that as Silkstone was scarcely right, but they might retort that they were paying the southern Silkstone the compliment of attaching the same name to their best seam in the West Yorkshire district.

Discussion.

The CHAIRMAN said, of course, the South Yorkshire people were not going to say that their Silkstone was worse than that of West Yorkshire. But if those of West Yorkshire had claimed that their Silkstone was as good as that of the south, he believed some people in South Yorkshire had claimed a seam of coal generally known by another name to be the Haigh Moor, so that they were getting a bit of their own back in that way.

Mr. S. R. KAY said that Prof. Kendall had apparently satisfied himself that the West Yorkshire Silkstone was equivalent to the Swilley of South Yorkshire. The true Silkstone of South Yorkshire must correspond with something else in West Yorkshire. Could Prof. Kendall give them any idea what had become of the true South Yorkshire Silkstone in West Yorkshire? If it had split up into other seams, what seams now represented it?

Mr. G. BLAKE WALKER said the Silkstone was a seam which showed a great tendency to split. At Thorncliffe, for instance, they had the full thickness of the seam in one part of their fields, while in another portion they were only working the top half of it, because this was separated from the bottom part by a very considerable thickness of strata. At Barrow the seam was its full thickness in the shafts, but as it went towards the east it became very much thinner. At Aldwarke Main, he believed, it was not 2 ft. in thickness. Undoubtedly the Silkstone seam was one that varied very much; and, considering the very remarkable disturbances of strata which crossed the coal field from Crigglestone to Badsworth and still further east, and the great change which had taken place in the Barnsley seam of South Yorkshire, and the Warren House seam of, say, Ackton Hall, he thought it exceedingly likely that the Silkstone seam in West Yorkshire had undergone a very great change, and had altered its character very considerably. It could only be, he thought, by still further workings, tracing the West Yorkshire Silkstone to the debatable ground between the two areas, and getting very close on either side to that ground, that they would be able to set the matter at rest. He hoped Mr. J. R. Wilkinson would give them some information as to the lower seams in the Woolley neighbourhood.

Mr. W. HAY said he had some knowledge of the Aldwarke district, and the Parkgate seam there was the Parkgate, strictly speaking. It was more or less a steam coal, and he could not see how one could mistake it for Silkstone. There was as much difference between the Parkgate seam and the Silkstone proper as between chalk and cheese. How the Silkstone seam came to be shown parallel with the Parkgate at Aldwarke he could not understand. He did not think the Aldwarke Main Company called their Silkstone Parkgate. As far as the separation of the Silkstone was concerned, it was very marked on the area belonging to the Thorncliffe Company. At their Tankersley Colliery they had the two seams practically together—only a few inches apart—but southward they separated, so that at the Grange Colliery, four or five miles distant from Tankersley, there was a distance of about 15 yds. between them. Going southward, they found, under Barnsley, that the Silkstone again became a seam 2 ft. 6 in. thick. At the Rockingham Colliery it was practically 4 ft. 6 in., and in some cases 5 ft., with a separation of about 7 in. or 8 in. between. Going further northward, the bottom seam left again, and they got an upper seam of 2 ft. 9 in. The same thing happened if they went in the southern direction, so that the seam did split up in most peculiar ways.

Mr. E. W. THIRKELL said he also was struck with the reference to Aldwarke Main, because the distance there between the Swallow Wood and the Parkgate was very clearly defined, and likewise the distance to the Silkstone, both seams having been proved. He did not know why the co-relation had been entered on the section. Possibly there might be some error. The section of the Middleton seam was rather interesting, because it showed the Middleton Main apparently, and a seam underneath called the Blocking, which many of them had associated with the Silkstone. But he remembered that, about Silkstone Village, there was a seam of coal called the Silkstone Four-foot, which was not very far away from the Silkstone seam itself, and it struck him that possibly the two seams shown on the section were on something like the same footing as these two at Silkstone. The whole section which Prof. Kendall had supplied gave them food for a good deal of thought.

Mr. J. R. WILKINSON thought that the results of the investigations which Prof. Kendall was about to make at Woolley would be very much more valuable than anything that he (the speaker) could say at present. However, it was a fact that, to the best of his knowledge, the pit recently sunk at Woolley was about the only one on that side of Barnsley that had proved the measures down to, say, the Silkstone or the Whinmoor seam. They were certainly interesting. There

were some really good seams, and some that were not quite so good. To the west side of their area they had a very substantial washout. One very singular thing about it, to his mind, was the fact that the Barnsley Hard disappeared altogether, while the Softs remain undisturbed. On that side they had a parting of, say, 40 ft. between the soft and the hard portion of the Barnsley seam. Going down in the new sinkings, the pit was practically on the outcrop of the Barnsley seam. They got the top Haigh Moor at 77½ yds. below that, and the low Haigh Moor at 88 yds. The Flockton seemed to be somewhat split up. There were a lot of seams, which would be very nice if two or three of them were in one place instead of being separated by intervening strata. The Lidgett was above the Flockton. They had 2 ft. of low Haigh Moor coal. At a depth of 369 ft. they had a 2 ft. seam; at 391 ft. there was a split up seam; and at 530 ft. they had 1 ft. 8 in. of coal. The Parkgate seam was at 243 yds., the Thorncliffe at 296 ft., another seam at 315 ft., the Silkstone at 403 ft., and the Whinmoor about 10 yds. below that. They had put a borehole down a further 60 yds., and found no coal at all. That, to his mind, verified the idea that the low seam referred to was the Whinmoor, and the one above was really the Silkstone.

Prof. W. G. FEARNSIDES thought that geologists would agree that it was high time the difficult question of the co-relation of the seams between West and South Yorkshire was ventilated. A little while ago, in the course of making preparations for a map, he endeavoured to draw a series of contour lines which would show the variation of thickness in the measures between the Barnsley bed and the Silkstone coal. He got on very well while drawing the contours for South Yorkshire, the lines going very nicely and uniformly, and, as Prof. Kendall's diagram showed, one also got on very well if he dealt with the Middleton Main coal in West Yorkshire. He found, however, as Prof. Kendall had shown, that there was very great difficulty in joining the one with the other, and he quite agreed that they wanted far more information on the point. He thought that, when that information was obtained, it would be dealt with more usefully by considering the distribution of the pits in space—on an area—than by projecting all the sections on a straight line, and drawing a single section through them all. The information given to them was exceedingly useful. In so far as it showed that the Middleton Main of West Yorkshire and the Silkstone of South Yorkshire had something to do with one another, it depended, as he understood it, upon the success of the co-relation of the Haigh Moor of West Yorkshire with the Swallow Wood of South Yorkshire. The Silkstone certainly was a seam which split. So was the Haigh Moor or Swallow Wood. He did not know how the taking of the upper or the lower Haigh Moor seam would affect the matter, but certainly it was a fact that they had not got any single stratigraphical horizon—failing only the marine band at the bottom of the measures, the Halifax Hard bed—by which geologists could know for a certainty, within a few yards, that they had got something to measure from. The coal seams mostly went in and out at about the same horizon, but it had never been proved, he thought, that the horizon at which they appeared in one place was identical with that 10 miles away. With regard to the Silkstone seam in South Yorkshire, one knew that it varied, and varied in rather a definite way. One could go to such a colliery as the Barrow, and, on one side of the pit, find them working a fine Silkstone seam, while on the other side they had to work a much thinner seam. The line along which the 3 ft. 6 in. seam changed to 4 ft. 6 in. was almost a straight line. That straight line could be projected both ways, and he found that there was evidence of variation along that particular line more than on other lines. He took it that that was a line which had something to do with the conditions under which the seams were deposited. He took it, also, that this difficulty of co-relation depended upon the difference of the surface upon which the coal seams grew at the time when the Silkstone was laid down. He thought Prof. Kendall had done a very useful piece of work in bringing into the daylight the circumstance that they knew nothing about the co-relation of their coal seams.

Prof. KENDALL, in reply to the discussion, said the measurements for Aldwarke were taken from the "Sections of Strata." There was an interval of about 189 yds. between the Haigh Moor coal and the seam called the Parkgate. Aldwarke would have to be examined further. He did not know what justification there was for a remark made by the late Mr. Nevin, who, in speaking of the Silkstone at Aldwarke, said there was a parting 60 ft. in thickness between the top and bottom parts of the seam. If so, it was an exceedingly interesting fact, and it agreed very well with the variations in the seam observed in the Thorncliffe series of pits. The parting thickened; in the direction of Rotherham it reached 30 ft., and it expanded still further to 60 ft. at Aldwarke, which was simply continuing the tendency. The facts about Barrow were well within his knowledge. That remarkable straight line was pointed out to him by Mr. Steel some weeks ago. He had been looking into the Silkstone seam through all its range, and he hoped at an early date to bring the result of his investigations before the institute. He found that the variations could be reduced to something like order, and expressed upon a map; and that he hoped to do. His object in bringing the matter forward on the present occasion was to clear up the question of the position of the so-called Silkstone seam of West Yorkshire, because at the November meeting he hoped to bring before the institute an account of some of the remarkable splits that the seam exhibited, and to offer an explanation of them. Mr. Shaw knew well that he had long been interested in this matter. He saw the drift that was put across the split at Whitwood some nine or ten years ago. As to what represented the Silkstone seam in West Yorkshire, he started without any bias or inclination to either one view or the other, but he was

disposed to concur in Green's opinion that the Blocking or Barcelona coal was the sole representative of the original Silkstone in that area.

Mr. A. C. F. ASSINDER asked if microscopical investigation had been employed in connection with the point.

Prof. KENDALL said that so far it had not. He had many misgivings as to the value of microscopical investigation for such a purpose, because seams varied greatly from place to place.

The CHAIRMAN proposed a hearty vote of thanks to Prof. Kendall for his most interesting paper. What with Prof. Kendall, Prof. Fearnside, Mr. Walker, and others, they ought to have no difficulty whatever in keeping up a hearty discussion on these matters during the winter. If they could only set one of them against the other, to see who could produce the best and brightest, this geological subject would become tremendously interesting, and very much more practical to many of them than it had ever appeared before.

The resolution was carried.

Areas of Deposition of the Coal Fields of Western Europe.

Mr. G. BLAKE WALKER's paper on this subject, and the ensuing discussion, are given on page 639 of this issue.

The meeting concluded with a vote of thanks to Mr. Blake Walker.

AMERICAN COAL TAR DYE PRODUCTION.

A very interesting review of the dye manufacturing industry in the United States has been compiled by the Bureau of Commerce from information supplied by American manufacturers, in response to a request from the Bureau for their co-operation in securing more accurate returns than have hitherto been available. Practically the whole industry responded, the exceptions being a few minor firms and those just beginning operations and not in a position to calculate their probable output. The industry is still in the experimental stage, many products being manufactured on a semi-commercial scale with processes not fully developed and qualities not yet standardised. From the figures given in the review, we note that 22 firms are returned as manufacturing crudes, their total monthly production of benzole, toluol, and some xylol and phenol being 1,240,350 gals., and of benzole, toluol, natural and synthetic phenol, cresol, naphthalene, anthracene, and some xylol, cumol, and amylene, 6,181,600 lb. Forty firms make returns of intermediates, their monthly output ranging from 1,000 lb. to 2,000,000 lb., with a total of 10,420,600 lb. The larger part of this output of intermediates is, in all probability, consumed in the dyestuff industry, although a large amount, especially of trinitrotolhol, falls in the category of explosives. There is a constant increase in the variety of intermediates and chemicals produced in America for making colours. Coal tar dyes in a variety of colours suitable for leather, textiles, straw, paper, inks, stains, pigments, varnishes, waxes, furs, feathers, and for many other purposes, are now regularly obtainable from domestic sources. Several manufacturers carry full lines of direct, acid, basic, chrome, oil, and sulphur colours, while others confine their efforts to improving and extending their output of particular groups. Among the prominent colours produced are nigrosines, indulines, triphenyl-methane dyes, safranines, eosines, chrysoidines, rhodamines, rosanilines, direct fast reds, browns, and yellows for cotton, fast chrome colours for wool, Sudan colours, basic violets, synthetic indigo and indigotines, alkali blues for the silk and woollen industries and also for the lithographic trades, metanil yellow, methyl violet, methylene blue, benzopurpurine, benzo sky blue, primuline, naphthol green, rose bengale, galloxyaniline, and special chrome and khaki colours. About a dozen firms are giving considerable attention to developing as rapidly as the necessary intermediates are available the triphenyl-methane dyes, particularly fuschine, methyl violet, methylene blue, magenta, and malachite green. Manufacturers of coal tar by-products are also marketing quantities of salicylic acid and its derivatives—particularly acetyl-salicylic acid (aspirin)—phenacetin, acetphenetidin, acetanilide, and other medicinals. One maker of intermediates is producing the synthetic perfumes bromelia and nerolin; another firm includes in its products vanillin (used in flavouring extracts) and also saccharin. The most striking feature brought out by the review is the marvellous growth of the industry, and the plans in process for its continued progress in both domestic and foreign fields. All of which shows clearly that German dye manufacturers in particular, and her chemists in general, are unlikely to find much that will comfort them in the report just issued, which is a record of progress made in dye manufacture that, before the war, would have been deemed impossible in so short a space of time, and which, even now, with three years' experience of revolutionised industry, is nothing less than amazing.

Iron Ore Handling at Sunderland.—To facilitate the discharge of iron ore at Sunderland, a grab system has been adopted at the South Docks, and has proved highly satisfactory. As much as 430 tons has been discharged by one grab in 8½ hours, and 1,550 tons in the double shift, when both grabs and tubs were utilised.

Coke Oven Plant for Ontario.—The Semet-Solvay Company has engineers reporting on a project to erect a 2,000,000 dols. coke oven plant at Stypes Inlet, Hamilton, Ontario. This plant will be erected by the Hamilton By-products Coke Ovens Limited. It will have a capacity of about 900 tons of coke a day, and 7,000,000 ft. of gas.

Coal Near Odessa.—The Odessa Bourse Committee, being informed that the district of Vosnesensk contains deposits of brown coal, have requested Prof. I. M. Golitzky, Director of the Technical Section of the Fuel Control of the Odessa Region, to have a careful investigation made, with a view to their utilisation.

REFRACTORY MATERIALS SECTION OF THE CERAMIC SOCIETY.

The second season of the Refractory Materials Section of the Ceramic Society commenced with a meeting at the Royal Technical College, Glasgow, on Tuesday last.

Mr. W. J. JONES (of the Ministry of Munitions), president of the society, who occupied the chair, expressed his pleasure at seeing so large a number in attendance from various widely-separated districts.

Scottish Fireclays and Ganisters.

A paper on "The Distribution and Geological Position of the Valuable Fireclays and Ganisters of the South of Scotland" (see p. 652 of this issue) was read by Messrs. L. W. HINXMAN and M. MACGREGOR.

In the course of the ensuing discussion, the propriety of using the term "ganister" for these particular materials was questioned. Mr. MACNAIR was of the opinion that only one of the series of specimens shown could be compared with true ganisters, though true ganisters occurred in Scotland around the (Midlothian?) basin. These latter were only casually mentioned by the authors of the paper as potential sources of refractory material, and were not in the millstone grit series. There was a fine show of these ganisters at Ninemilburn. Prof. FEARNSIDES suggested that the term "ganister" should be restricted to siliceous materials having the same chemical characteristics as the Sheffield ganister, and having, like them, been developed under the conditions of change from lacustrine to marine deposition. He considered the texture to be the most important thing about ganister.

Refractories and Modern Kilns.

A paper, under this title, by Mr. J. G. MAXWELL also came in for some criticism, especially as regards the feasibility of commercially using continuous kilns of the tunnel with car type for firing silica bricks or magnesite bricks. Maj. C. W. THOMAS (Stourbridge) drew attention to the fact that in some respects town gas offers advantages which to a great extent compensate for the extra cost. Mr. BERNARD MOORE said he had come to the conclusion that town gas would be the fuel of the future, as from his recent experience with a small gas-fired kiln at the Research Department of the Stoke-on-Trent Pottery School, he found it comparatively easy to get high temperatures with equal distribution of the heat.

Refractory Properties of Silica.

A paper on this subject, by Messrs. H. LE CHATELIER and B. BOGITCH (see *Colliery Guardian*, September 7, 1917, p. 459), was also read, and discussed by Dr. SCOTT, Prof. FEARNSIDES, Dr. C. H. DESCH, and others. Both Dr. Scott and Prof. Fearnside expressed general agreement with the conclusions expressed in the paper, and it was considered that some deductions, regarded in certain quarters as well established, needed further investigation. Dr. Desch pointed out that amorphous silica above the melting point has a rigidity equal to that of the crystalline form. He asked whether impurities are really necessary, as many suppose, instancing the case of zirconia bricks made of pure fine-grained material and cemented by colloidal zirconia, such bricks being extraordinarily resistant. He also called attention to the fact that in cases of transformation it is not always the most stable variety which results, but usually the second as regards stability.

Three short communications were made by title, by Dr. MELLOR, on "A Comparison of the Porosity and Contraction of Firebricks Made with Wet and Dry Grog," by Miss C. BEVERIDGE and W. EMERY; "The Rate of Reaction (Vitrification) of Different Forms of Silica," by P. S. DEVEREUX and J. E. FOSTER; and "The Rate of Hydration of Calcined Dolomite," by C. EDWARDS and A. RIGBY.

At the dinner, in the evening, the PRESIDENT, replying to the toast of "The Ceramic Society," recalled the circumstances which have led to the present enormous output, pointing out that refractory materials were indispensable, and that makers in this country had risen admirably to the occasion. He also made an appreciative reference to the valuable results of Dr. Mellor's continuous efforts on behalf of the society, and spoke in terms of high commendation of the arrangements made for the meeting by the hon. local secretary, Mr. G. Wink Wight.

Visit to Dalzell Steel and Iron Works.

On Wednesday, a visit was paid to the Dalzell Steel and Iron Works of Messrs. David Colville and Sons Limited, Motherwell, where the visitors inspected the open-hearth melting furnaces and heating furnaces for the various mills. Specimens of refractory materials were exhibited, including firebricks from Glenboig, Bonnybridge, Bathgate, and Ayrshire; silica bricks from Sheffield, South Wales, North Wales, Durham, and Scotland; magnesite bricks of Grecian material manufactured in England and Scotland; chrome bricks of material imported from abroad and manufactured in England and Scotland; sleeves, stoppers, and nozzles from Lancashire, Yorkshire, and Staffordshire; refractory sands from Belgium, Holland, Campbeltown, Leighton Buzzard, St. Helens, Breich, Caldwell, Auchinheath, and Glenboig; and dolomite from Coxhoe. As showing the importance of refractories in the iron and steel industry, it was mentioned that the following quantities of refractory materials are required to maintain the company's works, viz.:—firebricks, 5,000,000 per annum; silica bricks, 8,000,000; magnesite bricks, 200,000; chrome bricks, 45,000; and refractory sand, over 10,000 tons per annum.

Exports Embargo.—Regarding the prohibition of exports to Holland and Scandinavia, the War Trade Department announce that licences already issued must be regarded as provisionally suspended. This does not apply to coal.

THE FUTURE OF THE COAL TRADE.

LORD ABERCONWAY, at the annual meeting of the Sheepbridge Coal and Iron Company at Sheffield last week, made some pointed reference to the future of the industry. After dealing with the company's output and the difficulty of providing houses for miners, and of making further extensions at the present time, his lordship said that their costs had very largely increased. Wages went up periodically, and were now more than double the 1888 standard. He was sorry to have to repeat what he said last year, that the higher the wages the less work was done. He did wish that their men would really take this matter into their consideration, and feel that they were working not for what they called capitalists, but for the country, and that the men who were fighting for them at the front ought to be supported in every possible way. There was no support that the workmen who stayed at home could give with greater advantage than that of increasing the output of coal, iron, and steel. The cost of material had increased, timber costing 400 per cent. more than it did before the war, and other materials from 80 to 125 per cent. more. Notwithstanding this, owing to the Price of Coal (Limitation) Act, they were not able to charge more than 4s. per ton for coal over the pre-war price. Everything, therefore, pointed to a diminution of coal profits. He did not say that at the present moment there was no profit in coal, but if this condition of things went on, which was very likely to be the case, they must be prepared, taking the country as a whole, for a considerable diminution. Companies like theirs, whose finances were of the best, could stand these difficulties better than weaker collieries, and he hoped that they would still be able to show the shareholders a reasonable return for their money. Since they last met, the Coal Control had been established—one of those numerous Ministries which took charge of the business of the country with more or less success. The Coal Controller had only recently taken his seat, and since the end of February the collieries were practically under a beneficent despot, who sometimes appeared to know more about mining than experts of great experience, such as they were accustomed to. He did not say it was a bad principle, because in these war days everything was upset. As long as the Coal Controller was advised by wise and competent people he had no doubt it would work out for the good of the country, and without much injury to their interests. They were only allowed 5 per cent. over the standard profits; 80 per cent. of the excess profits went to the Government as excess profits duty, which was quite right, and 15 per cent. went to the Coal Controller to provide for the interests of the weaker collieries. He did not think they need complain of that. As long as the Coal Controller did not interfere with the management of the collieries, he did not think they ought to complain, but he did say most seriously that if they were to be interfered with in any way by Government officials in the management of the pits, most disastrous consequences would happen. He had every confidence in the discretion of those in high quarters that they would not attempt anything of the kind. Very drastic regulations had been issued with regard to the transport of coal. The country was mapped out into districts, and the coal produced in certain districts could only be sent to specified markets, the object being to save haulage of wagons and make people supply themselves from the nearest collieries. As far as theory went, that was a sound principle. He did not know how it was working out. He did not fancy it had made a very great difference, but the principle was a good one, and they were anxious to fall in with the views of the Government on the subject. He was glad to say that district committees had been appointed. In South Yorkshire and Derbyshire, for instance, there were district committees composed of practical coal owners, who understood the trade, and directed coal to the markets where they thought it could be disposed of most advantageously from the point of view of cost of transport. As far as the trading side of the collieries was concerned, they were now entirely under the Coal Controller, who had declared all contracts cancelled. Of course, they were allowed to go on selling, with certain exceptions, to their old customers, but every contract was liable to be broken at any moment, and the coal diverted elsewhere. Coal which they had sold for export at a high price may be ordered to go to some inland place, where they were obliged to take the Coal Limitation price, perhaps 5s. or 6s. per ton less. To that extent the Control interfered with their trade in a rather unfortunate manner.

Owing to lack of coal, five towns in Bohemia are without electric light, and three towns are without water.

Arising out of the recent all-round advance of 1s. 6d. per day in miners' wages, the proprietor of Allhallows Colliery, on the north-eastern extremity of the Cumberland coal field, has posted 14 days' notice to terminate engagements.

A course of six lectures on "Coals, Peats, and Some Oil Shales: their Origin, Structure, and Significance, Palaeobotanical and Otherwise," will be given at the University College, Gower-street, W.C., by Dr. Marie Stopes, on Tuesdays, October 16, 23, 30, November 6, 13, and 21, at 3 p.m. The lectures deal with microscopic evidence in some detail, and will be specially adapted to students of botany and geology, but are open to the general public interested in coal.

The Committee of the National War Museum are anxious to make as complete a collection as possible of portrait photographs of all British officers and men who have served or are serving in any capacity whatever with the British forces during the present war. It is hoped with the kind co-operation of relations and friends of officers and of the officers themselves, to establish a record of national interest and of permanent value as history. The name, regiment or ship, rank, decorations and date should be written on the back of the photograph, which should be unmounted, and should be sent to the secretary, National War Museum, H.M. Office of Works, Storey's-gate, Westminster, S.W. 1.

CONTENTS.

ES:—	PAGE
Boring.....	647
Dial Boreholes.....	648
Disposition of the Coal Fields of Western Europe.....	639
The Private Owners' Wagon (No. 2) Order, 1917.....	641
Wages of Underground Day Wage Men.....	641 and 642
Electric Haulage at Delagua Collieries.....	642
American Coal Tar Dye Production.....	645
The Future of the Coal Trade.....	645
Obituary.....	651
South Wales Mining Timber Trade.....	652
Fireclays and Ganisters of the South of Scotland.....	652
Testing Refractory Materials.....	654
Labour and Wages.....	655
Cumberland Surface Workers.....	655
Open Contracts.....	657
The Freight Market.....	657
Abstracts of Patent Specifications Recently Accepted.....	658
New Patents Connected with the Coal and Iron Trades.....	660
Publications Received.....	660
REPORTS OF MEETINGS:—	
Midland Institute of Mining, Civil and Mechanical Engineers.....	643
Refractory Materials Section of the Ceramic Society.....	645
THE COAL AND IRON TRADES.....	648-652
The London Coal Trade.....	648
The Tin-plate Trade.....	651
The By-Products Trade.....	652
NOTES FROM THE COAL FIELDS.....	656
COAL, IRON AND ENGINEERING COMPANIES.....	658
MISCELLANEA:—	
South African Industrial Developments—Household Coal Distribution Order, 1917.....	641
Iron Ore Handling at Sunderland—Coke Oven Plant for Ontario—Coal near Odessa—Exports Embargo.....	645
Edward Medal Awards.....	648
Brazilian Peat—Scotch Iron Moulders' Strike—Petroleum Oils.....	651
Spanish Coal Production—Future of Chemical Trade.....	652
The Organisation of Engineering Training.....	655
Export of Coal by Barges—American Rails for France.....	657
New South Wales Strike—Trading with the Enemy—Coal Commissions and Committees.....	660

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The discussion which took place this week at the Midland Institute upon Mr. BLAKE WALKER's paper on "The Origin and Extent of the Coalfields of Western Europe" served the purpose of again emphasising the national interest in a systematic borehole investigation of the underlying rocks of the British Isles. Prof. KENDALL called attention to the fact that the only purely scientific exploration of the earth undertaken in this country was the Sub-Wealden boring at Netherfield, near Battle, conducted many years ago partly by public subscription and partly by Government grant. This boring had no direct connection with coal. It was carried down 2,000 ft., ending in Oxford clay, and was interesting mainly from the evidence it gave of the great thickness of the Kimmeridge clay, reaching 1,480 ft., in this area. The value of the information afforded by this solitary boring cannot be properly estimated by the lay mind. There was no dazzling discovery capable of fascinating either the general public or the politicians responsible for the expenditure of public funds; but it was not entirely barren of commercial results, owing to the discovery of a seam of gypsum in the Purbeck beds, upon which a profitable local industry has been built up.

Since that time numerous attempts have been made to arouse public interest in the question of systematic borings for hidden coalfields. Private enterprise has accomplished something in the meanwhile; but, as Prof. KENDALL truly remarks, this method is generally too precarious for private individuals to undertake, and may result in nothing better than giving gratuitous information to their neighbours without any profit to themselves. In the case of Government exploration, however, the risk need not be so great if a well-designed plan of investigation is adopted. On the principle of making the profits on the swings balance the losses on the roundabouts, the Government can recoup itself by means which are not available to isolated individuals.

The case of the concealed coalfields, however, is no longer a question of scientific curiosity but one of national importance. It cannot be said that the Government has yet been impressed with its urgency, for the only move in the matter has been taken with respect to a far more speculative problem—i.e., the search for petroleum. No one will complain about the precedence given to oil. It is better to bore for oil, or even for banket for that matter, than to do nothing. We accept without reservation the principle that every borehole put down in this country will give information that will be turned to good account by geologists in their task of unravelling the hidden features of the earth's crust.

The problem of the coal fields was admirably introduced by Mr. BLAKE WALKER, who has clearly been at considerable pains to gather available information covering a wide area. This is probably the most profitable way of studying the question at the present time, when the borehole information is so scattered and scanty. Unfortunately, the solution is rendered still more difficult by our ignorance of the geographical conditions of deposition. It is uncertain in most cases what were the original boundaries of the coal fields. We do not even always know what the present boundaries are. The isolation of the coal fields, where the boundaries have been cut off by folding or faulting and subsequent denudation, gives little clue to the original area of deposition, and at the same time affords ample opportunity for much geographical speculation. There is no harm in giving play to the imagination in respect to hidden geological structures, but the game of guessing at hypothetical facts and their significance is more fitting for the mental training of geological students than for business men. At the present time there is too little solid foundation for the many guesses that have been made as to the relationship of the coal fields of Western Europe to one another. Prof. FEARNSIDES calls attention to the very scanty information we possess as to the boundaries of the coal field areas of deposition, and whether the ridge of St. George's ... the coal measures of the ... south, as JUKES-BROWNE long

cautious not to exceed legitimate limits. Even if we possessed a hundredfold more borehole data than are now available, there would still be room for carefully trained imaginative work in their interpretation; for a great part of the evidence has been irretrievably lost in the process of geological disturbances and denudation in post-carboniferous time. This is clear from a consideration of the Dover coal field, where a considerable number of boreholes have now been put down within a comparatively small area, and yet we do not know how this coal field terminates, either to the north or south; that is to say, it is uncertain whether it is cut off by folding or faulting, or whether it came to an end against a ridge of older ground.

THE LONDON COAL TRADE.

THURSDAY, OCTOBER 4.

The London coal trade is settling down to the new order of things, and the various changes seem calculated to benefit the Metropolitan traders. It is certain that better supplies are coming forward, and as the unusual number of orders from the general public is now within measurable distance of execution, there is not such a strong demand for the loaded wagons to be brought forward. In fact, in more than one instance, buyers are asking the collieries to refrain from sending on the extra supplies, as the depots are comparatively full. In other quarters, however, the demand is still very keen, and merchants are pressing for the orders to be completed. The North London depots have fared better than the southern depots from the Controller's regulations. If it were not for the shortage of labour to deal with the coal that has arrived, London may fairly be considered as well provided for the winter. Many of the merchants are bending their energies towards securing an efficient supply of coal for the poor, and have arranged for distribution in small quantities in the poorer districts. The rate is said to be at 1s. 9d. per cwt. and 10½d. in ½ cwt. lots, which is slightly lower than the official prices. This, with the co-operation of the various municipal bodies, should lead to a far better distribution amongst the smaller purchasers than ever has been known before within the London area. The Household Coal Distribution Order (1917) came into force on Monday last. All Metropolitan coal and coke merchants are called upon to register, so that they may receive the quantities of coal which their customers are permitted to purchase according to their household needs. Whilst the household qualities have been brought forward in better quantities, hard steam coals and the hard cobbles are exceedingly scarce, and factories along the riverside and in all parts of the Metropolis are keenly pressing for better supplies. The electric stations also are urgently needing double screened nuts; and here again the supplies are very short. Slacks have been sold freely, and the demand continues brisk, but the fine slacks are neglected. A heavy tonnage of gas coals is being sent to inland works, and the quantity of seaborne gas coal has been well maintained. The Admiralty and the requirements of the Allies are absorbing a very heavy tonnage, and all shipping centres are pressing for more coal. The number of contract cargoes returned for Monday's market as arriving in the River Thames was 17, and for Wednesday's market 18. During the week it has been notified: (1) That it has been arranged that no man is to be taken from the coal trade of London before October 15; (2) that the coal merchants in the districts of Bermondsey, Bethnal Green, Caterham, Chelsea, Fulham, Greenford, Hatfield, Hammersmith, Holborn, Islington, Lewisham, Poplar, Shoreditch, Stepney, and Westminster are urgently directed by the Coal Controller to appoint their supervisor at once, or that the Coal Controller would exercise his authority to appoint one; (3) that all prices in the area covered by the Metropolitan Coal Distribution Committee from October 1 should be advanced 1s. per ton, trolley prices advanced 1d. per cwt., dealers' price 4s. 6d. less than the delivery price, and coal shop price 1d. per cwt. advance. The following are to be the Central London prices: Best selected house coal, 37s. 6d. per ton; Silkstone, 35s.; Derby Brights, 34s.; Kitchener, 33s.; hard cobbles, 32s.; stove coal, 31s. per ton. Trolley prices north of the Thames, 1s. 10 per cwt.; ditto, south of the Thames, 1s. 11d. per cwt. Coal shop prices north of the Thames, 1s. 11d. per cwt.; ditto, south of the Thames, 2s. per cwt. These prices have been practically the only prices for the whole of the summer, so there is very little change.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, SEPTEMBER 28.—There was no alteration in the seaborne house coal market to-day. The demand, however, continues good, but no cargoes on offer. Cargoes, 24.

MONDAY, OCTOBER 1.—Seaborne house coal was in good demand to-day, but no ready cargoes were on offer, no sales being reported. Cargoes, 17.

WEDNESDAY, OCTOBER 3.—The seaborne house coal market was quiet to-day, no cargoes being on offer. Cargoes, 18.

Edward Medal Awards.—The King has been pleased to award the Edward Medal to William Fish, a chageman at the Cramlington Colliery, under the following circumstances: On January 19, 1917, a heavy fall of roof occurred at the Hartford Mine, Northumberland, at a spot where two men were working, instantly killing one man and injuring and pinning down the other. Fish at once set to work to release the injured man, although there was constant danger of a further fall, by which he himself might be killed or injured. After more than half-an-hour's work he succeeded in his attempt. There can be little doubt that, but for Fish's gallant action, the injured man would have died. The medal has also been awarded to Daniel Foulds, James Haddon, William Heathcote, James Short, and Alfred Smith, under the following circumstances: On November 28, 1916, at about 12.30 a.m., a heavy fall of roof occurred at the Pye Hill Colliery, Notts, by which three men were buried. Foulds, Haddon, Heathcote, Short, and Smith quickly arrived, and attempted to rescue the buried men by digging out the fallen roof and setting props as they progressed. The roof was still extremely dangerous, and stones were constantly falling. Three times heavy falls occurred, breaking the props which had been set up, but on each of these occasions the rescuers were fortunate in having sufficient warning to enable them to escape. They remained at work for seven hours, until all three buried men were reached and taken out; unfortunately all were found to be dead. During the entire period the rescuers were in continuous danger of serious injury or death from a further sudden fall.

THE COAL AND IRON TRADES.

THURSDAY, OCTOBER 4.

Scotland.—Western District.

COAL.

The general situation in the Scotch coal trade presents no fresh feature, and business continues dull and lifeless. The industrial turnover is steadily maintained, and household requirements are increasing, but until the shipping department can proceed with more facility, no great improvement can be expected in the position as a whole. In the west of Scotland district the collieries are just managing to carry on without an undue amount of idle time, but this is not accomplished without considerable difficulty, as new transactions, for the most part, are of a hand-to-mouth description. Shipments for the week reached the total of 142,901 tons, against 93,525 in the preceding week and 124,135 tons in the corresponding week of last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	25/-27/6
Ell	26/6-28/	26/-28/	24/-25/
Splint.....	28/-30/	28/-30/	26/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

Conditions in the Scotch iron trade are still of a strenuous nature, and the character of the work in progress is unchanged. Makers are utilising their entire energy in the production of war materials, either directly or indirectly, and only on odd occasions is any small distribution made to private consumers. In the pig iron trade, the output of hæmatite is totally devoted to the requirements of the local steelworks, while forge and foundry iron are becoming very difficult to procure. Exports are practically discontinued, with the exception of small shipments to the Allies. Prices are firm and unchanged. Monkland and Cambroë are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Malleable iron makers have sufficient orders on hand to keep the mills running for months ahead, mostly in connection with munitions of war. The ordinary brands of iron are really out of the market, while even shell-discard, which is being substituted, is now scarce. Where prices are uncontrolled very high figures are quoted for any available supplies.

Scotland.—Eastern District.

COAL.

Collieries in the Lothians are suffering from a lack of outlets for their produce, and though employment has been better during the past week or two, owners will be forced to resort to idle time once again if stocks accumulate at the present rate. Shipments were 19,419 tons against 15,564 in the preceding week and 33,283 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	28/-30/
Secondary qualities.....	25/6	25/6	25/-36/
Treble nuts	23/	23/	24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/

The position of the trade in Fifeshire still gives rise to considerable anxiety. Broken time is more prevalent here than in any other district in Scotland, owing to restricted land sales and the impossibility of doing export business. All qualities of coal are feeling the want of orders, and the situation is far from encouraging. Shipments amounted to 28,736 tons against 33,553 in the preceding week and 59,328 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	33/-37/6
Unscreened do.....	24/-25/	24/-25/	30/-35/
First-class steam coal.....	28/	28/	30/-32/6
Third-class do.	24/	24/	25/-26/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The aggregate shipments from Scottish ports during the past week amounted to 191,056 tons, compared with 142,642 in the preceding week and 216,746 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

During the week under review, the volume of business on official and inland account has continued to be gratifyingly large. Official requirements have taken up practically the whole output of large steams, leaving a very small surplus indeed for the requirements of individual exporters, and resulting in great regularity of employment on the part of collieries. This activity is, however, confined solely to screened qualities, unscreened sorts moving off very indifferently and smalls continuing to accumulate in a manner which does not lessen the problem of their ultimate disposal. Requisitioned steamers have been supplied adequately to the official requirements, but there has been a very considerable shortage of other shipping, with the result that the bunkering market has been exceedingly lethargic. The operations of gas coal collieries have been impeded by reason of the shortage of "free" vessels, and pits have not worked to their maximum extent. Coking coals and smithies have been well taken up on home

account. The enquiry for coke has been large, fully up to the output. Further sales of steam coals for comparatively early shipment to the Swedish State Railways are reported to have been made, and the chartering of a number of fairly large vessels for Gothenburg and Stockholm discharge is probably attributable to this fact. It is stated that the Department requires some 300,000 tons in all, but this statement is very doubtful, and ultimately it may be found that a considerably less quantity has satisfied the requirements of these railways. The coal sold in respect of these enquiries consists of Northumberland and Durham sorts at the scheduled figures, plus 5 per cent. for merchants' profit, and the orders appear to have gone in each instance to the original tenderers of these supplies. The Norwegian State Railways have placed their orders for 18,500 tons of best steam coals for November-December delivery. The contract has been divided between a Newcastle firm and a Wearside firm at scheduled figures, plus the usual 5 per cent. for named brands of Northumberland and/or Durham coals. Licences for the shipment of coals and coke to France during the quarter ended Sunday last have been extended for a fortnight, much to the relief of certain local exporters.

Prices f.o.b. for prompt shipment.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best, Blyths (D.C.B.) ...	30/	30/	40/
Do. Tynes (Bowers, &c.) ...	29/6	29/6	37/6
Secondary, Blyths ...	25/6	25/6	30/ -32/6
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	30/ -32/6
Unscreened ...	23/6-25/	23/6-25/	25/ -30/
Small, Blyths ...	20/	20/	22/6
Do. Tynes ...	18/6	18/6	20/
Do. specials ...	20/6	20/6	25/
Other sorts:—			
Smithies ...	25/ -30/6	25/ -30/6	25/
Best gas coals (New Pelton or Holmside) ...	25/	25/	32/6-35/
Secondary gas coals (Pelaw Main or similar) ...	23/6	23/6	27/6-30/
Special gas coals ...	26/6-30/	26/6-30/	34/ -35/
Unscreened bunkers, Durhams ...	24/ -25/	24/ -25/	24/ -28/
Do. do. Northumbrians ...	24/ -25/	24/ -25/	22/6-25/
Coking coals ...	24/ -25/	24/ -25/	22/6-25/
Do. smalls ...	24/ -25/	24/ -25/	20/ -22/6
House coals ...	28/6-30/	28/6-30/	37/6-40/
Coke, foundry ...	42/6	42/6	38/ -45/
Do. blast-furnace ...	42/6	42/6	36/ -40/
Do. gas ...	30/ -31/	30/ -31/	33/ -35/

Sunderland.

COAL.

The coal market is still devoid of interest, trade is irregular, some of the pits are losing time, while the position is rendered worse by a shortage of empty wagons. The supply of tonnage is also short, but fortunately requisition steamers are on hand. There is practically no change in values, which continue at schedule rates. Wear specials are quiet, and there is no improvement in steam smalls. Bunkers are entirely unaltered and quiet; coke is without change. There is, however, a moderate movement for shipment, and the home demand is strong. The Norwegian State Railways contract for 18,500 tons of steam coal has been divided, half to Newcastle for Northumberland coal and half to Sunderland for Durham named coal at schedule figures plus 5 per cent. to cover merchants' profits.

Prices f.o.b. Sunderland.

Gas coals:—	Current prices.	L'st week's prices.	Last year's prices.
Special Wear gas coals	26/6-30/	26/6-30/	35/
Secondary do.	23/6-25/	23/6-25/	28/
House coals:—			
Best house coals	30/	30/	40/
Ordinary do.	28/	28/	28/6
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	35/
South Hetton do.	28/6-30/	28/6-30/	35/
Lambton unscreened	24/	24/	25/
South Hetton do.	24/	24/	25/
Do. treble nuts	20/	20/	26/6
Coking coals unscreened	25/	25/	25/
Do. smalls	25/	25/	23/
Smithies	25/	25/	26/
Peas and nuts	24/6-26/	24/6-26/	27/6
Best bunkers	25/	25/	27/
Ordinary bunkers	24/	24/	22/6
Coke:—			
Foundry coke	42/6	42/6	37/6
Blast-furnace coke (dld. Teesside furnaces)	28/	28/	28/
Gas coke	31/	31/	33/

Middlesbrough-on-Tees.

COAL.

Very little news is ascertainable concerning the fuel trade. The market generally is dull, but it is reported that rather more steam coal is going to neutral countries. Official absorption, especially of steam coal, is well upheld. The position of many Durham collieries, however, is not very satisfactory. Inconvenience is caused by irregularity of tonnage, and some shortage of railway wagons. In the gas coal trade best qualities are in good demand, but other classes are very quiet. Best Durham gas coal, 25s.; second quality, 23s. 6d.; and Wear special, 26s. 6d. Bunker coal is very quiet and slow of sale. Unscreened Durhams run from 24s. to 25s. Special manufacturing coals continue in very good request. Coking coals are somewhat unsettled, but considerable quantities are taken up. The coke market is steady, without alteration. Beehive and patent oven each remain at 42s. 6d. for shipment, and gas-house product ranges from 30s. to 31s. 6d. Local demand keeps heavy. Average blastfurnace kinds continue to command the fixed maximum of 28s. at the ovens, and low phosphorus qualities still realise the limitation figure of 30s. 6d. at the ovens.

IRON.

Few new features are noticeable in the iron and steel trades. So far as pig iron is concerned, production has just been reduced for the time being by the blowing out of a Cleveland pig furnace at the Tees Furnace Company's works. This reduces the number of furnaces in operation on the north-east coast to 75, of which 33 are producing Cleveland pig, 28 are making hematite, and 14 are manufacturing basic, spiegel and other special irons. There is

quite a plentiful supply of Cleveland pig, and a considerable business is passing in that commodity. Allocations to north of England consumers and customers in Scotland are on a most liberal scale, and this month's inland deliveries promise to be heavy. Indications of improvement in foreign trade are also noticeable, though the tonnage situation still hampers business. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge were all quoted 92s. 6d., and No. 1 was 96s. 6d.; and for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. In east coast hematite, the Control Committee continues to arrange distribution, so that all legitimate demand of inland consumers is met, and a fairly good home trade is reported. So far as export business is concerned, August allocations for Italy have been received, and moderately large, but the tonnage situation at the moment is not satisfactory. The position generally is better, and promises to be further relieved by the blowing-in of an additional furnace at an early date. Mixed numbers are 122s. 6d. for home use, and 141s. for shipment to the Allies, the export quotation being subject to addition in connection with the extra charge on foreign ore freights by neutrals. There is continuous pressure for delivery of manufactured iron and steel, and the heavy output is still practically absorbed by Government requirements and shipyard needs. Prices are very stiff.

Cumberland.

Maryport.

COAL.

Briskness continues to characterise operations in all branches of the coal and coke industries in West Cumberland. The only change in the situation since last week is that the clamour for coal is keener, both on local and coastwise accounts. The home market is very firm, and the call for fuel for use locally is greater than ever. There is a phenomenal demand for coal for home consumption, and some of the collieries have more than enough to do to deal with all the business that is now coming in on this account. Requirements are now very much in excess of the supply, there being scarcely enough to go round even for local users, and supplies, more particularly for shipping, are now lower than they have been for months. The demand for all classes of coal for industrial purposes is very strong, and important consumers at the iron and steel works, the iron ore mines and other public works in West Cumberland are at present making a heavy drain on the supplies of manufacturing fuel. With the increased need for a bigger output of local coke, all the smalls that can be raised are required to keep the by-product coke ovens in full blast, with the result that smalls for other purposes are again very scarce, and therefore stocks for export are now practically unobtainable. The driver lads at William Pit, Clifton, struck again on Tuesday, but the men kept the colliery going and the majority of the lads returned to work on Friday morning. All the pits in the county are now working full time, and production is more satisfactory this week. House coal is in strong request, and all the depots are busy, but merchants are still experiencing considerable difficulty in securing regular and adequate supplies. The cross-channel trade is busy, but supplies of all sorts for shipping are lower than ever this week. There is a brisk demand for works, gas and house coal for the Irish market, but the collieries are now so heavily engaged locally that they are unable to deal with all the business that is being offered on export account. During the week 11 vessels have sailed with coals, all for Irish ports, and the shipments have amounted to 2,340 tons, compared with 2,865 tons this time last year, or a decrease of 1,275 tons compared with the previous week. The exports have also included a cargo of 280 tons of pitch from the West Cumberland By-Product Works. The shipments for the month have amounted to 14,035 tons compared with 9,375 tons for August, and 15,635 tons at the corresponding period of last year. The coke industry is exceedingly brisk, and all the by-product coke ovens are in full operation. The entire output of local coke is going to the ironworks in West Cumberland and Millom. The by-products trade is very busy and all the plants in the district are very fully employed. There has been no alteration in either home or coastwise quotations. A list of prices is being prepared by the Committees appointed by the various town and urban councils, for the purpose of carrying out the provisions of the Retail Coal Prices Order, and some of them have already been published. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b.	17/6	17/6	17/6
Best bunkers (coastwise)	28/6	28/6	25/
Do. (for foreign-going steamers)	28/6	28/6	30/
Best coal for gasworks	20/	20/	20/
Best washed nuts for gasworks	19/	19/	19/

IRON.

A very firm tone continues to prevail in the hematite pig iron trade in Cumberland and North Lancashire. All the industries are briskly engaged, and a big output of both iron and steel is being maintained. The number of furnaces blowing in the whole district is 30, 20 of which are in Cumberland and 10 in the Furness area. The entire production of both ordinary and low phosphorus iron is going into prompt use, either by important consumers in Scotland and the Midlands or at the local steel-works. A substantial tonnage of Bessemer iron is also being sent out of the district for Government work. Prices are at the official maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t. Special iron is 140s. per ton and semi-special iron is quoted

at 135s. per ton, f.o.t. Cumberland hematite is still quoted at 115s. per ton, and therefore by the quarterly ascertainment under the sliding scale the value of blastfurnacemen in Cumberland and North Lancashire is unchanged. There is intense activity in the steel industry at Barrow and Workington. The output consists mainly of special work for the Government, and at present very little railway material is being rolled. Steel rails, heavy sections, are quoted at £10 17s. 6d. to £11 per ton, with light sections at from £14 to £14 10s. per ton. Heavy tram rails are £14 per ton; ship plates £11 10s. and boiler plates £12 10s. per ton. There is a keen demand for native iron ore; all the mines are very fully employed, and production is improving. Practically all the local ore that is being raised is going to the furnaces in Cumberland and the Furness district. The imports of foreign ore for the month have amounted to 14,470 tons.

South-West Lancashire.

COAL.

The household trade continues much in arrears, many collieries not being able to send more than partial supplies to their regular customers, and those who have been put into their hands under the new scheme. The position with regard to steam coal remains unchanged, a fair tonnage being shipped under licence and on contract account for bunkers. Very little free coal is on the market. Best Lancashire screened steam coal, 27s. 6d. to 28s. f.o.b. Mersey, Controller's terms. There is considerable pressure for gas coal generally, although in some few cases it is understood reasonable stocks have been secured. In slacks, the market appears to be on the turn, owing to the increase of consumption, and there is a very small tonnage now available for spot lot sale. In the coastwise and cross-channel trade for household coals vessels are somewhat difficult to procure, and coal also in the tonnage required by the merchant.

Prices at pit (except where otherwise stated).

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Best	21/ -22/	21/ -22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/ -20/	19/ -20/	19/ -20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds.
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	23/ -24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. For various reasons, previously indicated, the coal trade remains in an unsettled condition. There is practically no house coal on offer, while the market for shipping coal is steady and prices firm. Slack is somewhat more plentiful, in consequence of the reduced consumption through the short time in the cotton trade. Prices generally are as below:—

Prices at pit (except where otherwise stated).

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Best	22/ -23/	22/ -23/	22/ -23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/ -18/6	18/ -18/6	18/ -18/6
Furnace coal	17/6-18/	17/6-18/	17/ -18/
Bunker (f.o.b. Partington)	—*	—*	25/ -26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/ upwds	14/ upwds	14/ upwds

* As per official list.

IRON.

There was a fair attendance on 'Change in Manchester on Tuesday last, but no change whatever to report in the state of the trade in this district. All works are fully occupied. Deliveries are allocated by the Ministry, and prices remain without change.

Yorkshire and Derbyshire.

Leeds.

COAL.

Tuesday's gathering of the Yorkshire Coal Exchange differed little or nothing from its forerunners of many weeks past. Keen pressure for coal and very limited supplies are consistently maintained as the prevailing conditions. The collieries are working full time (except in the case of one pit, where the men are on strike over the price charged for miners' home coal), and every effort is made to maintain the output at the highest possible level. A considerable increase would be required, however, in order to satisfy the keen demand, especially for house and steam coal. A feature of the market is the general dissatisfaction with the operations of the coal transport scheme. This feeling seems to increase, and there is talk of strong efforts being made to press for a radical modification, if not entire cancellation, of the scheme. With regard to the London house coal trade, the collieries are still sending extra supplies under orders, and are obliged to turn a deaf ear to complaints of shortage from other quarters. A number of London factors and merchants were on the market endeavouring to augment their deliveries, but the pressure for emergency coal is not quite so keen, suggesting that the position at the depots is less urgent, and that the arrears of orders are being overcome. Coastwise, the quantity of house coal that is being shipped up to London and the south from the Humber ports is considerably reduced. Tonnage is scarce, owing to war conditions at sea, and freights are high, in the neighbourhood of 19s. 6d. to 20s. Hull to London. In local trade there is a general scarcity of supplies and a great deal of complaining—depot stocks, usually plentiful at the time of the year, being practically non-existent, and regular deliveries unequal to the public demand. Where contracts are based on summer and winter prices, a rise of 1s. per ton came due on October 1. Gas coal is featureless, except that the needs of the works become greater as the season advances, and there is no corresponding elasticity about

the output. Ordinary small steam slacks are the only relatively weak spot on the market, and this may be expected to disappear as colder weather calls for the use of stoves. Washed nuts, almost entirely reserved for works, are unprocurable, and rough slacks are in short supply. Coking slacks remain in short supply, and furnace coke is more than sufficient to absorb the output of the ovens. The following list of revised pit prices is given, with all reserve, but the quotations are based upon current transactions all coming within the operations of the Price of Coal (Limitation) Act:—

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ...	19/-20/	20/-21/	20/-21/
Wallsend & London best	18/6-19/	19/-20/	19/-20/
Silkstone best	18/6-19/	19/-20/	19/-20/
Do. house	17/6-18/	17/-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	22/6-23/6	23/-24/	23/-24/
Silkstone best	21/6-22/6	22/-23/	22/-23/
Do. house	20/6-21/6	20/-21/	20/-21/
Other qualities	18/-19/6	19/-20/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	15/-16/	16/-17/	16/-17/
Gas nuts	14/6-15/6	15/6-16/6	15/6-16/6
Unscreened gas coal	14/-15/	15/-16/	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	16/-17/	17/-18/	17/-18/
Large double-screened engine nuts	15/-16/	16/-17/	16/-17/
Small nuts	14/-15/	15/-16/	15/-16/
Rough unscreened engine coal	14/-15/	15/-16/	15/-16/
Best rough slacks	13/-14/	14/-15/	14/-15/
Small do.	11/-12/	12/-13/	12/-13/
Coking smalls	11/6-12/6	12/6-13/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

Whilst the general condition of business shows little material change, considerable interest is aroused owing to the prospect of an advance in prices of coal. The recent increase to colliery workers renders this inevitable; and opinion generally accepts the view that the increase will largely apply to fuel used for industrial purposes rather than to house coal. The fact that new contracts have to be arranged owing to the new scheme of delivery will also enable the question of prices to be taken in hand. At the same time, generally speaking, a scarcity of all classes of fuel still prevails, heavy supplies ordered to be sent to London still having to be provided; and in a large measure consumers in other districts are having to go on short supplies. It was expected that the directions in regard to London would have been somewhat relaxed, but up to the present this is not the case, and despite a good deal of protest nothing has been done to render the position more favourable to nearer districts. The demand for steam coal for shipment to the Allies continues to be very heavy, and district fuel is also being largely used for Admiralty purposes. The consumption of hard fuel for home purposes is larger than ever, but enquiry for steam nuts continues to be useless, owing to the supplies being commandeered for munition factories. Collieries are experiencing heavier pressure in regard to gas coal supplies, it being no uncommon experience for consumers to find that the quantities arranged for under contract are inadequate. In regard to smaller coal, though it is possible to obtain a more ready supply of ordinary slacks, there is a marked scarcity of those suitable for coke making. The demand for furnace coke still continues to be very active. Merchants in all parts of the West Riding are keenly pressing for better supplies of house coal, and find it very difficult indeed in any way satisfy the orders which they have on hand. Values are again largely nominal, and are represented by the following quotations:—

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	17/-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/9-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts	16/	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.

COAL.

Supplies of coal coming over rail are only moderate, and shipments are still hampered in consequence. It is hoped that with an improvement in the position regarding supplies to London and the south more attention will be paid to export requirements. France can take very large quantities, and, indeed, must have them; and it is probable that some will also have to be spared for Holland, which has a great preference for Yorkshire coal. Though no forward business is being entertained, a few transactions continue in the prompt market, and exporters are now able to command up to 35s. for best South Yorkshire steam hards for export to neutrals. France is a keen buyer of West Yorkshire Hartleys, but many kinds, particularly manufacturing fuels, cannot be had for shipment abroad, so great is the official call for them.

COAL.

There is a pressing call for coal for household use, and daily in substantial numbers. Manufacturing fuel continues on an even keel, the kinds suitable for steel-

making purposes. Sheffield continues to draw from this district the larger proportion of the coal which it requires for gas-producers. Cobbles and nuts are in great request. Slack for boiler firing is in active demand. Railway companies are pressing for supplies of locomotive coal and gladly accept deliveries of all that the collieries are in a position to send. Gas coal continues in strong demand. The export trade shows no improvement, and so far as this district is concerned there is no prospect of an early change. The coke trade is in an active condition. There is a good steady demand for all qualities, the output of the district being quickly taken up.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

There is no new feature to report. Business continues in a state of great activity in every branch of the trade.

Nottingham.

COAL.

Within the past week there has been a less active demand by the public on local merchants. This is attributable in some degree to the favourable weather which has prevailed and also to the fact that many householders have secured stocks for winter use. With fewer orders coming to hand, merchants are taking the opportunity of putting what fuel they can into reserve, but the amount thus appropriated is on a small scale, in consequence of the limited supplies obtainable at the collieries. There is still a good deal of pressure on owners for full contract deliveries by merchants generally, and the output of all qualities of domestic fuel can readily be disposed of. A similar state of affairs exists in the steam coal branch, the demand on which continues very active. War requirements absorb a considerable proportion of the output. Railway companies are taking large supplies of locomotive fuel. There is keen competition for steams for manufacturing purposes in view of the scarcity of supplies. Gas coal is in good demand, fair supplies being delivered on contract accounts. Slacks of nearly all grades are selling well, but there is a continued shortage of those grades used in coke-making.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	18/6-19/6	18/6-19/6	18/6-19/6
Good house coals	18/-18/6	18/-18/6	16/6-17/6
Secondary do.	17/-18/	17/-18/	16/-16/6
Best hard coals	16/9-17/6	16/9-17/6	17/-17/6
Secondary do.	16/-16/6	16/-16/6	16/-16/6
Slacks (best hards)	12/-13/	12/-13/	12/-13/
Do. (second)	10/6-11/6	10/6-11/6	10/6-11/6
Do. (soft)	11/	11/	11/

Leicestershire.

COAL.

It is a most noteworthy circumstance that all the very numerous changes which have taken place or are in progress have one outstanding result—a very great increase in the clerical work and in the labour of administration. What is even more surprising is that this unproductive work and its continual expansion is so lightly regarded by outside officials, as if it were of no account whatever. Hence it is that at all collieries there are complaints that there is no eight hour day for the clerical staffs or any corresponding increases in the rates of pay. It is very satisfactory, however, to have the assurances of the colliery managers generally that the clerical and the other permanent officials are responding in a patriotic spirit as far as is humanly possible to the extra calls that are being made upon them day by day. Prices of all classes of coal have been advanced by 1s. per ton in accordance with the Price of Coal (Limitation) Act. Further increases will of course become essential unless Government bonuses are allowed in order to meet the further advances just conceded to the miners. The demand for all classes of household for London and district is if anything keener than ever, and every effort is being made to maintain the daily deliveries at the maximum. Bakers' nuts, both main and deep cobbles and nuts, as well as small nuts for mechanical stokers, are cleared off as fast as they become available. Country merchants are pressing for larger supplies, and it is fortunate that the very mild weather is restricting the domestic consumption at the great centres of population. Stocks in reserve at country stations are very small, and there are none whatever at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	17/6-19/	16/6-18/	17/-19/
Second, hand picked	16/6-17/6	15/6-16/6	15/6-17/
Deep screened cobbles	17/-18/	16/-17/	16/6-17/6
Deep large nuts	17/-17/6	16/-16/6	16/-17/
Bakers' nuts	16/-16/6	15/-15/6	15/-16/
Small nuts	15/6-16/	14/6-15/	14/6-15/6
Deep breeze	13/9-14/6	12/9-13/6	12/9-13/6
Peas	13/-13/3	12/-12/3	12/-12/3
Small dust	6/-7/	6/-7/	6/-7/
Main nuts for London			
kitcheners	14/6-15/	13/6-14/	13/6-14/6
Stearns, best hand picked	15/-15/6	14/-14/6	14/-15/
Stearns, seconds	14/-14/6	13/-13/6	13/-14/6
Main cobbles for kitcheners	14/6-15/	13/6-14/	13/6-14/6
Main breeze	13/6-14/6	12/6-13/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The coal situation has been full of interest during the week. Last week end, output was again endangered owing to a large number of men in Old Hill district coming out over the delay in settling wages, but fortunately the

trouble was of short duration, the men agreeing to accept the settlement arrived at by the Controller and the men's leaders. Work accordingly has been resumed. The larger proportion of the coal of the district was sent to London by instructions of the Controller, and probably at no time has Birmingham been so short of stocks as this week. Some relief is expected, but merchants are meantime at their wits' end to obtain supplies sufficient to meet even a small part of their requirements. The weather is in their favour, but the demand for house coal is still very insistent, and merchants continue to have a long list of orders on their books. There has been no interruption of works activities; indeed, at some establishments there is some stock in reserve, but in the district affected by last week's strike a stoppage at neighbouring works was only narrowly averted. A matter of considerable moment is the official announcement that coal had been reached at the new colliery at Keresley, in North Warwickshire, four seams of the aggregate thickness of just over 23 ft. having been laid bare. It will be three years, however, before any output can be expected. The depth is over 700 yards, and engineering difficulties will be formidable. Maximum retail prices have been fixed for Birmingham, ranging from 25s. a ton for kitchen coal to 31s. 6d. for the best selected coal tipped at the entrance to consumers' premises, and for similar quantities delivered in bags from 27s. 6d. to 34s.

Prices at pit.

Staffordshire (including Cannock Chase):—	Current prices.	L'st week's prices.	Last year's prices.
House coal, best deep	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

The position of the merchant in the iron and steel industries is causing a good deal of concern in the district. So great is the proportion of business now being done direct between Government agents and manufacturers, and so complete is the control exercised by Government over all the branches, that the merchant is being effectively crowded out. Birmingham Chamber of Commerce, which is anxious about the regular organisation of trade, has addressed a letter to the Prime Minister and the heads of naval and military departments, the Chancellor of the Exchequer, the President of the Board of Trade, and the Minister of Munitions, suggesting that the Government should act as a trading intermediary until the resources of existing commercial machinery were exhausted or had become inefficient, and that to this end merchants should be encouraged to continue to carry or import stocks of commodities essential to this country. Another matter of moment that has occurred within the past few days is the fixing of a controlled price for sheets at £17 for hard doubles and £28 for galvanised sheets, net, at makers' works. Until recently the price for the former was £19 10s., less 4 per cent. delivered: a fortnight ago the discount was abolished, and a net price of £18 10s. fixed by some firms, at least, so that the new rate shows an appreciable drop. The £17 applies to lots of two tons and upwards, for lesser quantities £19 may be charged. Makers are not at all satisfied with the new prices, which they consider inequitable, and they have taken steps to lay their case before the Ministry of Munitions. The disparity in galvanised sheets is not so pronounced, the former price being £28 10s., and besides, the output has shrunk to very small dimensions indeed. Copper sheets are not affected by the movement, as they are not under price control, but they, too, have declined by £5 a ton, and now stand at £155. The Government are the largest customers, and large quantities are being utilised for aeroplane work, powder boxes and other materials which minister to the conduct of the war. Makers of bar iron report an immense call for rolling stock work, engineers, constructive firms and various other purposes. There is also large business being done in small iron, hoops and strip. The requirements of the steel trade are being met better in the matter of basic iron. Forge and foundry iron are urgently called for, and some of the higher qualities of foundry are scarcely obtainable. The only feature of the Wages Board returns for July and August is that for the first time since the outbreak of war the average net selling price does not show an increase. On the contrary, it is 3d. a ton down, now standing at £15 5s. 9d. There is decline of 2,500 tons in output compared with the preceding two months, due to the holiday stoppages and hot weather.

Forest of Dean.

COAL.

With the continued scarcity of all qualities of fuel, there is little alteration to record in the position of business since last writing. House coals are still in heavy request, and the pits are kept fully employed endeavouring to cope with the abnormal demand. Buyers are very numerous and their demands are most insistent, but the collieries are utterly unable to give the desired supplies. There continues a pronounced scarcity of all classes of steam coals, and the collieries are all fully extended—consumers, however, have to go short of their requirements.

Prices at pithead.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Block	24/	24/	21/6
Forest	23/	23/	20/6
Rubble	23/3	23/3	20/9
Nuts	21/6	21/6	19/
Rough slack	13/6	13/6	13/
Steam coal:—			
Large	20/-21/	20/-21/	18/-19/
Small	16/-16/6	16/	16/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

COAL.

Messrs. W. Wade and Son report that the coal trade of the south of England is very disturbed about the small quantity of house coal now coming into the No. 13 district. It is expected that the allocations of Welsh steam coal will be cancelled, as this coal is practically unignitable in the small grates of householders. It is felt that this allocation to this district is really unnecessary, inasmuch as the collieries in north-east England and east Scotland have been working only three days a week. An arrangement to send the product of these collieries to London district would admit of Derby and Nottinghamshire coal being sent to No. 13 district. Representations to this effect have been submitted to the Coal Controller, and it is hoped that they will receive attention. As the matter stands, a great scarcity of house coal is near at hand, as there is scarcely any coal offering in the wholesale market, and the local conditions nearly approach those of the great strike in the spring of 1912.

THE WELSH COAL AND IRON TRADES.

THURSDAY, OCTOBER 4.

Monmouthshire, South Wales, &c.

Newport.

COAL.

The market has been very dull for some time past. But in its featureless state coal owners and their selling agents have been a good deal disturbed by the trend of events. The Order that house coal was to be sold at 20s. per ton at the pit for use in the south-western area had a disturbing effect. There has been a good deal of broken time at some of the collieries due to the want of wagons, as the arrival of tonnage has been slow and uncertain. Stocks of coal have accumulated, especially so in the case of smalls, which, in a free market, would show a great reduction in values. All large coal is still in great request. House and gas coals are also much sought after.

Prices f.o.b. cash 30 days.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Black Vein large...	30/	30/	41/-42/
Western-valleys, ordin'y	29/	29/	40/-41/
Best Eastern-valleys ...	29/	29/	39/-40/
Secondary do.	28/	28/	36/-38/
Best small coals	21/6	21/6	26/-28/
Secondary do.	20/	20/	24/-26/
Inferior do.	18/	18/	20/-23/
Screenings	23/	23/	27/-28/
Through coals	27/	27/	26/-28/
Best washed nuts.....	30/	30/	30/-32/
Other sorts:—			
Best house coal, at pit...	33/	33/	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/
Patent fuel	32/6	32/6	40/-43/6
Furnace coke.....	47/6	47/6	50/-55/
Foundry coke	47/6	47/6	60/-65/

IRON.

There is little change in the conditions of the iron and steel trades of the district. An excellent output on Government account is being maintained at all the local works, which are running up to their maximum capacity. The tinplate trade shows considerable improvement in spite of Government control. Orders are now fairly plentiful, and there would be a lot of work at the mills if sufficient raw material could be obtained. Pitwood prices have been rising, and best fir is quoted as high as 70s.

Cardiff.

COAL.

The position seems to be going from bad to worse, and there are open murmurings that the control of the trade is not nearly so efficient as it might be. Frequent stoppages have been reported from the pits owing to shortage of tonnage and consequent lack of empty wagons. These stoppages are a constant source of irritation to both sides, but they appear to be unavoidable so long as there is a lack of transport facilities, and it is here that the dissatisfaction expressed on the market manifests itself. Outside Admiralty and Allied requirements there is little doing, and it is contended, therefore, that better facilities ought to be provided by the authorities, who are presumed to know exactly what their requirements at a given date are likely to be. In all the sidings, both at the collieries and in the vicinity of the docks, stocks are excessive, especially of small steams, and as yet there has been no serious attempt to solve the difficulty. The policy up to the present seems to have been one of "wait and see," with the result that the trade is suffering, and discontent is being fomented to such an extent that may lead to a prolonged dispute before matters can be adjusted at the conclusion of the war. Reference was made a week ago to the Order of the Controller fixing a maximum price of 20s. for coal to be transported to the south-western counties from South Wales and Monmouthshire. It was pointed out that such a rate was much below a remunerative level, and, in fact, in many instances involved an actual and ascertained loss. Representations were made to Mr. Calthrop on the subject, and he has consented to receive a deputation on the matter. That the coalowners have a legitimate grievance may be gauged from the fact that whereas south-western consumers are to receive their coal at 20s. at the pit head, those in the immediate vicinity of the pits at Cardiff and elsewhere cannot buy retail, best qualities, under 36s. for cash or 37s. for credit, and this latter scale has just been fixed after consultation with the Coal Factors' Associations by the local Food and Fuel Control Committee. The long-expected classification list has not yet been published, but the Controller has made certain modifications on the schedule with regard to smalls, on which certain collieries have been added to the list and several others have been de-graded. In the meantime, all transactions are being carried out on the basis of the schedule as published, subject to any modification that may take place hereafter. Pitwood is becoming increasingly scarce, and prices have now reached the record rate of 67s. 6d. to 70s. per ton, with a corresponding rate for English-grown wood. Coal for gas making and household purposes is in strong demand, and there is a pronounced scarcity. Fuel and coke, on the other hand, are in plentiful supply.

Prices f.o.b. Cardiff (except where otherwise stated).

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	40/-42/6
Ordinary	30/	30/	39/-40/
Best bunker smalls	23/	23/	29/-29/6
Best ordinaries.....	21/6	21/6	27/6-28/6
Cargo qualities.....	20/	20/	23/-24/
Inferior smalls	18/	18/	21/-23/
Best dry coals	30/	30/	40/-42/6
Ordinary dries	28/6	28/6	37/-39/
Best washed nuts	30/	30/	35/-37/6
Seconds	28/6	28/6	34/-35/
Best washed peas.....	27/6	27/6	33/-34/
Seconds	26/6	26/6	31/-33/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	40/-42/6
Western-valleys	29/	29/	40/-42/
Eastern-valleys	29/	29/	37/6-38/6
Inferior do.	28/	28/	34/-37/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	40/-41/
Through-and-through	—	—	33/-34/
Small	26/	26/	28/-31/
No. 2 Rhondda—			
Large	27/	27/	34/-35/
Through-and-through	25/	25/	26/-29/
Small	20/	20/	23/-24/
Best patent fuel	30/	30/	42/-44/
Seconds	30/	30/	40/-42/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	60/-62/6
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	67/6-70/	65/-67/6	43/-45/

* Nominal.

IRON.

The tin-plate market continues strong, and maximum prices are freely paid. In fact, some makers have been obliged to refuse orders, as their books are not only full for some months ahead, but they have oversold their output. The continued restrictions and meagre allocations of tin-plate bars is driving much of the South Wales trade into American hands, and it is stated that there will be the greatest difficulty in recovering these markets after the war. Shipments were not so heavy last week, being only 12,732 boxes, as compared with 20,962 boxes the previous week, and 24,841 boxes at the corresponding date of last year. Receipts from works, on the other hand, were rather heavier, and amounted to 19,692 boxes, against 14,325 boxes the previous week, and 42,626 boxes last year; thus leaving in stock 71,629 boxes, compared with 121,020 boxes a year ago. There is no change in the galvanised sheet trade, and prices remain on a nominal basis. Spelter continues steady at £54 per ton. In the general steel works, outputs both of Welsh hæmatite and of finished steel are maintained at the utmost capacity, and there is no diminution in the demand. Iron ore supplies continue to be satisfactory. There is a good demand for scrap metals, and maximum rates are being obtained.

Swansea.

COAL.

The trade of the port showed no improvement during the past week, the shipments of coal were down, but patent fuel shipments were larger; together they amounted to 65,082 tons. There was a good attendance on 'Change, and conditions were unaltered. Anthracite large and machine-made sizes were practically unobtainable owing to collieries having sold their outputs forward. Small quantities were secured here and there, depending upon the position of tonnage. Culm and duff were, if anything, weaker. Large steam coal of the better grades were in good demand. Through and small coals, however, were slow.

Llanelli.

COAL.

There is not much change to report as to the state of the local market. Anthracite large kinds continue to maintain their strong position, and it is difficult to secure full supplies of the better grades. Cobbles are also in demand,

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/6
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-41/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine-broken beans (best)	35/	35/	30/-31/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm.....	13/	13/	14/6-15/
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	5/-5/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	26/-29/
Smalls	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

and there is a scarcity in supplies of nuts and smalls. Orders for these latter qualities are difficult to place. Peas are not so active, and culm and duff are with very easy and stocks on the heavy side. Large steam coal is steady, with a good demand for the better qualities. Throughs and smalls are not very active, with the lower grades moving very slowly, and stocks accumulating. Manufacturing coals are strong, and there is a firm demand for house coals.

THE IRISH COAL TRADE.

THURSDAY, OCTOBER 4

Dublin.

Locally the demand for house coal is moderate for immediate requirements, owing to milder weather, but the country trade is more active, as consumers are looking to their winter supplies. Prices remain unchanged, as follow: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s. all less 1s. per ton discount for cash. Scotch steam coal, 41s.; Welsh steam, 48s. Coke has been advanced 1s. 6d. per ton this week, and now stands at 46s. per ton. As a consequence of the large demand all through the season, and the curtailment of supplies of best English coals, stocks are still small, and under present conditions there is very little prospect of increasing them. In some quarters, expectations appear to be entertained that the net result of the recommendations to the Corporation with regard to the fixing of coal prices, is that the coal will be about 4s. to 4s. 6d. a ton less than the existing prices in this port.

Belfast.

It is stated that no prices have as yet been fixed by the Coal Controller for house coal locally, although consumers are, in some instances, holding back in view of the anticipated reductions before purchasing winter supplies. There is no change so far in prices of any of the qualities, and demand generally continues to be good. Current quotations are as follow: Best Arley house coal, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Scotch steam coal is about 29s. per ton; and best qualities up to 35s. and 37s. 6d. per ton. Irish coal at Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton, and 30s. per ton delivered at Belfast.

THE TIN-PLATE TRADE.

Liverpool.

There is not a great deal of business passing. Makers are not anxious to book forward to any extent, as they have great difficulty in dealing with orders already on their books, owing to shortage of labour and materials. The maximum official price is, on the whole, being maintained, but occasionally transactions in light weights are reported at a shade less money. Wasters seem to be accumulating on account of the difficulty in obtaining "permits," and works are in many cases glad to sell at a little under the official maximum price to reduce their stocks.

OBITUARY.

The death has occurred in a nursing home in Glasgow of Prof. Charles Latham, M.I.M.E., Dixon Professor of Mining in Glasgow University. Prof. Latham, who was well known in the Lancashire coal field, was born at Birkdale, Southport, in 1868. His father, the late Mr. James Latham, was for practically a generation general manager of the Moss Hall Coal and Cannel Company in the Wigan coal field, and for a time Mr. Latham was assistant manager with the same company. Prof. Latham was a distinguished student of the old Wigan Mining School, of which he was a silver medallist and also a Queen's medallist. The deceased gentleman had been in feeble health for some years.

Mr. Chas. Rollo Barrett, of Whitehill Hall, Chester-le-Street, who died suddenly—apparently from heart failure—on Saturday last, was a colliery engineer, and went to Chester-le-Street 25 years ago from Seaham Colliery to assist Sir Lindsay Wood, his brother-in-law, in connection with the local mining interests of the Ecclesiastical Commissioners, for whom Sir Lindsay is agent. Mr. Barrett, who was 63 years of age, leaves a widow, two sons, and two daughters. His death is believed to have been hastened by the death in action some little time ago of his son, Maj. Barrett, of the Yorkshire Regiment.

Second-Lieut. Percy Braidford, third son of Mr. William Braidford, junr., manager of the South Garesfield and Lintz Collieries, was killed in action in France on September 21. Lieut. Braidford, who was awarded the Military Cross two months ago, was about to enter on a mining career at Spu Colliery just before joining the Colours. His elder brother, Second-Lieut. Wm. Braidford, fell in France in July 1916.

Brazilian Peat.—The principal seams of peat are those of the River Marahu, in the State of Bahia, the seams being 15 m. thick. By simple process of distillation, the peat of Marahu is capable of yielding nearly 400 kilogs. of combustible oil per ton, which gives it a great industrial value. It is composed of the following elements: Volatile hydrocarbons, 72 per cent.; fixed carbon, 10.5; and ash, 17.5.

Scotch Iron Moulders' Strike.—A mass meeting of iron moulders, who have been on strike for some days owing to dissatisfaction with an award by the Committee on Production, was held in Glasgow on Tuesday. The proceedings, which were private, lasted three hours. After hearing a deputation which met the Minister of Labour in London on Saturday last, and in view of the fact that their claim would come before the Committee on Production in three weeks' time, it was unanimously agreed to return to work as yesterday.

Petroleum Oils.—Mr. Walter Long, M.P., having been requested by the War Cabinet to take control of all questions affecting petroleum oils and petroleum products, has appointed Prof. Cadman, C.M.G., Petroleum Adviser to the Colonial Office, and Professor of Mining of the University of Birmingham, to be his Technical Adviser and Officer between the various Government departments, and the title of Director of Petroleum Executive. The new quarters of the Petroleum Executive are at 8, Northumbria land-avenue, W.C. 2, to which all communications should be addressed.

SOUTH WALES MINING TIMBER TRADE.

Home and Foreign Supplies.

Foreign mining timber are coming to hand and it is no doubt that the total amount allowed for Import Restrictions for September will be taken up. Vessels were with difficulty and the tendency is for the larger sized vessels to be drawn into other trades, leaving the smaller class, especially sailing vessels, for the pitwood trade. Much difficulty also exists in South Wales owing to the scarcity of wagons, and any detention awaiting wagons drives up demurrage costs until there is little or no remuneration left for the importer. For the week ending September 28 the total quantity imported amounted to 20,628 loads, of which the agents supplying the Admiralty collieries took 7,440 loads. The actual quantities received by consignees were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Sept. 22	Lysberg Limited	2,400
" 22	Lysberg Limited	720
" 22	Franklin Thomas and Company	1,600
" 24	Morgan and Cadogan	720
" 25	Montague L. Meyer	858
" 25	Marcesche and Company	540
" 26	Lysberg Limited	360
" 26	Lysberg Limited	2,160
" 26	Lysberg Limited	1,200
" 26	Lysberg Limited	600
" 26	Morgan and Cadogan	600

Total.....16,618

Newport:—

Sept. 28	Franklin Thomas and Co Ltd.	2,640
" 28	Budd and Company Limited...	1,320

Total..... 3,960

Swansea:—

Sept. 24	50
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MISCELLANEOUS TIMBER.

Cardiff:—Sept. 25. Firwood, 4,356 loads to M. L. Meyer.

With the exception of 858 loads from Russia, the whole of the imports were received from the French ports. The small amount of foreign wood arriving has led to a firming influence upon prices. For best French fir market values ranged from 65s. to 67s. 6d. per ton ex ship South Wales. A belief is entertained that prices will go higher during the next few days, as the outlook for available vessels is anything but bright. Meanwhile the home-grown trade is increasing. Deliveries to collieries have been upon a better scale, and with good weather continuing, hopes are entertained of increasing supplies being available. The extent to which imports of foreign mining timber are decreasing is shown by the fact that during June the actual quantity imported into South Wales and Monmouthshire amounted 82,704 loads, while 88,287 loads were imported in July, and only 58,606 loads in August. The September returns are expected to show a decrease beyond the 10,000 tons lessened quantity allowed by the Controller. Whilst there has been short time worked by many collieries in the district the fact that the imports of foreign wood have decreased sharply plainly shows that the home-grown pitwood trade is increasing despite the difficulties it has had to surmount. This month (October) the quantity allowed to be imported by the Controller falls to its lowest ebb, and it is incumbent upon the home trade to make good the deficiency. Some question whether this will be possible without the Controller sanctioning an excess quantity being imported. At any rate, beyond delay, no collieries have been in difficulties with regard to pitwood supplies. The district is being exploited for wood to an extent that threatens early denudation of forests, but it is generally hoped that before this happens peace will be declared, and that the foreign pitwood trade will again be resumed as formerly.

THE BY-PRODUCTS TRADE.

Tar Products.—With one or two exceptions, the by-product markets show very little definite change. Pitch remains steady, at about 48s. per ton f.o.b. London, but a slightly better tendency is noticeable in the provinces. Home demand is moderate, although insufficient to keep stocks from accumulating; transport and shipping facilities are the stumbling blocks in the way of improvement. Nevertheless, the provinces are living in hope, being encouraged by the continued strength of the London shipping position. Very little is to be said about creosote, the market still waiting for definite information regarding price. Carbolic acid, both crude and crystals, is unchanged and almost nominal. Naphthalenes are very firm, the refined being quoted up to £35 per ton, and crude at from £5 to £15, according to quality. Solvent naphtha remains a feature, and up to 3s. per gal. is reported to have been offered; there is a very great scarcity for prompt delivery. Benzol and toluol are unchanged. Efforts have been made to obtain better terms for the former, which costs practically 2s. a gal. to produce, but so far without result. It is rumoured that the distribution of this product is to fall into the hands of the Government-controlled Anglo-Persian Oil Company after the war, and that thus the trade will be handled by parties interested in petrol with which it may be considered as a competitor. Accordingly, a strong committee has been formed, representative of gas undertakings, coke oven interests, and tar distillers, to watch developments and conserve the interests of these industries. Fear has been expressed at more than one gas company's meeting lately regarding the effect of the coal distribution Order on profitable by-products, owing to the forced purchase of coal from areas in which the quality was not so rich as the supplies hitherto used. Quotations are: Coal tar, 24s. 6d. to 30s. Pitch, east coast, 18s. to 19s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 19s.; Clyde, 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 4½d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 2s. 4d. to 2s. 6d. Heavy naphtha, north, 1s. 5d. to 1s. 7d. Heavy oils, in bulk, north, 3¾d. to 4¼d. Carbolic acid, 60 per cent., east and west coasts, 3s. 6d., naked. Naphthalene, 90 per cent., included. Anthracene, "A" quality, 2d. to 2½d.

The situation regarding sulphate of soda, which was last week ago, with the exception of a small quantity, by 10s. per ton. Demand is not so great as there is no further increase in prices. Manufacturers are more ready to hurry the trade for the current month is

being still further restricted; indeed, the home demand is such that no surplus is likely to be available for export for some time ahead. Quotations, basis 25 per cent. double bags: Oct.-Dec., £15 15s.; Jan.-May 1918, £16 7s. 6d. delivered—10s. per ton less at makers' works. Export prices range from £23 10s. to £25 per ton f.o.b. London, Leith, Liverpool, or Hull.

WAGES OF UNDERGROUND DAY WAGE MEN.*

The following further statement relating to wages in the South Wales coal field has been issued by Mr. Finlay Gibson, the secretary, to the members of the Monmouthshire and South Wales Coal Owners' Association. It deals with the average daily earnings of colliers employed at piecework during September last, and speaks for itself. It will be seen that it shows an average daily wage of 43.470 colliers of 14s. 7½d., which compares with an average wage in 1912 of 8s. 1½d., when the percentage was 50, and in 1914 of 8s. 7½d. per day at the higher general wage rate of 60 per cent. The statement is as follows:—

COLLIERS' AVERAGE EARNINGS (including percentage) (excluding colliers on day work), per day for the last full week worked prior to September 29, 1917, excluding the amount paid to the helper, colliers' daywagemen, or boys.

ASSOCIATED COLLIERIES.

Number of colliers whose average earnings per day (including percentage) for the number of shifts actually worked by them in the last full week prior to September 29, 1917, were at the rates below:—

Rate.	Number of colliers whose earnings were at the rates in column 1.	Total number of colliers whose earnings were at or over	Percentage to total number of colliers.
(1)	(2)	(3)	(4)
21s. and over	47	21s.	47... 0.2
20s. 6d. and under 21s.	—	20s. 6d.	47... 0.2
20s.	142	20s.	189... 0.4
19s. 6d.	—	19s. 6d.	189... 0.4
19s.	452	19s.	641... 1.5
18s. 6d.	517	18s. 6d.	1,158... 2.7
18s.	798	18s.	1,956... 4.5
17s. 6d.	1,273	17s. 6d.	3,229... 7.4
17s.	1,534	17s.	4,763... 10.9
16s. 6d.	2,444	16s. 6d.	7,207... 16.6
16s.	3,128	16s.	10,335... 23.8
15s. 6d.	3,299	15s. 6d.	13,634... 31.4
15s.	4,580	15s.	18,214... 41.9
14s. 6d.	5,060	14s. 6d.	23,274... 53.5
14s.	5,660	14s.	28,934... 66.6
13s. 6d.	4,986	13s. 6d.	33,920... 78.0
13s.	5,147	13s.	39,067... 89.9
12s. 6d.	2,481	12s. 6d.	41,548... 95.6
12s.	691	12s.	42,239... 97.2
Under 12s.	1,231	—	* ... —
	43,470		

* Number of colliers under 12s. = 1,231.

† Each line in this column is an accumulated total of the figures in column 2, and, therefore, includes the line immediately above.

Average earnings per day in February 1912 (including 50 per cent.) of 63,223 colliers, 8s. 1½d., which based on the percentage (60 per cent.) payable in June 1914 = 8s. 7½d.

Average earnings per day in September 1917 (including 133½ per cent.) of 43,470 colliers, 14s. 7½d.

Mr. Gibson has also had prepared the following statement showing the percentage on standard rates of 5s., 6s., and 7s. of a bonus of 9s. per week (1s. 6d. per day) according to the number of days worked:—

A bonus of 1s. 6d. per day for six days is equal to a percentage on the standard rate, as below:—

STANDARD RATE 5S.				
If, owing to the colliery being stopped through want of tonnage, a man is only able to work:—	Standard wage.	War bonus.	Percentage of war bonus on standard wage.	
One day	5 0	9 0	180	
Two days	10 0	9 0	90	
Three days	15 0	9 0	60	
Four days	20 0	9 0	45	
Five days	25 0	9 0	36	
STANDARD RATE 6S.				
One day	6 0	9 0	150	
Two days	12 0	9 0	75	
Three days	18 0	9 0	50	
Four days	24 0	9 0	37	
Five days	30 0	9 0	30	
STANDARD RATE 7S.				
One day	7 0	9 0	128	
Two days	14 0	9 0	64	
Three days	21 0	9 0	43	
Four days	28 0	9 0	32	
Five days	35 0	9 0	26	

In the case of men working a full week, the recent special advance represents an increase in the case of a workman with a standard of 5s. of 30 per cent.; in the case of 6s., 25 per cent.; and in the case of a workman with a standard of 7s. per day, an increase of 21 per cent.

* See also page 641.

Spanish Coal Production.—The *Boletín Oficial de Minas y Metalurgia* gives the following figures of production of coal in Spain during the first half of the current year: Coal, 2,321,977 tons; anthracite, 134,673 tons; lignite, 296,780 tons—total, 2,753,430 tons.

Future of Chemical Trade.—The Minister of Reconstruction has appointed a Committee, of which Sir Keith W. Price will act as chairman, and Mr. G. C. Smallwood as secretary, to advise him as to the procedure which should be adopted for dealing with the position of the chemical trades after the war. The Committee have been asked to conduct their deliberations with a view to the creation of some organisation which should be adequately representative of the trade as a whole, and by means of which the trade may be enabled hereafter to continue to develop its own resources, and to enlist the closest co-operation of all those engaged in the chemical industry.

FIRECLAYS AND GANISTERS OF THE SOUTH OF SCOTLAND.*

By L. W. HINXMAN, B.A., F.R.S.E., and M. MACGREGOR, M.A., B.Sc.

The main sub-divisions of the carboniferous systems recognised in Scotland and used in the published maps of the Geological Survey are: Upper barren red measures; productive coal measures; millstone grit; carboniferous limestone series; and calciferous sandstone series.

FIRECLAYS.

Firedays occur in each, but the chief source of the valuable refractory material in Scotland is the millstone grit.

Millstone Grit.

The fireclays and ganisters at present used in Scotland in the manufacture of high-class refractory goods are chiefly confined to the millstone grit strata between Glasgow and Bonnybridge, on the western side of the Central coal field. This localisation of the fireclay industry is primarily due to the fact that the industrial centres of the west, with their blast furnaces, foundries, steel, glass, and chemical works, have created a large and increasing market for refractory materials, both raw and manufactured. Ample supplies of suitable fireclay were fortunately found to exist in the neighbourhood of these centres, and thus, while rocks of millstone grit age cover considerable parts of the South of Scotland, it is only in certain limited areas that their economic possibilities have been adequately tested.

Central Coal Field.—The rocks of the millstone grit series in this region form an irregular strip of varying breadth on either side of the great coal measure basin, whose axis extends eastwards from the Clyde above Glasgow to the neighbourhood of Slamannan, and thence northwards in the direction of Alloa and Stirling. The continuity of the belt on the western side of the basin is interrupted by a series of parallel east-and-west faults of considerable magnitude. The downthrow of most of these faults is to the south, causing the outcrops of the different beds to be successively stepped back westwards, the lateral shift in some cases amounting to one or even two miles. This western belt stretches eastwards from the northern suburbs of Glasgow to Garnkirk and Glenboig, and thence northwards to Castlecary, Bonnybridge, and Pleau. To the north of Castlecary the continuity of the outcrop is broken by the outlier of coal measures forming the Banknock coal field.

An isolated area of millstone grit strata is found within the city of Glasgow boundaries, occupying the districts of Garnagad, Blochairn, and Germiston. Fireclay was formerly worked opencast to the east of the Blochairn Steel Works, and a pit, sunk in the near vicinity, passed through four lower seams of clay. Little is, however, known with regard to these early workings.

The millstone grit on the eastern side of the basin occupies a continuous strip of country stretching from Inveravon on the Forth southwards to Levenseat. There it expands to form the barren upland tract of the Gladsmuir Hills and Auchterhead Muir. In connection with this main outcrop, there are two north-west pitching anticlines of millstone grit strata which illustrate the secondary flexures into which the Central coal field has been thrown. One of these extends from Whitburn to near Balgownie; the other from Allanton to Salsburgh, and round both folds the lower seams of the coal measures can be continuously traced. Both anticlines contain refractory fireclays which are now being worked. (See Drum pits and Hareshaw mine below.)

On the west side of the basin the thickness of the millstone grit increases steadily from south-west to north-east. To the north-east of Coatbridge it varies from 276 ft. at Gartsherrie to 320 ft. at Burnlip, a little way south-east of Glenboig Station. Near Slamannan it is about 636 ft. thick; at South Drum, Bonnybridge, approximately 740 ft.; and at Pleau, 900 to 960 ft. This increase appears to be confined to the upper part of the series, since the cement limestone and lower fireclay horizons preserve a constant distance above the base. There is consequently a corresponding increase from south to north in the amount of strata present between the top of the millstone grit and the lower fireclay—a fact to be borne in mind when estimating the depth of that horizon in different localities.

A similar decrease in thickness from north to south is found on the east side of the basin. Between Falkirk and the Carse of Kinnell the millstone grit is approximately 730 ft. thick; between Bathgate and Armadale, about 468 ft.; and in the Fauldhouse and Levenseat district, about 450 ft. To the south-west of Shotts, at Bowhousebog, it is roughly 400 ft.; and at Jersey Bridge, a little south of Salsburgh, about 340 ft. It is still less in the Wishaw area; and west of the Clyde, at Larkhall and Stonehouse, is reduced by a local unconformity to a few feet.

In addition to this variation in thickness, there are certain other geological factors which have to be considered in attempting to establish correlations between different districts.

(1) The upper limit of the millstone grit is drawn at the Crofthead slaty band ironstone, a very useful and easily recognised horizon over a considerable area on the east side of the basin, but only approximately determined on the west and south.

(2) The Castlecary limestone which marks the base of the series is not always present. It is not found, for example, immediately west of Levenseat, nor round the south-east and south side of the Lanarkshire coal field between Auchterhead Muir and Quarter. Its absence in this district is ascribed to local erosion during millstone grit times, making the thickness of that series a very variable quantity.

* Paper read before the Refractory Materials Section of the Ceramic Society at Glasgow.

(3) Within the millstone grit series itself there is only one readily recognisable index horizon. This is the cement limestone, a calcareous band or "lunachelle" made up of flattened shells of Orthotetids (probably Derbya). The cement limestone lies 40 to 70 ft. above the Castlecary limestone and forms an extremely useful index mark for the fireclay horizon described below as the lower fireclay. In the higher and larger part of the series there is no index horizon at all comparable with the cement limestone; so that where the base of the coal measures is a more or less indeterminate line, it becomes impossible to correlate closely the upper fireclays of the millstone grit of different areas. In place of tracing individual seams from one district to another, as can be done with seams of coal or limestone, it is only possible to say that certain fireclay horizons occupy the same relative position in the millstone grit sequence.

Fireclays used in the manufacture of a wide range of refractory goods are found at two horizons in the millstone grit of the Central coal field—one near the base, and the other near the top, of that series. They are known as the lower and upper fireclay horizons respectively. From the fact that the latter is well developed, and has long been worked in the Bonnybridge district, it is also widely known as the Bonnybridge fireclay horizon.

Lower Fireclay.

The lower fireclay lies a short distance, varying from 12 to 30 ft. as a rule, above a very persistent calcareous band, already referred to as the cement limestone or cement stone. This band, as stated above, is characterised by its abundant orthotetid shells; it is generally thin, but locally reaches a thickness of nearly 3 ft., and in some places passes into a ferruginous cement stone. It is usually associated with a nodular ironstone, known and formerly worked in the Fauldhouse district as the "Curdly ironstone." The cement limestone forms an invaluable index mark for the lower fireclay in boring operations, both from its persistence as a horizon and for the reason that over the greater part of the millstone grit area it is the first limestone encountered after passing through the base of the coal measures. In the Plean district, however, three calcareous horizons with marine fossils are met with in boring through the millstone grit: the second, or middle, of these is correlated with the cement limestone. (The cement stone, as already stated, also preserves a fairly constant distance above the base of the series, independently of the total thickness of the formation.)

Two seams of clay are wrought in some parts of the Glenboig field, the lower—the "white clay"—pale lilac-grey in colour, with a white streak, is separated by a bed of sandstone of varying thickness, from a darker "upper" seam known as the "blue clay." The light-coloured clays are usually considered the best, but at the Gain workings the "blue clay" is found to possess very high refractory qualities.

The thickness of the individual seams is subject to constant variation. The average measurement of the principal bed wrought in the Garnkirk-Glenboig district is from 6 to 12 ft.: at Gleneryan, 5 ft.; and at Castlecary, 7 ft. The clay is, however, often greatly reduced or even pinched out altogether by local erosion, the sandstone roof descending towards or resting upon the pavement of the seam. The quality of the clay also varies within comparatively short distances, and to obtain the best results in fireclay products requires careful selection and blending of material.

That the fireclays of the lower zone were formed under different conditions from the ordinary coal seats or underclays found under coal seams is evident from their position. They do not represent land surfaces, but are intercalated with massive and often gritty sandstones, and though in a few instances a thin coal is associated with the fireclay, there is evidence to show that the thin coals of the lower part of the millstone grit are of sedimentary origin.

These clays seem to have been deposited as fine siliceous muds in still and probably land-locked waters, but their intercalation with coarse, false bedded sandstones, and the local erosion of the underlying clays, points to the periodical irruption of strong currents and a return to open water conditions.

The clay may be briefly described as a hydrous aluminium silicate, with a small but varying percentage of fluxing impurities—iron, lime, magnesia, and alkalies. The nature of the "clay substance" of the lower fireclay of Glenboig has been the subject of some controversy, but the recent investigations of Dr. Mellor show that the dominant mineral of the clay is clayite, a colloidal form of kaolinite.

The district between Garnkirk and Glenboig has for many years been an important centre of the fireclay industry. Fireclay was worked opencast at Garnkirk for some time previous to the year 1836, when the Glenboig field was first opened up by Mr. R. Hillecoat. The output was small until 1860, but from that date increased steadily. The present Glenboig Union Fireclay Company was formed in 1882 by the amalgamation of two Glenboig firms.

The lower fireclay is now raised from pits at Heathfield, Gartcosh, Garnqueen, Gartliston, and Glenboig; from mines along the crop at Inchnock, Gain, and Gleneryan, Cumbernauld; also from pits further north at Castlecary Station, and at Stein's Works, between Castlecary and Bonnybridge.

Large areas of the lower fireclay still remain unexploited on the west side of the basin. A new field has lately been opened up some two miles to the north-east of Glenboig, and the evidence afforded by recent bores and natural sections warrants the belief that a large extent of this clay is present at no great depth from the surface in the area between the Luggie Water and the Walton Burn, and may extend northwards as far as the dolerite dyke that runs east and west a short distance south of Castlecary.

In the Plean district, north of Larbert, fireclays in the position of the lower seam are exposed in the Torwood Glen. Fireclays in association with a shelly cement limestone have also been met with at depths

of 40 to 100 fms. in recent bores put down at Carbrook and Rosehill, further to the north. Little is at present known as to the nature and quality of these clays, but it is not unlikely that a considerable field of valuable fireclay may reward further investigation in the Plean area.

On the eastern side of the basin there is only one place where a fireclay in the lower part of the millstone grit is worked. On the east bank of the River Avon, close to the viaduct on the Manuel and Bonness Railway, and half a mile north-west of Linlithgow, a refractory clay of good quality, formerly worked on a small scale, has recently been re-opened. This clay is associated with a shelly limestone a short distance above the base of the millstone grit, and is almost certainly on the horizon of the lower fireclay. Further south, between Torphichen and Levensat, fireclays and ganisters in approximately the same horizon have been proved in many bores, from some of which the Geological Survey have been able to collect samples for analyses and tests. Fireclays occur here at two horizons.

(1) A few fathoms above the cement limestone in the position of the lower fireclays of Castlecary and Glenboig. Some of the beds reach a thickness of 10 ft.

(2) Immediately above and below the same limestone fireclays of workable thickness are recorded, especially in the Handaxwood and Levensat district.

Upper Fireclay.

The upper fireclay horizon in the Bonnybridge district includes two or three seams of fireclay and one or two seams of ganister. A complete section shows:—Roof, of silica rock; top fireclay, 2 ft. 9 in. to 5 ft.; coal, 1 ft. 6 in.; iron rib, 4 in.; coal, 3 or 4 in.; top ganister, 2 ft. to 3 ft.; mid fireclay, about 5 ft.; bottom ganister, 3 ft.; lower fireclay, 2 ft.

The total working thickness varies from 13 to 22 ft.; it is wrought on the stoop and room system in two workings, the top fireclay being kept about 9 ft. in advance of the rest.

The individual beds vary in quality and thickness. The top clay may be locally wanting, or may be represented by 2 or 3 ft. of sandstone and blaes. The coal is pyritous, and may reach a thickness of 2 ft. just east of Bonnybridge, but deteriorates when followed westwards. Below the coal the section sometimes shows:—Fireclay, 3 ft. to 5 ft.; ganister, 2 ft. to 3 ft.; fireclay, 6 ft. to 8 ft.

Lateral variation in a seam is not infrequent, and in the workings a fireclay may pass into a ganister or may contain lenticular masses of similar material.

To the south-west of Bathgate, at Drum pits, Torbanehill, a variable seam of fireclay, locally reaching a thickness of 8 ft., is now being worked, and other fireclays are known to occur below. Here, as at Bonnybridge, the roof is formed by a thick post of a very pure sandstone (silica rock), and at both localities experiments have been conducted with a view to using this material in the manufacture of silica bricks. The Drum pits are the only place on the east side of the Central coal field where a fireclay near the top of the millstone grit is worked. At Hareshaw mine, one mile to the south-west of Salsburgh, a 6 ft. seam of fireclay is wrought, which occupies a position about 12 fms. below the base of the coal measures.

After careful consideration of all available data, it may be said that the Bonnybridge, Torbanehill, and Hareshaw fireclays are approximately in the same relative position in the millstone grit sequence.

Fireclays on the same horizon as those of Drum and Hareshaw have been proved in numerous borings along the eastern side of the Central coal field and in the Allanton-Salsburgh anticline. The seam worked at Hareshaw is overlain by a 9 in. wild coal, and underlain by 2 ft. of coaly fake, and the coal and fireclay together represent a horizon which can be traced round the basin as far as Torphichen, near Bathgate. At Bowhousebog, a little south-west of Shotts, the coal is very thick (but unworkable on account of its many partings of clay), and is known from that locality as the Bowhousebog coal. Generally it is thin or even absent, but the fireclays associated with it are very persistent. Seams of clay of 8 to 10 ft. frequently occur in bores through the horizon, and others are recorded not far below. This horizon lies from 72 to 96 ft. below the base of the coal measures, and can generally be easily recognised in bores passing through the millstone grit. As at Hareshaw, scattered nodules of clay band ironstone may occur.

South Lanarkshire.—Millstone grit rocks cover a considerable area in the district of Poncil, Douglas, and Glespin, and include fireclays of workable thickness; these have been passed through in bores and exposures of fireclay horizons are seen at several points along the Poncil Water and in the Kennox Water at Glespin. Nothing, however, appears to be known of the quality of these clays from a refractory standpoint. The thickness of the millstone grit in the Poncil district is at least 400 ft.

Ayrshire.—The millstone grit fireclays of North-West Ayrshire have recently been investigated by Mr. G. V. Wilson and the late Dr. C. T. Clough; they seem likely to yield valuable refractory material.

The principal fireclay seams are found at the top and bottom of the millstone grit. Here they are separated by about 20 fms. of volcanic rocks with interbedded sediments, which in this part of Scotland make up the greater part of the series.

The lower fireclay appears to be widely distributed in North Ayrshire, but is sometimes absent or very thin. The seam is exposed on the Caaf Water, a quarter of a mile below Drumcastle Mill, west of Dalry, and a 7 ft. seam of clay on the same horizon has been observed on the north side of the Fenwick Water, south of Meiklewood, near Kilmarnock. The same clay has also been met with in bores in the neighbourhood of Kilwinning.

Only the lower fireclay is at present wrought to any extent in Ayrshire; it is mined at Monkcastle, one mile south-south-west of Dalry Station, by the Douglas Firebrick Company, Kilwinning. The seam

here forms four beds of somewhat different thickness with a total thickness of 10 ft.

The upper fireclay of the millstone grit in North Ayrshire is a clay of somewhat peculiar character. It is described as usually very hard, well jointed, and with a distinctly conchoidal fracture.

The chemical composition of this clay is distinguished by the presence, in many cases, of from 1 to 10 per cent. of alumina in soluble form; the total amount of alumina present being sometimes as high as 47.57 per cent. Oxide of titanium, usually in the form of rutile, is also abundant. The analyses and physical tests show that a clay with 9.04 per cent. of titanium may have a refractory index higher than Seger cone 35.

The outcrop of the upper fireclay has been traced eastwards from South Bay, Saltcoats, to Kilwinning, and small outliers of the seam have been observed at Lochwood and Smithstone, north of that town.

The clay is also exposed on the banks of the Lington Water, east of Sevenacres Mains, and also 300 yds. south of Caven Hill. From this point the crop turns to the south, and is seen on the bank of the Annick Water east-south-east of Fairliecrook, and also on the Fenwick Water south by east of Southcraig, near Kilmarnock.

Physical and Seger cone tests of this clay from several localities have been carried out by Dr. J. W. Mellor for the Douglas Firebrick Company, Kilwinning. The results tend to show that the clay deteriorates in refractory qualities from west to east.

There appears to be an extensive field of good quality clay along the outcrop for about two miles eastwards from Saltcoats towards Kilwinning. It is now being worked at the crop near Stevenston.

About four miles to the south of Kilmarnock, rocks of millstone grit age outcrop near Spittalhill, and extend in an easterly direction to the Killoch Burn at High Holehouse. Here, again, contemporaneous volcanic rocks form a large part of the series, but the sequence is not yet known in detail. There is, however, no reason to doubt that the very refractory bauxitic clay,* already described as overlying the millstone grit lavas of North-West Ayrshire, occurs in this district also. It should also be observed that this belt will probably be found to extend a considerable way west of Spittalhill. Its actual extent and its economic possibilities are, however, not yet proved, and will require careful investigation in the future.

In South Ayrshire, the millstone grit covers a considerable area to the south of Cumnock, and appears also in the Dalmellington field. Volcanic rocks have not been met with, so far, at either locality; nevertheless, until the millstone grit sequence is more completely known, the possibility of their occurrence cannot be dismissed. At Dalmellington, a fireclay lying some 20 fms. above the base of the millstone grit (and about 50 fms. below the well-known Blackband ironstone) is worked by the Dalmellington Iron Company for the manufacture of furnace bricks and blocks. It is interesting to find this fireclay corresponding roughly in its position in the millstone grit sequence with the lower fireclay of the central basin.

Fife and Clackmannan.—Strata of millstone grit age form a border to the Dysart and Leven coal field, and good sections are exposed on the coast near Pathhead and in the Den of Kennoway. They fringe the little coal field of Kinglassie, and, further west, cover a wide tract of country on the east side of the Clackmannan coal field. The sediments include fireclays, but of the refractory quality of these nothing is known. The thickness of the millstone grit in Fife-shire is variable; on the coast near Pathhead it has been estimated as about 700 ft. In the Markinch district it is some 740 ft., and probably equally thick in Clackmannan. In Eastern Fife, on the other hand, it is considerably less.

Midlothian.—In the Midlothian basin the millstone grit is rich in fireclays, but here again little is known of their quality. In the Portobello and Niddrie area the whole thickness amounts to 740 ft. Detailed accounts of the fine natural sections in the Bilston Burn and South Esk will be found in the *Memoir* of the Geological Survey on the Edinburgh district (1910, p. 244).

Coal Measure Fireclays.

Coal seats or underclays are wrought at a number of localities in Scotland with the coals associated with them, but with few exceptions they do not yield high-class refractory material. Some of them are worked regularly, others intermittently, the more important of those at present (so far as the authors are aware) being mentioned below.

Lanarkshire.—At Herdhill and Chapel collieries, near Newmains, the floor of the Mid-Drumgray coal is extensively worked. This fireclay at Chapel is grey, rooty, and fairly hard, and furnishes excellent material for making refractory linings and goods of all kinds; its contraction is low, and it is specially adapted for different shapes. The same seam at Herdhill, however, is less refractory, and is used mainly in the manufacture of sanitary ware. The underseat of the Balmoral or Mill coal is worked at Gartheraig in the Shettleston district, and used partly in the manufacture of firebricks.

Linlithgowshire.—Several fireclays in the lower part of the coal measures are worked in the Armadale district; the most valuable is the underseat of the Colindale coal, which is used in the manufacture of refractory goods.

Stirlingshire.—Fireclays at several horizons are wrought in this county. At Roughcastle, one mile east of Bonnybridge, two fireclays of coal measure age are worked in addition to the upper fireclay of the millstone grit. One of these is about 5 ft. thick, and overlies the Slatyband ironstone at the base of the coal measures; the other occurs 5 fms. higher, and is the floor of a thin coal known as the *Coal of Bonnyhill*; it is a sandy clay, passing locally into ganister closely resembling the ganisters of the Bonnybridge horizon. At Callendar, a 6 ft. fireclay is

* This bauxitic clay also occurs in the Singuher coal field and in Arran.

wrought in the position of the Armadale Ball coal, and manufactured into firebricks and blocks, stove bricks, &c. At Carronhall Colliery, a small amount of firebricks is made along with the Craw and Coxroad coals. In the Kilmarnock district the under-lying coal seams are worked on an extensive scale, mainly for the manufacture of sanitary ware, enamelled bricks and tiles, and ordinary building bricks, though second-class firebricks are also made to some extent.

Carboniferous Limestone Series.

Several clays underlying coal seams in the central division of the carboniferous limestone series are also worked, and of these a few are used in the manufacture of firebricks and other refractory ware. At Prestongrange, in East Lothian, the floor of the clay seam is intermittently wrought, and the fireclay below the Great seam at Whitehill, in Midlothian, has also been used for firebricks. In Fifeshire, the floor of the Four-foot coal at Kingseat is worked; and a fireclay lying 6 to 7 fms. under the index limestone is wrought at Lochead and Lilliehill. At Cardenden, a clay above the Glass coal was used for firebricks, and several other clays have been, or are being, worked for various purposes. For manufactures which require a plastic clay, the Kingseat material has been found particularly useful.

Calcareous Sandstone Series.

A fireclay in the calciferous sandstone, lying about 55 fms. below the Hurler limestone, has been worked for some time at the Ferguslie Works, Paisley, both for refractory and ordinary bricks and tiles. The main seam consists of two beds, each 3 to 4 ft. in thickness, separated by a 6 in. coal; another seam, 2 fms. below, has also been wrought. At the neighbouring Newton pit, a fireclay, 2 fms. below the Newton coal, was at one time raised, and a mine driven through a fault immediately north of the pit met with three seams of fireclay, 1 to 4 ft. in thickness, separated by stone partings.

GANISTERS.

The ganisters or siliceous sandstones at present used in the manufacture of refractory goods are also chiefly derived from the millstone grit, where they are found in association with the fireclays both of the upper and lower zones, those of the upper zone being most in demand.

Lower Fireclay Horizon.

A siliceous sandstone lying immediately above the main seam of the lower fireclay is used to a limited extent in the manufacture of "ganister" bricks at Glenboig. At Gain, where it separates the "white" or main seam from the "blue clay," it varies from a mere rib to a bed 12 ft. in thickness. At Heathfield, Garnkirk, a siliceous sandstone, 22 fms. above the fireclay, is used, with an admixture of fireclay, in the production of a "silica" brick. At Castlecary a white ganister, lower in the sequence, and only separated from the base of the series by a few inches of blaes, is also used, mixed with a sufficient quantity of clay to reduce the percentage of silica to approximately 85 to 87 per cent. for refractory products.

Upper Fireclay Horizon.

Bonnybridge is the only locality where ganisters are worked in association with the upper fireclay. There are sometimes one seam, sometimes two seams, of ganister. They would be more correctly described as ganister-like sandstones; they are generally light-coloured, fine-grained, rooty, and somewhat micaceous. The texture is fairly uniform, and the grain varies from 0.075 to 0.1 mm. Angular quartz forms the bulk of the rock, with a fair quantity of white mica; the matrix is partly siliceous, partly argillaceous. The Bonnybridge ganisters, as compared with English ganisters, which they approach very closely in some respects, have a less purely siliceous cement and a slightly higher percentage of alkalis and lime.

In addition to the rocks of millstone grit age, a ganister lying immediately below the Gair or Calmy limestone of the upper group of the carboniferous limestone series, is now worked to some considerable extent at Auchenheath, West Lanarkshire. The rock occurs in two beds, separated by a thin fireclay, which is mixed and ground together with the two siliceous rocks. The lower bed has a very high percentage of silica.

Among the potential sources of material for refractory products, particular mention should be made of a bed of ganister found in association with the lowest limestones of the carboniferous limestone series along the southern and eastern margins of the Midlothian carboniferous basin. A highly-siliceous rock has been met with on this horizon at Carlops and Macbiehill, in Peeblesshire; at Middleton and Vogrie, near Gorebridge; and at Chapel Point, a few miles east of Dunbar; and it seems likely that this bed may be continuous at this horizon around the greater part of the basin. This ganister is now being opened up between Carlops and Macbiehill, where it is between 2 and 3 ft. in thickness, and has a very high silica percentage. The results of recent analyses and firing tests indicate that it is a rock of good refractory quality.

A ganister much in the same stratigraphical position, found near Blackwood, in Lanarkshire, on the west side of the Clyde Valley, has lately attracted some attention. Several other sandstones of carboniferous age in different localities in Lanarkshire, Midlothian, Dumfriesshire, Ayrshire, and Arran, have also been suggested as possible sources of refractory material, and a good many of these have been analysed.

Full analyses and results of physical tests of the above materials referred to above will be found in the "Refractories" (in the press) and in the series of "Special Reports on Refractories in Great Britain." This report gives an account of the principal fireclays and the uses of the material, and the uses of the material, and the uses of the material.

TESTING REFRACTORY MATERIALS.*

By Dr. J. W. MELLOR.

In devising tests for firebricks, it is desirable to reproduce as nearly as possible actual working conditions. A service trial accompanied by records of the furnace conditions is the ultimate test of the quality of the material, and this may be regarded as the ideal mode of testing. Unfortunately, such tests would occupy far too long; and it is not at all uncommon to find two works, manufacturing the same products by similarly designed furnaces, getting discrepant results from the same firebricks. Of course, a very slight change in the design of a furnace may make all the difference between success and failure. For instance, the author has known half-an-inch difference in the position of the tuyere-nozzles of a cupola to alter the life of the lining from a few days to as many weeks. It is also found that when tests are made on a small scale, different results are obtained; and when tests are made in the laboratories of user and consumer, under different conditions, the results are not always concordant. Even to-day there are troubles in several trades on account of discordant analyses. It is therefore important that the methods of conducting the tests should be standardised, since a consignment might be condemned on a set of tests conducted in one laboratory which would pass the tests satisfactorily if conducted in another laboratory.

The fire stability of a refractory is, perhaps, its most important quality, and one of the most important properties indicating the fire stability of a refractory is the squatting temperature. It is very important that we should have a clear idea what is meant by what is variously called the fusing temperature, softening temperature, squatting temperature, fire stability and the melting or fusion point of a refractory; and this question was investigated by the author some years ago, with results which have been confirmed by work in other countries—Germany, America, &c.

Importance of Specifying the Rate of Rise of Temperature.

When the temperature of a fireclay or firebrick is gradually raised, the material—more particularly aluminous firebricks—behaves in a manner almost analogous with pitch or butter. It becomes less and less viscous, and ultimately the viscosity is so reduced that the material is no longer able to retain its shape, the angular corners and edges are rounded, and the material begins to flow. There is no precise or definite temperature above which it can be said that the material is a flowing liquid, and below which it is a rigid solid. The softening temperature of a firebrick is not therefore a definite temperature, but rather a range of temperature within which the substance begins to lose its shape, and commences to flow. Observation shows that this range of temperature is wider with aluminous firebricks than it is with siliceous firebricks.

If the temperature be rapidly raised, the material appears to soften at a higher temperature than if slowly heated, because the internal forces have not time to attain a state of equilibrium before the material is carried to a still higher temperature. Otherwise expressed, the actual squatting of the material lags behind the temperature, and the faster the rise of temperature the greater the lag. The effect is sometimes very pronounced. For instance, two different firebricks with a difference of 150 degs. in their squatting temperature on a slowly rising temperature, appear to be equally refractory on a rapidly rising temperature. The softening temperature of a refractory for one rate of rise of temperature does not correspond with the softening temperature determined for another rate of rise of temperature. Consequently, the rate of rise of temperature must be standardised if refractory tests are to be compared one with another. Although this has been clearly defined in the Institution of Gas Engineers' *Standard Specification for Refractory Materials*, the importance of the fact does not appear to have been grasped by all.

The range of softening temperature is conveniently referred to Seger cones, and is determined by heating a selected piece of the refractory material—approximately a cone or prism $1\frac{1}{2}$ in. high and $\frac{1}{2}$ to $\frac{3}{4}$ in. base—alongside a suitable number of Seger cones covering a certain range of temperature. When the test-piece shows signs of fusion it is assumed that the softening temperature is best represented in terms of the cone which squatted nearest to that at which the clay begins to fuse.

Definite Temperatures v. Seger Cones.

In the present state of our knowledge, it seems better to express the softening of a refractory in terms of suitable cones, than as a definite temperature determined by means of a pyrometer, since we are dealing with a range of temperature, not a specific temperature. Whatever be the nature of the reactions which are attended by the fusion of the refractory, it is assumed that the temperature coefficient of the reaction in the Seger cone and clay are the same. This assumption is based on more or less remote analogy between the cone and the clay. The statement that a firebrick has "a melting point of 1,700 degs. Cent.," conveys no clear meaning. A lot of other information is required, and we can confidently anticipate that if others had made the test a different result would be obtained. A seller would naturally desire to have his tests made at the laboratory which gives the highest result, and a buyer at the laboratory which gives the lowest result. The author believes that the representation of the softening temperature of a clay in terms of a definite temperature gives an appearance of accuracy to the results which is quite illusory.

Size of Test Piece.

It does not appear that the refractory test would be improved by using larger pieces—say a whole brick. There are difficulties, but not insuperable ones, in maintaining a whole brick at a uniform temperature throughout the mass, and also in estimating the temperature of the interior of a hot brick. The fusion of a brick probably commences at the surface, not necessarily

because on a rising temperature the surface must be slightly hotter than the interior, since by raising the temperature slowly enough the difference of temperature could be made negligibly small. The phenomenon seems to be an effect of surface tension, and the surface of a firebrick of uniform composition uniformly heated must be the first to show signs of fusion. The author has not found any difference in the fusion test, whether the surface examined be large or small, provided the radius of curvature is large and the rise of temperature be not too rapid. True, with abnormally fine powders, where the radius of curvature is small, there is a marked difference, but not under ordinary conditions.

Oxidising v. Reducing Atmospheres.

It is well-known that if a refractory material contains much iron its refractory test gives a lower result if conducted in a reducing atmosphere than in an oxidising atmosphere. The bricks are usually fired in an oxidising atmosphere, and very frequently used in a reducing atmosphere. The test naturally should be conducted under reducing conditions, and it is perhaps more easily made under such conditions. The only objection to the reducing atmosphere depends on the fact that the reduction of the iron sometimes takes a long time, and it is then difficult to get constant and comparable results. A different proportion of the iron is reduced in the different cases.

Testing Refractories Under Load.

There is a difficulty in standardising the test for refractories under load. With the more aluminous types of refractory there is a rapid fall in the squatting temperature as the load increases. To get comparable results from test to test, for industrial purposes, it is necessary either to fix an arbitrary pressure at which the tests shall be made, or else to express the results in the form of a curve. The latter is probably the better way, although it will probably be more convenient to specify a definite load—say 30 to 50 lb. per sq. in. With aluminous refractories, there does not appear to be a limit to the decrease in the refractoriness under an increasing load. Indeed, there is every reason to suppose that aluminous bricks could be vitrified by pressure alone, and Spring's experiments (1884) showed that purified alumina, normally stated to melt at about 2,000 degs., can be melted at ordinary temperatures by a pressure of about 5,000 atmospheres per sq. cm., but neither natural nor artificial silica showed any evidence of fusion. Tresca also (1868) obtained evidence that dry clay flows like a liquid by the application of a pressure of 10,000 kilos. per sq. cm.

Manufacture of Firebricks Without Kiln-Firing.

The logical inference from these facts is that it is merely necessary to drive the water from the clays, and then mould the bricks under a great enough pressure to perform the work of vitrification without firing the bricks at all. The author has in the past emphasised the fact that the vitrification changes which occur during firing are arrested by the manufacturer at a certain stage of their progress, and that a number of firings at, say, cone 4, under normal conditions, will do the work effected by one firing at cone 10. When no undue pressure is exerted, however, the reaction is arrested if the temperature be reduced much below cone 4, and no vitrification occurs. At first sight any proposal to manufacture good firebricks without kiln-firing seems to border on madness. In spite of this, the author sees no flaw in the deduction when applied to aluminous clays. In practice, however, things have a way of developing differently from what logic prescribes, because we are so liable to overlook some essential factor. In the present case, the unforeseen difficulties will have to be furnished by observation and experiment. Over 45 years ago Mr. W. H. Turner, of Staffordshire, made vitreous pottery and actually attempted its manufacture on a commercial scale by the application of enormous pressures, and without firing, but nothing appears to have developed from the idea. The provisional assumption is that the product formed by the vitrification of the clay will be satisfactory whether the vitrification be performed at a high or at a low temperature, but experimental trial can alone give the empirical data required for further progress in this direction. The author believes that the result would be successful with the aluminous types of fireclay, although not in making silica bricks without a rather more elaborate preliminary treatment of the raw material than would be needed with normal fireclays. Even here, however, the cost of the preliminary treatment would still keep the total cost of manufacture less than that which is involved in the present method of manufacture.

Some Theoretical Considerations.

There is an important theoretical question. The results obtained by testing refractory materials under a load appear to contradict the well-known thermodynamic formula:

$$\frac{dT}{dP} = \frac{T}{L} (v - v_0)$$

where P denotes the pressure, T the absolute temperature of fusion, v the volume after fusion, and v_0 the volume before fusion. This formula has been verified and established by experiment. If the latent heat of fusion is positive, as it always is, then the raising or lowering of the fusion temperature with unit change of pressure (dT/dP) is dependent on whether the volume v of the liquid is greater or less than the volume v_0 of the solid. If the volume of the material decreases during fusion so that $v < v_0$, the melting temperature will be lowered by pressure, and if the volume increases during fusion so that $v > v_0$, the melting temperature will be raised by pressure. Otherwise expressed, an increase of pressure favours that state which has the smaller volume. Ice at 0° has a larger specific volume than water at the same temperature, and consequently an increased pressure favours the water phase, and the ice melts.

The volume of most of the silicates involved in the vitrification of a brick in burning increases during fusion. For instance, the specific gravity of a sample of fireclay was 2.627 before fusion, and after fusion

* From a paper presented to the Refractory Materials Section of the Ceramic Society, at Glasgow.

2470. This corresponds with an expansion of about 6 per cent. In this respect, therefore, clay behaves like numerous other silicates. Consequently an increase of pressure should raise, not lower, the fusion temperature of the clay. It has been assumed that the latent heat of fusion L is constant. Experiment shows that this assumption is generally valid, although Tammann and others have discussed the possibility of the latent heat of fusion changing from a positive to a negative value. Tammann has also shown that since a liquid is usually more compressible than a solid, a positive value of $v - v_0$ will diminish with an increase of pressure, and, after passing through zero, will gradually assume an increasing negative value.

The discrepancy between theory and practice is to be attributed not to either of these possibilities, but to the formula being inapplicable to the case under discussion. Theory assumes that the pressure is uniformly exerted in all directions, whereas the interstices between the grains of a firebrick would give the pressure the character of a shearing stress. The solid and liquid phases do not therefore suffer the same increase of pressure; and Roozeboom has shown that the melting point of a solid will always be lowered when the pressure acts on the solid but not on the liquid. E. Rieke calculates that by the application of a pressure P , the lowering of the melting point $= \frac{vT}{2LE} P^2$, where E represents the elasticity of the solid in the direction of the applied pressure P ; L , the latent heat of fusion; T , the absolute melting point, and v the specific volume of the solid.

LABOUR AND WAGES.

South Wales and Monmouthshire.

At their conference in Cardiff the Examiners' Association considered the report of a deputation which had waited upon Sir R. Redmayne, and also met representatives of the coal owners, and it was decided to accept the recommendation of the deputation and suspend notices for a month. The association will continue their endeavour to obtain recognition of their trade union by the coal owners, as also the establishment of a uniform rate of wages throughout the coal field.

At Swansea on Friday a joint conference took place between employers and workmen's representatives engaged in the South Wales Siemens steel industry, the men having asked for a war bonus of 25 per cent. The chair was occupied by Mr. Herbert Eccles, chairman of the South Wales Siemens Steel Association; and the men were represented by Mr. Pugh, general secretary of the Steel Smelters' Union, and by Mr. T. Griffiths, the district organiser. The employers made an offer which brought forth a further proposal from the men; but the difference between the two sides proved to be so great that agreement was impracticable, and it is understood that the issue will have to be determined by the Committee on Production. Certain minor questions were dealt with in regard to which agreement was reached in some cases, but others were deferred.

The arbitrator has issued his award in the case of colliery weighmen employed at the Newport Abercarn Company. They wished their rate to be based on a six-day week of 6s. 7½d. per day—plus the percentage. The arbitrator has decided that the claim for levelling up rates was not sustained, but he has made an addition to the rate so as to bring wages up to 6s. per day, and this will be plus the percentage.

A joint deputation from employers and workmen at Hills Plymouth Colliery has waited on Sir Richard Redmayne and submitted facts relating to the price list dispute at that colliery. The men desire payment at the rate of 3s. 6d. per ton, whilst the employers offer only 2s. 3d. per ton, for working the 2ft. 9in. seam. After hearing the representatives, Sir Richard Redmayne stated that he would submit the matter to the Controller.

Llanbradach Collieries, on account of the difficulty arising from alleged unsatisfactory condition of safety lamps, continued idle during this week, about 2,000 men being affected. Mr. Greenland Davies, H.M. inspector, attended at the colliery on Monday in company with workmen's representatives, and an investigation was carried out on Tuesday also at the lamp room, when Mr. Dyer Lewis, divisional inspector of mines for South Wales, was also present.

The miners' executive met on Saturday last, when the reply of the coal owners to the request for altering the pay-day was submitted. The men had asked that Friday be substituted for Saturday, but the answer of the owners was that they could not make a general alteration, although they were quite willing to consider any cases of hardship at particular collieries. The meeting dealt also with the question of sub-contracting at the collieries, and it was decided to bring it up again before the Conciliation Board. Colliery examiners from the Pontypridd and Rhondda districts attended the meeting, and gave particulars as to several matters which they desired to have brought before the Home Office authorities. Another deputation was appointed to interview the Labour Minister on the question of certain classes of colliery workmen being compelled to contribute to the National Unemployment Insurance scheme. From the Aberdare district, a resolution asked the executive to approach the Local Government Board in order to secure payment of the expenses of Labour representatives on public authorities who had to lose work in order to attend to these public duties. It was resolved to bring the matter before the Labour Party. Representatives were appointed to deal with disputes at the Tirydail anthracite colliery and at Llanbradach. Members of the South Wales Pensions Committee were appointed, Mr. John James from the anthracite district and Mr. Oliver Harries from Monmouthshire.

With regard to the new war wage increase granted by the Controller, Mr. Vernon Hartshorn makes an addition to what has previously been disclosed—namely, that "the loss of a shift in which a fatal accident occurs, where such a loss is customary, shall not cause the forfeiture of special war wage." It has already been noted that where the custom of a district is to work less than six days a week the war wage will be paid as for six days to those who qualify for it. Also he stated that the war wage will not be taken into account as the ground for reducing compensation paid to workmen of light employment after an accident or through a scheduled industrial disease. Two principles distinguish this concession. One, that it is a flat rate and not a percentage on earnings, and therefore the poorly paid man is advantaged. The other is that whereas, previously,

advances were made only upon actual earnings, this applies also to men who are prevented from working owing to conditions over which they have no control. Moreover, the new advance has been national, not local. In all probability the payment commences on October 13; and the men are warned not to be impatient because the Controller has to issue instructions to 1,700 firms.

The employees at Cardiff Docks have set up a claim, under the national settlement between the Railwaymen's Union and the committee of the Railway Executive, claiming that women engaged in unloading ashes at the foreshore are entitled to 23s. per week instead of 18s. now paid. The men also object to a new arrangement as to medical examination.

The Rhymney Valley district of miners held their monthly meeting on Saturday, and the agent (Mr. W. Lewis, J.P.), referred to the neglect of workmen in reporting accidents which were apparently slight, but afterwards proved serious and in some cases even fatal. He urged that such accidents should be reported to a colliery official on the day the injury was received. With regard to a short strike at the Groesfaen Colliery, Deri, the agent stated that an interview had been had with the general manager of the Rhymney Iron Company but it was unsuccessful, and he was sorry to indicate probability that the Coalowners' Association would sue the workmen for damages on account of breach of contract.

Arising out of an agitation carried on by blastfurnace men and iron ore workers in the Cwmbran district of Monmouthshire, Mr. P. O. Lawrence, K.C., acting on behalf of the Ministry of Munitions, completed, on Thursday of last week, an enquiry into the wages question as affecting 600 workers, male and female. Mr. Llewellyn Carter, Ebbw Vale, local representative, was present on behalf of the National Federation of Blastfurnacemen, Coke Workers, Iron Ore Workers and Kindred Trades Society, and Mr. Whitehouse represented Messrs. Guest, Keen and Nettlefolds Limited, the employers most directly concerned. The minimum weekly wage for male workers was fixed at £2, including a war wage of 5s. and a bonus of 5s., as against about 29s., and substantial increases were also agreed to in the case of female workers. Consideration of the wages question in relation to mill hands was deferred. The enquiry lasted five days.

Mr. W. L. Cook, J.P., deputy agent for the Eastern Valley District of Miners, has presented a report to the district, intimating that all craftsmen, with the exception of fanmen, employed at the Varteg United Collieries, have been given advances in wages. Efforts are being made to obtain increases for the fanmen.

North of England.

At the September meeting of the joint committee for the Northumberland coal trade, the owners of Ellington Colliery applied to have hewing and other prices fixed for working the Main and High Main seams, and the workmen applied for an advance on the hewing tonnage price in the Yard seam. These applications were sent to arbitration, but the owners and workmen were recommended to come to an agreement.

At the September delegate meeting of the Durham County Colliery Enginemens', Boilerminders' and Firemen's Association, Mr. W. B. Charlton, agent, referred to the resolution of the Trades Union Congress protesting against the Miners' Federation trying to compel all working in and about collieries to become members of that organisation. He stated that miners only desired that colliery workers should be in colliery workers' unions to facilitate joint action. The trend of business in coal mining seemed to be veering round to one central authority. It occurred to him very forcibly that some linking-up with the miners must be made. They could not, as an association, content themselves with being merely hangers-on. They must seek a useful and business blend with the miners in their common interests. The committee had approached the coal owners with a view to obtaining an eight-hour day for the members at the conclusion of the war, and had received the intimation that the request would be sympathetically considered. As to whether the Coal Controller's offer of a wages advance to the Miners' Federation would apply to the members of the association, Mr. Charlton stated that the Federation board had resolved by all that was possible in that it should.

During September, 44 Northumberland steam coal pits worked an average of 5'09 days per week, and 21 household coal pits an average of 5'04 days per week making a total average of 5'07 days. In August, the steam coal pits averaged 4'04 days per week, and the household coal pits 4'6 days, or a total average of 4'23 days per week. Thus, there has been a very considerable improvement in the employment of the collieries during the past month.

Representatives of the Durham Miners' Association and of the Durham Mining Federation have waited upon Sir Richard Redmayne, as representing the Coal Controller, with reference to the distribution of employment. They complained that a great amount of trade was going to other counties, instancing Yorkshire, where the pits have been working full time, and where there was a dearth of coal, due to Yorkshire being nearer to the great consuming centres. Durham trade, they said, was being interfered with by the large amount of munitions that were being transported from the Tyne and trained from surrounding districts, making it impossible for Durham coal to be despatched, owing to the congestion of railway traffic. They urged that Durham coal, being largely consumed inland, should have a larger share of the trade of the country, especially in view of the fact that its quality was the same as that of many of the southern coals. In the county itself, some firms possessing large collieries were working, as to some of their pits, full time, but, as to others, very little. Whether these owners were working the cheapest collieries or those where the coal was easiest to get, so as to maintain the output required by the Controller and secure their returns in keeping with the arrangement, the deputation was not sure, but, whatever the cause, the fact remained that the trade had been unequally distributed, and that miners in many parts of Durham had suffered greatly in consequence. Since February last, £40,000 had been spent in relief to Durham miners owing to the collieries working slack time. Mr. Fletcher, of the Mechanics' Association, threw out the interesting suggestion that it might be possible for a larger number of skilled workmen to perform Government work, to be arranged for at the collieries when the pits were idle. Sir Richard made a sympathetic reply, and promised careful consideration of the points raised. He hoped that, in the near future, Durham would get a much larger share of the coal trade, and that the trade in the county would be more equally distributed.

There has been more trouble with the driver lads at the Allerdale Coal Company's William Pit at Clifton. The inspection committee which was appointed by the Concilia-

tion Board visited the pit on Monday to see the lads at their work. As they did not complete their inspection on that day, the committee decided to come on the Wednesday. This apparently did not suit the lads, who took again before the committee arrived at the pit on Wednesday. As the lads refused to go to work, their places were taken by some of the hewers, and the pit therefore continued to work both on Thursday and Friday. It seems that all the boys had to see the manager of the pit before restarting again, and apparently an arrangement has now been agreed upon, as the majority of the lads returned to work on Friday morning.

The Seaton Delaval Urban District Council has had under consideration a suggestion from Mr. R. L. Stoker, of Seaton Sluice, that the Council might find work for miners who were employed at New Hartley Colliery, and had been working very slack time. Mr. Stoker said that, no doubt, the Council would be aware that there was distress in many cases which had been hidden by many people who did not desire their condition to be too widely known. He thought that, if the Council could ease the position, it might do so. It was stated that the local collieries had been working much better during the past month, but it was agreed that Mr. Stoker should be asked to keep the Council informed if the slackness and distress recurred.

Scotland.

At Bent Colliery, Hamilton, trouble has lately arisen regarding rates paid in the Kiltongue seam, the men claiming an advance of 6d. per ton, on the ground that it would take that amount to enable them to earn fair wages. Mr. David Gilmour, county agent, is to take the matter up with the management.

Glenclelland Colliery, in the Wishaw district of Lanarkshire, has been reopened, and a slight difficulty which arose with regard to the payment to be allowed for tonnage rates has been amicably adjusted.

The Splint coal seam in Douglas Park Colliery, Lanarkshire, where tonnage rates have been in dispute for some time, has been examined by two members of the executive of the Lanarkshire Miners' Union. They recommend that no reduction should be made in the tonnage rates meantime, as the places are not sufficiently developed to warrant any change.

Idle time is threatened at Pencaitland Colliery, in the Lothians, in consequence of an intimation from the manager to reduce the hewing rate of a few men in one of the sections by 6d. per ton.

The miners employed at Wheatrigg Colliery, Kilmaurs, in Ayrshire, are at present on strike. The trouble is in relation to drawing scales. These were settled by arbitration some months ago, but a difference has cropped up regarding the interpretation of the finding of the arbiters. Efforts have been made to get the Government Departments to intervene, but without success. Full 50 men are affected.

Another stage has been reached in the negotiations at Fergushill Colliery, Ayrshire. The underground firemen have received an advance of 2d. per day, which brings them up to the level of the full county wage.

At Streethead Pit, Galston Colliery, Ayrshire, the men in the Main coal section have been conceded an advance of 2d. per ton. At Goatfoot Pit, belonging to the Gauchalland Colliery Company, Ayrshire, the men employed in the Main coal have been granted an advance of 4d. per ton.

Iron, Steel and Engineering Trades.

The accountants to the Board of Conciliation and Arbitration for the Manufactured Iron and Steel Trade of the North of England, have certified the average net selling price of iron plates, bars and angles, for the two months ending August 31 last at £13 13s. 4½d., as compared with £13 10s. 9½d. for the previous two months, and under sliding scale arrangements an advance of 3d. per ton on puddling, and 2½ per cent. on all other forge and mill wages takes effect from the 1st inst.

CUMBERLAND SURFACE WORKERS.

CONCILIATION BOARD AWARD.

Sir Wm. Job Collins, acting neutral chairman of the Cumberland Coal Conciliation Board, who presided at a meeting of the Board at Workington on Sept. 14, to consider the demands by the Cumberland surface workers for advances in their wages, has now issued his award, which is as follows:—

1. That the starting standard wage for boys on the surface shall be 1s. 6d., and after six months 1s. 8d.; and that the applicants have not established their case for a scale of standards for boys on the surface between 14 and 18 years of age.

2. That the standard rates for adult surface workpeople with standards of from 4s. 2d. up to and including 5s., shall be advanced by 2d. per shift. That the standard rates for adult surface workpeople with standards of 3s. 4d. to 4s. 2d. inclusive, shall be advanced by 1½d. per shift, or including the advance awarded to those with such standards by the neutral chairman on December 18, 1916, by 3d. per shift. Provided always that where the aforesaid limits would operate to prevent a workman receiving less advance than he would receive if his standard did not exceed those limits, he shall have such amount added to his standard as will make up the difference. Thus, a workman with a standard of 5s. 1d. will receive an advance of 1d.

3. That the standard rates for screen women be advanced by 1d.

4 and 5. That the applicants have not established their claim.

The above advances on standards shall come into operation on and from the beginning of the first full pay week following the date of the award—September 22, 1917.

The Organisation of Engineering Training.—A meeting will be held on October 25 in the theatre of the Institution of Civil Engineers for the purpose of considering the establishment of a central organisation for improvement in and better organisation of engineering training and the appointment of a representative committee of engineers and educational interests to initiate action. Sir Maurice Maurice, the president of the Institution of Civil Engineers, will preside. Invitations may be obtained by those interested from the honorary organisers, Mr. A. P. M. Fleming, British Westinghouse Company, Trafford Park, Manchester; or Mr. A. E. Berriman, Daimler Company, Coventry.

The great danger of damaged lamps was emphasised before the West Riding Bench at Doncaster last Saturday, when John Walsh, miner, Denaby, was summoned for a breach of the Mines Act in the Denaby pit. It was stated that the defendant, although only 22 years of age, was earning £4 per week at the coal face. His lamp was perforated with a pick, but he went on working, and handed it into the lamp cabin without reporting the damage. Mr. Smith, manager of the mine, said the lamp danger was one of the biggest perils they had in the pit. The magistrates said it was the custom in that court, where cases came before them in which men had caused danger in the mine, to demand a whole week's wages as the penalty. Defendant must pay £4, or go to gaol for 14 days.

Lancashire and Cheshire.*Extensions in South-East Lancashire—Housing at Irlam—New Workings at West Leigh.*

It was announced on Tuesday in Manchester coal trade circles that substantial contracts had just been entered into for extending their properties by seven or eight leading coal owners in South and South-East Lancashire. The developments include the opening out of new seams and the putting down of more surface buildings, such as washeries, etc. Amongst others who are mapping out further schemes of extensions are the New Moss Colliery Company Limited, Messrs. A. Knowles and Sons Limited, Hulton Colliery Company Limited, Ladyshore Colliery Company, Abram Coal Company, J. Roseoe and Sons, and Hindley Green Colliery Company.

Owing to the increasing demand for current from local engineering firms, iron foundries, factory owners, and other large users, the Finance Committee of the Bolton Corporation are applying to the Local Government Board for sanction to borrow £60,000 for extensions to their generating station at Back-o'-th'-Bank, where the plant is already fully loaded.

Coal and cotton are becoming more and more allied in South and South-East Lancashire. Many directors of colliery concerns are also directors of local cotton companies, and further developments are spoken of as likely to take place in this direction ere long.

At meetings of miners employed at Messrs. J. Roscoe and Sons and Lord Ellesmere's collieries in the Worsley and Little Hulton townships, held last week-end, it was decided to petition the local authorities for more light in the early mornings during the present autumn and coming winter months.

The continued extension of the Partington Steel and Iron Company's new works at Irlam, near Manchester, is creating a big demand for houses, which the local council has so far been unable to meet. Additional housing schemes are projected.

Members of the Oldham Coal Merchants' Association met the General Purposes Committee of the Oldham Town Council on Thursday evening, September 27, the object being to consider the drawing up of a scale of coal prices. A general discussion on the question resulted, but no definite decision was arrived at. The representatives of the association will consult the members, and in due course present a suggested scale to the General Purposes Committee.

Not a few Lancashire colliers, taking advantage of the prosperous condition of the coal trade, are now investing largely in War Loan stock as well as in cotton companies.

The putting into operation of the Cotton Control Board's restriction scheme does not appear to have resulted in any material curtailment in the consumption of coal at cotton mills in South-East Lancashire. A great many mills are running their full quota of machinery, and paying levies.

The opening out of the new mines in which several valuable seams will be worked is to be pushed forward as quickly as the times will permit, at the Parsonage pits, West Leigh.

Thousands of householders in East and South-East Lancashire are now getting loads of coal instead of two or three bags at a time, in order to be prepared for the coming winter months. As a result, private dealers and "Co-ops." are abnormally busy.

Notts and Derbyshire.

A somewhat rare accident was the subject of an inquest at Ilkeston last week upon Matthew Duro (19), onsetter at the Coppice pit of the Shipley Collieries. As the deceased was pushing the trams off the cage at the pit bottom with a pole, something was heard to fall, and then the deceased, his head covered in blood, fell and became unconscious. Investigation showed that a piece of coal must have fallen from the top of the shaft, inflicting a fatal scalp wound. "Accidental death" was the verdict returned.

Remarkable circumstances, too, were disclosed at an inquest at Chesterfield last week on Charles Cross (15), a pony driver, belonging to Shirebrook, whose body was found at the bottom of No. 2 shaft of Shirebrook Colliery, where he was employed. It was one shapeless mass, identification being only made possible by the clothing. There was no evidence to show whether the deceased fell down the shaft accidentally, or intentionally threw himself down. It was stated that whilst ordinarily a high-spirited lad, he had latterly been morose and low-spirited. Nobody saw him go down the shaft, the top of which was fenced, and which he would have to climb over. The jury returned an open verdict.

The Midlands.

It is officially announced that coal has been reached in the No. 2 shaft of the Coventry Colliery of the Warwickshire Coal Company Limited, at Keresley, at a depth of 711 yds., and that the four seams were found to exist of the aggregate thickness of from 23 to 24 ft. In the adjacent shaft (No. 1) it is expected similar success will have been met with by the end of the year. The coal is stated to be of excellent quality, and a considerable quantity has been brought to the surface this week. About 14 years ago boring operations were carried out at an outlay of upwards of £10,000, and this proved the existence of a grand bed of coal. The sinking of the shafts has been in progress several years, and work was from time to time retarded by the great inrushes of water when the red sandstone was cut through. This was eventually overcome by a Belgian system of cementation. It will, of course, be some time before the colliery is in full working order, and when that day arrives it is expected 4,000 hands will find employment with a yearly output of a million tons of coal. The company have secured the right to work the coal underlying about 4,000 acres of land and situated in the parishes of Keresley, Corley, Exhall, etc. The colliery has a connection with the London and North-Western Railway by a branch railway, and extensive siding accommodation is being established near the Bedlam level crossing on the Nuneaton and Coventry branch.

Kent.

A reply has been received by the town clerk of Canterbury from the Coal Controller respecting the appeal recently made by the Town Council that he would take steps to secure that sufficient labour is left to the Kentish collieries. The letter states that the Controller is aware of the importance of increasing the present output of the Kent coal fields, and the matter has been engaging his attention for some time. It involves the transfer of mining labour from other parts of the country, and this is not a matter which can be done without a considerable amount of negotiation with the miners' unions in the districts from which and to which the transfer is proposed to take place, and with the Miners' Federation of Great Britain. It is true that during the past few months a number of men who have entered the coal mining industry since the outbreak of

war have been released for service with the Army, but it is regretted that it is quite impossible to make any exception in favour of the Kent coal mines in the working of the various measures of the recruitment of miners.

Kent coal is now being supplied to electricity works in London, where furnaces have been altered to suit this coal.

Nearly 6,000 tons of coal were raised at the Tilmanstone and Snowdown pits last week.

Scotland.*Transfer of Scotch Miners to Cumberland Iron Ore Mines—Reduced Export Figures—Gas Managers and Fife Coal.*

In the Hamilton Sheriff Court, Sheriff Shennan disposed of several cases in which the accused were alleged to have contravened the Coal Mines Act. Thomas Marshall, colliery roadsman, Larkhall, was fined 30s., or eight days' imprisonment, for having in No. 3 pit, Cornsillock Colliery, Larkhall, unlocked his safety lamp and re-lit it. Hilary Quinta, miner, Nackerty, and Joseph Otty, miner, Nackerty (both Spaniards), were fined £2 and 30s. respectively for having been found with cigarettes and matches in their possession in Haughhead Colliery, Uddingston. For like offences in Haughhead and Earnock Colliery, Lanarkshire, John Barkas, miner, Uddingston, and Archibald McLean, pony driver, Burnbank, were each fined £2, or 10 days' imprisonment.

The inspection of pit ponies in the collieries in the Wishaw estate of Lanarkshire has resulted in the following prizes being awarded by Lady Belhaven:—Berryhill pit (16 ponies): 1, John Gray; 2, Henry Hewitt; 3, Oliver Knox. Heathery pit (21 ponies): 1, James Miller; 2, Peter Tweedley; 3, Henry Weir. Overjohnstone pit (25 ponies): 1, John Colquhoun; 2, Robt. Stevenson; 3, David Scott.

Mr. David Gilmour, O.B.E., miners' agent, Hamilton, who is doing duty as Labour Adviser in connection with the Ministry of National Service, has this week made an important announcement in connection with the proposal to transfer 700 men from the coal mines in Scotland to the iron ore mines in the Cumberland district. The chief points in the informative statement he has caused to be circulated are that the terms of employment are very satisfactory, and are as follow: Under the wages agreement in Cumberland, the miner's wage at present, including war bonus, is 12s. 1d. per shift. The working policy is 11 days per fortnight, for which 12 days' wages are paid, making a total standard wages for 11 days' work of £7 5s. There is also a bonus scheme by which wages may rise to £8 9s. per fortnight for 11 days' work. The first batch of workmen will be expected to leave for Cumberland in about a fortnight's time. The branch secretary of the union will provide each man accepted for service with a free railway warrant, and each volunteer will be allowed a day's wage for the time spent in travelling to his destination in Cumberland.

At Dunfermline Sheriff Court, a workman in the employment of the Fife Coal Company Limited was fined 7s. 6d. for leaving a stick of gelignite in his working place at the finish of his shift.

Deaths due to falls of roof are reported for the week at Dalbeath and Greenfield collieries respectively.

Mr. Geo. Harvey, district superintendent of the Caledonian Railway Company at Dundee, has been appointed Scottish representative of the Coal Controller. It is the desire of the Coal Controller that there should be sufficient reserves of coal at the various centres in Scotland so that in case of emergency there may be sufficient supplies for household purposes; and it will be Mr. Harvey's duties to consult with local authorities and coal merchants to secure that end.

The coal exported during the week from Methil was 17,048 tons, against 22,559 tons for the previous week. Burntisland exported 11,104 tons, as against 26,520 tons last year. Only a small quantity of this was consigned abroad.

The possibility of federation on the part of the miners and enginemen was the subject of a meeting held between representatives of the two bodies. A friendly discussion took place, in which both sides expressed their desire to remove any causes of friction which exist. It was agreed to adjourn the meeting to give an opportunity to each side to submit their proposals in writing, and that it be left to the officials of the two bodies to arrange for a further conference on an early date.

For some time past a considerable number of men from Poland have found employment in the Scottish mines. Recently these miners have begun to experience some difficulty in consequence of an Order having been issued giving those within military age the chance of either joining the British Army or being returned to Russia. Arrangements have, however, now been made to grant them exemption cards under certain conditions.

Fife and Kinross Educational Committee has decided to contribute £1,000 for the further development of the Fife Mining School at Cowdenbeath.

A meeting was held of gas managers of North of Scotland gas works, the chairman and secretary being the managers respectively at Inverness and Peterhead. A representation is to be made to the Coal Controller in regard to the Order restricting the drawing of supplies to the Fife area of coal pits. The Fife coal is not so rich for gas purposes as that obtainable from other districts.

Export of Coal by Barges.—The Ministry of Shipping are making enquiries into the nature and extent of the present export of coal from the United Kingdom in towing barges. Information is being asked as to the number of barges employed, the size, construction, manager's name, whether towage is done by tugs or by steamers, whether the barges return empty, the time occupied on round trip, loading and discharging turns, etc. There is little or no coal shipped by barges from South Wales to the near European ports. Schemes have been discussed for years whereby Welsh coal would be transported by barges to the French Atlantic and Bay ports, but experiments proved futile. At the outbreak of war, a scheme was created whereby sailing vessels were converted into barges. A tug was purchased and a patent towing rope apparatus installed which paid out the rope in accordance with the rise and fall of the waves. It was the intention to create a regular service between South Wales and France—the barges would be laden with Welsh coal and towed to France, whilst barges laden with pitwood would be towed to South Wales. Very soon, however, the Admiralty authorities viewed the project with such favour that the tug and converted barges were commandeered for a special purpose. Otherwise there is no doubt but that the project would have been a distinct success. It is understood that the original scheme will be put into operation as soon as normal conditions obtain.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts, Advertised in this issue, see column on right for inclusion in this column, see *Advertiser's List* White pages.

ALDERSHOT, OCTOBER 20.—Offers are invited by the Aldershot Gas, Water, and District Lighting Company for the supply of best South Yorkshire and/or Midland first-class screened gas coals, over the next nine or 12 months. Further particulars can be obtained from, and tenders should be sent (stating the names of the collieries, and prices per ton, delivered in colliery trucks, carriage paid to Tongham Siding, L. & S.W. Rly.), to the secretary of the company, Victoria road, Aldershot, not later than 9 a.m. on Saturday, October 20, 1917.

Abstracts of Contracts Open.

BARGOED, OCTOBER 8.—1,000 tons of coal for the Bedwellty Urban District Council. Forms from the engineer, Aberbargoed.

BELFAST, OCTOBER 9.—Best house and steam coal for the Public Health Committee. Forms from the town clerk.

BELPER, OCTOBER 18.—Coal for the Belper Isolation Hospital. Forms at the office of the clerk, Bridge-street.

CHATHAM, OCTOBER 9.—500 tons of good household coal and 200 tons of Welsh steam coal, to be delivered at Chatham railway station or at the Workhouse. Tenders to the Workhouse.

CLOONAMAHON (SLIGO), OCTOBER 16.—Coal and coke for the Sligo County Council. Forms from the secretary, Court House, Sligo.

COSLEY, OCTOBER 13.—For supply of coke and best quality thick coal for the Cosley Education Committee. Forms from the secretary.

HEBDEN BRIDGE, OCTOBER 15.—2,000 tons of screened gas coal and nuts for the Hebdens Bridge and Mytholmroyd Gas Board. Tenders to the clerk, Gas Offices, Carlton-street, Hebdens Bridge.

KILLOUGH, OCTOBER 8.—70 tons of best household coal to the Charles Sheils' Institution, Killoogh, to be delivered half November 1, 1917, and remainder February 1, 1918. Tenders, addressed to the presiding chairman, may be lodged with the superintendent.

MELTON MOWBRAY, OCTOBER 8.—Coal for the Melton and Belvoir Hospital Committee. Tenders to the office of the clerk.

ROSCOMMON, OCTOBER 13.—60 tons of best double-screened Wigan, Whitehaven, or other suitable house coal for the Guardians. Tenders to the clerk.

WIGAN, OCTOBER 9.—Coal, also carting of coke, for the Education Committee. Tenders to the Director of Education, Education Offices, King-street, Wigan.

WOODBRIDGE, OCTOBER 8.—Coal and coke for 3rd Cyclist Brigade for a period of 2½ months, commencing October 15, 1917. Forms on application.

The date given is the latest upon which tenders can be received.

THE FREIGHT MARKET.

Fixtures arranged in the open outward freight market since last report have been few and far between. At the north-east coast, most of the business done has been for Gothenburg discharge, at rates varying from 185 kr. to 200 kr., figures at which six vessels of nearly 13,000 tons in all have been taken up, presumably on account of the purchases of steam coals made by the Swedish State Railways. It will be observed that the rates are, generally, lower than those recently paid for that port. Stockholm has been arranged for at the old record figure of 207½ kr. An interesting fixture is that of a 2,700-ton steamer for Rotterdam, at 95s., the first fixture in that direction since, we believe, the latter end of 1914. Probably it portends the resumption of coal shipments to Holland, under the arrangement just effected with the British Government. At South Wales, business has been almost wholly concerned with charters for French Atlantic ports, at the scheduled rates. A neutral vessel has been taken up for Bilbao with fuel at 150s., Swansea loading, and some small vessels for coasting journeys have been arranged for, but otherwise France has the monopoly of business.

Homewards, the River Plate is nominally unaltered, at 140s. from down-river and 145s. from up-river ports to the United Kingdom, but it is stated that 200s. has been paid for a neutral vessel loading at the down-river ports. At the United States, coal freights are still quoted at 125s. from Virginia to Buenos Ayres or La Plata, with 33 dols. for Rio discharge. On Committee account on heavy grain basis, the Northern Range is steady at 32s. 6d. to the Mediterranean, and 30s. to the United Kingdom, with the Gulf at 35s. to West Italian ports. On net form, the Northern Range is stronger, at from 210s. to 215s. to the United Kingdom; steady at 250s. to North France. At the Far East, Bombay or Kurrachee to the United Kingdom on d.w. basis is firm, at 250s. Bombay to the Mediterranean is mentioned at 400s. Haiphong-Saigon to France with rice is unaltered at 500s., which figure rules also for kernels from the Madras Coast to Marseilles. There is a fair enquiry at the Mediterranean and Bay of ports for tonnage, and firm rates are offered.

Tyne to Gothenburg, 2,500, 200 kr.; 800, 185 kr.; 2,700, 2,000, and 2,100, 190 kr.; 2,400, 195 kr.; North French Range, 250, 50s.; coke; 800, 46s., coke; 650, 45s., coke; Rotterdam, 2,700, 95s.; and Stockholm, 2,700, 207½ kr.

Cardiff to Caen, 700 and 900, 48s., neutral; 1,100, 46s. 6d., neutral; Granville, 600, 100s., sail; Havre, 2,000, 45s. 9d., neutral; and Rouen, 1,400, 1,500, 5,000, and 2,200, 48s. 9d., neutral; 1,400 and 1,500, 25s. 3d., fuel; 1,500, 45s. 9d., neutral; 600, 26s. 3d., fuel; and 1,500, 24s. 6d.

Swansea to Dublin, 300, 19s.; Bilbao, 3,400, 150s., fuel, neutral; Rouen, 600, 25s. 3d., fuel; 1,400, 48s. 9d., neutral; 500, 51s., fuel, neutral; Tonny Charente, 1,500, 63s., neutral; and Irvine, 700, 16s. 6d.

Newport to Granville, 150, 100s., sail.

Briton Ferry to Rouen, 1,650, 48s. 9d., neutral.

The Spanish coal problem has been solved by a standing with England, whereby ships visiting the purpose of transporting minerals will come to Spain.

American Rails for France.—The American Government has passed an order for 150,000 tons of rails to be delivered in France for the laying of railways between the ports of landing and the battle front.

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

Cable and Construction Company Limited.—Dividend at the rate of 10 per cent. per annum on shares for the half-year is announced. A interim dividend was at the same rate.

Carlton Main Colliery Company Limited.—The directors recommend an interim dividend of 2s. per share, free of tax—same as last year.

Edinburgh Collieries Company Limited.—Half-year's dividend to July 31, 5 per cent. per annum, and $7\frac{1}{2}$ per cent. per annum on preference and ordinary shares respectively, free of tax.

Hamstead Colliery Company Limited.—Dividend of 5 per cent. (20s. per share), less income tax, on preferred shares for half-year, making 10 per cent. for year; £10,000 to reserve; £5,738 forward. Last year no dividend was paid.

Kayser, Ellison and Company Limited.—The net profits for the year ended June 30, including £13,811 brought forward, were £52,482, after providing for excess profits duty. A final dividend of 7s. 6d. per share is proposed on the ordinary shares, making $12\frac{1}{2}$ per cent. for the 12 months, and also a bonus of 7s. 6d. per share, both free of income tax, adding £5,000 to the workpeople's benefit fund, and carrying forward £20,482. Further land has been acquired adjoining the works, and considerable progress has been made with the erection of buildings and plant. The machinery is kept working continuously for the Ministry of Munitions, and to cover the consequent excessive wear and tear £10,000 has been written off for depreciation. For 1915-16 the appropriations were similar to those now announced.

Palmer's Shipbuilding and Iron Company Limited.—The report for the period ended June 30, 1916, states that the profits for the year were £63,255, after making provision for depreciation. Debenture and other interest amounted to £29,502, leaving £33,753 net profit for the year, which sum, in addition to £42,772 already standing to the credit of profit and loss account, making altogether £76,525, the directors propose carrying forward. In accordance with the agreement entered into with the debenture trustees and the prior lien debenture holders, no dividend upon either the preference or the ordinary shares can be paid until the prior lien debentures are discharged. The Hebburn property was acquired on July 1, 1915, by Palmer's Hebburn Company Limited, in which this company holds all the shares. The scheme of modernising the iron and steel works has made good progress, notwithstanding the difficulties and delays caused by the war. Some of the plant is now at work, and it is expected that a further portion will be in operation next month.

Sanderson Brothers and Newbould Limited.—The directors have declared an interim dividend of 4s. 6d. per share, less tax, on the ordinary shares. This distribution equals $4\frac{1}{2}$ per cent., compared with $3\frac{1}{2}$ per cent. at this time last year.

Vulcan Foundry Company Limited.—The directors have declared a dividend of 3s. per share, less tax, the same as last year.

Wilson's and Clyde Coal Company Limited.—The report shows that, after providing for depreciation and excess profits duty, and allowing for dividends on the preference and ordinary shares paid in April, there remains £95,676. The directors recommend a final dividend of 4s. per share, less tax, the same as last year, carrying forward £41,676.

NEW COMPANIES.

Channel Steel Company Limited.—Public company. Registered office, Clarence House, 4, Central-buildings, Westminster. Registered September 26. To search for coal, ironstone, and other minerals, etc. Capital, £750,000. Directors: Sir Hugh Bell, Bart., Sir J. E. J. Ferguson, Bart., A. J. Dorman, R. Grant, junr., and two others. Qualification, £1,000. Remuneration, £2,000.

Cumberland Pitwood Association Limited.—Registered office, 19, Falcon-street, Workington, Cumberland. Registered September 21. To purchase, grow, fell, prepare, and make, and to sell, deal in, and distribute timber and pitwood, etc. Every member of the association undertakes to contribute to the assets of the association, in the event of the same being wound up, the sum not exceeding which shall be equivalent to 10 per cent. of the cost of the timber and pitwood used and consumed within 12 months. Directors: G. H. Askew, Castlemount, Aspatria, colliery agent; W. J. Barratt, Keppleway, Broughton-in-Furness, iron ore owner; W. Burnyeat, Millegrove, Moresby, Whitehaven, iron ore owner; W. W. Casson, Whitehaven, iron ore owner; and six others.

Cymric Rhondda Colliery Company Limited.—Private company. Registered September 29. To carry on the business of colliery proprietors, coke and by-product manufacturers, iron masters, tin-plate makers, chemists, etc. Capital, £5,000. Directors to be appointed by subscribers. Subscribers: F. W. Holman and W. A. Horey.

Field (T. W.) Engineering Company Limited.—Private company. Registered September 26. To carry on the business of iron founders, mechanical engineers, etc. Capital, £1,000. Directors: S. J. E. Pitts, T. W. Field, and F. B. Estcourt.

Harding (T. L.) and Sons Limited.—Private company. Registered September 26. To acquire and take over as a going concern the business of ironmongers, iron and brass founders, and engineers, etc. Capital, £20,000. Directors: T. S. Harding, Annette Conroy Harding, and W. P. Harding.

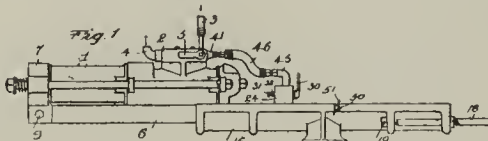
Limit Gauges and Tools Limited.—Private company. Registered September 22. To acquire and take over as a going concern and carry on the business of a gauge and tool manufacturer, etc. Capital, £5,000. Directors: D. J. Niven and C. F. Lawton.

Nicklin (Bernard) and Company Limited.—Private company. Registered September 28. To carry on or be interested in as principals or agents all or any of the businesses of manufacturers of and dealers in iron, steel, pig iron, bricks, fireclay, cement, copper, lead, etc. Capital, £10,000. Directors to be appointed by the subscribers. Subscribers: H. C. Chambers and G. J. Withington.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons, registration agents, Chancery-lane, E.C.

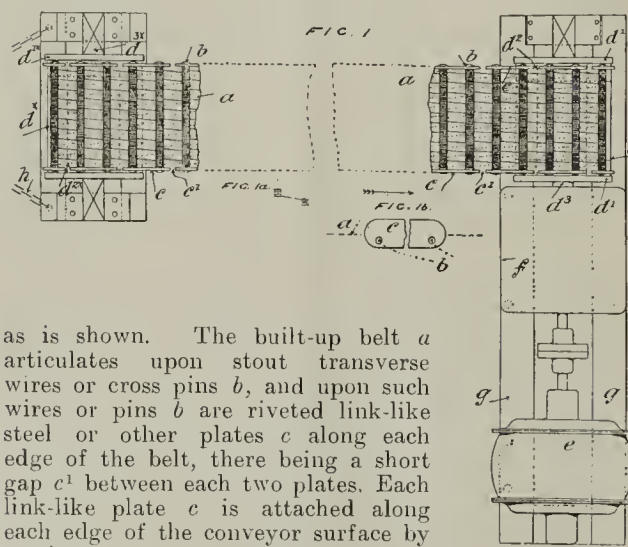
ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

101969. *Improvements in Pneumatic Drills.* J. C. H. Vaught, 462, West 23rd-street, New York, U.S.A.—This invention relates to pneumatic hammer drills. The invention consists in the construction, combination location, and relative arrangement of parts. Fig. 1 is a view in side elevation of a drill embodying the invention, the drill being at the limit of its forward position. In the drawing one embodiment of the invention is shown wherein 1 designates generally a working cylinder, in which the pneumatic hammer operates in the well-known manner, and the details of which do not form a part of the present invention, except as will be more fully hereinafter pointed out. Mounted on the casing of the machine 1 is the usual valve chest 2 provided with a suitable connection 3 to a source of fluid pressure, not shown, and an exhaust opening 4, and a suitable valve control therefor, as, for instance, the handle 5. A feed tube or cylinder 6 secured to the drilling machine 1 is employed in any desired or suitable manner. The usual head 7 of the drilling machine is provided with a downwardly projecting lug adapted to fit into a vertical slot cut into the end of the feed cylinder and drive a pin 9 therethrough. The body of the drilling machine may be secured to the outer surface of the feed cylinder 6, if desired, in any suitable manner. The cylinder 6 may be open at one or both ends; as shown, the slit portion thereof to receive the lug of the head 7 of the drilling machine 1, forms a portion of a plug, preferably a screw plug indicated at 10, while the other end of the cylinder is closed in any suitable manner to ensure airtightness. Within the feed cylinder 6 is a piston rod provided with a head to fit snugly against the interior wall of the cylinder. The usual cradle or shell 16 is shown, and is provided with channels adapted to form guides for the movement of the drilling machine therein. Stay rods 18 are suitably secured to the shell or cradle 16 on opposite sides thereof, as by brackets cast thereon and nuts 19. The stay or brace rods 18 are secured to each other at their free end by means of a head, to which the piston rod is also secured, for example, by means of a bolt head or nut. Thus, it will be seen that



the piston rod and head are stationary with respect to the shell or cradle, but upon admission of pressure either side of the piston head, the feed cylinder 6 will move relatively to the piston head until the cylinder plugs rest against the piston head. The objects of the invention are to provide double-acting pneumatic or fluid pressure feed mechanism that is exceedingly simple, requires little attention for the operation thereof, ensures constant uniform feed, and which rapidly retracts the drilling machine to its initial position, thereby saving time and energy and securing more perfect work than has heretofore been obtained in the machines of this class. (Two claims.)

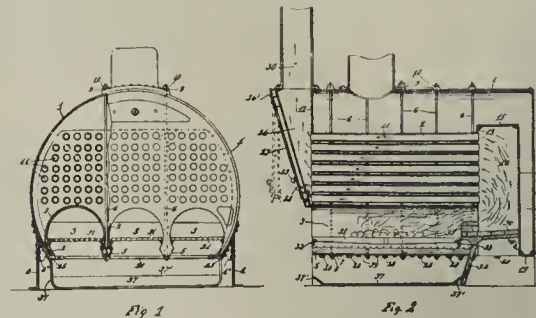
108243. *Improvements in Coal Conveyors.* A. Johnson, of the firm of C. H. Johnson and Sons Limited, Irkdale-street, Smedley-road, Manchester.—This invention relates to improvements in and connected with conveyors for dealing with coal or other material. Fig. 1 is a broken plan view of a conveyor consisting of a woven wire conveying surface provided with a combined fence, edge, or ledge according to the invention. A woven wire endless belt, such as that marked *a*, is used. This is a known type of wire belt, and consists of units made up of two or more connected coils, the wire running from one coil to the other (see fig. 1*a*). Between the lines of coils metal laths are applied, so that a not too open surface results,



as is shown. The built-up belt *a* articulates upon stout transverse wires or cross pins *b*, and upon such wires or pins *b* are riveted link-like steel or other plates *c* along each edge of the belt, there being a short gap *c1* between each two plates. Each link-like plate *c* is attached along each edge of the conveyor surface by passing each two consecutive transverse wires or cross pins *b* therethrough, and by riveting over the ends. The link-like plates are of such sufficient depth that they stand proud or a little distance above what is the carrying face of the belt, and so make a perfect fence or raised edge or margin, which possesses the power of articulation along with the conveyor surface. Such link-like plates applied in the manner described may also serve to drive the endless belt or conveyor, and, to this end, said belt or conveyor passes around a hexagonal or like driving drum *d* consisting of two cast iron plates or ruffs, each with an annular ledge *d1* and flats *d2*. Such cast iron plates or ruffs may be mounted on a shaft, and driven by an electric or other motor through a speed reducing gear, or the shaft might be otherwise actuated. (Two claims.)

108338. *Improvements in Steam Boilers.* A. M. Fernandez, 13, Luz, Havana, Cuba.—This invention relates to internally fired steam boilers of the type wherein the lower part of the cylindrical shell and the corresponding part of the furnace shell are omitted or cut away, the shells being riveted or suitably fastened together at such parts. The object of the invention is to provide an improved boiler of the above type. Fig. 1 is a front end view, partly in vertical section, of a boiler with three internal furnaces according to this invention; fig. 2 is a vertical longitudinal section through the same. The shell 1 of the boiler is cut straight on its lower part underneath the line of the furnace grate, so as to form in cross section about four-fifths of a circle, and the shells 2 of the furnaces 3 are shaped accordingly. The walls 21 of the shells 2 of the lateral furnaces 3 and the corresponding wall of the

shell 1 are united by means of a double row of rivets, a plate strip 11 of wedge cross section being interposed between both shells. Supporting members or posts 4 are provided. The side walls 21 of the shells 2 of adjacent furnaces 3 are connected by means of a steel plate 5 forming in section an inverted horseshoe, the inclined walls of which are secured to the walls of the furnaces by means of a double row of rivets. The rods 6 pass between the vertical rows of flues 11 of the boiler, which are mounted in the front plate 12 and the rear plate 13 forming a wall of the firebox 14. This firebox 14 has a wall 15 curved concentrically to the shell 1 up to a certain height underneath the top of the shell 1, where it extends in a plane, and is stayed in the same manner as on Scotch type of boilers, and at its lower ends said plate 15 is adapted to the sides of the shell 2 of the lateral furnaces 3, the curvature of



which it follows on a portion of about 300 degs. of the circle. The shell 1 of the boiler and the shells 2 of the furnaces 3 are secured to the horseshoe pieces 5 by means of a row of horizontal transverse rods 20 extending underneath the grates, and which tangentially pass the horseshoe pieces 5. The horizontal rods 20 may pass through holes in the horseshoes 5 instead of tangentially thereto. As at the rear part of the boiler the plate 13 and the plates 16 and 17 partly counteract the action of the internal pressure over the side portion of the shell 1, and to a certain extent replace the action of the horizontal rods 20, only one of these rods is placed underneath the firebox 14. At the front of the boiler an uptake 26 is provided, the front wall 261 of which is inclined and made of a double-stayed plate with an intermediate air strata, and having a lock door 27 hinged by its upper edge, and which closes by its lower edge by means of latches 28 being operated from the outside by handles 29, and from the upper part of said uptake 26 leads to the smoke passage 30 extending to the chimney. The grates 31 are arranged underneath the axis of the shells 2, and are supported on cross bars 32 and 33 at the ends, and the furnace firebox 14 is closed at the rear end by a metal bridge 34 of angular cross section, upon which the firebrick bridge wall 35 is located, which is so disposed that the flames and the smoke are guided upwardly; said bridge 34 also carries a firebrick floor 36. The ashpit consists of a bottom plate 37 with inclined walls which are secured to the seam of the boiler shell 1 and firebox shells 2 by means of screws and the like, and said bottom plate 37 has a raised edge 371 at the front and at the rear, to be adapted for receiving water in which the ashes will be extinguished. (Four claims.)

108339. *Separating Low-Temperature Tars into Components Without Distillation.* R. Maclaurin, Homesteads, Cambusbarrow, Stirling.—True low-temperature tars, such as are obtained by the process of distilling bituminous and canneloid coals, Patent No. 24426/13, are quite different in their constitution and characteristics from ordinary coal tars, and more valuable products can be obtained by the separation of such tars or crude oils without distillation than by distillation. The crude oils or tars to which the present invention applies, are characterised by the almost entire absence of the aromatic hydrocarbons of the benzene series, so characteristic of ordinary coal tar, also by the absence of naphthalene and anthracene, and of large percentages of free carbon. Vertical retort tars are defined as semi-low temperature tars. To such tars this process is not intended to apply. The crude oils or tars, to which the present invention does apply, consist apparently of two main groups of products, viz., a resinous group, and a non-resinous group presumably consisting of paraffins, olefines, and naphthenes, with some cresylic acid, and related bodies. The resinous group is at the moment of unknown constitution. The separation to which this invention relates is simply the first rough separation of this type of crude oil or tar into these two main groups of products. The low-temperature oil or tar obtained from cannel coal differs from the tar obtained from coking coal, in the proportion of paraffinoid and resinous material it contains. The cannel coal oil is relatively deficient in resinous products and rich in liquid or semi-liquid products, presumed to be of a paraffinoid nature. Both crude oils, however, are amenable to the treatment herein proposed. To effect the separation, a quantity of a hydrocarbon oil is added, such as a light petroleum, paraffin oil or gas oil, viz., oils consisting largely of paraffins and olefines, in which oils the resins are insoluble, and agitated. After a short time a black resin collects and sinks to the bottom, and the light oil can then be decanted off. Oils, such as benzole, solvent naphtha, or turpentine are not suitable oils for effecting the separation, as they dissolve portions of the resinous material. This is particularly true for benzole, and all aromatic solvents. The black resin obtained can be used after thinning with a suitable solvent, such as benzole or methylated spirits, as a black varnish, or for other purposes. This black resin is naturally quite different from the material thrown down when high temperature coal tar is treated with a paraffinoid oil, in so far as these tars contain large quantities of non-resinous bodies, and large quantities of free carbon, naphthalene, etc., while the presence of aromatic hydrocarbons in these tars tends to retain the resinous bodies in solution. In the case of the non-aromatic true low-temperature tars, the resins are largely precipitated. (One claim.)

108373. *Improvements in Mine Signalling Keys.* Sterling Telephone and Electric Company Limited, F. G. Bell, and W. C. Davey, all of 210-212, Tottenham Court-road, London.—This invention relates to signalling keys of the kind set forth in the specification of British Letters Patent No. 13062/14. Fig. 1 is a front view of the key with the front of the casing removed; fig. 2 is a central vertical section of fig. 1 with the key handle in the signalling position; fig. 3 is an outside elevation with the cover and handle in place corresponding to fig. 1; fig. 4 is a side elevation corresponding to and in the same position as fig. 2; and fig. 5 shows a detail. The key is shown designed for that kind of signalling system in which a signalling contact can be closed with the key in the signalling position, and a second contact, called the normal contact, is closed when the key handle is allowed to drop

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1. B. g to an absolute minimum.

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1. B. g to an absolute minimum.

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

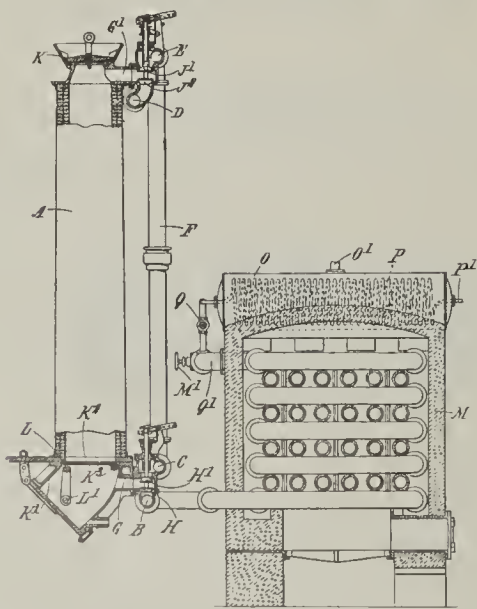
47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

position. The key shown is of the totally locking type, and is provided with a casing 1 with an air-locks 3 for the conductors. The operating handle 4 is shown, and is suitably secured to the spindle 5 passing through the key casing 1, and is provided with a relatively heavy knob 6. The handle 4 is at rest, having fallen to a lower position shown in dotted lines in fig. 4, a heel piece 7 fixed to but insulated from the spindle 1 by an ebonite bush 8 passes between a pair of contact members 9. Fig. 5 shows a section through one of these members, and shows that each of them carries a ball contact 10 pressed sideways against the heel piece 7 by helical springs 11. Thus, as can be readily seen from fig. 2, when the handle is released, even if it takes up a swing of some amplitude, the contacts 7, 9, do not come out of engagement. Thus, there is no risk of unwarranted breaking the normal contacts. The drawings show the handle 4 raised to the signalling position. During the first part of the operation of raising, as may be seen from fig. 2, the contacts 7, 9, remain closed, but after a short movement the normal contacts 7, 9, are interrupted and the upper edge 12 of the heel piece 7 acts as a kind of cam surface for operating the signalling contacts proper. These contacts are mounted upon a rocking lever 13, pivoted at 14, and normally held in the position shown in fig. 2 by the helical spring 15. The signalling contacts are carried upon the long upper arm of the lever 13, one being mounted on the leaf spring 16, and the other carried adjustably by the screw 18 passing through the fixed bridged piece 19, and provided with a lock nut 20. The amount by which the spring 16 can recede from the lever 13 is limited by the head of a screw 21. In the normal position the long arm of the lever 13 rests against a stop 22. The whole of the switch parts are mounted upon a suitable base 23. The key handle is raised to the signalling position, as shown in the drawings, the face 12 of the heel piece 7 abuts against a steel facing 24 on the short arm of the lever 13, and by further movement rocks the lever 13 against the stress of the spring 15, and thus closes the signalling contacts 25. By the arrangement of this operating mechanism, and the feature that the contacts are carried upon a longer arm of the lever 13 than that actually operated upon, very slight movement of the handle 4 serves to close the contacts 25, and allows them to re-open. In order to prevent the operator from putting too great stress on the interior parts, it is arranged that the handle 4 abuts on the lid 2 of the casing 26 before lever 13 reaches the position where it would be subjected to stress. In order to give a definite movement to the handle it is arranged that the end of a plunger 27 comes into contact with the casing at 26 before the contacts 25 are made. Further pressure forces the plunger 27 into the handle 4, and compresses a helical spring 28 within the knob 6, during which the contacts 25 are completed. The plunger 27 is prevented from being pushed entirely out of the handle by the spring 8 by means of a screwed in plate 29. This buffer spring 8 has the further advantage that when the operator releases the handle, it expands, and gives the handle a push off, so to speak, from the surface 26, so that any doubt of the handle remaining in the signalling position inadvertently is totally avoided. (Five claims.)

108343. *Improvements in the Low-Temperature Distillation of Coal.* F. Lamplough, Trafalgar House, Waterloo-place, London, S.W.; and Oil Extractors Limited, 25, Victoria-street, London, S.W.—The present invention is of a process for the low-temperature distillation of coal, of the type consisting in bringing superheated steam or other gaseous heating medium, preferably at low pressure, into contact with the coal to effect the distillation. The figure is a section through a battery of retorts, but show-



ing, in addition, a vertical section through a superheater for use with the apparatus. The apparatus comprises a battery of vertical retorts A built with two parallel mains B and C extending along the bottom of the battery, and another pair of parallel mains D and E extending along the top of the battery. The main B is fed with superheated steam, and is hereinafter referred to as the steam main, whereas the main C hereinafter referred to as the by-pass feed. A down-take F with the uppermost end hereinafter referred to as the steam main, and the lower main D of the two upper mains B and C discharge into a common main G. Each inlet duct G is provided with a mushroom valve H, H¹. In the drawing, these are preferably of the type known as J¹, J², namely, co-axially with one

another, and with the stem of the valve H¹ made hollow to allow the stem of the lower valve H to pass through it. The two stems emerge from a stuffing-box arranged above the duct G, and each is provided with a convenient control lever, so that they may be moved in unison to close one or the other on to its seating and simultaneously to lift its fellow off its seating, or so as to close both. The two mains D and E at the top of the battery are similarly connected through valves J¹, J², to an outlet duct G¹, a set of valves and an outlet duct being provided for each retort to connect it with those mains. The top of each retort is fitted with a hopper K, and at the bottom of each retort is a discharge mouth K¹, at the upper end of which is a perforated grate K² to support the coal. The grate K² is pivoted at K³, and is operated by a pivot arm L carried on a spindle L¹, and worked in any convenient manner from a lever outside the discharge mouth. The steam for the battery is provided by means of a superheater M, normally fed by exhaust steam from engines, radiators, or other steam utilising apparatus through a control valve M¹. The top of the superheater is, however, furnished with an evaporator in the form of a drum O built into the roof of the superheater so as to receive some of the waste heat therefrom. The drum is connected at O¹ with a donkey boiler or other source of live steam, and contains a coil P connected at the end P¹ to a water supply, for example, to a pump, and at the other end by a valve Q, to the inlet Q¹ of the superheater. The drum and coil constitute an evaporator to form an alternative supply of steam, should the supply of exhaust steam fail. If the supply of exhaust steam stops, or is insufficient, water is passed through the coil P, and is there transformed into low-pressure steam and delivered to the superheater through the valve Q. (Six claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Aiton, J. A. Steam generators. (14031)
 Alexander, G. H., and Nash, R. J. Means for indicating quantity of liquid in tank, etc. (13946)
 Alexander, G. H., and Nash, R. J. Tank or fluid level gauges. (13947)
 Alexander, G. H., and Nash, R. J. Ganges for liquid storage tanks, etc. (13948)
 Alexander, G. H., and Nash, R. J. Fluid level gauges. (13949)
 August, J. R. C. Regenerative furnaces. (13817)
 Begg, N. Self-exciting dynamo electric machines. (13737)
 Bingham, C. Electric furnaces. (13858, 13977)
 Blast Furnaces and Equipment Limited. Blast furnaces. (14022)
 Bolton, C. H. Signalling apparatus for winding engines at mines, etc. (13819)
 (Booth-Hall Company). Electric furnaces. (13956)
 Bouhon, L. J. R. Apparatus for recovery of waste heat in engines. (13798)
 Brooke, H. L. Internal combustion engines. (13758)
 Buckle, E. A. Treatment of peat, etc. (13888)
 Challiner, J. A. Containers for storage of gas for use in internal combustion engines of motor vehicles. (14069)
 Chapman, G. and W. Automatic folders for gas containers on gas-driven vehicles. (14101)
 Cole, A. H. P. Transporter and elevator trucks. (13971)
 Cole, W. J. Mechanical stokers. (13734)
 Couper, A., and Mason, H. E. Manufacture of refractory bricks, blocks, tuyeres, etc., for furnaces. (13906)
 Cox, C. W. Portable compressed coal gas feed and carrier. (13980)
 Crossley, Sir K. I. Combined internal combustion engine and air compressor. (14008)
 Dawson, P., Fawdry, F. W., and Richards, H. W. H. Supporting device for overhead electric trolley wires. (13726)
 Day, R. B. Producing hydrocarbons. (13954)
 Edgeworth, K. E. Treatment of peat for fuel. (13714)
 Enclosed Motor Company. Dynamo electric machines. (14035)
 Feary, N. A. T. N. Instruments for indicating inclination. (13892)
 Gilchrist, A. L. K. Internal combustion engines. (13752)
 Hann, G. Mechanical stokers. (13734)
 Harrison, G. A. Household coal economiser. (13769)
 Hooson, H. V. Regenerative furnaces. (13817)
 Jacoby, H. C. E. Dynamo electric machines. (14035)
 Kruyswijk, J. Transmission of power by alternating currents. (13950)
 Leadbetter, T. A. N. Internal combustion engines. (13752)
 McKechmie, J. Two-stroke internal combustion engines. (13739)
 Mandle, H. H. Process of producing hydrocarbons. (13955)
 Nutter, W. Mechanical coal savers. (13709)
 Palin, J. Grabs. (13771)
 Rayner, G. Valve apparatus for percussive rock drills, tools, etc. (13919)
 Reid, H. C. Means for storing gas for use in internal combustion engines. (13809)
 Richardson, A. N. W. Multi-cylinder internal combustion engines. (13787)
 Ritson, F. Blast furnaces. (14023)
 Royle, G. E. and J. J., and Royles Limited. Steam traps, etc. (13816)
 Sage and Company, F. Instruments for indicating inclination. (13892)
 Schaanning, A. Self-exciting dynamo electric machines. (13737)
 Schaufelberger, E. Centrifugal pumps. (13899)
 Slack, J. E. Steam superheaters. (14044)
 Smith, W. T. Internal combustion engines. (13942)
 Southall, J. Internal combustion engines. (13756)
 Stock, G. J. Process for synthetic production of low phosphorus and sulphur pig iron from steel or iron scrap. (14063)
 Tarry, T. W. Portable compressed coal gas feed and carrier. (13980)
 Tate, W. H. Internal combustion engines. (13752)
 Thuman, F. Gas producers. (13770)
 Vickers Limited. Two-stroke internal combustion engines. (13739)
 Webb, J. G. Electrically reducing refractory substances. (13780)
 Westinghouse Machine Company. Steam turbine installations. (13789)
 Whitaker, T., and Yeaton, J. A. System of carbonising coal. (13694)

Complete Specifications Accepted. (To be published on October 18.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 11049. Portham, R. S. Superheating apparatus for boilers of the fire tube type. (109633)
 11844. Denton, J. J. Method of producing and controlling high temperatures in electric furnaces. (109639)
 12065. Titterton, F. E. Reversing means for rotary piston pumps. (109641)
 13196. Hooke, A. E. Power driving mechanism for canal and other barges and water craft of like nature. (109644)
 13256. Halliday, T. E. Steam generators. (109647)
 13347. Hawthorne, W., and Twinberrow, J. D. Tipping wagons. (109653)
 13430. Ladishensky, I. A. Fire and water tube boiler. (109656)
 13786. Hurst Limited, C., and Patton, A. Internal combustion engines. (109668)
 17772. Kilner Brothers and Knowles, F. W. Gas generators or producers. (109710)
 18179. Reynolds, J. W. Furnace and like grates. (109713)
 18520. Babcock and Wilcox (Babcock and Wilcox Company). Steam boiler economisers. (109717)
 1917.
 2751. Gairing, E., and Eclipse Interchangeable Counter-bore Company. Boring tools. (109738)
 2794. Cutler-Hammer Manufacturing Company. Fluid meters. (105061)
 4019. Bald, C. Sighting clinometers. (109744)
 5920. Bagley, D., and Bagley, E. A. Method of introducing the combustion gases into the heating flues of coke ovens, etc. (109752)
 10806. Rayner, G. H. T., and Rayner, P. Percussive rock drills and like fluid pressure operated tools. (109777)
 11732. Hooke, A. E. Power driving mechanism for canal and other barges and water craft of like nature. (109778)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
 9894. Moystad, J. K. Internal combustion engines. (109788)
 11745. Dampierre, M. A. H. de. Manufacture of volatile oils such as petrol. (109796)
 12134. Jones, S., and MacDonald, J. D. Vertical retorts for the destructive distillation of coal, shale, etc. (109800)
 12682. Westinghouse Electric and Manufacturing Company. Underfeed stokers. (109803)
 12683. Westinghouse Electric and Manufacturing Company. Mechanical stokers. (109804)
 12809. Axtell, F. C. Liquid fuels. (109806)
 13404. Coadie, J. M. J. Apparatus for removing incrustation from boilers. (109812)

PUBLICATIONS RECEIVED.

"Report on Mining Operations in the Province of Quebec During the Year 1916" (Province of Quebec, Canada, Department of Colonisation, Mines and Fisheries, Branch); "Industrial Management" (Vol. 53, No. 6), September 1917 (edited by R. Dunlap), price 25c.; "The Mining Congress Journal" (Vol. 3, No. 9), September 1917, price 20c.; "Monthly Bulletin of the Canadian Mining Institute" (No. 65), September 1917 (edited by the secretary); "Bulletin of the American Institute of Mining Engineers" (No. 129), September 1917, price 1 dol.; "Mining Institute of Scotland: List of Members, 1916-17, on the Roll at August 1917" (Hamilton: printed by The Hamilton Advertiser Limited); "The Housing Question—as Affected by Recent Legislation—Reasons for Repeal of Part I. of the Finance (1909-10) Act, 1910" (published by the Land Union, 15, Lower Grosvenor-place, London, S.W. 1), dated September 1917, price 1s.

New South Wales Strike.—The southern and western miners' lodges have decided, practically unanimously, to accept the Government's terms, as have also several of the northern lodges. Four lodges, however, on the Maitland field have rejected the Government's proposals, but, as the majority decides, an early settlement is anticipated.

Trading with the Enemy.—The Controller of the Foreign Trade Department has issued a new list of additions to the statutory list of firms of enemy nationality or enemy association with whom persons in the United Kingdom are forbidden to trade. Copies of this list can be obtained at a trifling cost from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C.

Coal Commissions and Committees.—The following commissions and committees, extracted from a list (published by H.M. Stationery Office, Kingsway, W.C. 2) of 267 such bodies, set up to deal with public questions arising out of the war, have special reference to coal, iron and engineering and allied trades:—Central Control Committee, 7, Princes-street, S.W. 1; Central Colliery Recruiting Court, Home Office, Whitehall, S.W. 1; Coal Exports Committee, 3, Central Buildings, Westminster, S.W. 1; Coal Mines (Controller of) Advisory Board and Coal Mines Department, 8, Richmond-terrace, S.W. 1; Electric Power Supply Committee, 7, Whitehall Gardens, S.W. 1; Iron and Steel Industries Committee, 7, Whitehall Gardens, S.W. 1; Labour Ministry, Montagu House, Whitehall, S.W. 1; Metal (Non-Ferrous) Trades Committee, 7, Whitehall Gardens, S.W. 1; Mineral Resources Advisory Committee, Whitehall-place, S.W. 1; Commission Internationale de Ravitaillement, India House, Kingsway, W.C. 2; Scottish Shale Industries Committee, 29, St. Vincent-place, Glasgow; Sulphate of Ammonia Distribution Committee, 72, Victoria-street, S.W. 1; Timber Supplies Department, Caxton House, Westminster, S.W. 1; Woods and Stones (Import Licences) Committee, 22, Carlisle-place, S.W. 1. The following committees have ceased to exist:—Chemical Products Committee, Coal Mining Organisation Committee, Coal Prices Committee, Coal Trade Committee, Engineering Industries Committee, Iron, Steel and Engineering Industries Committee, Timber (Home-Grown) Committee.

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Suction Gas from South African Coals.*

By F. C. STURROCK and E. J. WAY.

Producers using bituminous coals are a comparative recent development, suction gas practice having developed along the lines of utilising anthracite or char fuels, which either never contained volatiles, or from which all volatiles have been removed by previous treatment.

The removal of tar and other volatiles from the gas derived from bituminous fuel has always been a complicated process, involving elaborate plant and skilful attention, conditions which have hitherto rendered this type of producer unsuitable for the smaller suction units now so extensively used. There are four important considerations which a designer and manufacturer of a bituminous suction plant must keep in mind if he is successfully to compete with the ordinary and well-known type of anthracite gas producer. These are:—

- (1) That his plant must be simple in design;
- (2) moderate in first cost;
- (3) easily managed; and
- (4) capable of continuous running.

It is obviously useless to show a saving in fuel cost if the increased interest on the capital expenditure or extra cost for skilled attendance involved amounts equal to or more per annum than is saved in this way. It is likewise useless to show remarkable fuel figures if these can only be obtained for a short space of time, and thereafter necessitate a prolonged shut-down to clean out the plant.

Such troubles as have been experienced by the authors in plant of this type have been primarily due to two causes, the first being that the type of plant employed has been unsuitable for the fuel it was called on to burn, and, secondly, the dimensions of the producers have been insufficient for the work they were required to do.

Suction bituminous plants to-day may be roughly classified into two types—the “single draught” and the “double draught.” Briefly, the difference in these two types rests in the fact that, with the one, the volatiles are distilled from the coal along with the gas, and subsequently separated in the cleaning and scrubbing appliances provided; whilst with the other, or “double draught” type, volatiles drawn from coal are passed through the hot zone of the producer, and there broken up into fixed gases, no tar leaving the producer at all.

In South African bituminous coals the proportions of volatiles is high in relation to heat value, and, consequently, plants designed to burn this fuel must be capable of handling a high percentage of tar in proportion to the fuel consumed. The importance of this has sometimes been overlooked, with disastrous results. The experiences of the authors confirm them in the belief that it is more satisfactory to burn the tar in the producer than to take it off with the gas and endeavour to separate it. For one thing, tar leaving the producers will harden on to the pipes of the plant before it can reach the washing appliances, and ultimately cause choking, and, for another, it is not easy to remove every trace of tar from gas containing a high percentage of it in fine suspension, and the smallest trace of it escaping into the engine will give trouble. A very small quantity of tar will stop a 400 b.h.p. engine so effectively that it will require an hydraulic jack of some tons capacity to move it again.

The single-draught bituminous plant is built practically on the same principle as the ordinary anthracite plant with which we are all familiar, except that more elaborate cleaning and cooling appliances and mechanical tar washers are provided. The coal is fed into a closed hopper at the top of the producer, and from there is passed on to the fire. Steam and air are admitted at the base of the producer, and are drawn up through the incandescent fuel by the suction of the engine. The usual process of conversion takes place, the CO_2 formed being converted into CO , the surplus oxygen from the decomposed water vapour being utilised in this process. The gas leaving the generator consists of a mixture of CO and hydrogen, with a proportion of nitrogen drawn from the air, together with some unconverted carbonic acid. This is a very rough description of what is in reality a highly complicated process. The temperature of the fire at its hottest will, if the generator is properly proportioned, be about 1,800 degs. Fahr., and the gas will pass off at a temperature round about 1,500 degs. Fahr.

Now, in the “single-draught” type of plant, designed, as it usually is, with the gas outlet at the top of the generator, this high temperature gas will require to pass out through the layer of green coal which rests on the top of the fire, and will in so doing distil from that coal most of the volatile it contains. This is the source of weakness in this type of plant, for, as already indicated, the subsequent separation of these volatiles from the gas is no easy matter.

The tar produced by these plants has very little commercial value on account of the impurities and moisture

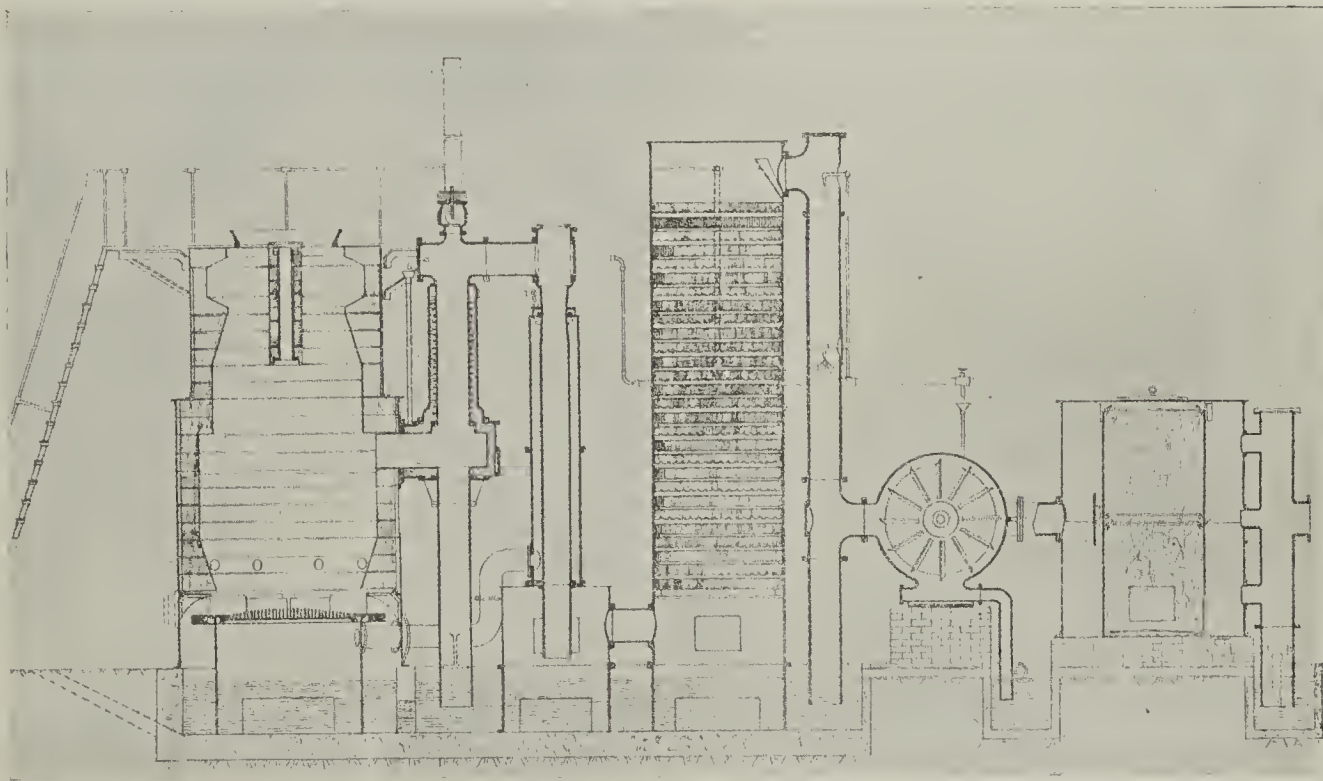
it contains. On the other hand, it has a definite fuel value when broken up, and thus the saving obtained by employing it as a fuel probably more than counterbalances any profit that might be made were any market available for its disposal as tar. About 300 lb. of tar are extracted from each ton of coal gasified in cases where mechanical separation is employed. Each pound of tar contains about 18,000 British thermal units; consequently a saving of approximately 15 per cent. is made in fuel consumption by burning it.

It was decided some three years ago to instal at an outlying gold mine in the Transvaal an additional gas plant, and after careful consideration a type of plant was adopted which was of the “double draught” type, and which, theoretically, at any rate, appeared to overcome the tar trouble indicated above and experienced with the earlier “single draught” producers already installed. Subsequent experience proved that in practice the plant behaved even better in this respect than was then anticipated. A description of this plant will be given later.

The plant in question is a 575 b.h.p. bituminous plant, the largest suction plant in South Africa, if not anywhere. It was installed under very rigid guarantees as to consumptions and continuous running. The original guarantee given by the makers was one

small—to do more work than it was designed for. The result is hot gas, and hot gas from bituminous coal means an early shut-down. The result of running the generator too hot has also a bad effect on the firebrick linings, and tends to cause clinking of the fuel. Clinkering should always be avoided, as the heavy poking necessary to break up the fire also breaks up the firebrick lining, resulting in air leaks and frequent shutting down for repairs. The proportions of a gas producer depend directly upon the calorific value of the fuel to be used, and, in the case of the “double-draught” plant, on the nature of fuel to be burned, and one rated for a given output on the best Welsh coal of 14,000 British thermal units, will only give 75 per cent. of that output on the South African product of 11,500 British thermal units value. A gas plant, like a gas engine or an electric motor, has a considerable overload capacity for a certain time, but the wise engineer will not trade upon this, but rather regard it as a factor of safety, taking the working rating of his plant at its full load, and not at anything more.

Another potential and prolific source of trouble rests with the vaporising arrangements often provided with gas producer plants. Some vaporisers take far too long to heat up in the first instance, and in one case it took nearly four hours to start the plant owing to insufficient steam being available. To overcome this, an auxiliary steam supply from a boiler working in the neighbourhood was used, but auxiliary supplies of this kind are not always handy, and in any case should not



SECTIONAL ELEVATION OF PLANT.

month's continuous run, with a consumption of 1.3 lb. of coal per b.h.p. hour at full load. The local representatives, having regard to local conditions and for their own peace of mind, gave a guarantee to the mine of 1.4 lb. It was mutually agreed that all guarantees should be on the basis of burning coal from the South Rand collieries, the analysis of which showed it to be a coal of fairly uniform and good quality, though the plant was guaranteed to burn any South African bituminous coal, so long as it was non-caking. The consumption would, of course, vary according to the calorific value. This value in the case of South Rand coal was approximately 10,912 British thermal units per pound, and it contained about 60.7 per cent. fixed carbon.

The official trials were carried out over a period of 21 days under working conditions. The consumption of coal, allowing for everything, was 1.146 lb. per b.h.p. hour, a figure which is the more satisfactory when it is remembered that at no time during the trials was the plant up to full load, and, indeed, for half the time it was loaded to not more than 40 per cent. of its capacity.

It may be useful and of interest to members to know what the principal difficulties were that have had to be overcome in connection with this and other bituminous plants of different makes in South Africa.

Large suction gas plants suffer from the fact that they have been preceded by small units, and have simply been developed from such units by a process of mathematical progression in the matter of dimensions and capacity. The result of this is that what works well in small units becomes unnecessarily heavy in large, and strains and stresses due to too rigid construction, whilst not noticed in light plants, are accentuated, and cause trouble in plants of great size and weight.

The effect of employing too small a generator is that it runs at excessive temperature at full load, thereby calling upon its cooling apparatus—probably also too

be necessary. The ideal vaporisers should contain a moderate-sized, but not too large, water heater. There should be no small pipes or fine holes, which easily choke up with the water usually available, and the vaporiser should have capacity enough to supply all the steam required at the maximum load of the plant. It should be so placed that it quickly absorbs heat from the fire on starting up, so that steam is quickly available. Shortage of steam, besides causing the gas to fail, also sets up high temperatures in the fires, with the results already indicated.

An abundance of steam at all loads is absolutely essential to good results, and it is much better to generate rather too much than too little.

The air and steam should be given the opportunity of becoming thoroughly mixed before entering the generator, and they should then be evenly distributed over or round the firegrate. Unless this is done, trouble will be experienced in large generators by the tendency for the steam to short circuit through the fire in the direction of the gas outlet, causing portions of the fire to run hot and clinker.

Adequate arrangements should be provided for poking and cleaning the fire in the generator. In large plants poking plugs should be provided in suitable places. Poking from the top is out of the question, when plants stand anything from 10 ft. high. Large and ample cleaning doors should be insisted upon right through the plant, and those in the generator, if the capacity of the plant is anything over 200 horse-power, should easily admit of the passage of a man.

The coal as it is consumed in the fires takes up space, and this has led many makers to curtail the diameters of their generator as they near the base. This is a great mistake. Where coal shows any tendency to clinker or cake, such action is always found to commence at the point where the lining reduces. On account of this angle in the sides of the producer such clinker is difficult to move.

* Journal of the South African Institution of Engineers.

very type of plant, but more especially plants, the generator and all the cleaning apparatus should open at the bottom, so as to permit of the removal of all from the fire and the gas while the plant is in operation. The plant should really sit in a trough of water for its whole length.

The authors experienced trouble in large plants owing to insufficient provision having been made for expansion and contraction of the various parts under heating and cooling, due to intermittent working. Where cast iron pipes carrying gas at about 1,000 degs. Fahr. are water-jacketed by water at about 70 degs. Fahr., ample provision must be made for different expansions, and unless this is done fractured castings inevitably result. For this reason wrought iron piping and connections would be preferable, but these unfortunately are subject to very rapid destruction on account of the corrosive action of the gas. It is important, however, that in a big plant provision must be made for a certain measure of flexibility in the pipes connecting the various units of the plant. The plant should not be bolted to its foundations at any point, but rest on cast iron rails. Where pipe connections are taken from large cylindrical generators, provision should be made for the movement of the steel plates forming the sides of the generator independently of the cast iron connecting flanges; otherwise the flanges will be cracked on heating up.

The authors would emphasise the necessity of having all parts of a gas plant made of material suitable to the work to be performed. Wrought iron will not stand the corrosive action of the gas and cleaning water anything like so well as cast iron will, and consequently all the bases of the plant, the connecting pipes, and even the exhaust box from the engine should be cast—any part of the plant, in fact, where moisture may tend to lodge and remain. The authors have seen wrought iron plate $\frac{1}{2}$ in. thick corroded through inside of four months, and a complete plant constructed throughout of wrought iron plate could not hold together for more than 12 months.

The "double-draught" plant installed by the authors consists of five main elements, viz., the generator, the evaporator, the scrubber and cooler, the mechanical tar washer, and the dry scrubber. All parts of the plant, with the exception of the dry scrubber, are open at the bottom, where they are water sealed. This permits of continuous cleaning, while the plant is working—an important consideration where day and night running for months on end has to be faced. The generator consists of an outer steel shell supporting the loading platform. This shell is heavily lined with firebrick, the space between the firebrick and steel being filled with sand to permit of free play between the bricks and the casing. The firegrate rests on a separate pedestal as shown. To start operations, it is necessary to lay an ordinary fire on the grate, filling the generator with coke or charcoal up to the level of the gas outlet. The bituminous coal is then fed in on top of this, and, lastly, on top of everything kindling is laid. The exhauster is then started, and a fire is lit simultaneously at the top and the bottom of the generator. This has the effect of making the whole mass of fuel incandescent, the hottest zone of which is in the centre at the gas outlet. Air is drawn in from the top to sustain combustion, while air and steam are drawn from below through the coke to make gas. The green coal on the top is coked by the action of the fire, the tar and other volatiles being drawn down through the fire, and thus become broken up, tar oil and lamp black being practically the only by-products of this process. Both of these are easily washed from the gas. As the original coke is consumed, the coked coal falls down and continues the process, and the wastage is made good by filling in fresh coal on top of the fire. On this type of plant no hopper is necessary. In cleaning out the fires, the coke left in the producer after shutting down is kept for starting up. It is, therefore, not necessary to use new coke with every start, but only on the first run made by the plant. The generator on this type of plant performs a double function. In its lower section it generates gas for the engines, whilst in its upper it cokes the green coal preparatory to using it for this purpose. The producer is open at the top, and the coal is simply fed in when the level at the top indicates the need for it. No other attention is needed beyond occasional poking and cleaning, this being done through the plugs and doors provided, as shown at the lower end of the generator.

The gas generated passes from the generator through a system of pipes, which compose the evaporator. This system of pipes is open at the bottom, and any solids or suspended matter carried over drop clear, and can be removed. The first of these pipes is water-jacketed. In passing through this the gas is cooled, and the surrounding water is heated. This hot water then passes to the second pipe, where it again serves to cool the gas, and where it is itself turned into steam mixing with the air drawn in at the base of the jacket. The mixed air and steam are passed in turn to the producer, and there used for making gas. In this way advantage is taken of what would otherwise be waste heat.

The gas then enters the scrubber, where it passes upwards through a series of wood grids, through which water is sprayed. This scrubber not only cleans, but cools the gas, and it is of the greatest importance that the gas be thoroughly cooled down before it enters the engine, not only on account of the volumetric effect, but because warm gas carries over moisture, which in turn corrodes the cylinders and valves.

The gas passes to the mechanical tar washer, which consists of a series of double-sided ribbed wheels. These wheels are arranged so as to pass through them first in one direction, and then through the first series of blades, and then through the second series, this being repeated for every stage. The blades are arranged at a high speed, and jets of water are directed on to them to assist in the process of cleaning.

Any tar or dust contained in the gas is thrown by centrifugal action to the periphery, where it is passed off with the water to the seal. There being no tar produced in the generator, it is a moot question whether a tar washer is necessary at all. In the early days of the plant in question, the spindle of the motor fractured, and threw the washer out of commission. It was of importance at the time that the plant should not be stopped, as there was no stand-by available, and the authors decided to take the risk of unclean gas reaching the engines, and continued to run the plant without the washer. Arrangements were made for frequent examinations of the engines, but these indicated that nothing harmful was reaching them. In this way the plant ran for three weeks, and on being shut down at the end of this period, all that was noticed was that the wood wool in the dry scrubber was slightly discoloured on the surface facing the plant. In actual working conditions, this washer is not run at all, but it is available should any circumstance, such as overload or failure of some other part of the cleaning plant, warrant its use. It is probable, however, that if another fuel were used carrying a higher percentage of tar, the rotary tar washer might require to be used.

The dry scrubber is simply a chamber filled with wood wool, through which the gas finally passes. This scrubber needs very little attention, a tribute to the cleanliness of the gas and the effectiveness of the principal cleaning apparatus.

A brief reference to improvements which experience of this plant suggested to the authors may be of interest. To begin at the generator, it will be noticed that a considerable contraction of the firebrick takes place near the bottom of the generator. This should be avoided on account of the tendency of the fuel to clinker at the contraction.

Since the steam and air enter beneath the furnace at one point, and are not distributed properly, there is a tendency for these elements to short circuit through the fire. Also the mixture can only pass through the firebars, and not round the side of the dead plate, with the result that the peripheral zone of the fire is starved of steam, and clinkering may start at the very place it is desirable to keep free—namely, on the firebrick lining. The evaporator casting requires to be built up in such a way as to permit free relative movement between the inner and outer castings and between the steel casing of the generator and the saddle piece carrying it. The section shown has been completely re-designed in subsequent plants.

It was found that a considerable waste of steam took place at the blow-off pipe provided between the evaporator and vaporiser. This steam was made use of by connecting the blow-off pipe with the air and steam inlet pipe at the generator. Although much has been done by the makers to render the pipe system between the generator and scrubber more flexible, the authors are of opinion that improvement in this respect can still be made.

A 360 b.h.p. plant was installed at the Leeuwpoort Tin Mines in January 1916, and has run continuously since then, except for the usual cleaning stoppages. It runs 24 hours per day, and at nearly full load most of the time. No difficulty is experienced in running this plant continuously for over 70 days on end. It would doubtless run longer, but occasion has never required that it should. In November, after 10 months' running, the coal consumptions were carefully recorded, the daily variations being from 1.05 to 1.2 lb. per b.h.p. hour. Round coal from the Uitkyk Colliery is burned on the plant, with very satisfactory results.

This plant is not of sufficient size to take the whole of the load on this mine, and it is still necessary to run one of the earlier charcoal producers in parallel. The charcoal producer takes from a-quarter to one-third of the load. Notwithstanding the fact that it is still necessary to burn charcoal to some extent, the saving in fuel by the installation of this bituminous plant amounts in round figures to 0.12d. per b.h.p. hour, the total cost when charcoal only was burned being 0.52d., and is now 0.40d., equalling a saving per month of about £170.

At the Rooiberg Tin Mines are two producers having a maximum capacity each of 420 b.h.p. These plants were installed on account of the price and the difficulty of obtaining adequate supplies of charcoal for the open-hearth charcoal plants then in operation. The consumption figures have been very satisfactory, and were ultimately agreed as the result of a careful test at 1.2 lb. per b.h.p. hour. The authors are confident, however, that, with more experience, the running staff at the mine will improve upon it. The coal first used was a coal containing from 4 to 5 per cent. more tar than any of the coal previously used, and it is interesting to note that when operating on this fuel traces of tar were found in the water seal. This shows that if a plant is to burn any given fuel and be free of tar, it must be modified to suit. The authors are satisfied that the Rooiberg plant could burn the coal in question without producing tar by a comparatively simple modification of the furnace, but this modification would make them less suitable for operation on any of the less tarry coals. Coals which cake badly should not be used, not only because of the extra labour they involve, but also on account of the rapid deterioration of the furnace lining that the constant poking results in.

The labour actually required in feeding and running a 575 bituminous producer consists of two natives per shift, these being supervised by the engine driver, who gives an occasional look round. There is, of course, an increase due to interest charges on capital, these plants costing from 30 to 50 per cent. more than ordinary plants, but where the saving effected redeems the capital inside of five years, the authors do not think much importance attaches to this item.

Mr. Ellison, of Holbeck Hall, Scarborough, has given 100 tons of coal to be distributed free to the poor of the town.

MINING INSTITUTE OF SCOTLAND.

A general meeting of the Mining Institute of Scotland was held on Saturday, October 6, in the Heriot-Watt College, Edinburgh, Mr. D. M. Mowat, Coatbridge, (president) occupying the chair.

The following gentlemen were admitted to membership: *Members*—Messrs. J. Kirk, Kustore Collieries, Manbhurn, India; and W. Grierson, Callendar Coal Company Limited, Falkirk. *Associate members*—Messrs. W. Brazenall, Coatbridge; H. Brown, 27, Hamilton-street, Larkhall; and K. M. White, Ormiston, East Lothian.

The Late Prof. Latham.

The PRESIDENT, at the outset, made sympathetic and appropriate reference to the death of the late Prof. Latham, of Glasgow University; and it was agreed that an excerpt of the minutes should be forwarded to the members of his family.

The Higher Training of Colliery Managers.

Discussion was resumed on Mr. G. L. KERR'S paper.*

Mr. SAM MAYOR (Glasgow) wrote that the handicap imposed upon boys by starting their working career at the age of 14 had recently been brought especially to his notice. In connection with a scheme to facilitate technical education, he had to select engineering apprentices for the privilege of release, with wages paid, for attendance at the day classes during the winter session of the Royal Technical College, Glasgow. It would be quite futile to send to these classes lads whose education in mathematics, physics, etc., had not reached approximately the standard upon which the instruction at the day classes was based. Therefore, to send boys of 14 years of age into pits was, in effect, to debar them from the higher training at which Mr. Kerr aimed. Many boys over 16 years of age could attend evening classes, and profit by them, after a day's work; but boys of between 14 and 16 were too young to stand the strain. It appeared to follow that the responsibility of selecting boys whose capabilities qualified them for higher technical training must rest upon the schoolmasters of the primary schools; and the bursaries granted on their recommendation carried selected boys through the higher grade schools in preparation for the technical college or university. In this way, the great reservoir of natural capacity among the boys of poor parents would be effectively tapped.

Prof. GEORGE KNOX (South Wales and Monmouthshire School of Mines, Treforest) wrote that the difficulties in working very thin seams and those at greater depths could only be satisfactorily solved by colliery staffs having both a higher and broader technical training. This implied not only a good all-round knowledge of mining engineering, but also required sufficient technical skill in (a) planning out work to eliminate waste labour; (b) works organisation and centralisation of plant to increase efficiency and reduce cost; (c) standardisation of plant in the equipment of collieries; (d) the keeping of proper graphical records of production and costs, to enable the lowest officials on the staff to prevent waste, etc. In colliery undertakings very little attention was paid, as a rule, to the planning of either the surface or the underground arrangements. Works organisation was very closely associated with that of centralisation, and whereas on the Continent, by centralising the works dealing with small coal for coking purposes and the production of large quantities of "waste gas" capable of supplying huge power installations, they had been able to produce cheap power for the establishment of numerous industries connected with the mining industry, in Britain it was quite common to see large companies controlling a number of separate collieries having a series of small workshops at each colliery, and none of them big enough to carry out the necessary repairs to their own plant if these involved large pieces of machinery. The same thing applied to the treatment of small coal for coking and the by-products which resulted. The standardisation of plant in colliery equipment was also commonly overlooked in this country. It was rarely possible at a British colliery to find two units for which the same spare parts could be used, even where the units were of the same power and performing the same duty. This led to an increase in the cost of repairs, and loss of time and output in the case of a breakdown. In actual coal getting there was always the question of the amount of dead work necessary, the amount of timber required, and the damage done to the surface, which in urban districts might prove very costly. Proper graphical records of all the costs involved in mining operations ought to be kept in such form that the lowest officials could easily read and understand. The general record should be sub-divided into two main groups: (a) surface, and (b) underground. These again should be in as many subdivisions as thought necessary, so that each official might have a weekly copy showing the cost of everything coming under his supervision. To ensure that the best brains of the nation might be attracted to the mining profession, it would be necessary to construct a more secure ladder than existed at present for the sons of workmen having the ability without the means of pursuing a suitable course of training. For this purpose some form of maintenance scholarships must be instituted as suggested in the paper, and he would further suggest that they should be associated with some form of apprenticeship which would guarantee that the practical and technical training would be taken together. In the South Wales School of Mines they had been developing along these lines with satisfactory results. The school was founded and was supported by over 30 colliery companies, having a combined output of about 30 millions of tons per annum, which, on a levy of 0.10d., produced £12,000 annually. In connection with the three full-time courses, an apprenticeship scheme had been introduced whereby students who had matriculated (or passed a similar qualifying examination) might be apprenticed to a

* *Colliery Guardian*, June 15, 1917, p. 1134.

colliery company for five or six years. The students attended the school for six months of the year (October to April), and the other six months they were at the colliery, when each student had to undergo a definite system of training, and must keep a diary of his daily occupation, which was signed by the manager and presented at the school at the commencement of his next term. The colliery company to whom he was apprenticed paid his fees to the school and paid his apprenticeship wages while he was at the colliery. To assist deserving students, the management board of the school provided eight scholarships (two every year), value £40, and tenable for four years. The Ocean Coal Company also provided a similar scholarship annually to the son of one of their workmen attending the school. Until the war broke out, the Glamorgan and Monmouth County Education Committees also provided annually two scholarships each to the best students in their evening technical classes for the purpose of attending the School of Mines. The board of management further provided five post-diploma scholarships, value £50, for one (or more) year, to students who had completed their course, and desired to specialise in some branch of mining or prosecute research work.

Mr. JOSEPH PARKER, B.Sc. (Fife Mining School), wrote that the author made two tacit assumptions: (1) That part-time courses of instruction were an insufficient preparation for the examination for the certificates of competency under the Coal Mines Act, on the amended standard; and (2) that when it was desired to supplement the training received at a part-time course, so as to effect the higher training of the colliery manager, the sufficient and obvious thing to do was to enrol the student in a two or three years' normal course in mining at a day technical college or at a university. On these assumptions the author founded his proposals, which would of necessity lose their appeal should the assumptions be found to be untenable, which in his (Mr. Parker's) opinion they undoubtedly were. His own experience with students of the Fife Mining School did not lead him to believe that students who had completed a full course were likely to fail to pass the examination for the colliery manager's certificate. Indeed, during the past few years, several men who had tried the examination after the completion of the fourth year's course had gained their certificates. With the view that there was a great need for the higher training of colliery managers he was heartily in accord; but the normal courses for a technical college diploma or for a university degree in mining had been drawn up to suit lads who passed through a secondary school, and had not been fashioned to suit the part-time or evening student. In the case of the better class of part-time schools or continuation classes, what Mr. Kerr aimed at could quite well be accomplished if arrangements were made whereby the student could be enabled to attend for one whole day in addition to, say, 2½ hours on two evenings each week. This would ensure an attendance of, say, 12 hours per week, which for a 40 weeks' session would mean 480 hours. At the end of six or seven years the student taking such a course would, while maintaining unbroken contact with his practical work, be well able to stand on a footing of equality with the lad who had taken a three years' college course. The main defect of Mr. Kerr's proposal of a college or university mining course for part-time students was that most of the time would be occupied in covering ground they had already traversed satisfactorily. The problem of the efficient management of the mines in face of the vastly increased difficulties one had to contend with was a problem which really demanded most serious attention, and called for a complete re-organisation of mine management, so as to secure the effective application of all the brains that were employed in mining. In such a re-organisation, the principle of the division of mental labour should be very prominent. How many departments there would be would depend upon local circumstances, such as the size of the mine and the actual conditions under which the coal must be worked. In every case there would be a planning department, responsible for the drawing up of the plans of working, and fixing on the amount of stone drifting and other development work carried through each year, so that there would never be more than sufficient or less than enough ground exposed at any time. They would also determine upon and delimit the output to be taken from any given seam or area. There would also be a haulage department responsible for the installation and working of all haulage plant, and the laying and upkeep of tramways. This department should find it possible to reduce the number of haulage accidents, and to effect considerable economies by preventing the need for much re-railing of tubs, by a better upkeep of the tramways and a more scientific construction of the track, especially where bends occurred either horizontal or vertical. Machine mining and conveying formed the natural sphere for the activities of another department; whilst ventilation and unwatering might be left to a further department. In a large colliery the mining manager, who should be well trained in the theory and practice of mining, would preside over the activities of all these departments, except perhaps those of the planning department. Above him would be the general manager or agent, who need not be so intimately acquainted with mining, but who should have the widest possible general training. To a degree of mining or engineering he should add a good knowledge of literature, psychology, sociology, and of economics, and he should be a good organiser, and well up in business methods. In such a scheme of management there would be room for every grade of ability, the utilisation of which would conduce to greater economy and contentment.

Dr. HENRY BRIGGS (Edinburgh) said that Mr. Kerr rightly concentrated on the problem as it applied to the son of comparatively poor parents, and had indicated how educational opportunity was to be given to such a boy to allow him to make the utmost of his talents and capacity for work. At present, however,

the educational ladder ended in mid-air, the stepping-off platform having been omitted. Thus a student who rose from the ranks by dint of hard study, with 12 or 15 years of mining experience, a manager's certificate, and a college training creditably carried through, found himself offered a job as assistant repairer when he sought to return to the pits. It was nobody's business apparently to see that that man's ability and training were not wasted. The result was that, in very many cases, the men went abroad, where their qualifications were appreciated, and where they could earn a salary commensurate to the sacrifices they made and the money that was spent on their education. South Africa, for example, offered inducements to the successful graduates of the mining colleges. They asked for this type of man in the Transvaal, and they would grant him a post-graduate scholarship to enable him to get a footing in the mines. In certain cases the Institution of Mining and Metallurgy would assist him with his passage out. In three years, if he proved himself worth his salt, such a man would often be earning £50 a month. Was it then to be wondered at that in so many instances the best men from the schools were lost to British mining? It ought surely to be made an axiom that the object of the higher mining education was to select men fitted to become leaders in the British mining world.

Mr. JAMES BOYD (Kilsyth) said he was persuaded that, for profitable and efficient service, the trained and practical manager superseded the man of the university training. While the latter might be more classic, the former was more useful, and the mining industry was one in which the willing and enterprising worker could qualify and make an opening for himself if he showed sufficient energy, interest, will power and determination to succeed. He had no desire to decry useful technical knowledge or university training; but, after all, there was no schooling, either at college or university, capable of bracing a man up who was anxious and ambitious to succeed, like that of a good sound practical and unbroken training in the mine. It enabled a man to obtain a robust and vigorous conception of what a workman could do or was expected to do—a very important essential of the colliery manager's equipment. Then he had also the feeling that the industry had been better served in the past by the stamp of practical man he had been referring to than it was likely to be in the future by the university trained manager. The problems and difficulties enumerated by the author—thin seams, reduced outputs, labour worries including those of legislation, and higher wages—were matters that the university trained man had neither the knowledge nor the inclination to tackle successfully. No amount of university training could ever outstrip what had been attempted and accomplished by men trained in the old school of mining. The standard of a man's working ability and his disposition had more to do with success than anything else, and there was nothing like several years of good hard work in a colliery for broadening out the mind of a college or a university student. In regard to the provision of scholarships, he liked the idea, if they were to be available for afternoon or evening classes. All encouragement was necessary to build up an efficient army of officers and workers, and to inspire them with the power of initiation and self-confidence. When, however, all was said and done, the colliery was the best school or college.

Mr. WILLIAM RIDDELL (Falkirk) said he believed there were colliery managers who had attained to the highest success because they belonged to a type having a genius for the practical in their profession. What they required was that the dead weight of non-essentials should be cast aside from the curriculum of education, and the mind of the student be guided along the most direct lines to a well-defined and clear objective. It was a mistake, he thought, to place the colliery manager's profession on the same plane as, say, medicine or the teaching profession, and to attempt to map out a curriculum. The work of a colliery manager was of such a nature that the profession stood on a plane by itself. Indeed, the stage at which the first-class certificate of competency was gained was but the opening of the way to the training ground.

The PRESIDENT remarked that the most valuable education a colliery manager could get was that which enabled him to say accurately and definitely whether those working under him were performing a full day's work or not. He was perfectly satisfied with the present-day type of colliery manager, who had shown his ability to keep in touch with the technical developments in mining. On the whole, he was inclined to the view that the development of the practical side of a colliery manager's training was far more important than the development of the technical side.

Mr. G. L. KERR said that from the discussion there appeared to have been a good deal of misconception regarding his aims in writing this paper. He did not think he had said anything which would infer that he wished to stop the education of boys at any definite period. There were ample opportunities for every boy to improve and extend his education to almost any extent and age he might desire after he passed 14 years, by attendance at evening continuation classes, which were held in almost every town and village in the country. The law in Scotland to-day gave school boards and other educational authorities power if they wished to enforce compulsory attendance of boys at evening continuation classes; but how many school boards had used such power, or ever attempted to do so? It was surely no great hardship for boys to attend evening classes for two hours on three or four nights per week, at least in the winter season. For boys working in the mines it was certainly no hardship to attend continuation classes, being at work for only eight or nine hours out of the 24; but he thought there was no reason why the classes should not be held at an earlier hour than 7 or 8 p.m. Where had the great majority of our present colliery managers received their education? Had it not been largely at such evening classes? They had no doubt experienced dis-

advantages and probably some hardship, but in the end they had accomplished what they had set out to do. The author's aim was to try and diminish such disadvantages and hardship for the future colliery managers, and not to leave them solely dependent on evening classes, but to give them the advantage of attending the day classes at the colleges at a certain stage in their studies, and thus to benefit from the higher training which the colleges could give. Prof. O'Shea had mentioned the German system of training colliery managers and the mining school at Bochum. It made one almost envious and ashamed to compare the equipment and funds at the disposal of this German mining school with any of our British mining schools or colleges. The coal owners of Westphalia, by a levy of 1/16d. per ton on their output, contributed over £20,000 per annum, and, in addition to the Bochum Mining School, maintained between 20 and 30 preparatory schools throughout the district. Mr. Robert McLaren had disagreed with the manner in which the scholarships were to be provided, and took special objection to the proposal that the miners' unions should be invited to take part. The author did not believe that miners' unions were opposed to managers as a class. The interests of the owners whom the managers represented and had to safeguard clashed at times with the views of the union representatives, but the unions had some to stay, and the work must be carried out as harmoniously as possible between the two parties. It would not do to ignore the unions, and he (Mr. Kerr) did not think that if the miners' unions were asked to subscribe to a scholarship scheme they would then seek to dominate the managers. Mr. Kerr concluded by an appeal to the Mining Institute of Scotland to take an active part in a movement for the higher education of colliery managers. In this connection, he instanced the remarkable measure of encouragement which the Government of Japan gave to its promising students to continue their studies and researches along useful and profitable channels to the nation as well as themselves.

The discussion was closed, and the author thanked.

A Fresh Aspect of Intensive Mining in Thin Seams.

The discussion of the paper by Mr. GEORGE GIBB, on "A Fresh Aspect of Intensive Mining in Thin Seams," was adjourned till next meeting.

MINING LABOUR MOBILITY.

[FROM OUR MINING CORRESPONDENT.]

The Coal Controller has communicated to the Mining Association of Great Britain, as representing the colliery owners, and the Miners' Federation, as representing the workmen, his proposals for making labour in the coal mining industry more mobile, so as to secure more regularity of work and an increased production of coal, by setting up mining labour mobility bureaus for transferring labour from districts where it is unemployed to districts which are short of men. The Advisory Board has discussed the question, and as such transfers of labour involve the close examination of the wages rates and working conditions in the districts to which the transfers are made, considers the matter would probably be more effectively handled by the coal mining industry itself than by the outside agency of Government Departments. It is felt by the Board that the fundamental principle must be that the men transferred (with their families wherever possible) should be in no worse position than they were before, and that the best thing would be for certain of the district miners' unions to set up mobility bureaus, all of which would be linked up by some central bureau run by the British Miners' Federation. Then, supposing, for instance, certain collieries in Lancashire wanted additional labour, they would send a requisition to the Lancashire mobility bureau, who would then, from the central bureau, ascertain from which districts men could be spared—for instance, Northumberland. The Lancashire bureau would then investigate the wages, conditions of working, and housing accommodation at the collieries desiring extra labour, and if satisfied with them would then feel justified in holding out an invitation to Northumberland miners to transfer themselves for a period with their wives and families (wherever housing accommodation permitted) to the Lancashire collieries.

The Controller is prepared to take up with the Government the question of railway fares, separation allowances, etc., somewhat on the lines of the National Service Department scheme, and is anxious to give any other help that can be suggested—for instance, in the matter of housing accommodation, or office accommodation.

The Empire's Commerce and Commercial Requirements.

—A course of public lectures on "The Empire: Its Commerce and Commercial Requirements," will be given at the London School of Economics and Political Science (University of London), Clare Market, Portugal-street, Kingsway, W.C. 2, commencing to-day (Friday), when Prof. A. W. Kirkaldy will lecture on "The Commercial Geography of the Empire" (chairman, Sir Everard im Thurn, K.C.M.G., C.B.). The other lectures of the course are as follows:—Friday, October 19, "Coal," by Mr. A. F. Pease, past-president of the Mining Association (the Right Hon. the Earl of Crawford and Balcarres, Lord Privy Seal, in the chair). Friday, November 2, "Mineral Oil," by J. S. S. Brame, Professor of Chemistry, Royal Naval College, Greenwich (John Cadman, C.M.G., Professor of Mining in the University of Birmingham, Director of Petroleum Production, Ministry of Munitions, in the chair). Saturday, November 16, "The Rarer Key Minerals," by Sir John Johnston, B.Sc., London, of the Scientific and Technical Research Department, Imperial Institute (H. J. Mackinder, M.A., M.P., in the chair). Friday, November 30, "Iron Ore," by Henry Louis, M.A., D.Sc., A.R.S.M., etc., Professor of Mining, Armstrong College, University of Durham (the Hon. W. P. Reeves, Ph.D., Director of the School, in the chair). All the lectures will begin at 5 p.m.

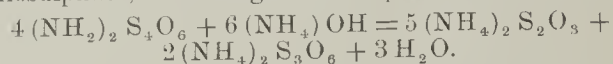
RECOVERING SULPHUR FROM COAL.

number of the *Chemiker Zeitung*, A. ... the possibility of recovering considerable amounts of sulphur from coal by the Feld polythionate process of gas purification. In the gas works process, in which the gas is passed over bog iron ore, or artificial preparations of similar composition, whilst good results are obtained, the superficial area required by the purification plant is so large as to preclude its employment at cokeries. Moreover, the spent purifying material, though containing up to 50 per cent. of free sulphur, is unsuitable for the recovery of that substance as such; and certain large gas works—including those of Berlin and Budapest—have preferred to instal sulphuric acid plant in order to utilise this material. Another method which has recently been proposed is to wash the sulphuretted hydrogen out of the gas with milk of lime, and convert it into sulphur (or sulphur dioxide), but it is not known whether this has been applied in practice.

A better way of utilising the sulphur in coal is to convert the sulphuretted hydrogen and ammonia in coal gas into sulphate of ammonia direct; and among the processes which have been devised for this purpose, the Feld polythionate process claims attention, especially in view of the recent simplifications which have been introduced. The process is based on the great reactivity of the polythionates, and the ease with which they decompose into sulphate, sulphur dioxide, and sulphur. For washing the ammonia and sulphuretted hydrogen out of the gas, use is made of a solution containing ammonium tetrathionate, prepared by the action of sulphur dioxide on ammonium sulphide (gas liquor).

In laboratory experiments conducted by the author, solutions of pure tetrathionate were used, the sodium and potassium compounds being employed for convenience in analysis. In harmony with the conditions obtaining in practice, the action of ammonium

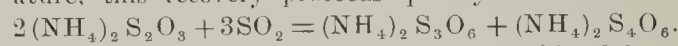
occurrence of subsidiary reactions, the ultimate result depending largely on the conditions employed. The closest approximation to the truth was obtained by Thatcher, who was the first to study the reaction at ordinary temperature, and follow its course quantitatively. He found that, under these conditions, no sulphate is formed, and sulphite only in extremely small amounts, trithionate being produced along with thiosulphate, according to the equation:—



In the absence of a method of determining trithionate in presence of tetrathionate, Thatcher could not definitely prove the formation of the first-named, but could only assume it from the consumption of alkali, and from the amount of thiosulphate obtained. The author, however, has found a simple volumetric method which enables this determination to be made, and by the aid of which the accuracy of Thatcher's equation has been confirmed. There are, however, several intermediate stages before this final one is reached; and it may be assumed that free alkali splits up the tetrathionate molecules into two symmetrical halves, with formation of hydrogen peroxide, which can be identified by means of the perchromic reaction.

Alkali carbonates and ammonium carbonate act on tetrathionate in precisely the same way, though less energetically. An important point in connection with the practical application of this reaction in the gas industry is the fact that the ammonia alone is held in combination, the carbon dioxide being liberated.

The recovery of the polythionate from the thiosulphate is effected by the aid of sulphur dioxide. Given sufficient concentration, and a somewhat high temperature, this recovery proceeds quickly:—



If, as is always the case in practice, the thiosulphate liquor contains finely divided sulphur, this latter is taken up by the trithionate, which is transformed into tetrathionate.

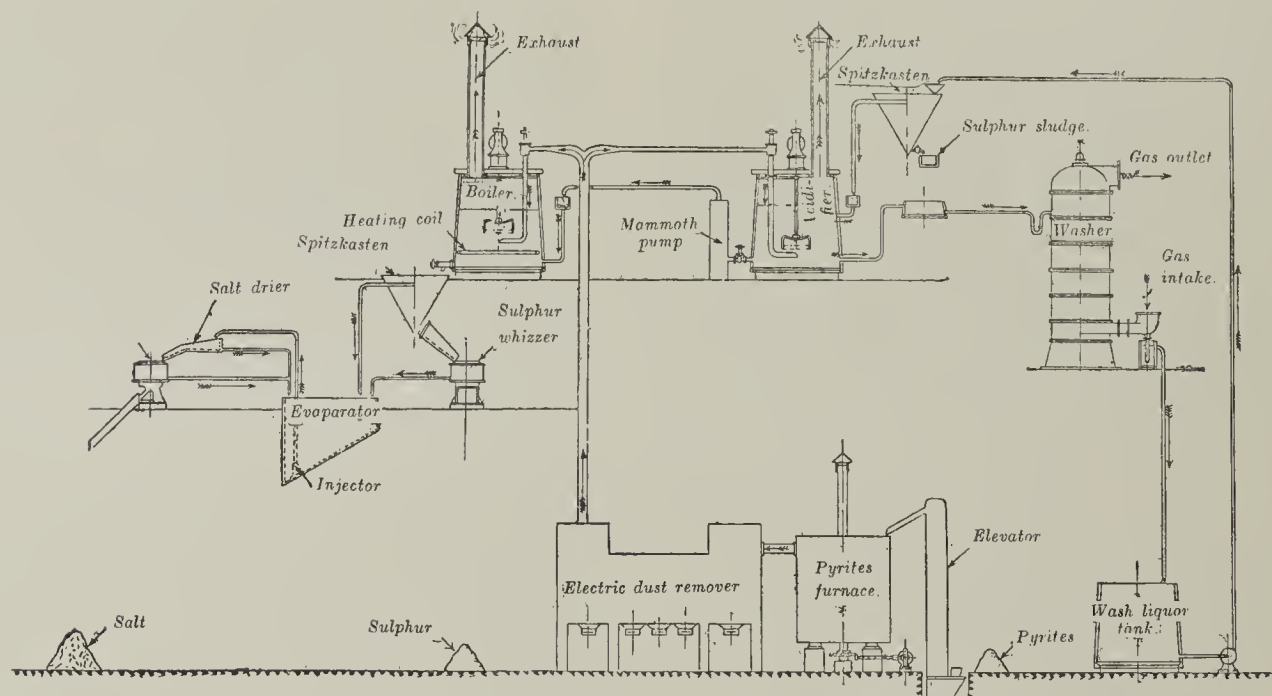


DIAGRAM OF PLANT FOR FELD PROCESS.

sulphide, sulphuretted hydrogen, ammonia and caustic soda on the tetrathionate was examined, together with that of ammonium carbonate (on account of the presence of carbon dioxide in coal gas), and the recovery of the polythionate and its transformation into sulphate.

The action of potassium sulphide on potassium tetrathionate furnishes potassium thiosulphate and sulphur; and the corresponding ammonia salts act in exactly the same way. For the Feld process, it is important to know whether the reaction is quantitative and sufficiently rapid. Both these points have been satisfactorily settled, the tetrathionate solution at once becoming turbid (through precipitated sulphur) whether an aqueous solution of sodium sulphide be added to a solution of tetrathionate, or a current of gas laden with ammonium sulphide fumes be passed through the solution. At the same time, the tetrathionate is very quickly transformed into thiosulphate. The reaction splits up the tetrathionate molecule into two thiosulphate molecules, and is thus a reversal of the formation of tetrathionate by the action of iodine on thiosulphate.

Similar, but less rapid, is the action of free sulphuretted hydrogen on tetrathionate. In this case, too, the tetrathionate molecule is first split up into two symmetrical moieties; but since no acid thiosulphate exists, one molecule of thiosulphate is obtained, together with one molecule of free thiosulphuric acid and sulphur, this acid also soon decomposing into sulphur and sulphurous acid, which latter in turn is converted into sulphur and water by the action of sulphuretted hydrogen.

When sulphuretted hydrogen is passed into a tetrathionate solution tinged yellow with methyl orange, the solution is found to become acid in one to two minutes, and at the same time sulphur is precipitated. If all the above reactions are allowed to proceed to the limit, the solution again becomes neutral, a result obtained in comparatively short time at high temperatures. However for the success of the Feld process, it is not sufficient that a portion of the sulphurous acid be converted into sulphur, since this acid is utilised in the process.

The decomposition of the tetrathionate by free sulphuric acid or alkalis is one of the most interesting series of reactions. It has often been noted that most workers have committed the error of working at a high temperature, and thus obtained discordant results owing to the

With regard to the transformation of tetrathionate into ammonium sulphate, whereas moderately concentrated solutions of tetrathionate are only very slowly decomposed by boiling, this decomposition sets in very quickly in presence of other salts, thiosulphate in particular, sulphate, sulphur, and sulphur dioxide being formed. The last two are returned to the process, so that a cycle of operations is maintained, without the formation of by-products.

Turning to the technical performance of the process, the illustration represents a plant for the recovery of sulphate of ammonia. It consists, in the main, of a washer, an acidifier, a boiling pan, an evaporator, and a sulphur (or pyrites) furnace. The gas, freed from tar and at a temperature of about 60 degs. Cent., is admitted into the bottom of the washer, where it is washed by the descending stream of ammonium tetrathionate liquor. This takes up the ammonia and sulphuretted hydrogen from the gas, and is itself transformed into thiosulphate, sulphur separating out. The effluent liquor is run into a tank, from which it is pumped into the acidifier, traversing, on its way, a spitzkasten, in which a portion of the sulphur is deposited. In the acidifier the thiosulphate liquor is treated with sulphur dioxide, prepared by roasting sulphur or pyrites in the sulphur furnace, and has been freed from dust in an electrical purifier, and cooled. The sulphur dioxide re-converts the thiosulphate into polythionate, which is returned to the washer. This cycle of operations results in the progressive enrichment of the polythionate; and when the concentration has reached a certain stage, a portion of the liquor is pumped from the acidifier into the boiler, where the polythionate is decomposed, by heat, into sulphate, sulphur, and sulphur dioxide. In order to make certain that the liquor to be decomposed no longer contains any thiosulphate, sulphur dioxide may also be introduced into the boiler. The sulphate of ammonia liquor flows through a spitzkasten into the evaporator, where it is worked up into solid salt, this being discharged by an ejector into the whizzer. The sulphur retained in the spitzkasten is also put through a whizzer, the sulphate liquor thus recovered being run into the evaporator. The sulphur is either burned to sulphur dioxide, or else is sold, in which event the sulphur dioxide is obtained by roasting pyrites. The furnace can be used for either material, so that advantage can be taken of market conditions in deciding which to use. The sulphur dioxide obtained in boiling the liquor is also returned to the process.

The question now remains whether the sulphur recovered from the gas is sufficient for the complete conversion of the ammonia in the gas into sulphate of ammonia. In the case of gas coal furnishing gas containing 1 per cent. (volume) of ammonia and 0.75 per cent. of sulphuretted hydrogen, there will be a surplus of this latter, inasmuch as sulphuretted hydrogen will transform its own weight of ammonia into ammonium sulphide, whilst the gas contains 11 to 12 parts by weight of the first-named to 7 to 9 parts of ammonia. With coals higher in sulphur—e.g., English gas coals—the excess of sulphur will be still greater; and, as a rule, there will be quite sufficient for the purpose in view.

With regard to the economic importance of the process, it is estimated that the German cokeries and gas works produce about 140,000 tons of sulphuretted hydrogen (130,000 tons of sulphur) per annum. This would furnish enough sulphuric acid to make all the sulphate of ammonia (about 550,000 tons per annum) produced in these plants, and leave a surplus of nearly half a million tons of commercial acid for other industrial purposes, thus enabling the importation of pyrites to be very considerably reduced.

MIDLAND COUNTIES INSTITUTION OF ENGINEERS.

The annual meeting of the Midland Counties Institution of Engineers was held last Saturday at the University College, Nottingham, under the presidency of Mr. G. SPENCER, West Hallam.

New Members.

Col. LEWIS, the secretary, announced the election of the following:—Members: Charles Baxter, lecturer in engineering, Cleveland House, Bradford-road, Shipley, Yorks; Gordon Gregory, mining engineer, The Fins, West Hallam, near Derby; Thomas Oddy, consulting civil and mechanical engineer, 12, Hudson-street, Rochdale; Lyddon Ward Walters, mining engineer and surveyor, 6, Sunnyside, Worksop. Associates: Hector Bates, surveyor, Eastwood Collieries, near Nottingham; Stephen Bircumshaw, deputy, 82, Lynn Croft, Eastwood, Notts. Student: Frank Neave Woodhead, mining student, Bagnall-road, Cinder Hill, Nottingham.

Annual Report.

The annual report showed that the total number of members for the year ending July 31 last was 329, as compared with 337 in the previous year. The financial position was very sound, the cash receipts having been £523 12s. 6d., and the cash payments £399 19s. At the present time, no fewer than 50 members of the institution are serving with H.M. Forces—viz., 25 members, two associate members, six associates, and 17 students.

Col. LEWIS pointed out that the decrease in membership was only eight, and that on the other hand there was a surplus on the year's working of £123. Fifty members of the institution were on active service, and the payment of their subscriptions had been excused, though the usual capitation payment of 20s. in respect of each had been made to the Federated Institute in the belief that this was the usual practice. As this proved not to be the case, £58 would be returned in due course, and would bring the balance in hand to nearly £200. The report was adopted.

Alteration of Rules.

Several alterations in the rules and by-laws of the institution were recommended by the council in order to bring them into conformity with the altered rules of the Federation, due to the acquisition of a charter.

Col. LEWIS said that the qualifications for membership as set forth were copied from those of the Federated Institute with one or two exceptions. For instance, a person might be a full member of that institution on reaching the age of 25, but the Federated Institute did not accept a full member until he was 30 years of age, so that a member of that institution between those ages could only be an associate member of the Federated Institute.

Mr. J. MEIN (South Normanton) said that the object of the Federated Institute was to prevent a person becoming a member unless it were thoroughly clear that he was *bona fide* engaged in the particular objects which the institute was pursuing.

On the motion of the PRESIDENT, seconded by Mr. J. STRACHAN (Stanton Hill) the alterations were unanimously adopted.

Election of Officers.

Mr. R. LAVERICK, who had acted as scrutineer, reported that the ballot for the election of officers had resulted as follows:—President: Mr. G. Spencer. Vice-Presidents: Messrs. P. Beaumont, E. E. Bramall, T. G. Lees, J. Mein, Major T. P. Barber, and Capt. H. Dennis Bayley. Councillors: Messrs. F. Chambers, C. Dickinson, C. M. Haslam, C. R. Hewitt, F. N. Iiffe, Lieut-Col. R. P. Leach, C.M.G., Messrs. H. March, H. E. Mitton, W. Tate, D. N. Turner, J. Bingley, and R. H. F. Hepplewhite. The following are *ex-officio* members of the council for the ensuing year:—Past presidents: Messrs. J. A. Longden, M. H. Mills, W. D. Holford, Maurice Deacon, W. B. M. Jackson, W. G. Phillips, G. J. Binns, W. Hay, J. Piggford, J. P. Honford, W. H. Hepplewhite, and G. S. Bragge. Vice-Presidents of previous year: Messrs. H. O. Bishop and B. McLaren.

Mr. SPENCER, in thanking the members for his re-election, regretted that it had not been possible to do much in the past year owing to the war. He hoped, however, that interest in the institution would not be allowed to flag, and he desired to announce that the council had decided that the best plan would be to hold their meetings in future at the usual time, so that at any rate the opportunity would be afforded to members of discussing papers and bringing forward matters relating to their important profession.

A New System of Concrete Reinforcement.

Mr. W. MARRIOTT, of the Midland and Great Northern Joint Railways Engineering Works, Melton Constable,

read a paper entitled, "A New System of Reinforcement, and Some Uses of Concrete and Cement in Mining." (See p. 692.)

Discussion.

The PRESIDENT said that at the present moment they had to find some substitute for timber in mines. The briquetting of slack, however important in itself, was a secondary consideration. He would like to ask which Mr. Marriott considered to be the better form of prop—square or triangular? Also whether the socket was intended to be used in the gob, or at the working face? If the former, it would be very difficult to recover it, though that difficulty might be got over by putting it at the top instead of at the bottom of the prop. Then, again, was the clay wet or dry?

Mr. G. J. BINNS observed that there were many cases in which concrete could be used with great advantage in a mine, but whether in happier times it would retain its place he would not like to predict. With regard to the use of clay in the box or socket, his idea was that it would be difficult to obtain, without washing, clay of sufficient purity to prevent the holes in the box getting stopped up. If ordinary clay were used there would be many pieces so hard as to render the orifice useless.

Mr. W. H. HEPPLEWHITE (Tamworth) enquired whether the prop had any yielding qualities apart from the cushion on which it was placed. Mr. Marriott had been down one of the Nottinghamshire mines, and would have seen the effect produced on timber by the depression of the roof. Certainly the clay in the pedestal, or socket, would enable the prop to yield when the depression came on, but he agreed that it would be better, for recovery purposes, for the clay to be placed at the top instead of at the bottom. It would be useful to know something about the cost of producing a 5 ft. or 6 ft. prop with the welded metal arrangement as a reinforcement. Many concrete props were being used in Warwickshire at present, and Mr. Walker, in his annual report, stated that they were of great advantage. These props were principally reinforced with wire ropes; they were very simple in construction and they held together for a considerable time after the pressure had come upon them.

Mr. F. N. LIFFE (Nuneaton) said that he had used concrete props for a considerable time. They were mostly 6 ft. in length and 5 in. to 6 in. in diameter, and were usually octagonal in shape. They stood very well where there was top pressure, but under the action of a side weight they began to crack. Even then, however, there was a certain amount of warning, and time to substitute another prop before the crack developed. They had tried them at the face in front of the packs, but they always took care to see that there was a soft bottom—it was no use putting them where the bottom was hard. There was a good lid at the top, and the soft clay bottom allowed the prop to push its way downwards when the pressure came on. He had tried props reinforced with wire rods, but they did not stand compression so well as those reinforced with wire rope. He ought, perhaps, to say that the wire rods were not braced together in any way. In reply to Mr. Binns, the speaker said that the props could be made so cheaply that they were hardly worth recovering. With regard to the cost, the material used was washed granite, and the total cost, including both labour and materials, was about 3d. per ft. The depth of the workings was between 500 and 600 yards. The props must not be hit with a hammer. A lid was put on the top, and a wedge was driven between it and the roof. He had over 5,000 of these props in use.

Mr. S. EVANS (Creswell) said he noticed that in the examples passed round one was welded and the other simply wrapped round loose. If the latter had been welded would it not have answered equally as well as the other?

Mr. MARRIOTT replied in the negative, stating that the triangular was the scientific form. It was through having failures in the ordinary strain posts that he set to work to find something better. He first tried the triangular form, and then he started welding, and so made a complete success of it. Speaking generally, the best authorities agreed that anything like wire rope ought to be taboo in reinforcement work. It might last some time, but failure would come eventually. The advantage of a wire rope over a plain bar was that the concrete was able to grip the one while it slipped away from the other. Concrete was one of the finest known preservatives of steel, and he was interested, as he went about the country, to see that many railway engineers were covering their ironwork with concrete. As to the question whether concrete had any yielding properties, the answer was that it had none. Therefore it was necessary to adopt such a device as the one explained in the paper, or else to set the props on a clay bottom where they could sink in. Personally, he did not think that concrete props were ever going to come into universal use, because directly timber was cheap enough there would be a reversion to timber; but he did not see why concrete props and bars should not continue to be employed in main haulage roads. With regard to clay, certainly the clay used in the pedestal or socket must be washed and put through a fine sieve, otherwise, as had been pointed out, small lumps of dirt would at once stop the flow of clay through the perforations. The choice between a square and a triangular form was purely a matter of taste, but the latter shape was cheaper and simpler. With regard to cost, concrete ought to be made of the best materials, and he did not pretend that it was cheap. Granite crushed to the size of a pea was the best material, and he was glad to hear that one member was using it. The way the concrete was made was very important. Whenever he had a fresh aggregate to prepare he filled a receptacle with crushed stone, and then poured in as much water as it would hold. He then poured off the water, and thus ascertained the exact amount of sand which was needed to fill the voids. He agreed that, from the point of view of recovery, it would be better to have the socket at the top. He was unable to say what pit props would cost, but there was

usually plenty of material about at a colliery, and with electric welding from their own plant they ought to do it very cheaply.

Mr. R. LAVERICK (Nottingham) said that the reason wire rope was used was that it was already on the spot. His idea was that the concrete should be made at the place where it was to be used. He wondered whether burnt pit-shale would not make a suitable aggregate. The pedestal, or socket, was not an entirely new device, but had been used in connection with timber props, being filled with small coal or bind to make the arrangement more flexible.

The PRESIDENT thought that burnt shale would answer very well for ordinary foundations, but it was very sulphury, and would need to be washed before it could be generally used. In the case of props, however, which usually had to stand for only a short length of time, he did not think it would be very detrimental to use this sulphury stuff. Props must not be made too solid. Mr. Hepplewhite grasped that idea years ago, when he introduced his tapered props. Until they got a concrete prop which would yield—in conjunction, no doubt, with some other material—it could not come into general use.

Mr. LAVERICK asked Mr. Marriott if he had made any comparison as to the relative calorific value of a briquette made of cement and one made of pitch. He could not see how cement would help the coal to burn—it would rather retard it.

Mr. MARRIOTT, in reply, said that there was no calorific value in cement—it was merely used to bind the coal. Tar and its compounds were at present hardly obtainable, and they ought not to use valuable constituents which needed conserving when they could employ a common material in a handy and cheap form. The amount of cement used in the briquettes was only 5 per cent.

Mr. BINNS moved, and Mr. EVANS seconded, a vote of thanks to Mr. Marriott, the latter remarking that he should have liked some particulars with regard to the tests showing the resisting pressures of both props and bars when used vertically and also when used horizontally.

The resolution was carried, and Mr. MARRIOTT, in acknowledging it, said that Mr. Guy Calthrop had put him in communication with Sir Richard Redmayne, who had pressed him to get in touch with some mining engineers—hence his appearance before them that afternoon.

The François Cementation Process.

The paper by Mr. THOMAS BLANDFORD, B.Sc., on "The Cementation Process as Applied to Mining (François System)" was then discussed. (See *Colliery Guardian*, March 9, 1917, p. 479.)

Col. LEWIS said that at two collieries with which he was connected in Warwickshire this system was being used. They were working the thick coal, which was peculiarly liable to spontaneous combustion—not so much in the goaf as in the solid coal. Unless the pillars of coal left in were of very considerable size, the crushing brought on spontaneous combustion. They dealt some years ago with a fire which occurred at one of the collieries where two roads met at one of the pillars, but they had recently had another fire which had been causing them a good deal of trouble, and this they had managed to settle by means of the François system. They poured quantities of cement into the cracks caused by the depression of the coal, and it had been very successful indeed. At the other colliery they had a difficulty in keeping one of the main roads open at all. The fire was close to the pit bottom, and at one time it seemed as though the whole pit would be endangered. With the aid of François' liquid cement, of which they poured in scores of tons, they gradually got the better of it, however, and it was now causing them no trouble at all. The system was extremely useful, especially where a fire occurred in the solid coal. It would have been a most serious matter for both collieries if the François system had never been invented.

Mr. R. H. HEPPLEWHITE remarked that he had seen a good deal of this cementation process in the Warwickshire mines. It had been used to deal both with water and with fire, and had always proved a success. At one mine they used no less than 140 tons of cement in dealing with one fire, but the result had been effectual. The boreholes could be put into the solid coal 6 ft. up to 20 ft. or 30 ft., and care must be taken in preparing the mixture, which must be consistent enough to flow through the pipe when forced by a small pump worked by one man. When once the work was started, however, it was necessary to go on, for the cement set very quickly, and became as hard as stone. All the openings and cracks were filled up, the percolation of air was stopped, and the fire was got under. In another place in Warwickshire there was an irruption of water, and dams were put up, but the water began to find its way through the cracks and fissures. Boreholes were made up to 30 ft. in depth, and some tons of cement were pumped in. It was astonishing where it all went to, but it was completely successful in stopping the flow of water.

Mr. NORMAN D. TODD said that at present they were engaged in cementing a shaft behind some tubbing, and owing to the extremely high price of cement they thought that ground lime might advantageously be mixed with the cement. They, therefore, made some tests, but while some appeared to come out all right, they found that in other instances the lime went to the bottom and the cement to the top. They consequently dismissed the idea altogether and went on using cement; and when the work was finished he believed that a good job would have been made of it.

The PRESIDENT thought that the application of cement to mining was in its infancy. Every time they discussed the subject they found some new uses for it, and it appeared to be almost unlimited in its application.

Pit Timber and Its Preservatives.

On the paper by Prof. PERCY GROOM, M.A., D.Sc., Mr. HEPPLEWHITE said that in a former discussion he ventured to remark that Prof. Groom admitted that the

application of water or of whitewash was not out of place in the preservation of timber. Prof. Groom, however, told him that he did not believe that either water or whitewash was any good in preserving timber, so that he (Mr. Hepplewhite) felt that it was only right that he should withdraw the remark he had made.

This concluded the meeting.

HOUSING PROBLEMS AFTER THE WAR.

For several months past a number of informal meetings have been held under the auspices of the National Housing and Town Planning Council, of technicians interested in providing workable solutions of those difficulties which will undoubtedly arise in carrying post-war housing schemes into effect. The discussion at these informal meetings has proved to be so valuable that it is recognised to be desirable that a technical conference should be definitely set up, with the following terms of reference:—

(1) The methods by which the best designs and laying-out plans can be secured for housing schemes to be carried into effect at the close of the war in both urban and rural areas.

(2) The provision of workable solutions of technical difficulties arising in regard to: (a) The shortage of materials (and more especially timber) where such shortage is due to the abnormal demand which will arise at the close of the war; (b) the economical adoption and use in building construction of new materials or new forms of materials; (c) the substitution of materials in construction, e.g., the substitution of concrete for timber in floors, joists, etc.

(3) The provision of labour-saving appliances in the equipment of houses.

(4) The provision of useful opportunities for experiment.

(5) The statement of the scope and possibilities of useful standardisation in the production of component parts.

(6) The statement of the points on which the by-laws usually in operation in (a) urban, and (b) rural areas should be amended in order to permit of the adoption of new ideas in building construction.

(7) Methods by which the proper planning of those areas in which after-the-war housing schemes to be carried into effect can be secured, including the relaxation of conditions as to road width in residential roads.

The chairman of the conference is Coun. S. Smethurst, J.P., past-president of the National Federation of Building Trades Employers; the duties of hon. secretary being undertaken by Mr. Henry R. Aldridge.

Three committees have been appointed. Committee No. 1 (chairman, Mr. H. V. Lanchester, F.R.I.B.A.; minute secretary, Mr. Alex. Harvey, F.R.I.B.A.) will deal with points (1), (2), and (3) in the terms of reference, as stated above; committee No. 2 (chairman, Mr. F. J. Hill, National Federation of Building Trades Employers; minute secretary, Mr. E. J. Strange) with points (1), (4), and (5); and committee No. 3 (chairman, Mr. E. Willis, Assoc. M. Inst. C.E., F.S.I., A.M.I.M.E.; minute secretary, Maj. C. P. Lovelock) with points (1), (6), and (7). It will be seen that point (1) is being considered by all the committees.

In addition to the already strong membership, it has been decided to arrange for the addition of a number of corresponding members of the conference, who will not be expected to serve on the committees, but will attend the meetings of the conference to take part in the discussion of the proposals submitted by the committees. The conference will, in accordance with the wishes of Mr. Hayes-Fisher, endeavour to act as an auxiliary force to the Technical Committee set up by the Government. Sir J. Tudor Walters, M.P., the chairman of the Government Committee, has already given a warm welcome to the efforts of the conference, and has asked that all proposals shall be submitted in the first place to his committee. Several questions of vital importance are already under consideration—e.g., the methods by which the proper laying-out on town-planning lines of housing schemes can be secured, and the supply in adequate quantity secured of raw materials, and especially timber and bricks. Several points as to standardisation are given carefully studied by groups set up by committee No. 1 of the conference.

Communications on this all-important subject should be sent to 5, Bennett's-hill, Birmingham.

The Widnes Town Council have decided to increase the price of gas by 3d. per 1,000 cu. ft. to all classes of consumers; this makes the present price of gas 1s. 6d. per 1,000 cu. ft., at which figure it retains the distinction of being the cheapest gas in the kingdom. The next lowest price—1s. 9d. per 1,000 ft.—is charged in Sheffield.

Brazilian Coal Measures.—The *Times Trade Supplement* for October devotes considerable space to Brazilian industrial matters, in the course of which it is stated that coal seams are worked at Tubarao (State of S. Catharina), St. Jeronymo, Rio Negro, Candiota, and Jaguarao (State of Rio Grande do Sul). The coal mined from the already developed areas is classed as bituminous and lignite. The results of analysis of briquettes made from the through coal of Santa Catharina are little inferior in calorific value to those of Cardiff patent fuel. At Xarqueadas, in Rio Grande do Sul, boring has proved the existence of seams 13 ft. in thickness, in addition to several other smaller seams in the same area. The Candiota field contains four seams, 4 ft., 6 ft., 8 ft., and 10 ft. respectively. The Government is doing everything possible to expedite the exploitation of the coal fields by assisting in the capitalisation of the exploration companies, and facilitating the pushing forward of the necessary branch railways. For this purpose, Congress has authorised the Government to issue up to 25,000 contos of reis (£1,500,000) of 5 per cent. bonds, with which to subscribe up to 45 per cent. of the necessary working capital, besides exempting the companies from Customs dues, and entitling them to railway freights, etc. Several Brazilian and American companies have recently been formed to take advantage of the new situation. National coal is being employed by the Brazilian Lloyd Steamship Company, several of the railways, many factories, etc. Whilst important consignments are being made regularly to Argentina, and contracts have been signed with the new Japanese Line plying between Japan and Brazil for the use of Brazilian coal on the homeward journey.

FERRO-CONCRETE PIT PROPS.*

By W. MARRIOTT.

with a shortage of timber, which, in was the cheapest and is still the best temporarily supporting any kind of excavation; first, because it was cheap, secondly, because it was light, and lastly because it talks. Concrete, on the other hand, is not generally cheap, and it is not light, but it does talk, if you know the language. The different systems of reinforcement are well known, but none of them lend themselves readily to the lighter and smaller articles required in engineering. Directly there is any movement in the parts undergoing tensile strain and the reinforcement is elongated or deflected, the concrete cracks and the article is ruined. The object aimed at should be to dispose the steel in quantity and form so as to take up the tensile strain without elongation or deflection, and so make the article capable of bearing transverse strain, the steel being, of course, of a high tensile quality.

Now a fence post, having no particular strain, can be very simply reinforced, whereas the strainer post, having

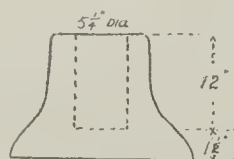


FIG. 1.—SECTION OF PEDESTAL.

wires tightly strained up, can have several tons load upon it, and it was the failure of these posts that led the author to desire something better. The improvement was triangular bracing, further strengthened by welding the members. This constitutes a box form of girder reinforcement, which enables the tensile strain to be fully met, while the reinforcement on the compression side has only sufficient area to take the shearing strains, leaving the compression strain to the care of the concrete, which it is fully able to stand. This box form also enables posts, piles and girders to have the concrete omitted about the neutral axis, and be made hollow and lighter, so that articles made on this system are little more than twice, instead of three and a-half times, the weight of wood; perforations also can be made between the triangulations without injuring the article.

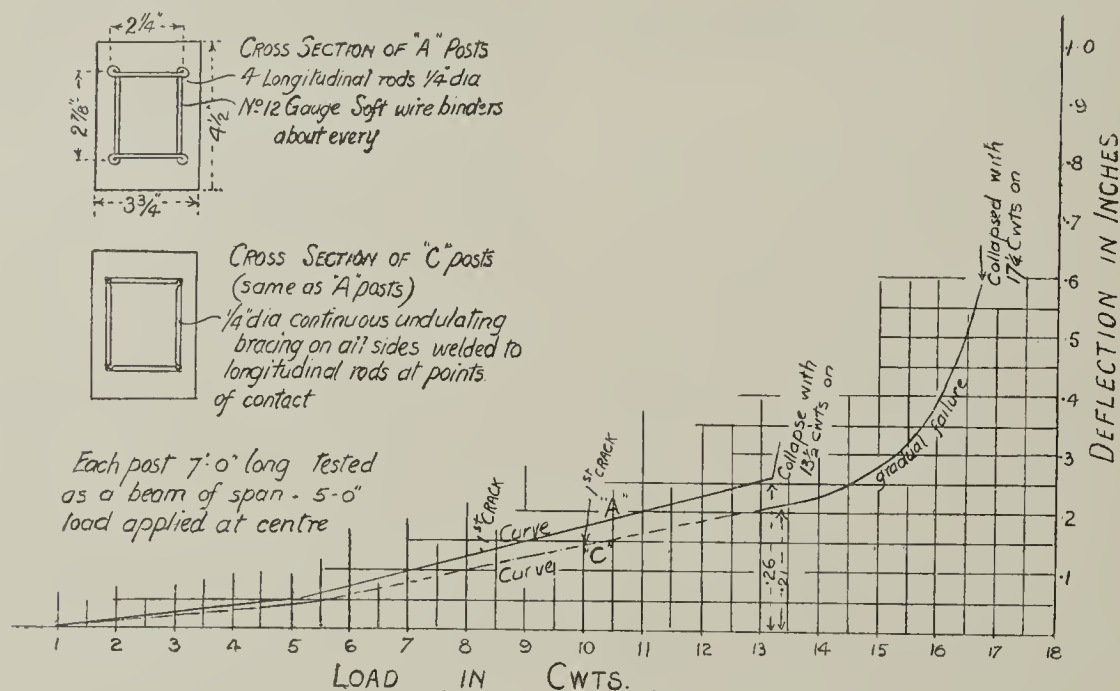


FIG. 2.—TESTS OF REINFORCED CONCRETE FENCE POSTS.

As regards mining, the question of reinforced concrete on this system for bars is comparatively simple. Bars can be made to stand any strain, they will be durable and, being hollow, are only about twice the weight of timber.

As regards pit props, the question is more difficult and complicated. As long as the compression on a pit prop is vertical or direct, the concrete, which is an excellent material for resisting compression, will stand, but this cannot always be guaranteed, and transverse strain comes on, which props do not always stand well. It is also a fact known to mining engineers that props should be yielding to allow for sinkage, otherwise they may break the roof, and the reason that wooden props are pointed is that they may yield and burr up, and so allow for the sinking of the roof. A concrete prop being unyielding, a method has to be devised to deal with the sinkage of the roof: this, of course, is met in a small degree by the crushing and yielding of the lids.

The various types of yielding props were dealt with in Mr. Hepplewhite's paper, entitled "Substitutes for Wooden Supports of the Roof in Longwall Workings,"†

After visiting several collieries (either personally or by deputy) the author came to the conclusion that it is necessary to have yielding props, concrete props can be made so by placing one end in a simple container made of concrete, cast iron, or even steel, filled with clay. This latter should be made to exude under pressure through a small hole or holes in the base or pedestal. The rate of shrinkage would be regulated by the size of the hole. Some full size experiments were made with a pedestal or container, the size and shape shown in

Fig. 1. The result of a series of experiments, that a concrete prop of one-third of the depth of the

Midland Counties Institution of

Colliery, December 18, 1914, p. 1283.

pedestal exuded the clay in a continuous thread. Under 23 tons pressure it took 14 1/2 minutes to sink the block, which represented the prop, 1 1/4th thus being equal to 6 in. in 23 hours, the length of clay exuded was 11 ft. 4 in. The clay at first tended to exude round the props; this was soon stopped, either by a string or by a wooden block shaped like an hydraulic cup leather. This clearly demonstrates that a concrete prop can be so arranged as to yield, if the local circumstances render it imperative.

With regard to concrete props, the following test of props made on the Marriott patent system is interesting. Three fence posts, 4 1/2 in. x 3 3/4 in., about the size of a prop, were placed on supports 5 ft. apart. These were reinforced in the ordinary way with 1/4 in. main rods and the usual binders, and tested by hanging weights in the centre as if they were bars or girders. The same tests were applied to three similar posts reinforced on the Marriott system. Comparing the two systems it was found that the ultimate load carried by the M.R.C. system was 28 per cent. higher, while the maximum deflection previous to collapse was 130 per cent. more, and the general deflection throughout 20 per cent. less.

The former failed by the rods slipping in the concrete, whereas the latter failed by compression, the welding preventing slipping. A failure in compression proves that both the concrete and the steel have taken their due proportion of the strains, which is the point aimed at. Fig. 2 shows the result of the test. It must be mentioned that these were just simple fence posts, not designed as girders.

There is one word of warning with regard to the material for concrete. One often sees or hears of concrete made of slag or coke breeze. Now both these contain sulphur in varying degrees, and sulphur is a deadly enemy to both steel and cement. Ultimate disappointment and failure are sure to result from the use of wrong materials, although it may take years to materialise. The use of slag for concrete is forbidden in most strict building regulations.

Concreted Coal Briquettes.

During the author's investigations on the subject of pit props, he was struck with the fearful waste of small coal shovelled into the "goaf," and never brought to bank, and having been abroad, and seen a good deal of the application of briquette fuel, he wondered why we made so little use of it in this country. In Germany the briquette industry has reached a very high state of

efficiency, and 10 years ago had an output of 16 million tons against our 1 1/2 million tons (very few of which are consumed in this country, 90 per cent. being exported). He therefore determined to try some briquettes made with cement under pressure, coal tar or pitch being now out of the question. He only used 5 per cent. of cement, and the result, even with the very bad slack he had got, was quite satisfactory, both as house fuel and on engines. Whether it is better to use it in this way, or grind it small to be fed into the furnace with an air jet, depends no doubt on circumstances. This method of making briquettes is not claimed as novel, Lyttle's Iron Company having, in 1876, made a large quantity of briquettes from coal slack and carbonate of lime mixed together in a moist state and then briquetted. Blast furnaces were run on this fuel producing pig which made top prices. The matter, however, is one which might be profitably developed.

Certifying Surgeons Appointed.—The Chief Inspector of Factories notifies the following appointments as certifying surgeons under the Factory and Workshop Acts: Dr. J. F. Muir, to Whitehaven (Cumberland); Dr. K. E. Crompton, to Wotton-under-Edge (Gloucester); Dr. E. C. Byrne, to Barton Latimer (Northampton); Dr. J. A. Ashcroft, to Littleborough (Lancaster); and Dr. F. W. Bloomer, to Long Eaton (Derby). Vacancies are announced at Muirkirk (Ayr), Gunnislake (Cornwall), Cleator (Cumberland), and Hastings (Sussex).

Mine Rescue Research Committee.—The Mine Rescue Research Committee (Department of Scientific and Industrial Research) invites inventors who have designs for automatically adjusting oxygen feed valves for self-contained breathing apparatus to communicate with Dr. Henry Briggs, Heriot-Watt College, Edinburgh, from whom further information can be obtained. Before any actual designs which have not already been patented are submitted for examination, it is desirable that inventors should apply to the Patent Office for provisional protection for them.

MINERS' HOUSING IN SCOTLAND.

Special interest attaches to the report of the Royal Commission on the Housing of the Industrial Population of Scotland, as the origin of the Commission was directly due to the representations made to the Secretary for Scotland by the Scottish miners' associations. This report, just published, includes the housing of all classes of the Scottish population; but, as the result of the preliminary reports prepared for the Local Government Board at the request of Lord Pentland, it was decided that the case for an investigation into the housing of miners was so overwhelming, that special enquiry was directed to be made into housing in the mining districts. Accordingly, not only was evidence on the conditions of housing in the mining communities obtained, but typical areas in the chief mining counties—Midlothian, Linlithgow, Fife, Lanark, Ayr, and Stirling—were personally investigated by the Commission, thus confirming by direct observation the evidence produced. These visits of inspection were made principally during the six months before the war. The masses of evidence adduced, and the records of observations made, constitute a valuable body of evidence on all the problems connected with the housing of miners, and, in order to convey a substantive impression of the investigations, an exceptionally large proportion of space is necessarily devoted to the mining section. But, as will be shown, the amount of space is not disproportionate to the magnitude of the mining industries, which include shale mining as well as coal mining; these necessarily give rise to special housing problems, for the organisation of the industries is determined by the geological situation of coal seams or shale beds, not, as in many other industries, by the availability of power and accessibility to the sea. Frequently, as in the recently sunk shafts at Valleyfield, in West Fife, the mine owner sinking such shaft is the only employer having any interest in providing houses near the new shaft. Where, as in Lanarkshire, several mining shafts are within a short distance of each other, existing towns or towns resting on other industries may be in a position to provide adequate housing; but, as a rule, even in the special mining areas of Lanarkshire and Ayrshire, the houses have been placed as near as practicable to the mining shafts. The housing of miners, therefore, has a very direct and special relation to the nature of the mining industry. The industry requires considerable numbers of houses all approximately of one class. The convenient sites are not always the best drained or the most easily laid out. For these and several other reasons, the housing of miners presents a series of special problems.

These problems are not of recent growth. The history of the industry is not without relevance to the conditions of to-day; for, in some areas, the houses built more than 120 years ago continue to be occupied, and, in at least one place (Bo'ness), a mine has been continuously worked for over 100 years. In such an industry it was to be expected that customs should become too firmly rooted to be easily changed. Where fathers, grandfathers, great-grandfathers, and even great-great-grandfathers can be counted in the history of the same local industry, tradition naturally becomes a governing factor in the life of the villages. Here and there the shadows of the early bondage of miners seem still to affect the miners of the present generation. This seems to be the only explanation of the idea, frequently encountered all over the mining fields, that the miner's house was really a part of his wages, and that half-a-crown a week should be the maximum rent. In the early days of the industry the "tied house" predominated. In certain localities it continues to predominate. As the industry has developed, and transit has been better organised, the "tied house" has lost its general predominance; but probably it is still, in the minds of some communities, a relic of the bondage days. The house is still very largely regarded as a piece of the mining plant, not as a place of free tenancy. There is, however, abundant evidence to show that, where the housing conditions have been improved, the personal interest of the miners in their houses tends to increase.

After tracing briefly the history of housing and other special concessions to miners since 1592, the report refers to the Parliamentary Commission of 1840, which was appointed to enquire into the conditions of women's and children's labour in mines, the result of which was that an Act was passed by Parliament on August 10, 1842, prohibiting the employment of women and girls in mines, and stipulating that boys should not be engaged in pits under 10 years of age. The Act became operative on March 1, 1843. The Commissioners of 1840 found that the housing conditions in many mining centres were of a piece with the work in the pits, and in 1844 the Government appointed Mr. Tremenheere, inspector of mines, to visit Scotland, and report on the administration of the new Act. The report showed that, although general conditions were unsatisfactory, an improvement had begun to be felt in some districts. At Shotts, in Lanarkshire, about 26 houses had been built by the colliers, with a little initial assistance from the coal owner through the agency of a building society to which they paid 2s. 6d. per week. At Coatland of Wemyss, Fife, and Newbattle, Midlothian, improved houses were being erected; and it is interesting to note that these two districts to-day possess some of the best miners' houses in the East of Scotland.

In order to indicate the magnitude of the problem before the Royal Commission of October 1912, the report makes use of the following table compiled from the Census Report of 1911, giving the number of (1) workmen below ground, and (2) total employed about the mines in the six principal mining counties of Scotland.

Even allowing for the fact that in many cases more than one member of the family works as a miner, it is clear that the total population of coal miners (apart from miners in ironstone, shale, etc.), with their dependants, cannot be far short of half a million.

County.	Total "popu- lation dealt with" (Census).	Employees working below ground.	Total employed in and about the mines.
Lanarkshire	1,400,088	54,390	64,961
Fife	259,787	21,340	28,577
Ayrshire	261,973	13,202	15,191
Stirlingshire	155,560	10,345	12,493
Midlothian	485,756	10,260	12,567
West Lothian (Linlithgow- shire)	76,542	9,768	7,260
Total	2,639,706	122,305*	141,349
Deducting Glasgow, Edinburgh and Leith†	1,292,326		
	1,347,380		

* According to the report for 1911 of the Government Inspector of Mines, the total number of workpeople of all ages, male and female, employed underground and above ground was 138,377.

† The number of miners resident in Edinburgh and Glasgow, though considerable, is small relatively to the total populations. Thus the figure, after deduction of these two cities and Leith, is the more accurate, though it does not allow for the non-mining portions of the counties.

This large population, amounting to about one-tenth of the inhabitants of Scotland, is housed partly in burghs and partly in landward areas. In the burghs some miners live in types of house similar to those occupied by other wage earners; but in some others—e.g., Hamilton, Coatbridge, and Dunfermline—there are to be found "miners' rows" that are at once recognisable as of the same type as those in the landward villages. On the other hand, in some of the county districts, large aggregates of population, amounting occasionally to 15,000 persons, are under county government. Such are Blantyre and Larkhall, in Mid-Lanark. In those places, a clear majority of the population are directly engaged in coal mining. Thus, in the mining districts, the apparent distinction between burghal and landward communities is more than usually indefinite. The differences between the administrative powers of burghs and counties are not reflected in the external differences of the communities.

In spite, therefore, of the differences in administrative control, the mining communities, whether burghal or landward, show certain common features, and this is true of the various coal fields of Scotland. In all the coal fields there is a well-marked difference between the oldest houses and the newest, between the worst and the best. But there are also great differences between the different coal fields. The differences are shown in such matters as the proportion of old houses, the prevalence of overcrowding, and the current sanitary standard. Fife and the Lothians, whose development has spread over a long period, show great varieties of housing, and broad distinctions between the older and newer villages. On the other hand, Mid-Lanark shows, in its mining villages, a uniformity of house structure, a monotony of village plan, and a congestion of houses that are probably, to a great extent, due to the very rapid development of its mines during the middle and end of the 19th century. In the account of the different types of miners' housing, it is inevitable that the worst conditions should receive most prominence; but the general impression given can hardly be more depressing than the reality.

The evidence on which the following sections are based is chiefly drawn from representatives (1) of the central and local authorities; (2) of the coal owners, by whom a large proportion of the houses are provided; and (3) of the miners' unions, of which the largest is the Lanarkshire Miners' Union, with over 40,000 members. The reports by the medical officers issued in 1910-12 at the instance of the Local Government Board have also been used.

Sites and Plans of Colliery Villages.

In the mining industry, three principles appear to have influenced the selection of sites and the planning of villages: (1) the necessity for labour convenient to the mine; (2) the commercial necessity to economise on the provision of houses as part of the mining plant; and (3) the speculative risk involved in the limited life of the mine. In the selection of sites, probably proximity to the mine was the predominant factor. Frequently, mines had to be sunk at a considerable distance from populous places and in areas that would not naturally have been chosen as building sites, and in the areas inspected by the Commission it was the exception to find that, in the selection of a site, any attention had been paid either to the nature of the soil or subsoil, or the amenities or exposure. In the planning of the villages, the line of least resistance has, for the most part, been adopted; the houses, built of the cheapest available material, are arranged in the cheapest form, viz., the straight row. Usually the rows are arranged in parallel lines; occasionally the grouping is varied by "the square." But, whether arranged in rows or in squares, the greater number of the villages show so little consideration for the conditions of life demanded in a modern town, that privies, ashpits, washhouses, and other outhouses have usually been erected in the most conspicuous places, and on the most primitive designs.

Of the Fife coal fields, it is, however, satisfactory to note that quite recently, not only as regards gardens, but in the matter of planning of the village, a reaction against the old careless and monotonous arrangement of the "rows" has begun to make itself felt on the side both of the mine owners and their employees. The general improvement is, however, very recent. Among the best miners' dwellings inspected in Lanarkshire was a village of 127 houses erected about the year 1905 by Messrs. Wm. Baird and Company. The houses, of two and three apartments, were well built of brick on the double-flatted plan, and had conveniences better than the average. Small garden plots had been set aside, but were not made use of. At Valleyfield (Fife-shire), and, in a less degree, at Kirkconnel (Dumfriesshire), and elsewhere, a definite attempt has been made to reach a more pleasing lay-out. Valleyfield is a

carefully designed new village. The site is admirable, and the amount of open space very generous. The houses are arranged in crescents, each of which has a certain proportion of three-room houses, and a certain proportion of two-room houses—each house with scullery, w.c., and (in many of the houses) bath, with hot water from the kitchen range for bath and sink, and garden. Every house has a back door opening to the garden; this has one drawback—it enables the tenant to subdivide his house into two houses of one room each, with one entrance from the front and one from the back. This has actually happened even in this new village, which, at the time of inspection, still had some houses unlet. The usual general conditions of housing are fulfilled: drainage, water supply, and removal of refuse. When the village is completed, and the public buildings essential to the life of such a community—a school, a hall, reading and recreation rooms, and churches—are established, this village will have all the machinery necessary for a sound civic life. Since Valleyfield was visited in 1913, a number of houses have been built in pairs, with suitable garden ground to each; similar provision, with garden, has been made at Shotts (Lanark).

In Mid-Lanark, the villages recently erected at Hart-hill and Cleland by the District Committee of the Middle Ward have been planned in the light of the latest views on garden villages. The contrast between the depressing monotony of the ancient rows and the graceful variety of the new villages is very striking. No doubt the type of house provided is a factor in the general pleasing effect; but the arrangement of the houses is an equally essential factor. For the sake of economy, the cottages are built in groups of two, and occasionally in groups of four; but nowhere is the dreary monotony of the long row repeated.

How far the speculative factor in the life of a mine has operated in inducing the owners to provide houses of inadequate structure, it is impossible to determine; but it is certain that the failure to close uninhabitable houses has frequently rested on the allegation that the life of the mine was about to end, and that the houses would soon become automatically derelict. In some areas the life of the mine has ended; but it has been found that the houses were transferred to other owners. But, in other areas, where the mines were alleged to be approaching exhaustion, they are still in full operation, and the defective houses continue to be occupied. There are, however, serious defects of site in many mining villages, quite apart from defective or haphazard arrangement of the houses. In some cases, a badly selected site throws real difficulties in the way of improvements of sanitation by making satisfactory drainage difficult. In other cases, the only outlook of the cottage is upon the "bings" of the pit at which the men find employment, varied in the case of the iron workers' cottages by old, obsolete properties, workshops, or needless walls, which cut off all view from the windows. An example is given of a case near Hamilton, where the site of the cottages was very low lying, a road running past their backs at a considerable elevation, and a large "bing" shutting out all view in front. They were back-to-back houses, for the most part of a single room; and the outside privies were peculiarly offensive, even for Lanarkshire. The roadways were in bad condition. In another group of houses in the Bellshill district, a dirty combined ashpit and privy was noted; the premises being grossly exposed and looking as if they were never cleaned. The streets were seas of liquid mud; the gutters broken in places; and there seemed to be no idea of draining off the surface water either from the general area or from the floors of the latrines. At the same time, the cleanliness of several of the interiors of the houses was especially noticeable, showing that the housewives at least were not responsible for and had not descended to the level of their surroundings.

Improvement of Design and Maintenance.

That there is no inherent impossibility in designing a mining village effectively is shown by the lay-out of the garden village at Woodlands, Doncaster. But the responsibility for the external amenity of a mining village cannot, unfortunately, be taken as ending with a good initial design. In the upper and more closely built portion of the village at Woodlands, there was a degree of neglect of the surroundings of the houses which, to a considerable extent, neutralised the benefits of the original plan. Nor is it surprising that those brought up in the sordid surroundings of a typical old-fashioned colliery village in Scotland, or the North of England, should not, in every case, at once respond to the improved external conditions of a village such as this. The indiscriminate keeping of poultry, and the scattering of the contents of ashbins, were cited by the architect of the Fife Coal Company as tending to lower the standard of upkeep even in the better rows. But these are matters which can only be set right with the raising of the standard of occupancy through education; and this process cannot begin until the present foul congeries of middens, ashpits, and coal sheds are cleared away from the fronts of the houses in the older rows, while it can certainly be stimulated by better design of the villages of the future. It seems clear that further powers are needed, whether under the Town Planning Act or extended by-laws, to enable local authorities to control the site and planning of all new villages.

To be continued.

Welsh Miners' Strike Ballot.—The South Wales miners' executive council on Thursday decided that the ballot of the coal field on the question of a "down tools" policy in South Wales in the event of the Government proceeding with their "combing out" scheme in the mines, should be taken at all the collieries on November 1 or 2.

American Coal Embargo.—The Exports Administrative Board (Washington, U.S.A.) announces that neutral vessels bound for neutral ports bordering on Germany with cargoes not originating from the United States will be refused coal at American ports, pending the answer of the northern neutral Governments to the questions put by the United States with regard to their resources and requirements.

LETTERS TO THE EDITORS.

The Editors are not responsible either for the statements made, or the opinions expressed by correspondents.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

As replies to questions are only given by way of published answers to correspondents, and not by letter, stamped addressed envelopes are not required to be sent.

AREAS OF DEPOSITION OF THE WESTERN EUROPEAN COAL FIELDS.

SIRS,—In the legend of the map of the areas of deposition of the coal fields of Western Europe, on page 639, "Carboniferous land surfaces" should be "Pre-permian land surfaces." This is unfortunate, but I hope most of your readers would notice the misprint and correct it, as it is obvious. In the black-and-white reproduction of the map it is difficult to distinguish between the pre-carboniferous strata and those of coal measure age.

G. BLAKE WALKER.

Barnsley, October 8, 1917.

SIRS,—I had not the advantage of hearing Mr. Blake Walker's paper on this subject at the Midland Institute of Mining, but, judging from the report in your current issue, several of those who took part in the discussion seem to be under a slight misapprehension concerning the map of these probable areas submitted. In spite of the fact that "from the Dutch report" is written on the map, Prof. Fearnside is reported to have said: "He thought that Mr. Walker, in presenting that paper, had been bolder than any professional geologist would have ventured to be with regard to putting on his map the area of deposition and the parts outside the area where there was no deposit." The boldness is not Mr. Walker's, but that of some of the most "professional geologists" in existence, viz., Mr. van Waterschoot van der Gracht and Dr. Jongmans, who published the map in 1909 as plate v. of their *Memoir 2* of the Netherlands Government Institute.

That Prof. Fearnside was not alone in treating the map as Mr. Walker's is shown by Mr. Gilligan, of Leeds University, who is reported to have said: "that he wished to say a word or two in favour of some of the lines which Mr. Blake Walker had got on his map." As numerous other such phrases occur in the discussion, the spread of the misconception to readers of your paper is likely, particularly at a time like the present when so many people who have not behind them an adequate knowledge of the already great literature on the subject, are concerning themselves with the scientific aspects of the "coal question."

To the exceptional interest and value of the Dutch Government publication I have several times drawn public attention, and should like now to append its full bibliographic reference,* in the hope that it may be read and receive adequate recognition in this country. It is written in English.

MARIE C. STOPES.

Palaeobotanical Dept.,
University College, London.

* "The Deeper Geology of the Netherlands and Adjacent Regions, with Special Reference to the Latest Borings in the Netherlands, Belgium, and Westphalia," by W. A. J. M. van Waterschoot van der Gracht, Director of the Service, and Dr. Jongmans. *Memoir 2* of the Government Institute for the Geological Exploration of the Netherlands, The Hague, 1909; pp. viii., 437; pls. x., text figs, and maps; quarto.

Home-Grown Timber for Pitwood.—Messrs. F. R. Howe and Company, coal exporters and timber importers, of Cardiff and Newport, have completed a substantial deal in standing timber. The purchase involves eight plantations and coppices of larch and fir pitwood, also timber in various coppices and hedgerows extending altogether over 1,300 acres in Shapwick and Ashcott, near Glastonbury.

Coal Owners and Wages Advance.—The South Wales Coal Owners' Association on Thursday passed the following resolution, a copy of which is to be forwarded to the Prime Minister: "The Monmouthshire and South Wales coal owners place on record their emphatic protest against the action of H.M. Government in granting an advance of wages to the workmen employed at collieries, involving new principles, without having conferred with the coal owners of the United Kingdom in order to ascertain the serious economical effect of a wages advance on the coal trade of the country."

Wigan Past and Present Mining Students' Association.—The Past and Present Mining Students' Association, which has recently been formed in connection with the Mining Department of the Wigan and District Mining and Technical College, has completed an interesting programme for the forthcoming winter session, which will be opened to-morrow (Saturday), 13th inst. The arrangements are that meetings are to be held on the second Saturday of each month during the winter session, at 7 o'clock in the evening, and a number of prominent men in the mining world have promised to deliver lectures on various subjects. Mr. G. H. Winstanley, M.Sc., M.I.M.E., who was formerly associated with the college, has been secured as lecturer for the opening meeting of the session to-morrow (Saturday) night. Mr. T. Pownall will address the members on November 10, his subject being "Preliminaries to Mining Education"; and on December 8, Mr. G. S. Corlett, M.I.E.E., M.I.M.E., will be the lecturer when the subject will be "Electricity in Mines." Mr. Winstanley will lecture at the first meeting on the 13th inst., on January 12; and at the following meeting on February 9, the lecturer will be Mr. J. Drummond, M.I.M.E. On March 9, Mr. J. Grundy will deliver "Rescue Apparatus: Its Use in Mines"; and the annual meeting will be held on May 11. All communications in connection with the association should be addressed to Mr. F. H. Liptrot, the hon. secretary, the Mining College, Wigan.

CONTENTS.

ARTICLES:	PAGE
Suction Gas from South African Coals.....	687
Mining Labour Mobility.....	689
Recovering Sulphur from Coal.....	690
Housing Problems After the War.....	691
Ferro-Concrete Pit Props.....	692
Miners' Housing in Scotland.....	692
South Wales Mining Timber Trade.....	699
The Thin Mine Problem.....	700
Labour and Wages.....	702
Obituary.....	704
Open Contracts.....	706
The Freight Market.....	706
Government Publications.....	706
Publications Received.....	706
Abstracts of Patent Specifications Recently Accepted.....	706
New Patents Connected with the Coal and Iron Trades.....	708
LETTERS TO THE EDITORS:—	
Areas of Deposition of the Western European Coal Fields.....	693
REPORTS OF MEETINGS:—	
Mining Institute of Scotland.....	688
Midland Counties Institution of Engineers.....	690
Miners' Conference at Harrogate.....	700
THE COAL AND IRON TRADES.....	696—700
The By-Products Trade.....	698
The London Coal Trade.....	699
The Tin-plate Trade.....	700
NOTES FROM THE COAL FIELDS.....	701
COAL, IRON AND ENGINEERING COMPANIES.....	704
MISCELLANEA:—	
The Empire's Commerce and Commercial Requirements.....	689
Brazilian Coal Measures.....	691
Certifying Surgeons Appointed—Mine Rescue Research Committee.....	692
Welsh Miners' Strike Ballot—American Coal Embargo—Home-Grown Timber for Pitwood—Coal Owners and Wage Advance—Wigan Past and Present Mining Students' Association.....	693
Increase in German Coal Prices—United Kingdom Trade with Switzerland.....	698
Witbank Colliery Limited—United States Coal for Canada—Sweden and American Coal—Housing in South Wales.....	700
German Coal for Holland—Colliers' Time for Starting Work.....	701
Italian Coal Output—Wages of German Miners.....	704
Minerals of the Empire—America and the Donetz Basin—Wagons for Winter Coal.....	706
Hull Coal Traffic—Coal Miners in Volunteer Corps.....	708

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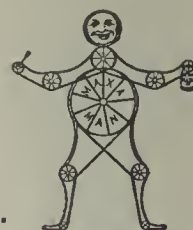
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The Colliery Guardian

AND
Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
 (At present on Active Service).

LONDON, FRIDAY, OCTOBER 12, 1917.

The London coal trade has been greatly stimulated by the colder weather, and the pressure for all household qualities has greatly increased, particularly in the poorer neighbourhoods. Steam coals are exceptionally scarce, very little coming through to London. Some of the North London depots have become congested with loaded wagons, and merchants are cancelling orders, whilst others, especially those in South London, are very short. The recent regula-

tions issued by the Controller has raised a storm of protest. Very little free coal is offering in the market.

Northumberland and Durham colliery positions remain without much alteration, the former being busy with official requirements, the volume of which is waning somewhat, and the latter still working irregularly. Enquiries from neutrals are moderately active, and licences are being granted more freely.

The tenor of Yorkshire and Lancashire business shows no change either in respect of manufacturing fuel or domestic supplies. Demand remains heavy, and the available supplies inadequate.

At the Humber ports supplies are only moderate and "free" coal very scarce; large shipments are being made to France, while neutrals are obtaining a small quantity of steams after official needs are satisfied.

There is no improvement in South Wales. Shipping arrivals have been delayed by the weather, and heavy stocks have been unable to be released, as the result of which many collieries have stopped work. Household supplies are in good demand, and gas coals are scarce.

Scotch conditions are unsatisfactory. Idle time is prevalent and stocks are accumulating, although industrial demands and household requirements provide a fair amount of business. More activity has developed in Ireland on account of the colder weather; a shortage exists in the south.

Business on the freight market has been of small dimensions, but with rather more chartering at South Wales than in the previous week. On the north-east coast most fixtures have been for French Atlantic ports, for coke and pitch, at scheduled rates.

A meeting of the Institution of Petroleum Technologists will be held on Tuesday evening, October 16, 1917, at 8 o'clock, at the House of the Royal Society of Arts, John-street, Adelphi, W.C. 2, when Mr. E. Lawson Lomax, M.Sc., F.C.S., will read a paper on "Testing and Standardisation of Motor Fuel."

A general meeting of the members of the North of England Institute of Mining and Mechanical Engineers will be held in the Wood Memorial Hall, Newcastle-upon-Tyne, at 2 o'clock to-morrow (Saturday), when a paper on "The Flow of Water in Syphons" will be presented by Mr. Mark Halliday, B.Sc.

A general meeting of the Institution of Mechanical Engineers will be held at the Institution of Civil Engineers, Great George-street, Westminster, on Friday, October 19, 1917, at 6 p.m., when Mr. Oswald Wans (Lincoln) will read a paper on "A Comparison of the Working Costs of the Principal Prime Movers."

The annual general meeting of the Manchester Geological and Mining Society was held on Tuesday, 9th inst. Owing to pressure on our space, the report of this meeting has had to be postponed till next week.

Compensation of Colliery Owners.

WE understand that the agreement for compensation to coal owners in connection with the control of mines has been accepted by the Mining Association of Great Britain and the Coal Controller. Whether that agreement will be carried out under the Defence of the Realm Act or by an Act of Parliament has yet to be decided. If no scheme of compensation had been entered into, each person affected would have been entitled to go before the Woodhouse Commission, which would adjudicate the amount of compensation he was entitled to receive. The Woodhouse Commission is a Royal Commission appointed on March 31, 1915, "to enquire and determine, and to report what sums (in cases not otherwise provided for) ought in reason and fairness to be paid out of public funds to applicants, who (not being subjects of an enemy State) are resident or carrying on business in the United Kingdom, in respect of direct and substantial loss incurred and damage sustained by them by reason of interference with their property or business in the United Kingdom through the exercise by the Crown of its rights and duties in the defence of the realm." The Mining Association is evidently of opinion that it was in the interest of coal owners that some general scheme should be entered into, rather than that each coal owner should be left to make his separate application to the Woodhouse Commission.

National Service.

THE more complete organisation of the man-power of Great Britain, a task which the Ministry of National Service, under the guidance of Sir AUCKLAND GEDDES, has now in hand, is an important and necessary step towards securing the only peace that the majority of the people of these islands care about. That there are many difficulties in the way before this end can be accomplished cannot be denied. Perhaps the most formidable of these is the hostility of a few misguided persons towards any attempt to curtail what they regard as their individual liberties. It is regrettable that this spirit should be so prominently displayed by the South Wales miners. The Miners' Federation of Great Britain have loyally accepted the Government's proposal respecting the recruiting of colliery workers. One condition of this acceptance was that the new scheme should not be put into operation until all persons of military age who have entered the mines since August 1914, and who were not *bonâ fide* miners prior to that date, had been combed out. It was also agreed that the scheme should apply to all unmarried Class A workers between 18 and 41 years of age. The South Wales Miners' Federation, however, refuse to acquiesce in this arrangement, and decline to co-operate in any way with the Government's proposal to comb out eligible miners working in the Welsh coal field. Following a practice which has now become almost a custom with these men, they propose to accompany their rejection of the scheme by the threat of a general strike if it should be put into force, and a ballot is to be arranged by the executive council for the purpose of carrying out this menace. It is not yet certain what the result of this ballot will be. There are, undoubtedly, large numbers of Welsh miners who will disapprove of this policy. There is, also, a considerable leaven of extremists who glory in the defiance of authority; who apparently would not hesitate even to sacrifice their comrades now serving at the front, and to be false to the memory of those who have given their lives for their country. Possibly they do not even admit, owing to some strange perversion of their intelligence, that the British blood which has been poured out upon the battle fields of Europe, has been shed to maintain those very hearths and homes to which they so persistently cling. It is perhaps not too late to ask these men to show some consideration for the great cause for which we are fighting, and to remember that the nation is now at the very climax which may determine the happiness and prosperity of succeeding generations of their countrymen.

There is one aspect of this attitude of the South Wales miners to which we have previously drawn attention in these columns. Believing, as we do, that a substantial majority of these men are imbued with a true patriotic feeling, why is no effort made to consolidate and extend this better spirit? South Wales has been left too severely alone by our publicists and leaders. This important industrial area seems to have been abandoned to the wiles and machinations of mischief-makers of every description. It is an insult to the intelligence of the inhabitants of this prosperous community to suppose that the majority is not amenable to reason and argument. There is no imaginable harm to be apprehended in undertaking a crusade amongst these people, many of whom are being led away by the plausible doctrines of a few fanatics. Prominence has recently been given in the public Press to the danger of allowing unrestricted play to what has been called the ferment of revolution. A little leaven, left to do its work, is proverbially capable of much harmful effect. The proper remedy is to provide an antitoxin for its destruction.

There are many difficulties in the way of carrying on an effective crusade under present circumstances, but in some respects the moment is most opportune. If it were clearly put before the Welsh miners that there is no choice open to them between German domination, with all its attendant evils, now so plainly manifest, and a whole-hearted co-operation in winning the war, surely the response would not be left in doubt. At least the country would know where the miners stand, whether as allies of the enemy, or as champions of the right. The present attitude of certain pacifists in this country is incomprehensible, except upon the assumption that it takes all sorts to make a world. But we like to

think that the sort which would condone the most detestable crimes to which Germany has endeavored in this war is an infinitely small minority, and almost negligible but for their possible influence upon the weaker-minded of their brethren. It is these latter who should be our chief concern.

In a few days the miners of South Wales will be asked to declare their adhesion to one side or the other. There is no middle way. Those who support even the threat of a strike upon such a question are playing the game of our enemies, and are aiding and abetting every atrocity which, to their lasting disgrace, the Huns have perpetrated. A great responsibility rests upon those who elect to support the recent unpatriotic policy of the South Wales Miners' Federation.

THE complexity of the coal export trade is remarkable even in times of peace, and its difficulties in existing conditions are still more pronounced.

We have, on the one hand, the urgent needs of our Allies, France and Italy; on the other, the requirements of neutrals; while at home have to be considered the various interests of exporters, coal owners and shippers. Above all these are the interests of a nation at war, to whom coal is a necessity both for military and commercial purposes. Hence the need for the elaborate organisation that has been set up, consisting of central and local committees, foreign supply committees and Government departments.

In the case of South Wales, which may be regarded as our premier exporting district, this organisation has now reached what would seem to be the limit of systematic control. The Cardiff Local Committee consists of three sections, representing respectively the exporters, coal owners and ship owners, three members of each are members of the Central Executive Committee of Great Britain, for the supply of coal to France and Italy. There is also a local Coal Licensing and Allocation Committee, sitting each day in rota, of which the nine members of the Central Committee are *ex-officio* members.

The Government departments include the Coal Division of the War Trade Department, dealing with the question of licences, the Coal Exports Committee, Ship Licensing Committee, Inter-Allied Chartering Executive, two Controllers—viz., the Controller of Mines and the Shipping Controller (both attached to the Board of Trade), and the Central Executive referred to above. The French Government is represented by the Coal and Freight Departments of the High Commissioner of the French Republic in London, and the Bureau des Charbons of the Ministry of Public Works in Paris; while the Italian Government is represented by the Comitato Centrale Carboni, Rome, acting through the Italian Coal Committee in London. There are, in addition to the above, six local committees, one each for Cardiff, Swansea, Newcastle-upon-Tyne, Glasgow, Hull and Liverpool.

One of the most important questions settled by this organisation was the fixing of freight rates, a matter which was complicated by the fact that neutral vessels, as well as those of the Allies, were concerned. The difference between neutral and Allied rates was at first fixed at 20 per cent. increase for neutral vessels proceeding to French, Channel and Atlantic ports, and 50 per cent. increase for Mediterranean ports. This was subsequently increased to 50 per cent. for Channel and Atlantic ports, and at the same time by 12s. per ton extra for Mediterranean ports. A further increase was afterwards made of 12s. per ton for vessels proceeding to all French ports north of Brest, and 18s. per ton for ports south of Brest. For vessels under 300 tons gross there was added a further 5s. per ton for all ports, both for neutral and Allied tonnage.

At the time when the question of the control of freights was first mooted, the difficulty of dealing with neutral tonnage was commented upon in these columns. The magnitude of this difficulty is reflected in the large increases which have been awarded. The effect may be measured by the fact that while the freight rate to Boulogne in Allied vessels for ships exceeding 2,500 tons gross is 24s. 6d., for neutral vessels it is 49s. 3d. In the case of Calais the figures are 25s. 6d. and 50s. 9d. respectively. So great is the increase in rates may probably be explained by the cost of insurance. Thus, taking the scheduled rate for coke to Rouen at 48s., the rate for neutral tonnage was arrived at by adding 50 per cent. to the Tyne coal basis with a further addition of 12s.

increase and an increase of 20s. for 1s. 3d. as compared with 48s. for

ultly arose from the necessity for remuneration for the coal exporters' services. It was essential that an arrangement should be made whereby agents buying on behalf of foreign firms should not compete unfairly with coal owners selling direct, either by undercutting one another or by endeavouring to obtain undue preference. It was also necessary to ensure that importers in France should not receive less favourable terms than their neighbours. The actual work done by exporters and buying agents includes making arrangements with collieries, railways and docks for stemming vessels, providing for Custom House formalities and other details connected with loading. The remuneration for these services is fixed at the rate of 5 per cent. on the f.o.b. price, with a maximum of 1s. per ton, this charge, together with port dues, being added to the f.o.b. price, and paid by buyers. Exporters further receive one-third of 5 per cent. brokerage on freight from the ship owners, in return for which they will relieve buyers of demurrage in loading. All questions of allocation and priority of orders, and available tonnage, are regulated by the local committees, and the latter are subject to Standing Orders framed by the Central Executive. Attention is given, also, as far as possible, to the maintenance of existing methods and established customs.

The position of coal owners selling direct to foreign consumers is defined by the simple expedient of bringing them under the definition of exporters. Thus coals, whether supplied through exporters or by coal owners direct, are invoiced at the colliery price plus 5 per cent. commission (with a maximum of 1s. per ton), and all business is done on f.o.b. basis, no sales being permissible c.i.f. or upon delivered basis.

The price of bunker coals for steamers carrying coal at limitation freights was originally fixed not to exceed a maximum of 7s. 6d. per ton above the limitation price for coals, but this was subsequently altered by the Coal Controller to a price not less than the scheduled price for export coal. The reason for this change was the desire to maintain colliery prices at a fixed level as far as possible. It appeared that certain temporary conditions, such as shortage of tonnage, produced fluctuations in price, and tended to interfere with the regular distribution of coal.

In the meantime, from the point of view of purchasers in France, the routine appears to be somewhat complex. So far as can be judged from statements in the foreign Press, the French importer has in the first place to obtain a permit from the Bureau National des Charbons at Paris. On submitting this to the English exporter, the latter has to remit it, together with certain Custom House forms and other information, to his local committee, by whom the demands for licences are forwarded to the War Trade Department in London. Without the necessary advices and formalities nothing can be done, but if these are in order, and the licence is granted, the shipper is authorised to apply to the Custom House at the port of shipment and to pass the necessary papers to enable him to ship the coal. But here comes possible trouble. If it should be necessary to complete the cargo with large coal, while the licence is for through-and-through, the shipper is required to apply again to the local committee, and to go through the whole routine once more in the same order as before, with consequent delay to the steamer. The collector of Customs at the port of shipment only gives permission to load the coal after the officer representing the Admiralty has endorsed the various printed forms submitted to him.

So elaborate a routine will doubtless betray weak places and imperfections as fuller official experience is gained. But so long as the existing machinery is allowed reasonable licence there should be no serious hitch in the despatch of coal. Any delays cannot fail to be a serious inconvenience to our Allies, as well as disturbing the continuity of work in the pits.

Coal Controller is, we are Order for the accumulation of coal in the London depots by weekly instalments. On October 6 04 tons, and 51,379 tons in orders for coal amounted reduced by the end of last week

THE COAL AND IRON TRADES.

THURSDAY, OCTOBER 11.

Scotland.—Western District.

COAL.

The general position of the Scotch coal trade continues unsatisfactory, with little indication of an early improvement. Idle time is still prevalent in certain districts, and stocks at the collieries are accumulating. The industrial demand is steady, and household requirements provide a fair amount of business, but other sources of outlet are very inactive. Collieries in the west of Scotland are still comparatively busy, but transactions are mostly of the day-to-day order. Shipments for the past week amounted to 108,396 tons, against 142,901 in the preceding week and 109,041 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	22/-27/6
Ell	26/6-28/	26/6-28/	24/-26/
Splint.....	28/-30/	28/-30/	25/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The course of business in the Scotch iron trade shows little alteration. All business is still, more or less, connected with war requirements, with little deference paid to private demands, and consequently is pretty much a matter of routine. In pig iron there is continued firmness, and an increasing scarcity of forge and foundry iron. Hæmatite is absorbed by the local steelworks as quickly as it is produced. Practically nothing is being exported. Prices are unchanged. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. At the malleable ironworks makers are faced with arrears of deliveries which they find impossible to clear off. The majority of the mills are engaged on the production of steel, and the usual brands of iron bars are practically unobtainable. For a time a shell-discard quality was substituted, and made up the deficiency comparatively well, but this material is also becoming difficult to secure. As a result ordinary consumers, both at home and abroad, are in an enviable position. Raw materials too are not obtained with a satisfactory regularity, and the works are suffering considerable inconvenience. All departments of the engineering trade are extremely busy, and have enough business on hand to last for months yet, going at full speed ahead.

Scotland.—Eastern District.

COAL.

The situation in the Lothians coal trade appears a little easier. Outputs are not so difficult to dispose of, owing to an improvement in local requirements. There is, however, a considerable leeway still to be made up. Shipments were 19,903 tons, compared with 19,419 in the preceding week and 31,644 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	30/-32/
Secondary qualities.....	25/6	25/6	28/-29/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Business in Fifeshire is still very patchy, and a big improvement is required here if the collieries are to receive regular employment. Shipments were 27,143 tons, against 28,736 in the preceding week and 47,629 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	35/-40/
Unscreened do.....	24/-25/	24/-25/	32/-35/
First-class steam coal.....	28/	28/	33/-35/
Third-class do.	24/	24/	25/-26/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/

The aggregate shipments from Scottish ports during the past week amounted to 155,442 tons, compared with 191,056 in the preceding week and 188,314 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The matter which is giving most food for thought in the local coal market this week is the Coal Controller's forecast that, in order to adjust coal prices in accordance with the increased cost of production consequent upon the advance in miners' wages, selling values will be proportionately augmented as and from September 17. Everyone agrees, of course, that prices should be advanced; the retrospective proviso promises, however, to be rather awkward in operation. In many instances, sales and contract shipment have already been made based on the present scheduled figures, and payment in respect of these has been collected. It will be difficult, under these circumstances, to collect any overplus from home consumers; it will be even more difficult to convince foreign customers that they must pay more for the coal they have already received. There is the further point that, until new prices are fixed, such transactions as are entered into must be conditional and subject to price changes when the Coal Controller has made up his mind as to what the revised figures are to be. It is likely that strong representations will be made by coal

exporters and merchants generally for the withdrawal of the retrospective idea, although it is hardly to be expected that colliery proprietors will back that agitation, for they will have to pay the increased wages as from September 17 and will desire to have that increase in expenditure refunded if possible. Under all the circumstances, the fact that shortage of 'free' tonnage has continued to be an obstacle in the way of export business during this week cannot be regarded as an unmixed evil, for it has prevented the necessity of a good many financial readjustments in the near future. Official requirements continue to absorb the bulk of the large steam coal produced, leaving, however, much unscreened and small coal on the market. Home demands are taking up a good deal of Durham coal, gas, coking and smithy sorts particularly. On the whole, pits in the two counties are working very regularly and disposing of their output at a very satisfactory rate. Bunkers are moving off very slowly, however. All makes of coke are in brisk enquiry, gas coke particularly so. F.o.b. quotations for coal and coke for prompt shipment are well maintained at the minimum scheduled figures. Gas coke has advanced by from 2s. 6d. to 4s. on the week. The Swedish State Railways are said to have contracted for several further cargoes of steam coals.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/	30/	37/6-40/
Do. Tynes (Bowers, &c.)	29/6	29/6	37/6-40/
Secondary, Blyths	25/6	25/6	30/-32/6
Do. Tynes (Hastings or West Hartleys) ...	27/	27/	32/6-35/
Unscreened	23/6-25/	23/6-25/	25/-30/
Small, Blyths	20/	20/	22/6
Do. Tynes.....	18/6	18/6	20/
Do. specials.....	20/6	20/6	25/
Other sorts:—			
Smithies.....	25/-30/6	25/-30/6	25/
Best gas coals (New Pelton or Holmside)	25/	25/	32/6-35/
Secondary gas coals (Pelaw Main or similar)	23/6	23/6	27/6
Special gas coals	26/6-30/	26/6-30/	34/-35/
Unscreened bunkers, Durhams	24/-25/	24/-25/	24/-27/
Do. do. Northumbrians	24/-25/	24/-25/	22/6-25/
Coking coals	24/-25/	24/-25/	24/-25/
Do. smalls	24/-25/	24/-25/	21/-23/
House coals	28/6-30/	28/6-30/	37/6-40/
Coke, foundry	42/6	42/6	38/-45/
Do. blast-furnace	42/6	42/6	36/-40/
Do. gas	32/6-35/	30/-31/	33/-35/

Sunderland.

COAL.

The coal trade is much upset over the Coal Controller's Order for the revision of prices as from September 17. The result of this Order has been to throw coal transactions into confusion, and business is almost at a standstill. Until the new prices are fixed, merchants can only sell subject to modification by the Coal Controller, which is so indefinite that transactions will probably be held up until the new schedule is issued; hence the situation is far from satisfactory. There is still a great shortage of empty trucks, and several collieries are again idle, whilst steamers are meanwhile being detained for the coal. In all the circumstances market values are purely nominal, and can hardly be quoted, the basis being the existing schedule, plus such modifications as the Coal Controller may order. Coke prices are steadily held at late figures.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	26/6-30/	26/6-30/	35/
Secondary do.	23/6-25/	23/6-25/	27/6
House coals:—			
Best house coals	30/	30/	40/
Ordinary do.	28/	28/	27/6
Other sorts:—			
Lambton screened	28/6-30/	28/6-30/	35/
South Hetton do.	28/6-30/	28/6-30/	35/
Lambton unscreened ...	24/	24/	25/
South Hetton do.	24/	24/	25/
Do. treble nuts	20/	20/	25/
Coking coals unscreened	25/	25/	25/
Do. smalls	25/	25/	22/6
Smithies.....	25/	25/	25/
Peas and nuts	24/6-26/	24/6-26/	27/6
Best bunkers.....	25/	25/	25/
Ordinary bunkers.....	24/	24/	22/
Coke:—			
Foundry coke	42/6	42/6	37/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	31/	31/	33/

Chartering operations are at a standstill, there being no offers of either coal or space. Merchants are pressing orders for neutral ports at firm values, without securing boats. Short loading hours can be arranged.

Middlesbrough-on-Tees.

COAL.

Nothing new of importance is noticeable in the fuel trade. Rather extensive enquiries on behalf of neutral countries continue, and occasionally contracts are entered into. Backwardness of tonnage and continued shortage of trucks have been responsible for irregular working at several pits. Coal values generally are unchanged at scheduled figures, but producers are still seeking business at the lowest range of prices. The call for gas coal is heavy and increasing, but new business is not very brisk, sellers in some cases having to dispose of all their available coal in order to fulfil contracts already made. Best Durham gas coals are 25s., seconds 23s. 6d., and specials 26s. 6d. In steam coals, supply of smalls is much too plentiful. Best smalls are 20s., and ordinaries 18s. 6d. Bunker coals show no improvement. What trade is passing is slow and irregular. Unscreened Durhams run from 24s. to 25s. Household coals are steady and firm. A strong home demand continues for special manufacturing and washed fuels of all kinds. Coking coals are fairly well taken up at rates that have ruled for some time past. The coke position shows little or no alteration. Beehive and patent oven cokes both remain at 42s. 6d. for export, and gas-house product is stiff at 31s. to 32s., the latter being in very strong request. Local consumption of descriptions

needed for the blastfurnace keeps large, and values are fully maintained, notwithstanding the very ample supply. Average furnace kinds still realise the fixed maximum of 28s. at the ovens, and qualities low in phosphorus continue to sell at the limitation price of 30s. 6d. at the ovens.

IRON.

Firmness continues to characterise all branches of the iron and steel industries. As was to be expected, demand for Cleveland pig in the home trade is quieter, consumers of foundry quality now being well bought under the current month's allocations. Allotments are still coming to hand in cases where consumers have, for convenience, split their purchases. Complaints as to shortage of trucks are rather pronounced, and as a consequence some apprehension is felt that considerable difficulty may be experienced in getting out October supplies. This month's demands are exceptionally heavy, and inability to deliver may result in increase of stocks. Foreign business is dull, due, not to any abatement of demand, but to the tonnage situation, which, however, is expected to improve. For home consumption No. 3 Cleveland pig is 92s. 6d., and that price also rules for No. 4 foundry and No. 4 forge; whilst No. 1 is 96s. 6d.; and for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Demand for east coast hematite iron is as heavy as ever. Strict official supervision of distribution enables inland consumers to receive adequate and regular supply, but when such needs have been met little iron is left over for sale abroad. A few further home contracts are understood to have been entered into, but new foreign business is very difficult to negotiate. Shipments are being made to Italy under August allotments, but sufficient steamers to meet requirements are not forthcoming. September export allocations are not expected to be issued for a few weeks. Mixed numbers are 122s. 6d. for home use and 141s. for shipment to the Allies, the export quotation being subject to such addition as may be fixed to cover the excess neutral ore freights. The continuous pressure for delivery of foreign ore is met as tonnage becomes available. Demand for finished iron and steel for Government requirements, and shipyard needs, is unabated, and keeps manufacturers so fully occupied that they are indifferent to ordinary commercial business. Prices are stationary.

Cumberland.

Maryport.

COAL.

The coal industry in this locality continues in an exceedingly active condition, and from the tone of the market there is every reason to think that the busiest season of the year has already set in. The clamour for coal is growing keener on all hands; with the return of colder weather the house coal trade is brisker, and requirements, more particularly on local account, are now expanding quicker than they can be coped with. The situation, however, throughout the district is one of increasing difficulty. Costs are again mounting, there is less coal to meet an increased demand, and the position so far as West Cumberland is concerned is gradually becoming more stringent. At the moment there is a phenomenal call for fuel in all branches, and with the increased activity in the iron and steel trades, the clamour for best steam and other manufacturing sorts promises to become bigger than ever this winter. The home market is very firm, more business is now being offered than can be accepted, and as there is not enough to go round, the collieries are finding it extremely difficult to satisfy the wants of all important consumers to the full. The demand on all accounts is very much in excess of the supply and therefore both outside and export consumers are again on short commons. In fact, local needs have been so heavy that little more than a thousand tons have been sent to the docks this week for shipment. Owing to disputes at one or two of the pits, production has been rather lower than usual during the past fortnight. At the time of writing all the pits in the county are in full swing, and it is hoped that outputs will be more satisfactory all over the district before the week end. The enhanced cost of production, owing to the recent all round advance in miners' wages, is said to be the main reason for the posting of the notices to terminate contracts on Saturday next, at the Allhallows Colliery, near Mealsgate. A similar step, it is rumoured, is also being contemplated by the management of another small colliery; but it is not anticipated that the closing of any pit in the county—however small—would be sanctioned by the Government, more particularly at a time when there is such an urgent need for all the coal that can be raised. The sudden spell of cold weather has given a further stimulus to house coal, and some of the depots have already booked more orders than they will be able to cope with before the end of the month. Manufacturing fuel is in strong and growing demand, local needs are expanding, and a big proportion of the industrial fuel raised is still earmarked for the iron and steel and other important works in West Cumberland. Gas coal is very firm, and locomotive fuels are in steady request, but supplies are so scarce that no outside orders are being dealt with, and at the moment the only stocks being sent away by rail are for consumers in the district. The export trade is as busy as it can possibly be under the circumstances. The clamour for all

Current quotations.

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	23/4	23/4	23/4
Best washed nuts at pit...	21/3	21/3	21/3
Buckhill best coal	22/6	22/6	22/6
Do. double-scrned washed nuts at pit	21/	21/	21/
Oughterside best coal at pit	22/6	22/6	22/6
Oughterside best washed nuts at pit	21/	21/	21/
St. Helens (Siddick) best coal at pit	22/6	22/6	22/6
St. Helens best house nuts at pit	21/	21/	21/
Best dry small at pit	12/6	12/6	12/6
Best steam nuts	19/	19/	19/
Best Cumberl'nd coal, f.o.b.	19/6	19/6	19/6
Best washed nuts, f.o.b. ...	17/6	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	28/6	28/6	30/
Best coal for gasworks ...	20/	20/	20/
Best washed nuts for gas-works	19/	19/	19/

sorts for the Irish market is as keen as ever, but owing to increased pressure on home account a good many consumers are now only able to secure little more than half of the amount of coal they need. The outlook at present is not very bright, but there is no doubt that as soon as outputs improve the collieries will be able to give more attention to the requirements of their Irish customers. The shipping trade at Silloth is tremendously brisk, but the bulk of the coal is exported from collieries in Scotland and the east coast. The shipments for this week have amounted to 1,780 tons, compared with 4,100 tons at the corresponding period of last year, or a decrease of 560 tons compared with the previous week. The imports this week included a good cargo of pit timber from Dumfries for the local collieries. Coke makers are very busy, all the ovens from Oughterside to Whitehaven are in full blast, and all the production is being absorbed at the iron works in West Cumberland. So far there has been no change in either home or export quotations, but an all round advance in price may be expected shortly to meet the increased cost of production.

IRON.

The situation remains practically unchanged, the demand being very strong, and production as large as it can possibly be until more furnaces are put into blast. With such a call for metal, prices are easily maintained at the maximum fixed by the Government, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton, with warrants at cash at 115s. per ton. Special iron is 140s. per ton, and semi-special iron is still quoted at 135s. per ton f.o.t. The steel industry is intensely busy, and all the mills at Workington and Barrow are securing good outputs. Billets are in very strong request, but other commercial sorts are still rather quiet. Steel rails, heavy sections, are from £10 17s. 6d. to £11 per ton, with light sections at from £14 to £14 10s. per ton. Heavy tram rails are quoted at £14 per ton, ship plates £11 10s., and boiler plates £12 10s. per ton. All the local mines are working full time, and good outputs are being obtained. The imports of foreign ore for the week have amounted to 3,500 tons.

South-West Lancashire.

COAL.

Little or no progress is made in overtaking the arrears of orders in the inland household trade, and merchants are not having a happy time of it. Amongst other troubles is the new instruction from the Coal Control foreshadowing a possible advance dating back to September 17 on all fuels sent out from the colliery, which, if carried out in its entirety, they will have to pay, at the same time knowing the impossibility of increasing the price for fuel delivered in small lots prior to the receipt of the circular, and in many cases not only paid for but consumed. In addition, merchants are totally unable to deal with the present situation, and can only continue to send out fuel at the prices that have been current prior to the receipt of the notice, with a very doubtful prospect of getting the bulk of it back if any advance is demanded. With regard to the Wirral, since the cessation of Lancashire fuel there matters are in a mild state of chaos. The newly allocated coal is not coming forward in nearly sufficient quantities to keep pace with present consumption. Shipping remains much as it was, requirements for ordinary bunkering and export on the whole being in excess of supplies. Shipments to France and Italy are fully maintained. Prices for Lancashire steam coals are the full rates according to official schedule. With regard to the coastwise and cross-channel trade, the merchant across the water is a willing buyer when fuel is forthcoming and suitable freight can be arranged. In slacks, the consumption is gradually creeping up, and there is very little free slack available.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	21/-22/	21/-22/	21/
Do. (f.o.b. Garston, net)	25/6	25/6	25/6
Medium	19/-20/	19/-20/	19/-20/
Do. (f.o.b. Garston, net)	24/6	24/6	24/6
Kitchen	18/	18/	18/
Do. (f.o.b. Garston, net)	23/ upwds.	23/ upwds.	24/ upwds
Screened forge coal	18/	18/	18/
Best scrnd. steam coal f.o.b.	—*	—*	23/-24/
Best slack	16/	16/	16/
Secondary slack	15/	15/	15/6
Common do.	14/	14/	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. There was not much business passing, the sole topic of interest being the circular just issued by the Coal Controller as to the war wage advance, and the probable consequent advance in the price of coal. The shipping trade is firm, while slack is still on the easier side. Prices are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	22/-23/	22/-23/	22/-23/
Medium	19/6-21/	19/6-21/	19/6-21/
Common	18/-18/6	18/-18/6	18/-18/6
Furnace coal	17/6-18/	17/6-18/	17/-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	16/ upwds	16/ upwds	16/ upwds
Common slack	14/ upwds	14/ upwds	14/ upwds

* As per official list.

IRON.

There are no new conditions as regards the trade of the district here. Prices remain as previously quoted, and the difficulty is in securing materials.

Yorkshire and Derbyshire.

Leeds.

COAL.

There was a very large and representative attendance on the Yorkshire Coal Exchange on Tuesday, but very little business of an ordinary market character was transacted, although the demand for coal of all kinds is greater than ever. Everybody wanting coal, and none to sell,

summarises the position in that respect. The notice issued by the Coal Controller this week of a possible increase of prices from September 17 to cover the advance in miners' wages, as well as other phases of the control scheme, absorbed the conversation on the market to the exclusion of almost everything else. The proposal to make the advance of prices retrospective has thrown the trade afresh into a state of unsettlement and uncertainty, if not chaos, and criticism is rife. In some usually well-informed quarters it is suggested that to increase prices back to September 17 will prove so impracticable when its probable effects are examined, that it is likely that the date will be altered to, say, October 1, although, even then, it is difficult to see how hardship is to be avoided in the retail trade, in regard to coal sold since that date and the Controller's announcement. It cannot be said that anxiety with regard to the coal transport reorganisation scheme has diminished; on the contrary, dissatisfaction is more widespread and intense. There are strong complaints of congestion on the railways in the London area, and serious difficulty arising from wagon shortage is reported at some of the pits. Experience varies considerably at the collieries. Some are well supplied with empties, others are short, and in some cases ground stocking has had to be resorted to in order to maintain full time working. With regard to house coal the demand is very keen, particularly from the local markets and other districts whose supplies have been reduced in order to send the extra deliveries ordered by the Controller for London. The effects of this disturbance of normal supplies is increasingly felt, but a number of collieries have this week received modified instructions reducing the extra quantities they have been sending to London, which is regarded as indicating that the situation there is now less serious. This enables better supplies to be sent to the south-eastern counties and the provinces generally, including West Yorkshire itself, where there are many complaints of shortage. Subject to the expected increase, pit prices for the West Riding are: Haigh Moor selected 20s. to 21s., Silkstone best 19s. 6d. to 20s., Silkstone house 18s. 6d. to 19s., other qualities 17s. to 18s. A very heavy demand for gas coal is maintained. The stocks at the gas works, which were low to begin with, are rapidly diminishing in consequence of the increasing consumption of gas, not only for lighting, heating and ordinary power, but for motor purposes, for which its use is spreading. The deliveries from the collieries are generally considerably below current needs, and there is absolutely nothing to be picked up in the open market. By comparison with other descriptions of fuel, the position of manufacturing fuel is satisfactory, supplies generally being sufficient to keep the works going. Washed nuts are very scarce, the whole output practically being reserved for Government controlled works, and rough slacks are firm, but small slacks are easier to secure. There is no change in the strong demand for washed furnace coke, or in the scarcity of coking slacks, which still presents a difficulty to coke makers.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	19/-20/	19/-20/	20/-21/
Wallsend & London best	18/6-19/	18/6-19/	19/-20/
Silkstone best	18/6-19/	18/6-19/	19/-20/
Do. house	17/6-18/	17/6-18/	17/-18/
House nuts	16/-17/	16/-17/	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	22/6-23/6	22/6-23/6	23/-24/
Silkstone best	21/6-22/6	21/6-22/6	22/-23/
Do. house	20/6-21/6	20/6-21/6	20/-21/
Other qualities	18/-19/6	18/-19/6	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	15/-16/	15/-16/	16/-17/
Gas nuts	14/6-15/6	14/6-15/6	15/6-16/6
Unscreened gas coal ...	14/-15/	14/-15/	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	16/-17/	16/-17/	17/-18/
Large double-screened engine nuts	15/-16/	15/-16/	16/-17/
Small nuts	14/-15/	14/-15/	15/-16/
Rough unscreened engine coal	14/-15/	14/-15/	15/-16/
Best rough slacks	13/-14/	13/-14/	14/-15/
Small do.	11/-12/	11/-12/	12/-13/
Coking slacks	11/6-12/6	11/6-12/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

A good deal of attention is directed to the increase to be made in the selling prices of fuel. Consumers have been notified in general terms that the increase will be retrospective, covering the period from the 17th ult., from which date the new war advance to all colliery workers begins. Colliery owners have held meetings to discuss the proposals, and the increase necessary on the part of the older and smaller collieries appears likely to be very considerable. Obviously, a general average will have to be struck, but the prospect for the smaller concerns is not very promising. However, the hope is expressed that the new conditions will influence the men to work the maximum time, and in this way one evil factor will be counteracted. In regard to business generally, the character of the demand shows very little alteration. It is still the case in regard to collieries having to dispense the bulk of the production in such directions as they are ordered by the Controller, and, in the lesser degree, as ordered by the local distribution committee, who are busily engaged in endeavouring to prevent difficulties. Their task, however, is by no means easy, and complaints are very frequent of the inferior quality or unsuitable grade of fuel which has to be used by large consumers. Whilst the justice of the complaint is recognised, for the time being, it appears to be absolutely impossible to make much alteration. On the whole, the output is well maintained and expeditiously dealt with. Although there is little free coal being sent to the ports, a large tonnage is going from this district for shipment to the Allies and for the needs of the Admiralty. On account, the demand continues to be extremely keen, and it is not easy to provide the tonnage which is required. Many concerns are still handicapped owing to the short supply of steam nuts which they are accustomed to have at normal times, the needs of the munition factories and other engineering concerns calling for practically the whole output of this class of coal. The supply of gas coal under contract continues to be of a variable description, and

are complaints of material shortage in various parts of the district. It is impossible to find any surplus lots. The demand is stronger, and coking slacks continue to be obtained in sufficient quantities. There is a shortage in respect to house coal, owing to the shortage of tonnage which has to be sent to London. The district is experiencing more pressure from the West Riding and near-by markets, but only reduced supplies are possible. The demand for furnace coke also continues to be very active.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	20/-22/	20/-22/	20/-22/
Best Barnsley softs	18/6-19/	18/6-19/	18/6-19/
Secondary do.	17/-17/6	17/-17/6	17/-17/6
Best house nuts	16/-17/	16/-17/	16/-17/
Secondary do.	15/6-16/	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals.....	17/6-18/6	17/6-18/6	17/6-18/6
Secondary do.	16/6-17/6	16/6-17/6	16/6-17/6
Best washed nuts.....	16/3-16/6	16/3-16/6	16/3-16/6
Secondary do.	15/6-16/3	15/6-16/3	15/6-16/3
Best slack	12/6-13/	12/6-13/	12/6-13/
Secondary do.	10/6-11/	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	16/6-17/	16/6-17/	16/6-17/6
Unscreened do.	15/6-16/	15/6-16/	15/6-16/
Gas nuts.....	16/	16/	16/
Furnace coke.....	25/8	25/8	25/8

Hull.

COAL.

Supplies continue only moderate, and "free" coal exceedingly scarce and difficult to buy. Large quantities are being sent to France, which country is still a keen buyer of West Yorkshire Hartleys. Large steamers are taken up very considerably on Admiralty and official account. In these a small business is being done with neutrals, exporters having to pay 33s. to 35s. for accommodation lots of best South Yorkshire hards. Derbyshire hards are not available for export. All kinds of manufacturing fuel are readily absorbed at limitation figures, only small coal showing a rather irregular tendency. Gas and house coals in great request, but demands cannot be wholly satisfied on account of the calls in other directions upon the Yorkshire outputs. In view of the shortage, merchants are exercising discrimination in executing local orders with a view to a fair distribution. The official return shows that the quantity of coal which arrived at Hull from the collieries in September was 235,356 tons, as compared with 316,467 in September last year—a falling off of 81,000 tons. The total arrivals to end of September amounted to 2,171,738 tons, against 2,529,199 tons in the corresponding nine months of 1916. Export figures are withheld, but the bulk of the shipments, after Admiralty and local requirements were met, was to France.

Chesterfield.

COAL.

The coal trade of this district presents no new feature. The demand for fuel of every kind is as great as ever. House coal orders are coming to hand in increasing numbers, but considerable delay is inevitable in executing these. Coal for manufacturing purposes continues in urgent request, cobbles and nuts being, particularly, in pressing requisition. A good demand is experienced for slack for steam-raising, but supplies of this fuel are less difficult to find, and there is no difficulty in satisfying customers' requirements. Gas coal is in brisk request and steam coal for locomotive use is in equally good demand. The export trade shows no change from its quiet conditions. Exporters find much difficulty in obtaining such coal as they need even for their reduced requirements. The coke trade is active, all qualities being wanted.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

Every branch of the iron trade continues in a state of great activity. Work is abundant.

Nottingham.

COAL.

As the month advances the demand on all branches of the trade in this district becomes keener. In the domestic section, while there is no particular pressure on local merchants from customers, many of whom had taken the precaution to get in winter stock earlier, there is an increasing demand on collieries by merchants for full contract deliveries in view of their scarcity of stock. As owners likewise have no reserve supplies to draw upon, the tonnage apportioned to the various districts, according to the Coal Controller's Order, is dependent upon the daily output. Under the new régime matters are beginning to work more smoothly, and considering the exceptional conditions it cannot be said that supplies are unsatisfactory. Prices generally show little alteration, though there have been slight increases in some cases allowable by the Act. There is a very brisk tone in the steam coal branch, and the full output is required to satisfy the demands by firms engaged on war work and the tonnage required to cover contracts. Slacks of most grades are in good supply, with the exception of those used in coke-making, which continue to be inadequate to produce the full output of the ovens. What supplies of gas fuel are obtainable are absorbed by contracts.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	18/6-19/6	18/6-19/6	18/6-19/6
Secondary do.	17/-18/	17/-18/	17/-17/6
Cobbles	16/9-17/6	16/9-17/6	16/9-17/6
Nuts	16/-16/6	16/-16/6	16/-16/6
Slack	12/-13/	12/-13/	12/-13/
.....	10/6-11/6	10/6-11/6	10/6-11/6
.....	11/	11/	11/

Leicestershire.

COAL.

The most prominent feature is the notification by the Government Control that the advance in wages becomes payable this week. Each man and youth, therefore, receives three and a-half weeks increase, or £1 10s. 6d., the advance being inclusive from September 17. The advance at each colliery in this district will work out at between £400 and £500 per week, which means that this week each colliery will pay in wages an additional £1,575 for the same output. In other words, the wages bill of each colliery will be increased by £20,000 to £25,000 per annum. The effect on the mining towns and villages will be very great, and must be so when it is considered that for every group of four collieries there will be an increase in the already high wages paid, amounting to over £100,000 per annum. The effect on colliery shareholders will also be very great, as this increase will absorb a very large proportion of the profits. What returns the proprietors will receive in the form of increased prices for coal has not yet been determined, but it is evident that there must be some adjustment in the prices paid by merchants. Another point also to be determined is whether or not this increase will be made retrospective so as to cover the period of the increase in wages. This is yet another cause of great anxiety to colliery managers, in addition to those of administration under conditions of unexampled difficulty. The demand for all classes of household for London and district is maintained at the maximum, while all the main and deep cobbles and nuts are taken up as rapidly as they can be produced. Bakers' nuts as well as small nuts for mechanical stokers are in the keenest possible request. Country merchants are now insisting on larger deliveries, and this has been brought about by the sudden increase in the domestic consumption at the great centres of population in consequence of the advent of very cold, damp weather. There are very small stocks at country stations, and none whatever at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	17/6-19/	17/6-19/	17/-19/
Second, hand picked	16/6-17/6	16/6-17/6	15/6-17/
Deep screened cobbles	17/-18/	17/-18/	16/6-17/6
Deep large nuts	17/-17/6	17/-17/6	16/-17/
Bakers' nuts	16/-16/6	16/-16/6	15/-16/
Small nuts.....	15/6-16/	15/6-16/	14/6-15/6
Deep breeze	13/9-14/6	13/9-14/6	12/9-13/6
Peas	13/-13/3	13/-13/3	12/-12/3
Small dust	6/-7/	6/-7/	6/-7/
Main nuts for London kitcheners	14/6-15/	14/6-15/	13/6-14/6
Stearns, best hand picked	15/-15/6	15/-15/6	14/-15/
Stearns, seconds	14/-14/6	14/-14/6	13/-14/6
Main cobbles for kitcheners	14/6-15/	14/6-15/	13/6-14/6
Main breeze	13/6-14/6	13/6-14/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The latest development in the coal trade is one that is causing a good deal of concern. On Saturday, merchants were notified by the coal owners that an advance was to be allowed by the Coal Controller, and that would be retrospective from September 17, which means that merchants will be expected to pay an enhanced rate for coal from that date which has already been delivered to customers. So far no amount has been mentioned. Meantime, supplies are kept very short owing to the large quantities being sent to London, and the situation has been aggravated by the recent strikes in the district. Stocks at depots and at merchants' call are very slender, though against this the public hold stocks in their cellars considerably in excess of any previous period. So far as the house coal trade is concerned, the future depends on the weather. With reasonably mild weather there should be no very serious amount of hardship. Industrial fuel is wanted in large quantities, and precedence is given to establishments engaged on essential work. Current prices remain unaltered pending official direction from the Controller.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	22/	22/	22/
Do. seconds deep	20/	20/	20/
Do. best shallow	19/	19/	19/
Do. seconds do.	18/	18/	18/
Best hard	18/6	18/6	18/6
Forge coal	16/	16/	16/
Slack	11/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder..	19/	19/	19/
Do. hand-picked			
cobs	18/	18/	18/
Best hard spires	20/	20/	20/
Forge (steam)	16/	16/	16/
D.S. nuts (steam)	14/6	14/6	14/6
Small (do.)	14/6	14/6	14/6

IRON.

People engaged in the iron and steel industries are naturally interested in developments in coal prices, because any advances that are conceded to the collieries will necessarily re-act on iron and steel. Dearer coal will in all likelihood be followed by an application to the Ministry of Munitions by pig iron smelters and finished iron manufacturers for a revision of maximum rates, and in the agreements which smelters make with their customers it is provided that any advance which the Ministry may make will be retrospective. The quarterly meeting this week did little more than to reaffirm existing conditions. Raw materials and finished products are alike sold at fixed Government prices, negotiated through Government channels. Values have been practically stationary throughout the quarter; the net selling prices of the district have altered by 3d. at on only, and that in a downward direction. This in itself is testimony to the extent and efficiency of the control system. The chief feature of the iron trade at the moment is the growing stringency in pig iron. There is more difficulty in supplying foundry grades than forge iron, the former being wanted in large quantities by the Admiralty, in addition to a multitude of other purposes connected with the manufacture of munitions. Sellers cannot look at all the orders

that are offered them, and they are doling out lots to old customers as best they can. Very large supplies of forge iron are also wanted. Bar iron continues to be the staple product of the South Staffordshire area. It constitutes almost 70 per cent. of the whole, and output is limited only by the capacity of the mills. The average net selling price worked out for July and August, the latest returns available, at £14 17s. 9d. A small quantity of merchant bars is available outside the control scheme, and for these buyers have to pay about £14 10s. delivered, compared with the net price of £13 15s. at makers' works for controlled material. Best bars, for which the enquiry is on a large scale, are firm at £15 10s., less 2½ per cent. at makers' works; nut and bolt iron is £14 5s. to £14 10s.; puddled bars, £12 10s. to £12 15s., which is 5s. dearer than recently. The shipbuilding programme is making very heavy demands upon the output of steel, and consuming trades are rigidly "rationed" in raw material. Even over discards a firm grip is kept.

Forest of Dean.

Lydney.

COAL.

As the year advances the demand for the house coals of this district is steadily gaining strength, and there is every prospect of a great rush of orders as the weather becomes colder. The order books already are in a hopeless position, each of the collieries having a heavy accumulation of arrear orders. For steam and manufacturing fuel a steady pressure is maintained by buyers, and supplies continue much below the requirements of consumers. The new price lists of the district's coal have not yet been published; we hope to give them in our next issue.

THE IRISH COAL TRADE.

THURSDAY, OCTOBER 11.

Dublin.

With the advent of colder weather, the trade is more active for household coal, and there is now a good demand both locally and in the inland districts, prices of all qualities being without change. The shortage of coal in the South of Ireland continues, and the Dublin merchants have been sending coal by rail to those districts which were unable to get supplies from across the water. At the last meeting of the Corporation, the town clerk read the report of the sub-committee appointed to confer with representatives of the Coal Merchants' Association on the subject of the retail prices of coal, but no prices have as yet been fixed. The Lord Mayor and some members of the Corporation were appointed with full Corporation powers for the purpose of dealing with the prices. The action of the Coal Controller is awaited, also that of the Shipping Controller with regard to coastwise freights. Current quotations in the city are as follow: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; Pemberton Wigan, 42s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount for cash. Scotch steam coal, 41s.; Welsh steam, 48s.; coke, 46s. per ton. The total quantity of coal imported last week was 25,053 tons.

Belfast.

The household trade shows an improvement since last week, orders now being more numerous, but prices all remain unchanged, at late rates. Trade in other departments is fairly good. Prices stand as follow: Best Arley house coal, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Scotch steam coal is about 29s. per ton; best qualities up to 35s. and 37s. 6d. per ton. Irish coal at Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton, and 30s. per ton delivered in Belfast. From September 16 to 29, the total number of coal-laden vessels entering the harbour was 129. A meeting of the committee appointed by the Belfast Corporation in connection with the regulation of coal prices was held in the City Hall last week, the Lord Mayor presiding. A conference took place with the representatives of the Merchants' Association as to the maximum retail prices to be charged for house coal, and these, it is stated, were agreed on. The merchants will hand in their schedule upon the agreed basis in due course. It is understood that it is not proposed to disturb the present mode of working with regard to the general dealers.

THE BY-PRODUCTS TRADE.

Tar Products.—There is a good demand for pitch for export to the Continent, at 48s. per ton f.o.b. London; and the provincial position shows further improvement. Solvent naphtha is strong, at about 3s. per gallon. Average quotations are as follow:—Coal tar, 24s. 6d. to 30s. Pitch, east coast, 19s. to 20s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 19s.; Clyde, 20s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent., naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 4½d. Coal tar crude naphtha, in bulk, north, 6½d. to 6¾d. Solvent naphtha, naked, north, 2s. 8d. to 2s. 10d. Heavy naphtha, north, 1s. 5d. to 1s. 7d. Heavy oils, in bulk, north, 3¾d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 4½d. per unit; "B" quality, 2d. to 2½d.

Sulphate of Ammonia.—There is a continued demand for this product for home agricultural consumption, and export business is reduced to a minimum.

Increase in German Coal Prices.—At the last meeting of the Syndicate, it was decided to increase the selling prices (inclusive of coal tax) for the final quarter of the year by 2-40 mk. per ton for coal, 3-60 mk. for coke, and 2-50 mk. for briquettes. The Brown Coal Association for Mid-Germany has announced that, with the concurrence of the Minister of Commerce, the price of brown coal has been raised, as from October 1, by 30 pf. per ton, and that of briquettes by 1 mk. per ton. An advance of 2-40 mk. per ton has also been notified in respect of Saar coals.

United Kingdom Trade with Switzerland.—Mr. G. B. Beak, the Acting British Consul-General at Zurich, who is visiting this country, will be prepared to interview by appointment representatives of British firms at the offices of the Department of Commercial Intelligence, commencing on Monday, October 22. Applications should be made not later than Thursday, October 18, and should be addressed to the Comptroller-General, Department of Commercial Intelligence, 73, Basinghall-street, London, E.C. 2, and the reference number (46,273/17) should be quoted.

THE WELSH COAL AND IRON TRADES.

THURSDAY, OCTOBER 11.

Monmouthshire, South Wales, &c.

Newport.

COAL.

There is still a great deal of dulness in the coal market in this district. The prospects of the increased arrivals of tonnage were modified by the very stormy weather at the beginning of the week. This, again, held up a great many colliery wagons, and made work at the pits intermittent. Though there was no alteration of the scheduled prices, it was known that the Controller would make modifications to meet the enhanced wages granted to all grades of the men and boys. This considerably upset the market, and made future sales rather uncertain. There is still a large demand for house and gas coals. Patent fuel and coke are practically unaltered.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	30/	30/	41/-43/
Western-valleys, ordin'y	29/	29/	40/-41/
Best Eastern-valleys ...	29/	29/	39/-40/
Secondary do.	28/	28/	35/-38/
Best small coals	21/6	21/6	26/-28/
Secondary do.	20/	20/	24/-26/
Inferior do.	18/	18/	20/-23/
Screenings	23/	23/	27/-28/
Through coals	27/	27/	26/-28/
Best washed nuts.....	30/	30/	30/-32/
Other sorts:—			
Best house coal, at pit...	33/	33/	24/-26/6
Secondary do. do. ...	30/9	30/9	22/-24/
Patent fuel	32/6	32/6	40/-43/6
Furnace coke.....	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	60/-62/6

IRON.

There is little fresh to report in the iron and steel trades of the district. The works are being employed to their full extent, and a large and steady output is being maintained, notwithstanding the difficulty in some directions to obtain supplies of raw materials.

Cardiff.

COAL.

There is still no improvement in the conditions, and pit stoppages are frequent throughout the coal field. Some companies have had four and five pits idle at the same time, and in the Merthyr Vale and Mountain Ash districts at the end of last week, no fewer than 8,000 men were "on stop" owing to shortage of wagons. The stormy weather of the last few days has also prevented expected arrivals of vessels, and clearances have been considerably below anticipations. To make matters worse, there was a strike of tipplers at the Bute Docks on Tuesday, and work was suspended for the greater part of the day. Stocks, of course, were accumulating in the meantime, and at the time of writing there was the probability that stoppages would be frequent throughout the week, owing to inability to release wagons. So far as official business is concerned there is no slackening in the demand, and the shipments keep up to the average. Beyond this, however, there is little doing. Chartering last week was on a small scale, the amount of tonnage taken up being only 13,265 tons. Throughout the year, up to the end of September, the fixtures reported showed a decrease of over three million tons compared with the corresponding period of 1916. Of course, in these figures Admiralty charterings and official shipments to the Allied Governments are not included. No official intimation has yet been received from the Coal Controller with regard to the representations made to him on the prices to be charged for coal for transit to the south-western counties, and business continues to be negotiated subject to any modifications which may be made hereafter. There is also some confusion existing as to the interpretation to be placed on the instruction of the Controller that the recent increase in miners' wages must be passed on to the consumer. It is contended in some quarters that this is only meant to apply to coals for home consumption and not

Prices f.o.b. Cardiff (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	39/-41/
Ordinary	30/	30/	37/-39/
Best bunker smalls	23/	23/	28/-29/
Best ordinaries.....	21/6	21/6	27/-28/
Cargo qualities.....	20/	20/	23/-24/
Inferior smalls	18/	18/	20/-23/
Best dry coals	30/	30/	40/-42/
Ordinary dries	28/6	28/6	38/-40/
Best washed nuts	30/	30/	34/-36/
Seconds	28/6	28/6	33/-34/
Best washed peas.....	27/6	27/6	32/-33/
Seconds	26/6	26/6	30/-32/
Dock screenings	—	—	—
Monmouthshire—			
Black Veins	30/	30/	38/-40/
Western-valleys	29/	29/	38/-40/
Eastern-valleys	29/	29/	36/-37/
Inferior do.	28/	28/	34/-36/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	38/-40/
Through-and-through	—	—	32/-33/
Small	26/	26/	28/-30/
No. 2 Rhondda—			
Large	27/	27/	33/-34/
Through-and-through	25/	25/	25/-28/
Small	20/	20/	22/-23/
Best patent fuel	30/	30/	43/-45/
Seconds	30/	30/	40/-43/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	57/6-62/6
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	70/-72/6	67/6-70/	44/-44/6

* Nominal.

to exported coals, and in the case of the former, as the Order is made retrospective to September 17, the question arises as to how the difference is to be recovered in cases of completed transactions. In the case of exported coals, most shippers have protected themselves by a clause providing that the business is subject to any modification which might be necessary when the classification scheme is published. It is now thought that this will be made public within the course of the next few days, and that the wages increase will be added to the new schedule. Another point of interest which has been freely discussed during the past week, is the proposed pooling of Italian business, such as has been done at Glasgow, Newcastle and Swansea. Two meetings have been held, but up to the present no definite conclusion has been come to. Beside the requirements of the Italian State Railways, which, outside the British Admiralty, are the biggest customers in the Welsh coal market, the Italian Commission were guaranteed a minimum of 225,000 tons per month. These figures have been considerably exceeded, and it is probable that the excess quantities shipped will be in the neighbourhood of a million tons. The pooling scheme is reported to be working satisfactorily in other ports, and it is not improbable that some such working arrangement will be agreed to in Cardiff before many days have passed. For household and other bituminous coals there continues to be a strong demand, and a difficulty in getting forward the necessary supplies. Patent fuel and coke are plentiful, and there is a steady request at the scheduled rates. The pitwood position is becoming worse, owing to the scanty imports and the difficulties of transport in dealing with English timber. The recent inclement weather has had the effect of making the roads very heavy, and hauliers complain of their inability to get the wood to the mills and the railway depots. Foreign pitwood is steadily advancing, current prices being on the basis of 70s. to 72s. 6d. per ton.

IRON.

There was a heavy increase in the shipments of tin-plates last week, the quantity exported amounting to 30,782 boxes. Receipts from works, on the other hand, were below the average, and only amounted to 11,436 boxes, leaving 52,283 boxes in stock in the docks warehouses and vans, compared with 71,629 boxes the previous week, and 128,362 boxes at the corresponding date of last year. The demand for plates continues unabated, and makers have the utmost difficulty in fulfilling their engagements owing to the irregular supply of bars. All bar and rail mills are working at high pressure, and ordinary commercial business is entirely neglected owing to the necessity of keeping pace with the demands for war purposes. All dealings in tin-plates are on the basis of the controlled price of 30s. per box for standard sizes. Steel bars are nominal, and the supply is strictly controlled and allotted. In the galvanised sheet trade there is little doing, and the works generally are producing black and painted sheets, and trench plates. Spelter is £54 per ton. Iron ore supplies are satisfactory, but complaints are made in some instances of poor grade ore, due to the fact that supervision at the ports of shipment is not what it should be. Scrap metals are steady at maximum prices.

Swansea.

COAL.

There was a good attendance on 'Change this morning and there was no material alteration to report in the conditions prevailing on the anthracite coal market. A fair amount of business was transacted. All qualities continued firm and in good demand, with the exception of culm and duff. Machine-made sizes in particular were very busy, nuts and beans being exceptionally firm. Bituminous large was firm, but throughs and smalls were on the easy side.

Llanelli.

COAL.

The position of the market is unchanged. Tonnage arrivals are not up to current requirements, and steam coals in particular are irregular. Large kinds of the better grades are steady, but there is no improvement in the position of throughs and steams, and stocks of the lower grades are accumulating. Anthracite large qualities are firm, and the higher kinds in good demand. Cobbles are also a better market. Beans and nuts are very strong, and supplies difficult to secure. Culm and duff are moving very slowly, and stocks heavy. Manufacturing coals are in good demand, and house coals are also going well. The Coal Controller has advised the collieries that, owing to the recent advance in wages given to the colliers, prices of all coal delivered on and after September 17 are to be increased. It is anticipated that the new prices will be known during the present week.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/6
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-41/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-31/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/-23/
Rubbly culm.....	13/	13/	14/6-15/
Red Vein culm	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	26/-29/
Small	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Small	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

SOUTH WALES MINING TIMBER TRADE.

Rising Prices.

The market prices of French pitwood are rising, quotations during the past few days having been strongly held at 70s. per ton ex ship Cardiff, and unless imports are upon a heavier scale, prices must inevitably rise to higher levels. For some three or four weeks past the quantity of foreign mining timber imported has been very poor in fact, below the quantity allowed to be imported—the scarcity of vessels being most pronounced. Apparently the larger sized ships have deserted the trade for longer distanced voyages, leaving only the small sailing ships and steamers available; furthermore, there are large stocks of coal held up in wagons in South Wales awaiting shipment. The difficulty in procuring empty wagons has been such that heavy demurrage costs have been incurred by importers, who oft-times of late have found transactions merely changing money. The element of chance in the endeavour to make a small profit is very great in the pitwood trade, and a number of importers are not at all keen on importing at the present time, which also accounts for the fact that imports have been actually below those authorised by the Controller. The home-grown article, therefore, has been in greater demand.

The Week's Imports.

For the week ending October 5 the total quantity of mining timber imported amounted to 22,527 loads, of which 6,284 loads were received from France under licences—1,392 loads going to the agents supplying the Admiralty collieries and the balance, 4,892 loads, for allocation amongst the qualified importers. There were also 16,243 loads of pitprops received from Russia; this is the largest quantity of timber imported from Russia since the trade re-commenced some few weeks ago. The actual quantities of pitwood and pitprops imported for the week ending October 5 were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Sept. 29	Lysberg Limited	840
" 29	Montague L. Meyer.....	2,983
" 29	Montague L. Meyer.....	333
" 29	A. Bromage	1,080
Oct. 1	Morgan and Cadogan.....	540
" 1	Lysberg Limited	552
" 1	W. H. Williams	103
" 1	Morgan and Cadogan.....	1,080
" 1	E. Marcesche and Company ...	570
" 1	Franklin Thomas and Company	1,375
" 5	Montague L. Meyer	12,927

(pit-props)

Total, 6,140 loads of pitwood and 16,243 loads of pit-props.

Newport:—

Morgan and Cadogan

144

Home-Grown Pitwood.

The imports of Irish and Cornish mining timber into South Wales were upon a slow scale. Supplies were quickly snapped up, and the best sorts realised 70s. per ton and even more in places. Thus, home-grown wood is commanding round about the same prices as French fir. Deliveries of home-grown timber to the collieries were fair, having regard to the difficulties to be contended with, the woods in the district being situated in undesirable places, and the roads adjacent never being intended for heavy traffic. The recent rains have churned the land into quagmires, and wheels sink to their axles. There is an acute shortage of woodmen and hauliers, and very hard work is entailed upon both horses and men. Only the strongest men are fit for the arduous work of felling and transporting timber in the winter, and unless a larger number of men are attracted or drafted to the trade there is little hope of any material increase in the deliveries of wood.

THE LONDON COAL TRADE.

THURSDAY, OCTOBER 11.

The London coal trade has been largely influenced by the colder weather, and the pressure for all household qualities has greatly intensified. The quantities arriving, both by rail and sea, have certainly increased, and all the wharves and depots are exceedingly busy trying to overtake the orders on hand. Many of the back orders are now cleared, and the loaders and carmen have stolidly set themselves to deliver as much coal as possible when the weather conditions are favourable. The rain of the previous week sadly hindered the delivery trade. Depots in the North of London have in some cases been obliged to ease off in the supplies, as the sidings are full of loaded wagons; but other depots, especially those in the South of London district, are still calling out for extra quantities. Colliery representatives are still declining orders, unless from contractors, and there is very little free coal offering. Considerable excitement was caused on the market on Monday last, when notices were received from all the various collieries that the Controller had under consideration the proposal of giving the collieries an advance in the pit prices to cover the war wages allotted to the pitmen; and the utmost alarm was occasioned when it became known that this advance may be dated back to September 17 last, and all coal invoiced since that date might be subject to this advance. Seaborne coals have had a good supply during the week; 29 contract cargoes arrived in the River Thames for Monday's market, and 20 for Wednesday. Freight rates have again advanced, and from the Humber to London the rate has been fixed at 20s. to 21s. per ton. Exporters, however, find considerable difficulty in securing boats. On Monday last a meeting of the trade was held at the Cannon-street Hotel to consider the new regulations issued by the Controller. Mr. Geo. Rose presided, and the meeting was attended by from 200 to 250 merchants. A large number of questions which had been received by the committee bearing upon the various points of the circular issued by the Controller were discussed and replied to, and in the end a strongly-worded protest was passed, calling upon the Board of Trade to repeal the Coal Transport Order, and to draw attention to the grave disorganisation of the whole trade under the new regulations. It is also understood that some of the coal owners' societies are banding themselves together to get these arrangements outside the Defence of the Trade Act. The Coal Distribution Order, 1917, has been an enormous amount of registration orders from the various London householders. The allowance of coal is regulated by the number of rooms in the house, and the maximum requirements for the year is in each case to be declared. This does not mean that the householder must commit

the maximum amount, but it does mean that the merchant or dealer is pledged to supply the coal if called upon. With the proposed prices to meet the special war wage (to the miners) comes in the two grave announcements of the Coal Controller: (1) the prices from October 1, was fixed as per scale then published; and (2) if the increase which is not yet fixed is to date from September 17, merchants are wondering how they can recover the increase from customers who have had coal within that period.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, OCTOBER 5.—The slight change in the weather caused a little better tone in the seaborne house coal market to-day, but through the scarcity of supplies no business was reported. Cargoes, 15.

MONDAY, OCTOBER 8.—The weather continuing cold and damp, caused a good enquiry for seaborne house coal at to-day's market, but no spare cargoes were available. Cargoes, 29.

WEDNESDAY, OCTOBER 10. — Seaborne house coal was again in good demand to-day, but supplies being scarce, no sales were reported. Cargoes 20.

MINERS' CONFERENCE AT HARROGATE.

The annual conference of the districts of the Miners' Federation comprised within the area of the Coal Conciliation Board of England and North Wales, was opened in the Prospect Hotel, Harrogate, on Tuesday. Mr. Stephen Walsh, M.P., chairman of the workmen's section of the Conciliation Board, presided, supported by Messrs. T. Ashton (secretary), H. Smith, F. Hall, M.P., J. Wadsworth, M.P., J. Hoskin, T. Roebuck, Yorkshire; J. G. Hancock, M.P., W. Carter, C. Bunfield, Nottingham; S. Finney, M.P., North Staffordshire; Barnett Kenyon, M.P., Derbyshire; W. Johnson, Warwickshire; J. Baker, Cannock Chase; F. G. Dean, Walsall; E. Hughes, North Wales; J. McGurk, T. Greenall, J. Butler, Lancashire; and others.

Presidential Address.

Mr. STEPHEN WALSH, M.P., in his presidential address, said that since the annual conference at Blackpool last year the control of the coal mines of the United Kingdom had been taken over by the State, the important coal fields of South Wales coming under control from December 1, 1916, and the remainder of the mining kingdom from March 1, 1917. Whatever views might be held respecting the State control of essential industries in times of peace, there could be no doubt that such control was an absolute necessity under war conditions. Already the Department had been of great service to the nation in arresting the demands of the colliery owners for reduction in wages. Northumberland sustained a reduction of 11 per cent. in December 1916, and shortly afterwards was faced with the demand for a further reduction. Similar applications were also submitted by the coal owners in South Wales, in Durham, and in Scotland; but these demands had, in every case, been vetoed by the Coal Controller, whose action had prevented serious industrial strife, and secured almost unbroken continuance of the coal mining industry, so vitally necessary at the present time. Apart from the bonus recently granted, which dated from September 17, the English and North Wales Federated area was the only large district that secured an additional bonus to wages during 1917. The wage position occupied by that area, compared with the other self-governing wage areas in the United Kingdom, was as follows:—Scotland, with a basis wage for hewers of 4s. per day, stood in July 1914 at 7s. per cent. over that figure, or 7s. per day. It now stood at 150 per cent. over the basis, equal to 10s. per day. Northumberland's pre-war standard was 50 per cent. upon a basis of 5s. 2d., or 7s. 9d. per day. Successive advances raised the standard to 131 per cent., or about 11s. 10½d. per day. A reduction, however, of 11 per cent. in December 1916 brought this figure down to about 11s. 4d., at which they now stood. The pre-war standard in Durham stood at 57½ per cent. upon a basis estimated at 4s. 8d. per day, equal to 7s. 4d. The net advance obtained since the war equals 50 per cent., raising the standard to 107½, and the wages to 9s. 8d. per day. South Wales stood at 60 per cent. over the basis of 1879, estimated at 4s. 7d. per day, so that the immediate pre-war standard represented approximately 7s. 4d. per day. The total advances secured since July 1914 raised the standard to 133¼ (old basis), this figure representing about 10s. 8½d. per day. The immediate pre-war standard in the Federated area was 65 per cent. upon the basis of 1888, which might be taken to represent approximately a hewer's wage of 4s. 9d. per day. The Federated districts now stood at 118½ over that basis, representing a wage of about 10s. 4d. per day. It would, therefore, be seen that Northumberland had made the greatest wage advance during the war, equal to 3s. 7d. per day. South Wales was second, with 3s. 4½d. per day. Scotland came next, with an advance of 3s.; the Federated area ranking fourth with 2s. 6d.; and finally Durham, with 2s. 4d. per day. The recent bonus granted on and from September 17 was not included in these figures. In Scotland, Northumberland, and South Wales the principle of a maximum wage standard had been abandoned during the war, and whatever might be said in favour of such a standard in wages agreements during times of peace, the theory became absolutely untenable when applied to war conditions unprecedented in history. The number of persons employed underground in the mines of the United Kingdom during 1916 was 792,911 against 777,000 in 1915, an increase of 38,238. The output of the United Kingdom was 256,348,351 tons, against 246,000,000 tons in 1915, an increase of 10,348,351 tons. In 1915, an increase of 10,348,351 tons, this increase, Northumberland contributed about 240,000 tons, South Wales 1,600,000 tons. It is estimated that the figures of 1915

represented the greatest output per person underground since 1907. In view of the unexampled difficulties against which the industry was struggling, the results proved that the miners, as a body, were doing their best to maintain production at the highest standard. Since the negotiations which secured the additional bonus of 4·2 upon current earnings in February last, the executive functions of the Conciliation Board had remained largely in abeyance: first, because the maximum within the existing agreement had been reached; and, secondly, the State had now taken over the control of the industry. Moreover, not being in any material sense dependent upon the export of coal, the Price of Coal (Limitation) Act, 1915, had practically stereotyped selling values at the pithead within this area. In January 1916 the average selling price was 13s. 5·32d.; for the quarter ended March 1916 the average was 13s. 6·97d.; for the quarter ended June the average was 13s. 10·8d.; for September, 14s. 5½d.; and for December, 14s. 6·37d. For January of this year the average per ton was 14s. 7½d.; and for May (the latest return available), 14s. 7½d. Thus the increased cost of living was the only factor upon which a definite policy could be based; but all mining areas were affected to a like degree by this factor, and action upon general lines was the only policy suitable to the circumstances. It was probable that State control of the mining industry would continue for a substantial period after the war; and the time was rapidly approaching when it would be incumbent on the representatives on the Conciliation Board to consider the desirability of negotiating a new agreement for the Federated area. When that time arrived, owing to the abnormal conditions now prevailing, not one single factor of those usually taken into account would be in its proper perspective. The war had wholly transformed the conditions of the problem which the representatives would be called upon to solve. In an area which produced 50 per cent. of the total output of the kingdom, their responsibility would be a heavy one, and their task of exceptional difficulty. But, with loyalty to each other, and with the single purpose of serving the best interests of the miners within the Federated area, their success would equal anything in the records of past endeavour.

At Wednesday's meeting, the conference practically agreed that any new wage agreement for the area shall not contain a clause fixing a maximum wage standard, that there must be an alteration in the methods of ascertainment of colliery selling prices, and that future increases of wages must be paid on the actual wage, and not on the standard.

Mr. F. LEE (Derbyshire) said there was great dissatisfaction with respect to the monthly statement of the average selling price of coal at the collieries. The latest return of 14s. 7d. per ton had no sort of relation to the price of coal to the ordinary consumer. Their experience since the present agreement was made in May 1915 showed them that a fixed maximum percentage on the wage standard was an obsolete method, which could not be continued in any future agreement.

Mr. T. GREENALL (Lancashire) also considered any future wage agreement made in the area would have to be without a maximum standard, and said there was the same dissatisfaction in Lancashire as in other districts against the method of ascertainment of colliery selling prices. The men refused to accept the present figure of 14s. 7d. per ton as the average selling price.

It was ultimately decided to report the matter to the incoming Board, to prepare a scheme for a new agreement which will make provision for the abolition of the maximum percentage, the calculation of future advances on the actual wage and not the standard wage, and a new method of ascertainment of colliery selling prices.

THE TIN-PLATE TRADE.

Liverpool.

Following on the meeting last week of the Liverpool Chamber of Commerce (iron trades sections), the London merchants held a meeting on Friday of last week in the Metal Exchange, when a resolution was carried that a "National Association of Iron and Steel Merchants" be formed. The leading merchant stock holders (London and provincial) held a meeting on Wednesday in Birmingham, with the object of seeing what can be done to protect their interests, both now and after the war. So far as the tin-plate market is concerned, there is nothing new to report. Works are all very busy, and the official maximum price of 30s. net f.o.t. at works is generally maintained.

Witbank Colliery Limited.—The output for the month of August was 85,254 tons.

United States Coal for Canada.—It is understood from Washington that the Fuel Administration has lifted the coal embargo to Canada, announcing that this action has been taken because it is vital to Canada's war industries to be kept going at full blast.

Sweden and American Coal.—The Swedish Government has appointed a representative to visit the United States with a view to buying coal for export to Sweden, Germany no longer being able to supply Sweden's requirements. The plan for obtaining coal contemplates the shipment of Swedish iron ore to the United States to provide return cargoes and stabilise the rate of exchange.

Housing in South Wales.—Mr. Edgar Chappell, secretary of the Welsh Housing and Development Association, estimates that before the war there was a shortage of at least 50,000 dwellings in the South Wales coal field, and he considers it probable that the requirements will be nearer 100,000 by the time building activities can be resumed. Already, in Monmouthshire alone, 15 local authorities are planning to build from 4,000 to 8,000 houses, but progress is slow. It is suggested that if a design standard in both construction and size were adopted, dwellings which would be both permanent and comparatively cheap could be built of concrete. Near Cardiff there are three cement works capable of producing 500,000 to 600,000 tons a year.

THE THIN MINE PROBLEM.*

By H. O. DIXON.

Many and varied papers have been written on the subject, but having in view the tremendous importance of the problem at the present moment, and particularly in this country, the author is of the opinion that the methods of working and the commercial results obtained from a 19 in. seam of steam coal may be of some interest to those responsible for the future maintenance of our outputs from the more or less slender reserves now left in some of our districts.

Following the almost complete exhaustion of the Yard mine, and faced with a very similar position in regard to the Arley seam after 40 years work, the Westboughton Coal and Cannel Company decided to open the two intervening thin mines, viz., the Three Quarters or Smith mine—which is about 70 yds. above the Arley, and consists of a seam of 18 in. clean coal in two layers, with 2 in. of dirt between—and the Half Yard mine or Bone Coal—which is 15 yds. above the Three Quarters, and consists of 18 to 19 in. clean coal.

The upcast shaft was set aside for these two mines, the pit eye being set in the Three Quarters mine at a depth from the surface of something over 200 yds.; and a tunnel rising 1 in 4 was set off some 80 yds. from the shaft to the Upper seam (the Half Yard). The bearing of this tunnel being the level line of the seam, the haulage road carries on some hundreds of yards dead straight. The haulage is endless rope fitted with two tubs spaced every 20 yds. lashed on back and front. The length of the tunnel being insufficient to give satisfactory self-acting haulage, the rope is attached to a pair of 8 in. compressed air engines in the pit eye, controlled and braked by a boy, and giving a steady speed of two miles an hour to the main rope. The hooking on arrangements are simple. Pedal-operated Star tub controllers pass two boxes a time into the cages, which are single decked, four seconds only being required at the bottom, and day by day 80 winds per hour are carried out with a daily output of about 400 tons, one shift coal winding. Two-thirds of this output is from the Half Yard and the other third from the Three Quarters. The Half Yard is in two districts, west and south, the former being thrown up 13 yds., and practically bringing in level the Three Quarters; and the haulage road to pit is straight for hundreds of yards, and operated by the engine at the pit eye. No road pillars of any description are left, and the settlements have been steady and timbering stood well.

The south district is served by an independent haulage, operated by a shunt lad at the control shunt some 300 yds. from the pit, where also the west district tubs as well as the Three Quarters tubs arrive at the main haulage. Here empties are changed to each of the three districts for full tubs from these same districts, and complete organisation can be maintained—a most necessary factor for successful working and keeping the main rope hauling continuously from the commencement to the end of the shift. The engine operating the south brow is driven by compressed air, and has now worked four years without a single failure. It is an ordinary two-cylinder ship's winch, very strongly built, and made into an endless rope hauler by a taper angle iron hoop, in halves, bolted on to the drum. The rope, of ¾ in. flattened strand, is now over 1,000 yds. endless, and the return wheel is fixed within 70 yds. of the face. The face is some 500 yds. in length, and advances at the rate of 3 yds. per week. Drawing drifts are made every 15 yds., and cross roads cutting off the drifts are driven every 75 yds. The rope is taken along a double track cross road to a point 200 yds. to the left of the brow, and on the right a self-acting cross road is being prepared—both to work the same control shunt. All drawing drifts, cross roads and main roads are roofed close up to the face, and the *débris* is stowed and well packed in the face wastes, not a single tub of dirt being now sent out of the mine. Each collier works 7½ yds. either side of his road, and fully employs his drawer; and the colliers do their own ripping and stowing, a certain proportion daily. This system makes each man keep his kench blown up to the face, and not only keeps the face well packed, but also assists in the filling out of the coal and reduces the constant supervision and annoyance of the night-turn dataller. It is becoming more and more evident that men do not want night-turn datalling, and their attendance is very fluctuating, and would, in this mine, certainly lead to kench getting very much behind. This would result in a serious reduction in the output from each place, as well as a great loss of dirt room, and, doubtless, would mean the filling up of many tubs of *débris* to be wound up the pit, thereby robbing the latter of its true use—viz., the winding of coal.

The main roads are blown 10 ft. wide and 7 ft. high, and are totally packed at the face by the colliers; the cross roads, as they pass through each man's place, are also taken in hand by the particular man concerned. The coal is got on the face, or with the line of cleavage, and, with the great length open, is as a rule good quality, or what is known as "ripe," so that transport, both at the present moment and also for future, is one of the main features.

Ventilation is well maintained by keeping up a good intake right to the face, the air coursing the full length of the face and working back by one of the cross roads to the main ropeway, and out-by to the pit.

The west district is operated on the self-acting principle, the bearing of the 50 yds. tunnel up the fault being slightly with the rise of the seam, and some 400 to 500 yds. of rope is controlled by a screw-braked jig-wheel. Every tenth road is blown 10 ft. wide, and has cross roads right and left cutting off the drawing drifts. Opening out is carried out all the time, at the far end of the haulage road, by sets of men cutting out their own places and turning fresh roads off at each 15 yds., an allowance of 4d. per ton being paid here for working on end. The main road is blown in two kenchs, the first one being packed by the set opening out of the

* Paper read before the Manchester Geological and Mining Society, October 9.

second (to a roof parting 7 ft. high) by contract and wagoned to dirt holes (finished drawing drifts); and all main roads and cross roads are driven on sight lines.

The price list is as follows:—

October 1914. Subject to the general advances and reductions in the district, and representing 65 per cent. on the 1888 basis.

1. The tonnage price to be 4s. 2d. per ton.
2. Places with fast side 5 yds. or more in advance, 2s. 3d. per yd., with free explosive.
3. Drawing out of the lower side places, two or more to a tub, 20 yds. *nil*. 1d. per ton extra for every further 10 yds. or fractional part thereof. Crabbing up places at same rate.
4. Drawing for the first 200 yds. *nil*; 1d. per ton extra for every additional 50 yds. or fractional part thereof.

Colliers roofing down 5s. 6d. per yd., with freedrilling and explosives. Only occasional allowances have to be made.

The present day actual results work out as follows, without war bonus of 18 per cent:—

	s.	d.
Tonnage rate to collier	4	2·00
Long drawing and allowance	0	0·15
Drilling (paid by companies)	0	0·85
Drawing drifts (ripping and stowing)	0	8·00
Main roads and cross roads (do.)	0	4·00
Haulage and supervision	1	3·00
Cost into cage	7	0·00 per ton

To this must be added royalty and wayleave charges, timber and power costs. The former, owing to the nature of the seam, are rightly in favour of the colliery, being 25 per cent. under Yard and Arley footage rents, and work out at 3½d. per ton. Wayleaves also have practically been arranged free, with a view to assisting the developments, and the writer has constantly urged that in the drafting of leases, landlords deriving, as they do, the benefits resulting from the working of their mines, should forego all wayleave charges, which would really be non-existent but for the enterprise of the colliery concern.

Timber costs also compare very favourably with those obtaining in thicker seams, and especially so at the present moment, as average face props of 3½ to 4½ in. diam. are anything up to nine times their pre-war price; but for the 19 in. props required for this seam very little above double has so far been paid. Some 7,000 props per month are sent into the mine, working out at a prop cost of 2d. per ton. Main road timbering is also light in cost owing to the thinness of the extracted strata and consequent slight disturbance of roof, and works out at 1d. per ton. The power required to drive the haulages is generated on the surface by direct electrically-driven two-stage compressor, used solely for hauling on the coal winding shift, the consumption of electricity being 90 amps. 400 volts A.C., and costing just under ½d. per ton.

The total underground cost, therefore, not taking into account interest on capital, amounts to the following:—

	s.	d.
Wages	7	0·00
Explosives	0	0·60
Royalties	0	3·50
Timber	0	3·00
Power	0	0·50
without war bonus; or, with war bonus on wages, a further	1	3·00
Making a total of	8	10·60 per ton into cage.

This, then, is the full underground figure on which the commercial aspect stands or falls, and on close inspection it does not appear that the winning of this and similar seams is beyond the range of possibility.

German Coal for Holland.—The *Handelsblad* (Amsterdam) learns that one of the conditions made on the conclusion of the purchase of German coal is that the conveyance of English coal shall take place without hindrance. The ships are to be marked in a special way, while a ship of a special type, apparently a paddle steamer, will convoy them. Notice of both must be given in advance telegraphically to German submarine commanders. The price of German coal is to be 45 florins (£3 15s.) per ton, while for every 45 florins thus paid a credit of 55 florins (£4 11s. 8d.) must also be loaned. The total credit loaned must not, however, exceed 9,000,000 gulden monthly (£750,000), to be provided partly by the coal consumers and partly by the central export body. It is understood that these figures are only approximately correct. Further various advantages, having relation to the delivery of steel and some other raw materials, are included in the agreement.

Colliers' Time for Starting Work.—A test case brought by the Cumberland Miners' Association to determine the rights of miners as to the time for starting work under the Eight Hours Act, was concluded at the Wigton County Court on Monday last. The conditions at Allhallows Colliery were that the lowering of the men to the mine for the morning shift should commence at 5.35 a.m., and complete at 6 a.m. There being complaints about the men hanging back until the last few minutes before descending the pit, and thus extending the lowering time to 6.15, the management posted a notice intimating that no man would be allowed to descend after 6 a.m., and eight workmen who had arrived late by train from Maryport, and who were at the pit top at three minutes to six, but who had not been lowered when the siren sounded the hour, were turned away, and lost a shift. His Honour Judge Gawan Taylor held that if a workman offered himself so that he could be taken to the bottom of the pit by six o'clock, he had fulfilled his part of the contract, and gave judgment against the colliery company, the plaintiff being awarded his day's pay and the costs of the action. The judge, however, suggested that an amicable arrangement be come to in regard to the lowering of the men, remarking that these were not times when they wanted trouble in the coal field.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Swansea as a Controlled Port—The House Coal Difficulty—The Re-employment of Discharged Soldiers—An Interesting Point: Position of Sub-Contractors—Bright Prospect for Swansea—Serious Decision of Colliers' Conference Against "Combing Out."

Upon the application of the Swansea Harbour Trustees, the President of the Board of Trade consented to meet a deputation who will submit to him an application that the Government will take control of Swansea docks, as in the case of docks at other large ports on the Bristol Channel. The report presented at the Trustees' meeting showed that the trade had fallen off in certain imports during September but that there had been an increase of iron ore, steel bars, and food stuffs. Coal, coke, and patent fuel, however, showed decrease.

The Italian section of the local committee upon exports propose to call a general meeting of both the Italian and French sections, in order that the question of pooling may be further discussed.

The difficulty which has arisen as to supply of house coal, the Controller having fixed £1 per ton as the price at the pithead, has been discussed with the Controller by representatives of the colliery companies in South Wales who are affected. Mr. Guy Calthrop promised to give careful consideration to the points that had been submitted by the deputation.

Mr. Gibson, secretary of the Coal Owners' Association, has pointed out that there is an avoidable absenteeism of 7 to 10 per cent., and that if nothing is done by the employers to ascertain what workmen are ready and able to work, the new war wage would really be paid to anywhere between 350 or 500 out of every 5,000 miners, these men receiving what they are not entitled to.

A blind inventor gave a demonstration before a meeting of colliers at Morriston of his shell-firing apparatus, and at the close a resolution was passed urging workmen throughout the coal field, with the assistance of the Federation, to impress upon the Government the necessity of immediately adopting the apparatus which had been shown them.

It is stated that the Cambrian Mercantile Colliery at Ystalyfera has been sold to a London syndicate, and that the new owners will develop the undertaking, particularly the Red Vein, and furnish employment for over 200 men.

The Ogmore and Garw Council are considering a scheme for house building, having a design to provide about 1,000 houses, and have invited an expert from the Town Planning Association to visit the district and advise them. The Maesteg Council propose a scheme for 600 houses; and the Penybont Council for nearly 1,000.

The Federation executive, after hearing a deputation from the Nine Mile Point Colliery, who brought up the subject of re-appointment of discharged soldiers, passed the following resolution:—"The council consider that any soldier returning from the Army is entitled to employment at the colliery in which he was employed before joining the Forces, even though his reinstatement necessitates the withdrawal of workmen who have entered the employment to fill vacancies since August 1914."

The colliery developments of the Tredegar Company were referred to at a meeting of the local Council, because of their effect in producing overcrowding. It was stated that, in response to a circular from the Local Government Board, a special committee had drafted a reply which stated that 200 new houses were required at once, with a further 300 at the close of the war. The committee state their opinion that at present there is gross overcrowding, which will become more serious when peace is declared. In addition to the 500 houses indicated, they consider that at least 1,000 more will be necessary in order to deal adequately with insanitary dwellings, and meet the needs created by local colliery work.

The Newport Corporation Housing Committee, under instruction from the Local Government Board, are investigating the housing conditions consequent upon the great extension of industries, and they estimate that at least 1,000 new dwellings will be required in their town.

The Merthyr stipendiary on Tuesday decided an interesting point as to the position of men employed under a sub-contractor. Two men had been given notice by the sub-contractor under whom they worked, and by whom they were paid their wages (after deductions for insurance, etc., at the colliery office). Their contention was that they were in the employment of the company, because they had individually signed the Conciliation Board agreement with the company. The case was argued at length, it being submitted on behalf of the company that the colliery officials did not control men working under a sub-contractor, and that he both gave and accepted notice. The stipendiary held the contrary, and gave judgment for the men, on the ground that the employment was under the Conciliation Board agreement, and that the clause of that agreement contemplated notice by employers or men.

Swansea Harbour Trust, which has fallen upon financial difficulty owing to the war, has this week received a report from its executive committee, which shows that after lengthy negotiations, terms have been agreed upon with the Anglo-Persian Oil Company as to leasing land at the King's Dock—an agreement which will make an enormous financial difference to them. About 45,000 sq. yds. of land, now covered by water, will be leased, and walls will be constructed with berths so that oil tank vessels may discharge petroleum and similar products, and pipe lines will be laid to convey the petroleum to and from the works which the company will erect in the neighbourhood. The lease will be 99 years; and in respect of vessels and goods, there will be for the first three years an aggregate minimum of rates payable to the amount of £30,000 a year. Sir Griffith Thomas, the chairman, in submitting the report to the trustees, said that the letting would be a very good thing for Swansea, not only because it would be highly profitable to the Trustees, but also because it would bring a great many other works to the neighbourhood, and Swansea would be taking a leading position in importation and export of petroleum and other products. The guarantee of £10,000 a year was like a dead rent of a colliery, and they had reason to believe that if the company carried on the works to the large extent that was expected, the income for the Trust would amount to very considerably more than £10,000 a year. In fact, if they brought two or three boats a week (and even more were anticipated), the income of the Trust would probably be advanced by £40,000 a year.

The Board of Inland Revenue, in view of the fact that the income tax question would come up at the conference of the South Wales Miners' Federation on Monday, issued a statement showing revisions of the impost which would be of distinct advantage to weekly wage earners. This statement showed that the allowance for children had been

raised from £10 to £25 per child. It was also stated that the Chancellor of the Exchequer had recently received deputations from the miners, and although he was not able to encourage any hope of restoring the pre-war conditions and abatement limits, he was ready to propose in the next Budget an allowance of £25 for a wife. The figures, worked out, showed that a man with wife and no children annually paid on £15 more than in the pre-war period; and that a man with wife and one child would be effectively exempted unless his income exceeded £170.

A conference of the South Wales Miners' Federation was held in Cardiff on Monday, 300 delegates being present, representing 151,000 members. The proceedings were conducted in private, but the statement issued to the Press shows that very serious decisions were reached. A recommendation had come from the Miners' Federation of Great Britain that the Government should be assisted in recruiting colliery workers for the Army—the suggested scheme not to come into operation until all persons of military age who have entered the mines since August 1914, not being *bona fide* miners previously, had been "combed out," and that the scheme should apply to all unmarried Class A workers between 18 and 41 years of age. After prolonged discussion, it was resolved, by a large majority, to take no part in assisting the recruiting of colliery workers for the Army, and it was ordered that a ballot paper should be issued to the workmen reporting this decision, and asking whether the men were in favour of a "down-tools" policy in South Wales in the event of the Government proceeding with their "combing out" of the mines scheme. The conference further passed a resolution calling for the total abolition of all taxes on wages.

A case of considerable importance came before the judge at Aberdare County Court on Monday. It raised a crucial point, and was to be regarded as a test case. An ostler sued the Cwmaman Company for £29, balance of wages alleged to be due. Plaintiff's claim was that before weekly pays were made, the ostlers at the colliery were paid 16 turns for 13 turns worked; one week being the night shift and the other the day shift, Saturday night being paid for as double, and two extra turns being paid under the old custom. The company had paid an extra one turn per week up to the time when, under Judge O'Connor's decision, the bonus of six turns for five for workmen employed on the afternoon and night shifts and for all ostlers became operative, and then the company desired to merge the extra turn into the bonus turn. It was claimed, on behalf of complainant, that he was entitled to the extra turn over and above the bonus under the protective clauses of the agreement applicable to old customs as to payments. The case was not concluded, the hearing being adjourned.

It will have been noted that the Coal Mines Department of the Board of Trade has issued a statement concerning increase of prices in order to meet the cost of the advances granted to the miners. The question raised upon this was whether it applied solely to the home trade, or whether scheduled export rates are equally to be raised; and this has been the subject of very keen discussion and clear difference of opinion for some days past. So decided has been the diversity of views that, whilst all merchants have put up the price of the home supplies, others have refrained from increasing the price under foreign contracts, and application has been made to the Controller for an interpretation of his Order in this respect.

The Merthyr district miners, at a meeting on Monday, pledged themselves to support the scheme for raising £3,000 towards the endowment fund for the new technical and engineering institute, towards which Mr. Seymour Berry, director of several local colliery companies, has given a sum of £10,000. The meeting decided that there should be a levy of 1d. per week for 12 months in order to provide the necessary fund.

The case of a colliery manager has been reported from South Wales, and the probability is that prosecution will be instituted, because he engaged three workmen without enquiry as to their position regarding exemption, and had not taken any steps to ascertain how they stood in this respect.

Sergt. O. Hulbert, of Ebbw Vale, Mon., who has been awarded the Military Medal, is the first member of the general office staff of the Ebbw Vale Company to secure the distinction. He has been presented by the townspeople with a gold watch as a token of admiration for the bravery he had displayed in battle.

Evidence showing how a workman was whirled to death in an engine room attached to the Celynen Colliery, Abercarn, Mon., was given at the inquest on Monday on Wm. Philip Lewis (48). It was stated that the "liner" on the engine had got loose, and whilst deceased was assisting to insert a new "liner," the wheel reversed unexpectedly, and the unfortunate man, who was embracing it firmly, was whirled around with it. His body then struck a portion of the platform, and he fell into the wheel pit. The manager said that men had been cautioned previously for putting their arms round the wheel when a mishap had occurred. The jury returned a verdict of "Accidental death," and recommended that arrangements should be made for obviating the practice of men applying their hands to the wheel, as in the present case.

At the annual meeting of the North Monmouthshire Liberal Association, which was held at Pontypool on Thursday of last week, and attended by the Right Hon. Reginald McKenna, M.P. for the Division, Mr. C. H. Badman, of the Varteg Collieries, and Mr. Benjamin Nicholas, J.P., managing director of the Tirpentyws Deep Black Vein Colliery Company Limited, Pontypool, were re-elected president and treasurer respectively.

Northumberland and Durham.

Northumberland Miners' Association and Cost of Living—Newcastle Coal Supply—Durham City Council Support Local Miners' Association's Request—Housing at Easington.

Discussing, in his October circular to the members of the Northumberland Miners' Association, the problem as to the repayment of the National Debt, Mr. William Straker questions the economic soundness of the miners' argument that they would much prefer that the cost of living should be brought down rather than that they themselves should have their wages increased. Mr. Straker contends that, as interest on the National Debt must be paid in commodities produced by the people, the higher the price of commodities the less the quantity required to pay the interest. If, however, prices are kept up, says, must be correspondingly high, otherwise there will be at a disadvantage. He points out that, in advance, secured by one section, and resulting in the price of the commodities produced by that section being advanced, handicaps workers in other industries, and he goes on to argue that there must be a drawing together of the labour forces, so that the whole of the workers may present a solid demand for wages to be kept abreast of the prices of commodities.

Coal merchants have received a circular from the Coal Owners' Association, warning them of the consequences in coal prices to meet the special war needs of the miners.

The Durham Miners' Association have a substantial majority, the proposals of the executive committee with regard to filling the position held by the late Ald. William House, and the question remains unsettled. The executive's proposals were that Mr. William Whiteley, junr., should be elected president, whilst retaining his position as insurance secretary; and that Mr. T. H. Gann should become compensation secretary, as well as general secretary.

Falls of stones have been responsible for several fatalities in local collieries during the past few days, causing the death of Joseph Pedelty (42), hewer at Eldon Colliery; Thomas Hey (61), hewer at Garesfield Colliery; and Francis Munnelly (37), stoneman at Bebside pit. In the latter case, the stone came away after a shot had been fired, and after the place had been examined and had "jowed" as hard as rock.

Fired, presumably, by the success attendant on recent sales of reclaimed foreshore, the Tees Conservancy Commissioners have in contemplation a further scheme of reclamation, which will add about 1,500 acres to the land available as industrial sites, and will permit of the erection of iron and steel works, rolling mills, engineering shops, shipyards, chemical works, etc., on the north bank of the Tees, below Port Clarence.

Mr. G. Emmerson, who has been manager of the William pit of the Whitehaven Colliery Company for over five years, has been appointed manager of the new collieries at Fishburn, in Durham county.

The Newcastle City Council have accepted the tender of Messrs. John Scott and Sons for the supply of coal to the Corporation over three months. Messrs. Scott's offer, which was the only one received, was based on 22s. 6d. per ton for best screened Seghill coal. The Lord Mayor remarked that the contract price was a very fair one, in view of the fact that 26s. was the price fixed for coal delivered to householders.

Durham City Council has decided to support the representations being made by the Durham Miners' Association and kindred bodies with a view to the county receiving a larger share of the coal trade, and has passed a resolution heartily joining in the request to the Coal Controller so to regulate the orders for coal that the Durham collieries shall not be compelled to work short time. It has been agreed, also, to ask the other councils in the county to support the appeal.

The housing question in mining districts of Durham county is at present receiving a good deal of attention from local authorities. It was stated at the meeting of the Easington Rural District Council that, of 13,110 houses in the district, 2,240 were overcrowded, and 2,031 were old insanitary dwellings. The percentage of overcrowding and old insanitary houses at the older collieries is said to be of very serious proportions, while at the newer eastern collieries there are no insanitary houses and a very small percentage of overcrowding. The colliery companies have been asked what steps they intend to take in regard to building and re-construction now and at the end of the war, and in every case a non-committal answer has been received.

Cumberland.

Mr. David Gilmour, Scottish Labour Adviser in connection with National Service, has issued a notice stating that he has been authorised to select 700 thoroughly capable miners from the coal mines in Scotland, with a view to their immediate transfer to the Cumberland iron ore district.

Yorkshire.

Skipton's Winter Coal—Inadequate Supplies at Sheffield—Many Court Cases.

The Skipton District Council decided at its last meeting to authorise the Gas Committee to purchase 400 tons of coal for the use of householders in absolute need during the coming winter months. The coal was not to be used unless the ordinary supplies failed. It was further decided that should any loss accrue from the purchase of the coal, it should be borne by the ratepayers for whose benefit it was made.

By taking coal from the already limited supplies of local coal merchants, part of the 1,000 tons of coal allocated to Halifax has arrived. At the last meeting of the Halifax Coal Control Committee a request was made that the remainder of the supply should be obtained from other sources.

Mr. Thomas Roles, the Yorkshire representative of the Board of Trade Coal Mines Department, is very busy conferring and arranging for the rigid economy which has to be maintained during the coming winter in the use of coal. Already a round table conference has been held at Leeds, and in Bradford the Lord Mayor, the Lord Mayor-Elect (Capt. John Bland), Ald. J. E. Fawcett, and the town clerk have promised him all the assistance in their power. Mr. Roles will be willing to give advice to would-be enquirers in his office at any time.

Acting on the Coal Controller's suggestion, the Bradford Electricity Committee have given authority for application to be made to the Board of Trade for power to disconnect classes of non-essential consumers in cases of urgent necessity.

Mr. Charles Mellor, coal merchant, of Westgate, Wakefield, has been appointed by the Lord Chancellor as a justice of the peace for that city.

The Coal Controller has intimated to the Bradford authorities that 2,800 tons of coal have been allocated to the city for distribution to the poor if the ordinary supplies fall short.

Sheffield is complaining about the inadequate supplies of coal coming into the district. On September 25, the hon. secretary of the Sheffield and District Coal Merchants' Association wrote to the town clerk of the city to the effect that the coal coming in was altogether insufficient. The town clerk, in due course, communicated with the Coal Controller on the subject, but no reply had been received up to October 3. The special committee dealing with the coal supply have now instructed the town clerk to address a further communication to the Controller, asking that immediate steps be taken to increase the supply of house coal. They have gone further than this. The Lord Mayor and town clerk have been asked to seek an interview with the Controller himself, and to bring the matter to his attention.

At the Police Court last week, William Hoyland, 38, was fined 20s. and costs for failing to appear at the hearing of the case of Isaac Main Colliery of Earl Fitzwilliam, to do so by a deputy. Charles Hoyland (19), employed in the same pit, was fined 10s. for interfering with the signalling apparatus.

Some serious offences against employees in South Yorkshire collieries were alleged at the Doncaster West Riding Police Court last Saturday. Thomas Wilson, of Bolton-on-Deane, was prosecuted by the Hickleton Main Colliery for leaving his work without taking his lamp with him. He left his oil lamp at the gate end, which the prosecuting solicitor said was a dangerous place for gas. It was there all Saturday night, and was not found till Sunday morning, when it was still alight. It was impossible to say what damage might have been done had sufficient gas accumulated to have been fired. The defendant's only plea was forgetfulness, and he admitted that, when subsequently he remembered he had left the lamp in the pit, he did not take the trouble to notify those in charge. A fine of 40s. was imposed. Herbert Priest, miner, Goldthorpe, for removing part of a safety lamp while in use, and thus exposing a naked light in the Hickleton Colliery, was fined 22s. He had substituted two brattice nails for the contact pins. For cruelly kicking a pony in the same pit. Geo. Astbury, of Thurnscoe, was fined 20s. John Fenn, miner, Denaby, for motting in the Denaby pit was fined £3 10s.; Herbert Burns, pit hand, Mexboro', was fined 50s. for interfering with the haulage at Denaby; and three Denaby pony drivers were fined 25s. each for riding in a tub, it being stated that their conduct very nearly entailed a serious accident.

Lancashire and Cheshire.

Winter Coal Supplies—Heysham Coal Prices—Economy at Middleton.

Following the example of many other municipal bodies in Lancashire and Cheshire, the Burnley Corporation has decided to purchase 2,000 tons of coal for the use, if necessary, of the poorer classes during the coming winter months.

At a meeting of the Bolton Domestic Coal Supply Committee held last week, it was reported that the reserve coal which had been purchased was now being delivered at special storage depots in the town.

The Little Hulton District Council last week decided to prepare their town-planning scheme for presentation to the Local Government Board. There is a great and growing demand for houses on the part of local colliery workers.

Miners in Walkden and other parts of the South Lancashire coal fields have secured representation on the local Food Control Committees.

Vigorous protests are being raised by members of certain co-operative societies in Manchester and Bolton districts against the action of their boards of management in raising the price of coal. It is a significant fact in this connection that a majority on the committee of one or two "co-ops." are coal miners.

Rochdale Corporation has decided to stock 1,000 tons of house fire coal in case of emergency during the coming winter months.

A well-attended meeting of the Manchester Coal Supplies Committee was held on Friday of last week in the Town Hall, when prices submitted under the Retail Coal Prices Order, 1917, were approved. It is understood that under the new lists consumers will not have as much to pay as they had last winter.

The Wigan Coal Supplies Committee has now made arrangements for the purchase and stocking of 1,100 tons of coal, which will be held in reserve at the gas works.

The Stalybridge Joint Electricity Board has decided that the coal clause for power supply shall be raised from 0-15d. to 0-2d. from January 1 next.

At a recent meeting of the Oldham Town Council, reference was made to the serious position in certain departments in the matter of coal supplies. The shortage of delivery, it was pointed out, had resulted in the present stock being some 10,000 tons lower than it should be at the beginning of the winter months. A letter has been forwarded to the Coal Controller, pointing out the shortage which is due to contractors being behind with their deliveries under the annual contracts, and asking for his help in getting a remedy. An interview is being arranged with the Coal Controller.

The question of coal economy was under discussion at a meeting of the Middleton Town Council on Wednesday of last week. It was stated that the inspector appointed by the Coal Controller had visited the electricity works and had gone fully into the question of coal which would be saved in the event of the carrying out of the scheme for taking a bulk supply of electricity from Manchester, and converting the present works into a transforming and distributing station. He is to send in a report to the Coal Controller. Ald. Bentley said the inspector was quite in agreement with the idea that it would save thousands of tons of coal.

The Heysham Coal Control Committee have issued their prices for coal, which are as follow: One ton or over (delivered in cellar or at entrance)—best selected, 33s. 4d. per ton; seconds and kitchen nuts, 31s. 8d. Less quantities than one ton from road vehicles or at merchants' depots, etc.—best selected, 1s. 8d. per cwt.; seconds and kitchen nuts, 1s. 7d.

Notts and Derbyshire.

Before the Chesterfield magistrates last week, a pony boy was fined £5 for striking a pony with a pick shaft, the Bench intimating that only his youth had kept them from sending him to gaol, and that in their opinion he ought to be thrashed as he had thrashed the pony. Because what was described as one of the best ponies in the pit did not stop where he wanted it to, defendant went a distance of 40 yds. and fetched a pick. With great brutality, he repeatedly struck the animal with this. Two wounds, one on the neck and one on the rump, were very serious. In all, there were 13 wounds and many bruises; whilst the lad had tried to intimidate the only witness of his dastardly conduct.

Kent.

The liquidator of Kent Collieries Limited has notified shareholders that the resolutions for voluntary liquidation, with a view to the sale of the undertaking to a new company, were duly confirmed, and that the new company has been registered as the Channel Steel Company Limited. Particulars of the registration were given in our issue of last week.

Scotland.

September Shipments—Housing Report—Developments at Craighall.

A fall of roof was responsible for the death of a machine man employed at Allanton Colliery, Hamilton.

Negotiations have been completed for the formation of a company to carry on the mine at present being worked at Craighall in Ceres parish, in the West of Fife. A large area of good steam and household coal is known to exist.

Delay in fixing prices of coal has been agreed to by Bathgate Town Council and the retail coal merchants until several points have been replied to by the Controller of

Coal Mines. Amongst the points to be reviewed are:—Bathgate was within 10 miles of collieries producing household coal most suitable for the requirements of householders in Bathgate, and from which the bulk of the supplies for householders have hitherto been drawn. This coal could be supplied at a price considerably below prices prevailing in other areas. The present system of distribution, whereby supplies now require to be drawn from collieries a longer distance from the town, has operated to increase the price of coal to the consumer.

A workman was found in an unconscious state in Jawcraig Colliery, Slamannan, from the effects of gas, and died shortly afterwards.

Burntisland coal shipments for the month ended September 30 aggregated 47,682 tons, as against 83,036 tons in the corresponding month of last year. Only a small proportion was consigned to foreign destinations. Last week there were 11,550 tons shipped, as against 23,350 tons in the same week of 1916. Methil shipments were somewhat affected by the strike. The exports were 15,555 tons, against 17,000 tons in the previous week.

At collieries in Fife, where the full 4s. per ton that owners were empowered to charge above pre-war rates for inland sales, had not been exacted, prices were raised to that rate last week.

The report of the Royal Commission on Housing of the Industrial Population in Scotland states that the housing conditions in the mining districts, particularly in Lanarkshire, Ayrshire, and, in a lesser degree, parts of the Lothians and Fifeshire, are in many instances very unsatisfactory, and a large number of new houses are required in these districts.

LABOUR AND WAGES.

South Wales and Monmouthshire.

Mr. B. Nicholas presided over a joint meeting representing the Coal Owners' Association and the Colliery Examiners' union, the meeting having been summoned in Cardiff in compliance with a suggestion from the Controller when he met the parties in London last week. The claim of the Colliery Examiners' Association to recognition as a trade union was submitted on their behalf by Mr. W. Frowen, and, after hearing his statements, the employers' representatives intimated that they would consider the position and would in due course submit conditions upon which they were prepared to recognise the men's association. At a separate meeting subsequently held by the colliery examiners' representatives, it was decided to take no action until after they had received a statement of the employers' conditions. The notices terminating contracts have been already withdrawn.

A very important meeting of the Tinsmiths' Conciliation Board took place at Swansea on Friday, the men having put forward a demand for a wage increase which would double what was paid them before the war. There were representatives present of six trade unions, and Mr. T. Griffiths submitted the men's claim, part of his case being that there were many anomalies in the present graduated system of percentages, and the men desired that the employers would agree to a flat rate of 100 per cent. war bonus for all grades, this to include bonuses now being paid. The employers, in response to the demand, stated that they were desirous to ensure for the workmen conditions similar to those which existed before the war, but Mr. Gilbertson, vice-president of the Welsh Plate and Steel-makers' Association, said they could not agree to do anything beyond that. Complaints had been made about irregularity of work, but Mr. Gilbertson said that there would now be an increase in the supply of steel for making tin-plates to the extent of about 22 per cent. so that that irregularity would be lessened. In addition, tin-plate men now employed in other directions would be able to resume their positions in the tin-plate trade. The employers made a counter offer that the bonus should be paid upon earnings—50 per cent. up to 20s. per week, 60 per cent. between 20s. and 40s., and above 40s. a flat rate weekly bonus of 25s. The men refused this offer, and the employers consulted further, and made a final offer of 50 per cent. war bonus for those earning 20s. per week, 60 per cent. to those between 20s. and 50s., and a flat weekly bonus of 30s. to those earning more than 50s. a week, and they intimated that if this were not accepted the dispute would have to go to the Committee on Production. A long discussion took place, but ultimately, the men having declined to accept, it was agreed to take the question for settlement to the Committee on Production.

The Blaenau miners, at their monthly meeting, received a report that the advance of 1s. 6d. per day would be paid within the next fortnight. It was decided to make a grant of £10 in aid of the Elled Colliery workmen who are idle as a result of a dispute. It was further stated that about 200 men at the Llyn Colliery had given in notices, which expired last Saturday, and that a deputation had been appointed to interview the Coal Controller, if necessary.

Fourteen days' notices have been tendered by workmen at the Copper Pit Colliery, near Swansea, there being some dissatisfaction with the management.

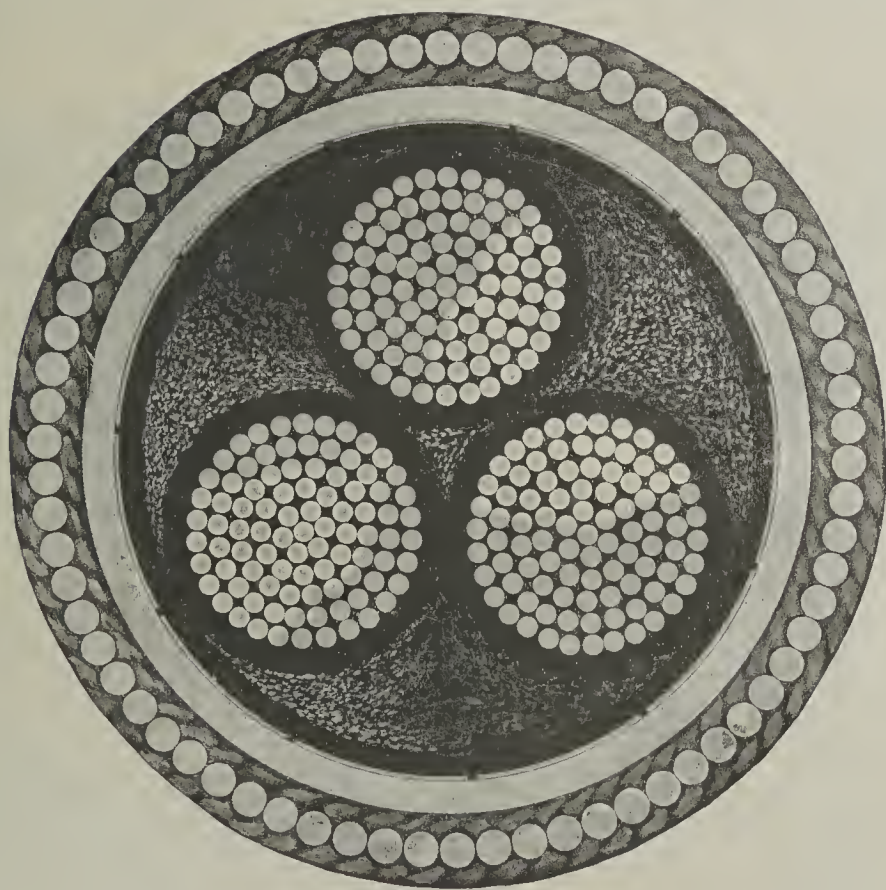
The Cardiff coal trimmers and hobblers met on Saturday, and discussed the question of distribution of work and the method of payment. It was stated that a large number of men over military age could not obtain employment, while about 400 men of military age were fairly well employed, and that these younger men were badged and therefore protected from military service. The contention of the older men was that those should be taken for the Army, and that the work these were now doing should be undertaken by their seniors. Although the recruiting authorities have been made aware of the circumstances, it was stated that no action had been taken; and the meeting on Saturday decided to bring the question before the executive of the Coal Trimmers' Union.

About 4,000 men were idle at the Glamorgan Collieries, Rhondda Valley, on Monday, as a result of a dispute with the hauliers upon the tonnage question. The difficulty was settled during the day, and the men resumed work at night.

During last week several thousand men were idle in the Merthyr Valley, and about 3,000 more in the Aberdare Valley, owing to shortage of trucks.

The men at Blaengarw Colliery attended at the colliery, but found a notice instructing them to go to the engine-room and report themselves as having attended for work; but they held a meeting and decided not to report, and passed a resolution of protest against the company for not notifying them in the usual way that the colliery would be idle for the day. A deputation waited upon the management, and were told that they were bound to report in order that the company might be safeguarded, now that

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247/9, Deansgate, Manchester.
91, Whitechapel, Liverpool.

165/7, Edmund Street, Birmingham.
88, Albion Street, Leeds.
56, Victoria Street, Bristol.
20, West Bute Street, Cardiff.

to pay extra allowances, against men who absented themselves from work. About 600 men were affected. The Ammanford collieries one day last week until empty wagons from the Gwaun-cae-gurwen strike is in progress, had been interviewed the management after a meeting, but could not obtain the promise to abstain from using the trucks; and thereupon a threat was made to call out all the pumpmen, fanmen and enginemmen who were members of the Miners' Federation. Statements were current as to Gwaun-cae-gurwen trucks having been used in other collieries, but this was contradicted. The Ammanford men held a meeting on Sunday, and decided to picket the colliery. It is stated that the fan engines were stopped, and that some of the pumps had been brought to the surface, thus risking flooding. An appeal for support is being made to the whole district.

With regard to the dispute at Gwaun-cae-gurwen, which originated in a demand by the men that the old agreement should continue, the Coal Controller has given a decision in their favour. Inasmuch as the strike at Ammanford is dependent on that at Gwaun-cae-gurwen, it is taken for granted that the difficulty at Ammanford will now end.

Llanbradach miners have been receiving relief pay of 10s. per week, and although there was hope that the lamp difficulty would be settled at the end of the week, other questions were raised which delayed the time. Work was resumed on Monday.

The workmen employed at Tirpentwys Colliery, Pontypool, were idle on Friday and Mouday last, owing to a lack of clearing facilities. About 1,400 men are employed at this colliery, and it is estimated that each stop-day involves a loss of output exceeding 1,200 tons.

As a result of representations made by the outside workmen in the employ of the Blaenavon Company Limited, at Blaenavon, the strike of 150 mill workers was not of long duration, as the management took prompt action in dealing effectively with a grievance which had caused considerable disaffection amongst the men, who seriously objected to the method of a new official in governing overtime, etc.

North of England.

Discussing, in his October circular, the national advance just conceded to miners, Mr. William Straker, secretary of the Northumberland Miners' Association, says that in the absence of colliery bills it is impossible to estimate correctly the average percentage advance on all classes of colliery workers combined this "war wage" will represent; but it is calculated the percentage is on basis wage of classes of workmen who have recognised basis wages.

The Howard Pit, Netherton, has now been idle for nearly four weeks, owing to a dispute, particulars of which we gave in this column in our issue of September 28.

Stoppages of work, because of minor grievances, are reported from the Chopwell and Stargate collieries.

The workers at New Shildon Colliery, numbering about 150 men and boys in all, have received a fortnight's notice to terminate their employment. The colliery is a very old one, and has before been closed and reopened.

Under the joint auspices of the Houghton and Harraton lodges, a conference of representatives of lodges of the Durham Miners' Association was held at Houghton-le-Spring last Saturday. It was agreed to instruct the association that, wherever female labour is employed in or about mines in the county, the workmen in such mines shall immediately down tools and receive support from the association. It was also decided to ask for a special council meeting to consider the question of demanding a living wage.

The education authorities decided that the Houghton Feast holidays this week should not be granted, but that, instead, the school children should have holiday during the whole of next week. The local miners resolved, however, that their children should not attend school this week but should observe the holidays as usual, and decided to forward to the responsible authority a protest against their interference with what has long been a recognised holiday. They decided, on their own account, to "lie idle" on Monday and Tuesday of this week, in accordance with local custom. At the meeting at which this defiant attitude was resolved upon, it was stated that the object in postponing the holiday was that the children might be available for potato-picking.

Mr. Harry Dack, president of the Cleveland Miners' and Quarrymen's Association, takes the opportunity afforded by the issue of another circular to the members to contradict the report that the recent national wages advance to miners does not apply to the members of his association. It applies, he states, to all members of the Miners' Federation, including coal miners, ironstone miners, ganister miners, fireclay miners, limestone quarrymen and others. During the quarter just ended there has not been a single fatal accident at any of the Cleveland mines.

Trimmers and teamers employed at the coal shipping ports on the north-east coast—from Hartlepool to Amble, inclusive—are formulating a demand for an increase of 15 per cent. on the tariff rate for dealing with coal, etc.

The pay bill for the Ashington group of collieries for the last week in September constituted a record, necessitating the disbursement of £21,500. It is stated that many of the miners received £5 each.

The Wages Board of the Northumberland Miners' Association has received the accountant's report on the ascertained selling price of Northumberland coal for the quarter ended August 30. This shows that the selling price was 15s. 9⁵/₁₆d. per ton, as compared with 15s. 1⁸/₁₆d. per ton in the previous quarter, an increase of 7⁶/₁₆d. per ton. Wages remain unaltered, as the sliding scale has not been in operation for several quarters past. Had the fluctuations in the selling price of coal been taken into account in recent months, miners' wages would now have stood at 106 per cent. above the basis of 1879; as a matter of fact, they remain at 120 per cent. above the basis.

The Durham Miners' Association has informed its members that the arrangements made between the Miners' Federation of Great Britain and the Coal Controller had not been completed so as to enable the sum of 1s. 6d. per day granted to all workers over 16 years of age, and 9d. per day for lads under 16 years of age to be paid last weekend, but the Coal Controller has guaranteed that all back money will be paid from September 17, and it is expected that arrangements will be completed so that the money will be paid.

employed at Harrington No. 10 Colliery, on Monday in consequence of a dispute related to the payment of wages claimed to be abnormal. The dispute was settled on Tuesday, but a settlement was not reached until the evening. The management have agreed to pay the money claimed to be already due, and to

continue the payment on the understanding that the men will do their best to increase the output of the colliery.

Federated Area.

At meetings of miners held last Friday night in the Bolton area, resolutions were adopted expressing satisfaction at the wages award of the Coal Controller. The increase would affect several thousands of men in the Bolton and surrounding coal fields, and would prove most acceptable to those middle-aged and elderly men who were only earning the "minimum," and there were not a few in the Bolton district. It was, however, admitted that some of the younger and stronger men were earning big money.

Scotland.

A strike is threatened by the miners employed at the Alloa Coal Company's Devon Colliery, Clackmannanshire. A stoppage of work will involve 250 men.

It was reported at a meeting of colliery smiths held in Hamilton, that the demand for an increase of 2s. per day has been refused. The claim is to be pressed before the Coal Controller.

A dispute arose at Auchengeich Colliery in connection with the wages paid to brushers, and three idle days took place before a temporary settlement was arrived at. The brushers have obtained an increase of 6d. per day.

The dispute at Dewshill, Salsburgh, amongst the Union members has been discussed by the Lanarkshire executive, and Mr. Gilmour has been instructed to intercede between the parties, with the view of getting work resumed at an early date.

The dockers' strike at Methil, which lasted for three days, had an adverse influence on the shipment of coal from Fife and the supply of empty wagons. Fully 4,000 men were idle for a day, and a lesser number for two days.

Some time ago, the surface workers at Banknock lodged a notice for an advance of 1s. per day. The management could not see their way to grant the advance. On September 24 the men refused to start work, and the collieries have been idle since, over 1,000 men being affected. Contrary to the advice of the union officials, the men refused to return to work till their claim was conceded. Work, however, was resumed on Wednesday, pending negotiations. The workers on the surface were prior to the stoppage receiving 5s. 9d. per shift, including 1s. 3d. war bonus.

Iron, Steel and Engineering Trades.

The accountants' ascertainment of the average net selling price of steel plates at Conssett in June, July and August last shows so little variation in figures that, in accordance with the 1896 agreement, the wages of local steel millmen during the current quarter remain unaltered at 62½ per cent. above the standard.

The average net selling price of No. 3 Cleveland pig iron for the three months ending September 30 last has been certified at 95s. 9⁵/₁₆d. per ton, as compared with 94s. 4⁹/₁₆d. per ton for the previous three months. There was thus an advance in price of 1s. 4⁶/₁₆d. per ton in the third quarter of the year, and under sliding scale arrangements north-east coast blastfurnacemen's wages are advanced 1⁵⁰/₁₆ (1½) per cent., raising wages from 78 per cent. above the standard to 79⁵⁰/₁₆ per cent. above the standard. The advance takes effect from the 7th inst.

OBITUARY.

Mr. O. M. Evans, well known in coal trade circles at Swansea, died on Saturday after a short illness, having contracted pleurisy and pneumonia, the result of a chill. He was a member of the firm of P. Evans and Company, and was connected with the Birchgrove Colliery Company. His age was 44.

Lance-Corpl. P. Pemberton, West Riding Regiment, whose death in action has just been listed, was, previous to enlisting, associated with his brother in the old-established coal merchants' business of Thompson and Sons, Guiseley. He enlisted in September 1914, and leaves a wife and two children to mourn his loss.

Capt. T. A. Thirlwell, of the Royal Engineers, died on October 1 from gas poisoning. Prior to the war, he was assistant manager at East Holywell Colliery, Northumberland.

Mr. John Parkes, elder brother of Sir E. Parkes, M.P., died at Birmingham. He was 75 years of age, and was a well-known Staffordshire iron master.

Mr. Thos. Dodd, of New Alston, Haydon Bridge, who has died at the age of 82 years, had been engineman at Settlingstones mines for over 50 years, without ever having lost a day's work through ill-health. To a very large extent self-educated, he was recognised as an authority on local geological matters and on mathematics. He was wont to relate how, as a boy, he made his own slates from rough roof slate in the mine, rubbing it down and polishing it with sandstone, and obtained his stock of slate pencils from a local "comb" quarry.

Italian Coal Output.—For the first half of 1917, the Italian coal output was 12,450 tons anthracite and 699,428 tons of lignite. During the year 1916, the total production of anthracite was 18,544 tons, and of lignite 1,282,819 tons.

Wages of German Miners.—A German official report gives the following information with regard to miners' wages during the first quarter of 1917. A comparison between these figures and those for the second quarter of 1914 gives an idea of the increase during the war. Moreover, the quality of the manual labour has changed considerably, the miners called to the colours having been replaced by less experienced men, so that the output of coal per shift is lower than formerly.

UNDERGROUND WORKERS.

Net wages and rise per shift.

	Hewers.		Other workers.	
	Wages, 1917.	Increase over 1914.	Wages, 1917.	Increase over 1914.
	Marks.	Per cent.	Marks.	Per cent.
Coal—				
Upper Silesia.....	7.04	47.0	4.92	41.7
Lower Silesia.....	5.24	35.6	4.60	34.7
Dortmund.....	9.16	50.7	6.04	36.5
Saarbrück (State mines).....	6.92	39.4	5.44	33.7
Aix-la-Chapelle.....	7.36	38.3	5.48	28.4
Lower Rhine.....	9	49.0	6.72	38.1
Lignite—				
Halle.....	5.40	32.1	4.86	38.4
Rhine.....	6.24	36.6	5.68	32.3

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Anglo-Spanish Coaling Company Limited.—An interim dividend has been declared at the rate of 6 per cent., tax free, for the half-year ended June 30.

Birmingham Small Arms Company Limited.—The report for the year ended July 31 reveals a profit available for distribution of £427,976, making with the amount brought forward a total of £571,518. A final dividend on the ordinary shares of 5 per cent., with a bonus of 2s. per share, is recommended. A sum of £150,000 is to be transferred to the general reserve fund, raising it to £400,000. Last year's profit was £381,770.

Canadian Explosives Limited.—A dividend of 1½ per cent. has been declared on the 7 per cent. cumulative preferred shares for the quarter ended September 30 last, payable October 15 to shareholders registered September 30.

Coltess Iron Company Limited.—The report for the year ended July 31 last shows that the profit earned on the year's operations to July 31, 1917, after making provision for liabilities under the Finance and Munitions of War Acts, amounts to £150,855, from which fall to be deducted amount written off for redemption and depreciation, £43,546; amount placed to suspense account for depreciation of the "special reserve fund" investments, £3,000; making a net profit for year of £104,309. The directors recommend a further dividend on the ordinary shares of 4 per cent. and a bonus of 5 per cent., making a total distribution of 13 per cent. on the ordinary shares for the year, leaving a balance to be carried forward of £17,208.

Dalmellington Iron Company Limited.—The report for the year ended June 30 states that there is in course of erection at the blast furnaces a new turbo blowing plant to replace the old beam engines, which have been in constant use since the commencement of the works, 70 years ago. The machinery and plant have been maintained in as good order as possible, considering war conditions. The results for the year, after adding £10,000 to reserve, and making provision for war taxation, show a profit of £54,653, and adding the amount from last year, £6,161, give £60,815, and deducting for depreciation and redemption £17,050, leaves a balance of £43,764. The directors now recommend a final dividend on the ordinary of 5 per cent., and a bonus of 5s. per share, free of income tax, carrying forward to next year £8,014.

Furness, Withy and Company Limited.—Warrants for the dividend on the ordinary shares at the rate of 10 per cent. per annum for quarter ending 31st inst., being 6d. per share, free of tax, will be posted on that date to holders registered 16th inst. The directors have also declared the usual dividend on the preference shares at the rate of 5 per cent. per annum for the half-year ending 31st inst.

Gulf States Steel Company Limited.—In addition to the usual quarterly dividend of 2 per cent., the directors have declared an extra dividend of ½ per cent. on the common stock.

Kinneil Cannel and Coking Coal Company Limited.—Balance dividend 6½ per cent., making 10 per cent. for the year.

Sneyd Collieries Limited.—The report for the year ended June 30 last shows a net profit, after providing for debenture interest, debenture sinking fund, directors' remuneration and income tax, of £64,885, which with the amount brought forward from last year makes £113,331. Debentures for £3,900 have been bought in the open market and cancelled, thus reducing the debenture debt to £32,200. The directors recommend the payment of a final dividend on the ordinary shares for the half-year ended June 30, 1917, at the rate of 20 per cent., making 17½ per cent. for the full year. In accordance with the provisions of the articles of association, a further dividend of 4 per cent. for the year must be paid upon the preference shares, in addition to the fixed cumulative rate of 6 per cent. The directors further recommend that £20,000 be added to the reserve, leaving the sum of £59,581 to be carried forward to the next account.

Whitehaven Hematite Iron and Steel Company Limited.—The directors have declared an interim dividend on the ordinary shares of the company for the half-year ended September 30, 1917, at the rate of 3½ per cent., free of income tax.

Wilson and Clyde Coal Company Limited.—In their report, with balance-sheet as at February 28 last, the directors state that, in consequence of the Government instructions in regard to all colliery undertakings, they considered that it would be better from every point that the company's year of accounts should correspond with the year of control, and so the accounts will therefore in future be made up to the end of February in each year, instead of, as hitherto, to August 31. The accounts now presented show that, after providing for depreciation and excess profits duty and allowing for dividends at rate of 7 per cent. per annum on the preference shares and of 1s. per share on the ordinary shares, paid in April last, amounting to £15,250, there remains the sum of £95,676, from which the directors recommend payment of a final dividend of 4s. per share on the ordinary shares, less tax, which will absorb £54,000, leaving £41,676 to be carried forward. The rate of dividend proposed for the period to February 28 is higher than would have been declared had it not been for the careful policy of retaining considerably more for excess profits duty than was ultimately found necessary. The directors also propose that the usual half-yearly preference dividend in respect of the current year should be paid early in November.

NEW COMPANIES.

Ansell, Jones and Company Limited.—Private company. Registered office, Naval Works, Kensington-street, Birmingham. Registered October 4. To carry on business as metal foundries and workers of metals, etc. Capital, £25,000. Directors: W. and F. E. Ansell.

Corra Engineering Company Limited.—Private company. Registered office, 95/97, Lower Richmond-road, Putney, S.W. 15. Registered October 3. To carry on the business of iron foundries, mechanical engineers, etc. Capital, £3,100. Directors: H. Hullier, P. Helot, and J. Cassel.

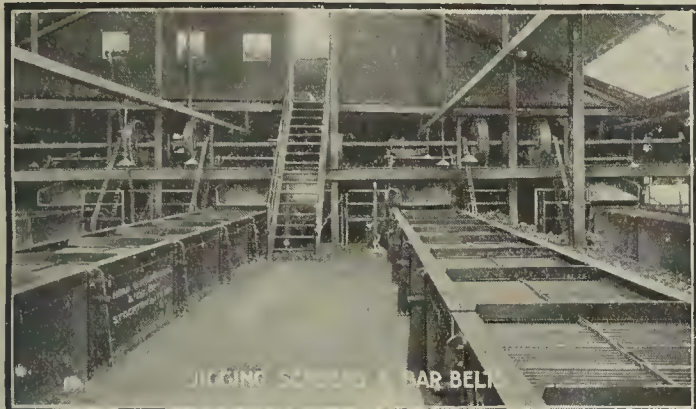
Irlam Engineering Company Limited.—Private company. Registered September 29. To carry on the trade or business of engineers, founders, etc. Capital, £2,000. Directors: W. A. Jones and B. Collinge.

Jennings (F. A.) Limited.—Private company. Registered office, Rems Works, Rosslyn-crescent, Wealdstone, Middlesex. Registered September 28. To carry on the business of general, electrical, and marine engineers, etc.

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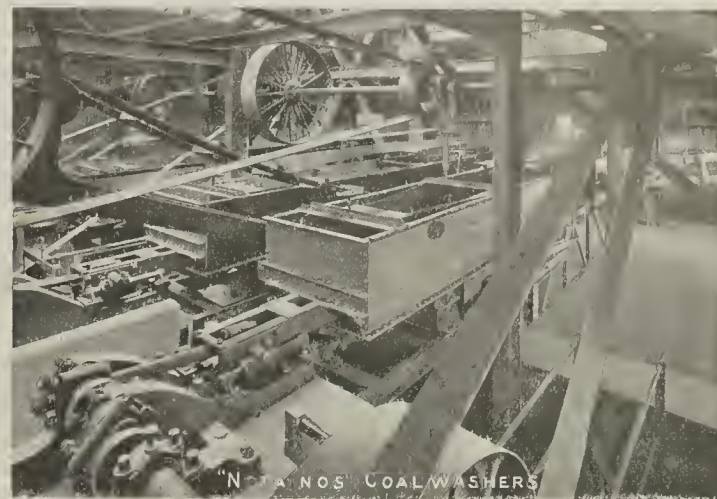
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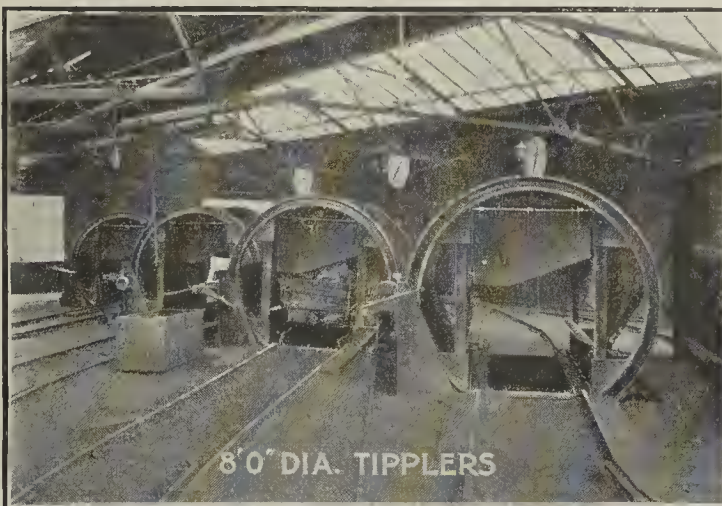
BAND CONVEYOR



"NOTA NOS" COAL WASHERS



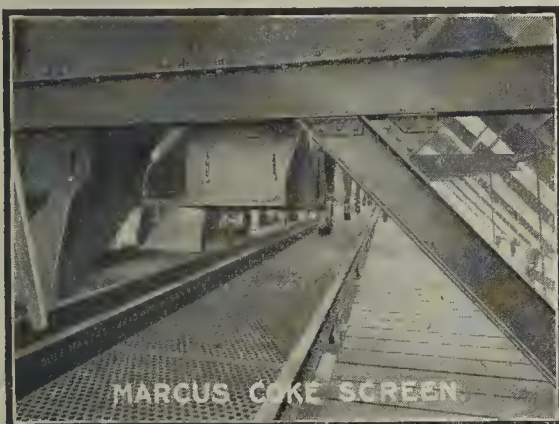
TUB CREEPER



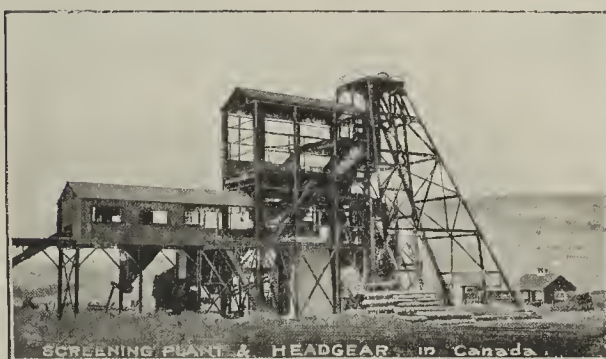
8'0" DIA. TIPLERS



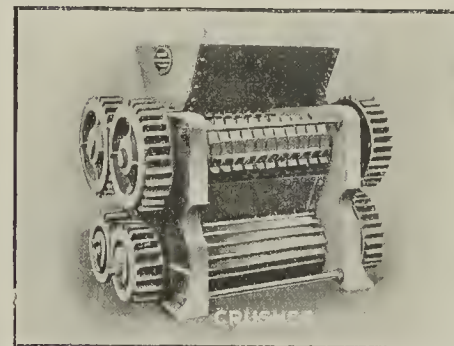
HYDRAULIC COAL SHIPPER



MARCUS COKE SCREEN



SCREENING PLANT & HEADGEAR IN CANADA



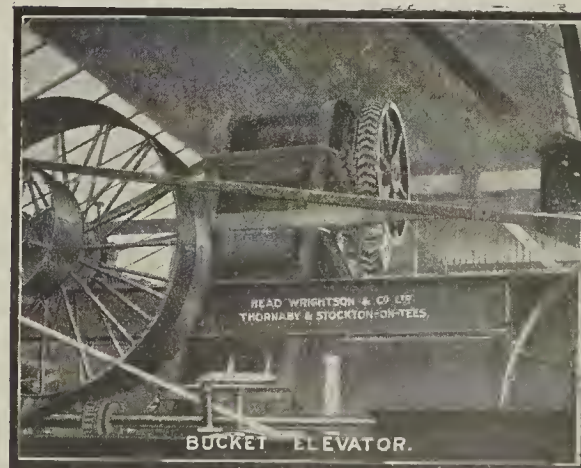
CRUSHER



GANTRY & ROPE HAULAGE



150 FEET STEEL CHIMNEY



BUCKET ELEVATOR



COVERED GOODS WAGON



STEEL TANK



CAISSONS

Blast Furnace Plant
Bunkers (Steel)
Bridges
Crushing Plant
Coal Shippers
Castings
Coal Washers
Chairs
Coke Screens

Colliery Plant
Cages
Cage Props
Conveyors
Caissons
Detaching Hooks
Drop Forgings
Dock Gates
Elevators

Friction Clutches
Forgings
Gantries
Grinding Pans
Headgears
Hoists
Mining Plant
Marcus Screens
Nota nos Washers

Nissen Stamp Mills
Pit Tubbing
Pulleys and Pulley
Blocks
Rollers
Roofs
Stampings
Steel Wagons
Steel Chimneys

Screens
Storage Bunkers
Shippers
Tub Creepers
Tiplers
Tanks
Wagons
Wagon Hoists

10. Directors to be appointed by the subscribers: F. A. and R. Jennings.
Pease and Company Limited.—Private company. Registered office, 64, Cornhill, London. Registered capital, £1,000,000. To carry on business as coal factors, and dealers in coal, coke, oil, and other fuels. Directors to be appointed by the subscribers. Subscribers: R. F. Pelly, B. A. Sanders, and T. A. Wane.

North-Eastern Pitwood Association Limited.—Registered September 29. To buy, sell, grow, fell, cut up, prepare for use, export, distribute, supply, and deal in pitwood and timber and wood of all kinds, etc. Every member of the association undertakes to contribute to the assets of the association, in the event of the same being wound up, the sum not exceeding (1) in the case of every member being the proprietor of, or a firm or company owning, holding, or carrying on any colliery or mine, a sum equivalent to 10 per cent. of the price paid or payable by such member for the whole of the timber and pitwood supplied to him by the association within 12 calendar months; (2) in the case of every other member, the sum of £1 only. Directors to be appointed by the subscribers. Subscribers: F. Stobart, Darlington, coal owner; A. Pease, 92, Hornsgate, Darlington, coal owner; E. J. George, Beechgrove, Darlington, consulting secretary; and four others.

Producer Gas Plants Limited.—Private company. Registered office, 5, Albany-street, Piccadilly, London. Registered September 5. Nature of business indicated by title. Capital, £25,000. Directors: E. G. Abrahams and O. F. Mundy.

Rollason (Abel) and Sons Limited.—Private company. Registered office, Bramford Mills, Erdington. Registered October 4. To carry on, develop, extend, and turn to account the business of steel founders, etc. Capital, £80,000. Director, J. Rollason.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

ALDERSHOT, OCTOBER 20.—Offers are invited by the Aldershot Gas, Water, and District Lighting Company for the supply of best South Yorkshire and/or Midland first-class screened gas coals, over the next nine or 12 months. Further particulars can be obtained from, and tenders should be sent (stating the names of the collieries, and prices per ton, delivered in colliery trucks, carriage paid to Tongham Siding, L. & S.W. Rly.), to the secretary of the company, Victoria-road, Aldershot, not later than 9 a.m. on Saturday, October 20, 1917.

Abstracts of Contracts Open.

ABERDEEN, OCTOBER 19.—Coal for the Royal Aberdeen Hospital for Sick Children. Tenders to the secretary, 12, Dee-street.

BELPER, OCTOBER 18.—Coal for the Belper Isolation Hospital. Forms at the office of the clerk, Bridge-street.

CLOONAMAHON (SLIGO), OCTOBER 16.—Coal and coke for the Sligo County Council. Forms from the secretary, Court House, Sligo.

HEBDEN BRIDGE, OCTOBER 15.—2,000 tons of screened gas coal and nuts for the Hebdens Bridge and Mytholmroyd Gas Board. Tenders to the clerk, Gas Offices, Carlton-street, Hebdens Bridge.

HERTFORD, OCTOBER 20.—For supply of coal and coke to the Corporation for six months from December 1. Tenders to the town clerk.

LLANDAFF.—Coal for St. John Auxiliary Military Hospital, St. Michael's. Forms from the matron.

WAKEFIELD, OCTOBER 19.—Coal (year's supply) for the Wakefield Education Committee. Tenders to the secretary, Education Department, Town Hall, Wakefield.

WIGAN, OCTOBER 15.—Best house coal (year's supply) for the Corporation, delivered at Whalley Hospital. Tenders to the town clerk.

WIGAN, OCTOBER 17.—For supply of pea nuts and rough slack for the Corporation; estimated quantity for the year, 300 tons. Tenders to the town clerk.

The date given is the latest upon which tenders can be received.

The late Mr. John Seacombe Burrows, of Drayton House, Lulworth-road, Birkdale, formerly of Green Hall, Atherton, colliery proprietor, a director of the Mazapil Copper Company Limited, a magistrate and county councillor for Lancashire, who died on May 18, aged 62 years, left estate of the value of £103,488 0s. 4d., including personalty of net value of £101,202 2s. 3d.

Minerals of the Empire.—It is understood that a definite decision has been arrived at to provide the necessary machinery for the protection and advancement of the economic welfare of the metal and mineral industries of the Empire. Last year the Iron and Steel Institute, representing the iron and steel industries; the Institute of Metals, representing the users and manufacturers of non-ferrous metal and alloys; the Institution of Mining Engineers, representing the coal and iron ore mining and allied industries; and the Institution of Mining and Metallurgy, representing the mining of minerals other than coal and iron ores, and the production of metals other than iron and steel, jointly advocated the establishment of a Department of Minerals and Metals, and this proposal was the subject of a resolution of the Imperial War Conference. Arrangements are now being made (says *The Times*) for the formation of a body called the Imperial Mineral Resources Bureau, which will be representative of the different parts of the Empire. There are highly-organised geological survey departments of mines in nearly all the British Dominions, but there is no central clearing-house to co-ordinate the mineral resources of the Empire, to ascertain what is required, and to safeguard the interests of the Empire, and to secure the most serious results to the national economy. The lack of co-ordination in the past have been stated by the war, and the new body is to be good this deficiency.

THE FREIGHT MARKET.

Business in the outward freight market has once more been of small dimensions, although chartering is rather more active at South Wales than was the case last week. On the north-east coast, the most interesting business transacted has been the fixing of three steamers, aggregating about 6,500 tons, for Gothenburg, from the Tyne, at the even rate of 190 kr., as compared with from 185 kr. to 200 kr. paid for this port last week; and two vessels for Stockholm at 200 kr., as against 207½ kr. paid recently. Coastwise, London has been fixed at 20s. 6d. for Tyne loading. All other fixtures are for French Atlantic ports, for the carriage of coke and pitch, at scheduled rates. There is a very keen enquiry for vessels for most neutral destinations, but supplies of "free" tonnage are miserably small. Spain is quoted at 150s. to Bilbao from the Tyne, and Barcelona at 220s. Portugal has Lisbon at 90s., and Oporto at 105s. Port Said stands at 165s. Gibraltar is quoted at 100s. At South Wales, there is a brisk all-round demand, but tonnage supplies are small, and have been rendered worse by reason of delays due to bad weather. Business done has been exclusively confined to vessels for the French Atlantic at scheduled figures.

Homewards, the River Plate is steady, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. At the United States, Virginia to Buenos Ayres or La Plata with coal is still quoted at 125s., with 33 dols. for Rio discharge. On Committee account on heavy grain basis, the Northern Range is quoted at 30s. for United Kingdom delivery, and 32s. 6d. for French Atlantic discharge. The Gulf is listed at 32s. 6d. for France, and 35s. for West Italy. On net form, the Northern Range is quoted at from 210s. to 215s. to the United Kingdom, and 250s. to Northern France. Cuba with sugar to French Atlantic is mentioned at 280s. At the Far East, Bombay to West Italy is firm, at 400s. on d.w. basis. To the United Kingdom, Bombay or Kurra-choe are steady, at 250s. Haiphong-Saigon to France with rice is unchanged, at 500s. Madras to Marseilles with kernels is quoted at that same rate. The demand for tonnage from the Mediterranean ore and phosphate ports is well maintained, as are also the rates.

Tyne to Dieppe, 600, 62s. 6d., pitch; Fecamp, 1,200 and 800, 62s. 6d., pitch; Gothenburg, 2,300, 3,000, and 1,200, 190 kr.; London, 1,000, 20s. 6d.; North French Range, 700, 62s. 6d., pitch; Rouen, 860, 67s. 6d., pitch; Stockholm, 1,600 and 2,400, 200 kr.; and Treport, 300, 46s., coke.

Cardiff to Bordeaux, 2,600, 69s., neutral; Caen, 1,300, 46s. 6d., neutral; Cherbourg, 1,500, 47s. 3d., coal, 74s. 3d., coke, neutral; 1,935, 47s. 3d., neutral; La Pallice, 1,300 and 1,600, 48s. 9d., neutral; L'Orient, 600, 61s. 6d., neutral; Rouen, 1,600, 1,400, and 2,000, 48s. 9d., neutral; 1,000 and 1,200, 24s. 6d.; 900, 50s. 3d., neutral; 1,200, 74s. 3d., neutral; and Trouville, 480, 48s., neutral.

Briton Ferry to Trouville, 500, 48s., neutral.

Swansea to Rouen, 900, 50s. 3d., neutral; 2,000 and 1,500, 48s. 9d., neutral; Honfleur, 700, 48s., neutral; Caen, 1,300, 46s. 6d., neutral; Trouville, 500, 48s., neutral; and Brest, 1,100, 45s., neutral.

Neath Abbey to Trouville, 400, 48s., neutral.

Port Talbot to Granville, 1,200, 46s. 6d., neutral; and Brest, 1,150, 45s., neutral.

Barry to Rouen, 1,150, 45s., neutral.

Newport to Trouville, 1,200, 46s. 6d., neutral.

Forth to Gothenburg, 2,200, 180 kr., reported.

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named post free.

Colonial Reports (Annual): (No. 930), Trinidad and Tobago, Report for 1916, dated September 1917, price 6½d.; (No. 931), Gibraltar, Report for 1916, dated September 1917, price 1½d.

Royal Commission on Housing in Scotland: Report of the Royal Commission on the Housing of the Industrial Population, Rural and Urban (Cd. 8731), price 4s. 6d.

PUBLICATIONS RECEIVED.

"Supply of Coal to France and Italy (Cardiff Committee)—A Synopsis of the Arrangements in Force up to Aug. 31, 1917, for Regulating the Supply of Coal, Coke, and Patent Fuel to France and Italy from South Wales Ports, and also the Directions of the Controller of Coal Mines as to the Sale of Coal" (June 28, 1917), price 5s.; "Cassier's Engineering Monthly" (Vol. 52, No. 4), October 1917, price 1s.; "Journal of the Franklin Institute" (Vol. 184, No. 3), September 1917, price 50c.; "Rules and By-laws of the Manchester Geological and Mining Society" (revised and amended, February 1917) (Manchester: Published at the Rooms of the Society, 5, John Dalton-street); "Mine and Quarry" (Vol. 10, No. 2), August 1917; "Journal of the Society of Architects" (Vol. 10, No. 4), October 1917 (London: At the offices of the Society of Architects, 28, Bedford-square, W.C.1), price 6d.; "Journal published by the Swedish Chamber of Commerce for the United Kingdom" (Vol. 9, No. 9), September 30, 1917; "Concrete: A Unique Building Material and Substitute for Timber, Bricks, Iron, and Steel" (post free on application to the Concrete Utilities Bureau, 6, Lloyds-avenue, E.C.3); "Memoirs of the Geological Survey of Scotland: The Economic Geology of the Central Coal Field of Scotland—Description of Area 2, including the Districts of Denny and Pleau, Banknock, Carron and Grangemouth, Cumbernauld, Castlecary and Bonnybridge, Falkirk and Slamannan," by L. W. Hinxman and others, price 4s. 6d.

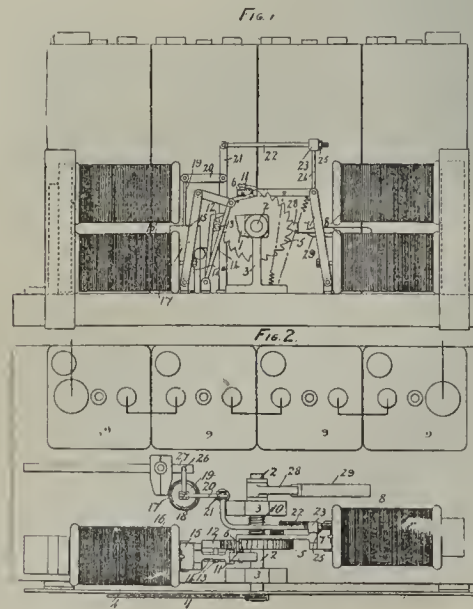
America and the Donetz Basin.—On the invitation of the Ministry of Ways of Communication, an official American committee has visited the Donetz coal basin. It stopped at the chief points on the way, studied the leading features of the railway system, and was able to give the Russian Government some hints respecting improved transport of coal from the mines to the consuming centres in the north.

Wagons for Winter Coal.—It is now confidently expected that the Controller of Coal Mines will have a sufficient number of railway and privately-owned coal wagons at his disposal by October 15 to remove all ground for anxiety about the conveyance of coal from the collieries to the various depots established throughout the country. In this work the Controller has had the co-operation of all the railway companies.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

108508. *Apparatus for the Production of Toluol, Benzol, and other Light Hydrocarbons from Heavy Oils.* W. Anderson, Inistore, Helensburgh, Dumbartonshire; and J. Meikle, 14, Garrioch-drive, Maryhill, Glasgow. — This invention relates to an improved apparatus for obtaining toluol, benzol, and other light hydrocarbons from heavy or dead oils, such as creosote oil or blast furnace oil, by distillation of the oil under pressure, followed by transference of the vapour obtained by distillation to a superheater and superheating along with steam, the decomposition being the consequence of superheat as distinguished from reaction in the presence of a catalyst. The apparatus according to the invention comprises a still 1 constituted by superposed drums A and B separated by a combustion chamber C, the lower drum B being traversed by fire tubes, a down-comer E being led from the upper drum A to the lower end of the lower drum B, preferably centrally of the drums, and return tubes F connecting the upper end of the lower drum B with the lower end of the upper drum A. The feed pipe 2 is preferably co-axial with the down-comer E. The superheater connected to the drum A by a pipe H and coupled to a steam supply pipe J is constituted by tubes 3 expanded into headers 4. As is evident, steam is thus admitted to the superheater together with the oil vapour from the still. The superheater has also a connection K with the condenser. The vapours from the superheater may be led to a retort, as described in the specification of the co-pending Application No. 11034/16.

108397. *Improvements in Signalling Appliances for Collieries.* J. Samson, managing director of the Sanguhar and Kirkconnel Collieries Limited, Sanguhar, Dumfriesshire. — This invention has reference to improvements in signalling appliances for collieries of the class in which an electrically controlled visual signalling device indicates on a dial in the engine house the number signalled from the pithead, pit bottom, or other locality. Referring to the drawings, an indicator pointer 1, mounted on a spindle 2, carried in suitable bearings 3, is adapted to move over an indicator dial 4, having numbers and the like marked on same to correspond to the signals required. A ratchet wheel 5, secured to the spindle 2, is actuated one tooth at a time by a pawl 6, carried by the armature 7, of one set 8, of electro-magnets, which may be supplied by cells 9, accumulators, by a dynamo, or by any suitable source of supply. A spring or the like 10 is fitted to the wheel 5, so that same always has a tendency to rotate backwards, and a stop 11 is arranged to limit the amount of backward rotation, and keep the pointer 1 at zero. A pawl 12, controlled by a spring 12a, is arranged to prevent backward rotation of the wheel 5, after it has been rotated forwards. This pawl 12 carries a projecting pin 13, adapted to be engaged by an arm or lever 14, fitted to the armature 15 of a second set 16 of electro-magnets. When these electro-magnets 16 are energised, the armature 15 is attracted, and withdraws the pawl 12 from the wheel 5, so that same rotates backwards and moves the pointer 1 back to zero. An oil plunger or dashpot is arranged to energise the electro-magnets 16 after a predetermined interval of time. This arrangement consists of an open-topped cylindrical vessel 17, containing oil or other suitable fluid. A piston 18 is arranged within this vessel 17, and the upper end of the piston rod 19 is connected to the one limb 20, of a bell crank lever, 20, 21; the other limb 21, of which is connected to a slidable rod 22, passing through an eye 23, formed at the end of an arm or bracket 24, fitted to the armature 7 of the electro magnets 8. When a signal is made, the piston 18 is raised, and then slowly falls. A stop 25 fitted on the rod 22, passing through the eye 23, of the armature bracket 24, bears against the said eye 23, when the piston 18 is at the lower position, and the armature 7, after making contact with the magnets 8, falls smartly, and the eye 23 slides over the rod 22, leaving the stop 25, and rod 22, connected to the piston 18, to fall slowly so that, after a predetermined interval of time, a rod 26, attached to the connection between the bell crank lever 20, 21, and the piston rod 19, makes contact with a two-way switch 27, and closes the circuit for the electro-magnets

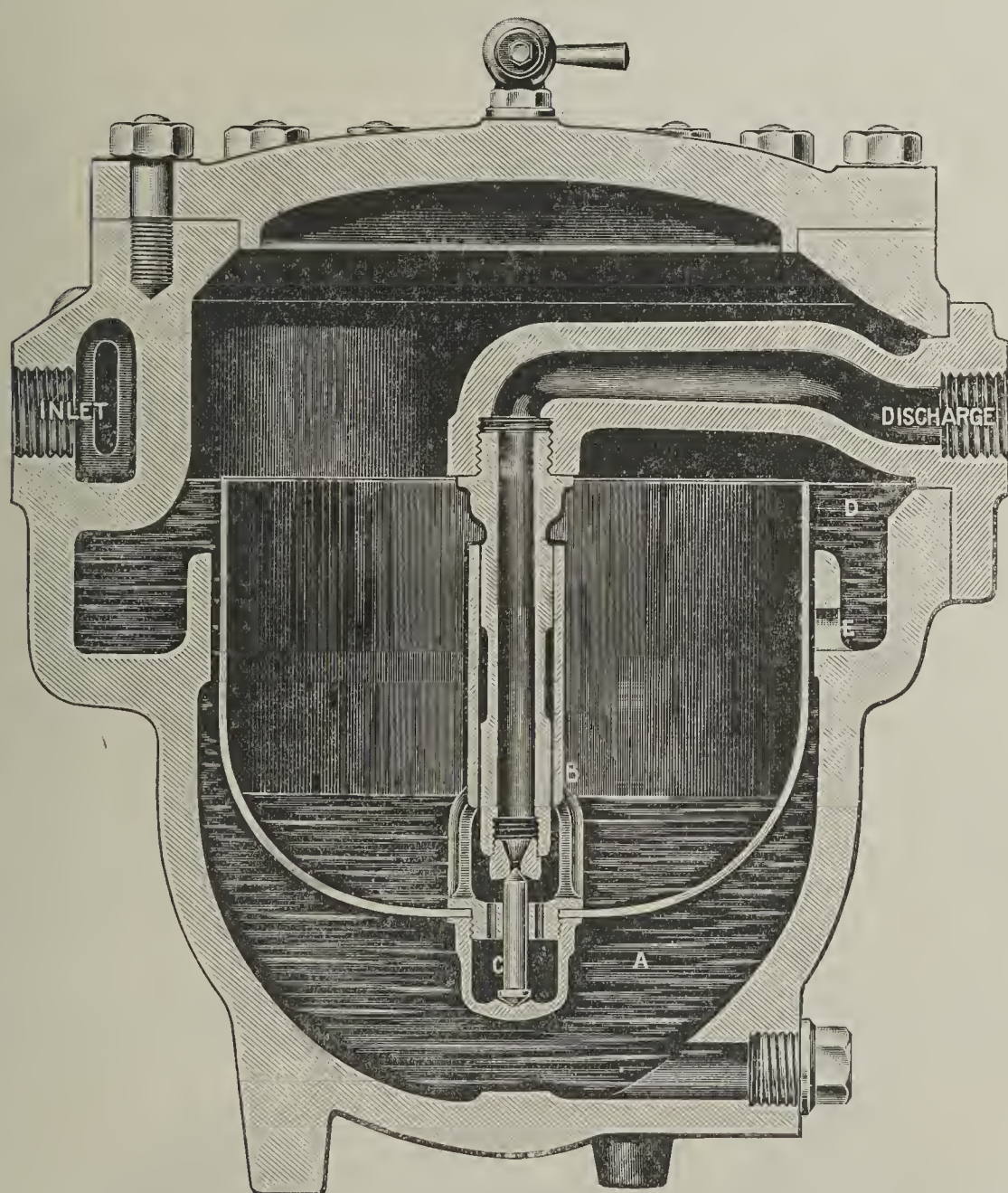


HOPKINSON

BOILER MOUNTINGS & VALVES

FOR HIGH PRESSURE AND SUPERHEATED STEAM.

R.D.S. STEAM TRAP FOR ALL PRESSURES



HOPKINSON R.D.S. STEAM TRAP

FIGURE No. 9034.

VALVE & SEAT
OF HOPKINSON
PLATINUM
METAL.

CAST IRON OR
CAST STEEL
BODY & COVER.

RAPID DISCHARGE
OF WATER AND
SHARP CUT-OFF.

NO LEAKAGE.

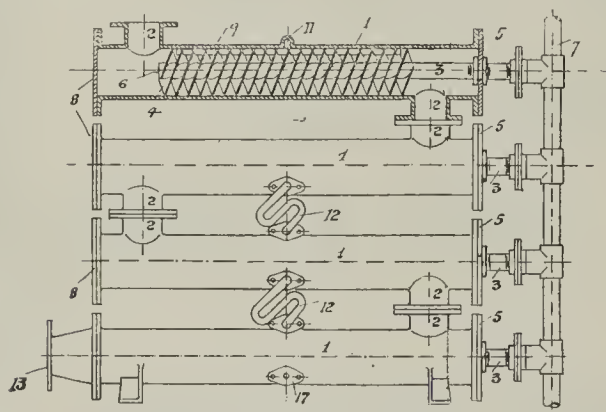
J. HOPKINSON & CO. L^D. HUDDERSFIELD.

LONDON - GLASGOW - EDINBURGH - PARIS
CARDIFF - OLDHAM - BLACKPOOL - PETROGRAD

is energised, and attract the armature 15, and release the pointer 1, and the electro-magnets 16 are also energised when reached a predetermined point during the operation. A contact is preferably arranged on the indicator pointer and another contact is arranged at a predetermined position on the engine indicator dial, so that when the cage is at a predetermined point in the shaft, these two contacts meet, and close the circuit of the aforesaid electro-magnets 16, and thus the signals are cancelled. A lever or arm 28 is also fitted to the spindle 2, and operates a spring two-way switch 29, when the pointer 1 is at zero in the one way, and in the other way when the pointer 1 has moved from zero. Suitable electrical connections are arranged to permit of the above operations between contacts arranged at the place where the signals are to be transmitted, the source of electrical supply, the electro-magnets, and the two-way switch. (Three claims.)

108448. *Separating Low-Temperature Tars into Components Without Distillation.* R. Maclaurin, Homesteads, Cambusbarrow, Stirling.—The object of this invention is to separate crude oils and tars, such as are obtained by the process of distillation, Patent No. 24426/13, into portions, without resorting to distillation. The invention is only intended to apply to true low-temperature tars, that is, tars very deficient in aromatic hydrocarbons of the benzene series, and which are also characterised by their freedom from naphthalene, anthracene, and free carbon. Crude oils obtained by the low-temperature distillation of bituminous or canneloid coals are equally amenable to the process, but to tars rich in aromatic hydrocarbons the present process is not intended to apply. True low-temperature oils or tars can be separated into two portions by the addition of water acidulated with sulphuric acid or other mineral acid. To a measured volume of the crude oil obtained by carbonising at a low temperature a bituminous or canneloid coal is added about an equal volume of water, made slightly acid by the addition of about 3 per cent. of its volume of oil of vitriol. The temperature of the mixed liquids is raised to about 40 to 50 degs. Cent., and the whole well agitated, and then allowed to settle. The resin will settle to the bottom, from which it can be run off. The acid layer can be treated direct for the recovery of bases, or if still distinctly acid can be used again on a further quantity of oil. The top layer of oil can be further freed from resins and phenolic bodies by treatment with caustic soda solution, and after washing, an oil or grease very suitable for lubricating purposes, is obtained. The resinous portion can be further washed with a light paraffin spirit, and after separating, and drawing off any water or spirit adhering, is ready for use as a black varnish or for other purposes. To obtain a quicker drying and less highly coloured resin, the crude oil obtained by carbonisation is treated first with paraffin oil, petrol, gas oil, or other paraffinoid oil, in which the bulk of the resinous constituents of the crude oil are insoluble, as proposed in Application 108339, and after settling out the black resin the light oil is run off. To this the weak acid water is applied. This causes a further deposition of resin, and this resin is termed red resin, as it is much redder in colour than the black resin thrown down by the paraffin oil. By washing and driving off the water from this, a resin is obtained which when thinned with a small proportion of methylated spirit or other suitable solvent, dries very quickly, forming a good yellow, or yellow red varnish. The oil floating above the acid layer can be freed from phenols, etc., by use of caustic soda, and is then, after washing with water, available as a lubricant or for other purposes. (Two claims.)

108579. *Improvements in Apparatus for Vaporising Oils for Enriching Coal and other Gases.* N. Swindin, 7, Wellington-buildings, Bow, E.—This invention relates to apparatus for vaporising oils, and is particularly designed



for vaporising high flash point oils, as, for example, paraffin oil, and passing the vapours so formed into a current of coal gas in order to avoid the troubles arising

from the deposition of naphthalene, and to that class of apparatus in which the current of coal gas is passed over heated surfaces upon which the oil is caused to flow in films. Fig. 1 is an elevation of the vaporiser constructed according to the invention, and showing the topmost main pipe in section. The apparatus operates as follows for vaporising oils, for washing out impurities, or other bodies from gases, vapours, and the like, or for bringing gases into intimate contact with liquids. Coal or other gas is caused to enter the lowermost main pipe 1 at 13, and flow upwards through each superimposed main pipe 1 in series and out again to the mains of the works to which the apparatus is connected. When the helical-finned steam pipe is fitted, the gas must screw itself, so to speak, along the main pipes 1, which greatly lengthens its travel through the apparatus, which time it is in contact with freshly-formed films of oil, as hereinbefore described. When the circular-gilled pipe is fitted, the gas passes through a series of staggered openings in the gills, a course which sets up eddy currents, thus promoting intimate contact of the gas with the films of oil or fluid on the gills 4. Steam is admitted by the pipe 7 to each of the gilled steam pipes 3 at such a pressure as will maintain a temperature of vaporisation of the oil to be vaporised. For paraffin oil, a temperature of 140 degs. Fahr. is found suitable, though lower temperatures than 140 degs. Fahr. may suffice to vaporise a sufficient quantity of paraffin oil. It is obvious that an apparatus constructed according to this invention can without alteration be used for washing gases with water or like liquids for the removal of impurities or for treating gases with oils and other suitable solvents for the removal and recovery of benzol, toluol, ammonia, cyanogen bodies, and the like. (Three claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Bircumshaw, J., and Butterley Company. Pit props. (14315)
Brown and Sons, D., and Sykes, A. Steam turbine, double helical, etc., gearing. (14345)
Clegg, J. H. Firebars. (14303)
Compagnie Générale d'Electricité. Steam turbines. (14232)
Dale, Brown and Company. Gas producers. (14271)
Davidson, E. C., and Rudde, S. H. Double acting internal combustion engine. (14147)
Drake, J. W., and Drakes Limited. Retorts and apparatus for manufacture of gas. (14317)
Draper, J. M., and Rhondda Engineering and Mining Company. Apparatus for separating substances of different specific gravities, such as fine coal or ores, etc. (14404)
Durnford, C. W. Electric motors. (14446)
Durnford, C. W. Dynamo electric machines. (14451)
Gibbs, W. E. Control of air in breathing apparatus for mines, etc. (14238)
Guy, J. G. Endless rope haulage clip. (14326)
Henderson, W. A. C., Leeming, J. A., and Rowse, A. A. Ropeways or telfer lines. (14428)
Howden and Company, J., and Hume, J. H. Furnace fronts. (14403)
Ionides, A. C. Gaseous fuel furnaces. (14296)
Jeffares, W. Two-stroke internal combustion engines. (14390)
Lee, W., and Shepherd, G. Coal cutter pick. (14262)
Lewis, T. Means for consumption of smoke. (14273)
Lindley, W. Driving or excavating tunnels, headings, or drifts, and sinking shafts, etc. (14155)
Liverpool Patents Company. Firebars. (14303)
Love, H. Indicator for use in coal mines, etc. (14334)
Mahonin, A. Internal combustion engines. (14212)
Marin, A. J. Explosives. (14160)
Millar, W., and Strachan, J. Mine signalling apparatus. (14105)
Morris, J. A. Combined reciprocating engine and turbine. (14128)
Newall, J. C. Gas producers. (14271)
Oddie, W. M. Ash handling plant. (14182)
Paterson, B. Rotary internal combustion engine. (14316)
Porge, P., and Strache, H. Process for increasing output of light hydrocarbons from mineral oils, etc. (14359)
Readman, R. Internal combustion engines. (14110)
Remy, M. E. de B. Two-stroke internal combustion engines. (14492)
Robinson, C. W. Steel. (14230)
Sandbrook, W. Miners' safety lamps. (14471)
Siemens-Schuckertwerke. Electrical transformers, etc. (14411)
Smal, F. Four-stroke cycle internal combustion engines. (14207)

- Standard Motor Construction Company. Internal combustion engines. (14161, 14422)
Submersible and J. L. Motors Limited. Electric motors. (14446)
Submersible and J. L. Motors Limited. Dynamo electric machines. (14451)
Tanner, H. L. Electric motors. (14369)
Westercamp, G. Means for propelling a load along a cable. (14248)
Willmott, A. M. Internal combustion engines. (14370)

Complete Specifications Accepted.

(To be published on October 25.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
9263. Vickers Limited, and Halstead, R. L. Electric regulators or rheostats. (109818)
13441. Ewing, H. O., and Field, T. W. Internal combustion engines. (109827)
13546. Matthews, R. L. Double-acting pumps, particularly applicable to deep well pumps. (109834)
13667. Addyman, E. T. W. Internal combustion engines. (109840)
13812. Bachelet, E. Electro-magnetic engine. (109847)
15213. Hall, R. W., and Pearce, D. Mine signalling apparatus. (109862)
16400. Williams, T. Self-locking pin and shackle for colliery trams and the like. (109878)
16508. Hofmann, A. Step furnace grates. (109883)
16538. Carter, L. E. Means for stopping or diverting leaks in steam generators. (109884)
16638. Mitchell, J. Governors for gas plant blowers or air compressing or exhausting systems. (109885)
17011. James, H. V. Controlling apparatus for electric motors. (109890)
18271. Thompson, W., Greener, H., Morgan, J., and Palmer, M. Conveyors. (109902)
1917.
114. Heginbotham, E. Rotary pumps. (109907)
502. British Thomson-Houston Company (General Electric Company). Electric controllers. (109910)
1107. Oates, W., and Robinson, E. B. Packing or filling for absorption recovery or scrubbing towers or the like. (109915)
1572. Skinner, W. C. Stoves, furnaces, and like fuel burning devices. (109920)
3716. Jackson, W. J. Mellersh- (Stein et Cie., C. M.). Device for preventing the escape of gas from gas generators. (109933)
4497. Hibi, K. Internal combustion engines. (109937)
6869. Mascart, C. Band conveyor. (106613)
7396. Ledebor, P. H. Direct iron ore process. (109952)

Hull Coal Traffic.—The coal traffic through the port of Hull during September decreased by 81,111 tons compared with September of last year. The official monthly returns show that 235,356 tons were imported to Hull last month, compared with 316,467 tons in September last year. For the period January-September 1917 the imports totalled 2,171,738 tons, against 2,529,199 tons for the corresponding period last year—a decrease of 357,461 tons.

Coal Miners in Volunteer Corps.—An Army Council instruction just published draws attention to the Order under which miners are ineligible for Section B of the Volunteer Force. The instruction states that it has been represented that, owing to the importance from a national point of view of the coal industry, employers are frequently in doubt as to the course they should take in giving or withholding permission to coal miners in their employ to join Volunteer Corps, and some guidance on the matter is desirable in order to clear up the misunderstanding which undoubtedly exists at the present time. The question has been under consideration by the War Office and the Controller of Coal Mines, and the following arrangement has been agreed to:—None of the following classes should be accepted either for enrolment in the Volunteer Force or for membership of Sections A, B, or C: (a) All mining officials, e.g., managers, under-managers, deputies, examiners; (b) winding enginemen, pumpmen, boilermen, stokers, electricians, fire brigade men, rescue men. A qualifying clause allows the enrolment of other classes of coal miners without restriction in Welsh counties other than the steam coal districts of South Wales, that is, Monmouth and Glamorganshire, as far west as a line drawn from Swansea and due north therefrom, Pifeshire, Haddingtonshire, Edinburgh, Northumberland, Durham, and Yorkshire, north of a line running due east and west through Wakefield. In these counties it has been arranged that employers shall not place obstacles in the way of their employees not specified in (a) and (b) joining Volunteer Corps (Sections A, B, and C). As regards other parts of Great Britain, decisions in each individual case are left to employers.

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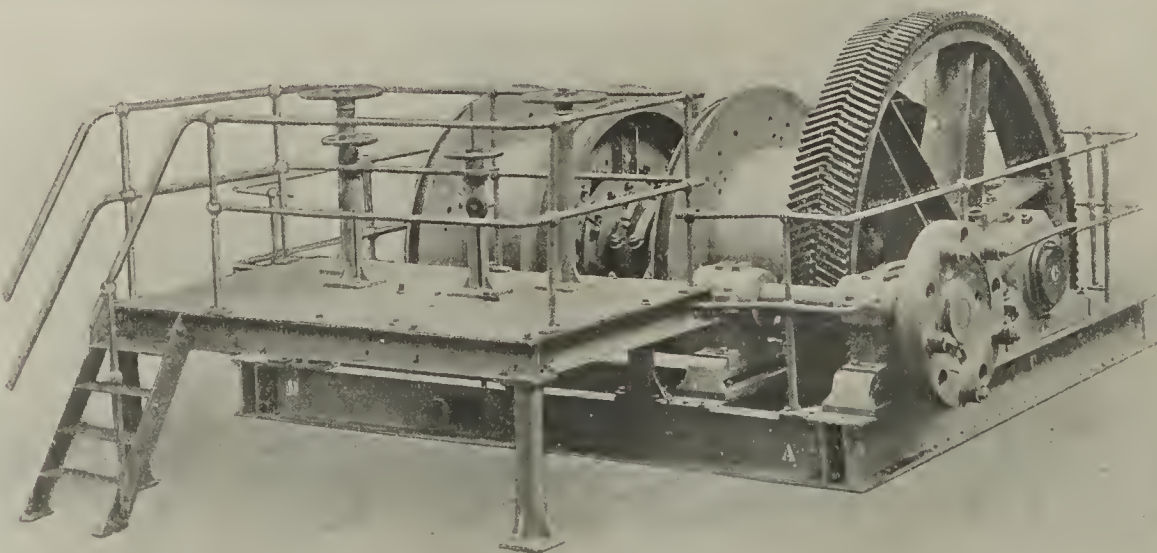
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AND

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COAL AND SHIPPING.

By F. J. WARDEN-STEVENS,
M.I.M.E., A.M.I.E.E., &c.

XXII.—Stacking and Re-handling Coal.

The usual method of stacking coal by hand is tedious and somewhat costly if large gangs of labour are employed. Carrying coal either from ship, barge, or railway wagon involves the use of plankways as the height of the stack increases; and whether bags or baskets are used, the wear and tear of these is excessive. An improvement on carrying is, of course, the use of wheelbarrows for pushing, or, better still, narrow-gauge rail trucks; and hauling mechanically if the distance from the position of unloading to the stacking ground is considerable. In order to obtain elevation when the coal is handled in rail trucks, there must be stagings reached by inclined ways—assuming that unloading is effected at ground level. If, how-

ever, as may be the case with railborne coal, the siding from the railway is on an embankment above the level of the stacking ground, then trestle stagings become necessary, and, if the height is considerable, fixed or movable chutes should be provided at the tipping positions to reduce the fall and breakage of the coal, and lessen the dust nuisance.

The Use of Cranes on Storage Grounds.

Mechanical systems of stacking are certainly desirable when large quantities of coal have to be frequently handled. Various methods are open for consideration, the choice, of course, being dependent on the particular conditions.

Perhaps the simplest and most flexible system of stacking is by means of one or more self-propelled derricking jib cranes, used either with grabs or self-discharging skips. If the coal is delivered by vessel or barge, and the stacking ground adjoins the quay or wharf, the cranes can also be used for discharging, the position of the craft being changed along the wharf to meet the progress of stacking, and the crane being moved on its track parallel with the quayside. To extend the area of the stacking back from the wharf and beyond the radius of the crane, the discharging crane or cranes can handle the coal to a staging situated on the stacking ground parallel with the wharf and at a distance therefrom equal to the extreme radius of the crane. On this staging the crane loads can be deposited, and if handled in skips can be lifted and stacked by another crane or cranes, also self-propelled on a track along the storage ground parallel with the staging. If a grab is used with the discharging crane, then it can deliver into portable hopper skips for the stacking cranes to handle. Loop or switch tracks for the cranes enable them to pass from one track to another; and if turntables are provided on the tracks, or the cranes are constructed with double (right angle) wheel bases, they can pass on to other tracks at right angles. In this manner the area of the stacking can be extended as desired, but beyond a certain limit a more economical and speedier method (which will be mentioned later) can be adopted. The use of cranes, as described, provides for a rectangular system of stacking, or for a series of circular piles. In some cases it is advantageous to elevate the crane tracks on trestles, for example, to obtain greater height of stacking, or to utilise the area beneath the track if the trestles are of open construction. When the storage ground does not adjoin the place of delivery, a method of stacking by jib cranes can still

be adopted, transport to the storage ground being effected by hauling the coal either in skips on platform trucks or in trucks having a removable skip body, which can be handled by stacking cranes, the arrangement of the rail tracks serving for distribution over the storage ground according to the particular conditions. In the case of railborne coal, the railway wagons can, in some cases, pass right on to the storage ground by way of the siding or an extension supported on an embankment or open trestle. A development of stacking, by means of one or more jib cranes, which provides for a large storage, is illustrated in fig. 1. In this system, a hopper is constructed at the centre of the storage area and below ground level; along the

Before proceeding to other mechanical methods of stacking, it will be well to note that, in the case of cranes, re-handling from storage can be equally well effected by means of the same equipment. This applies also to transfer in storage; and, in the case of conveyance to storage ground, by rail-truck skips as mentioned, stagings can be provided on the storage ground to support the skips, thus facilitating their handling to the trucks, the stagings being of such a height as to be level with the platforms of the trucks. Stacking by means of jib cranes has been referred to rather fully, because it offers alternative methods which are simple, flexible, and inexpensive. There is no reason why either breakage of the coal or the dust nuisance should be excessive; and stacking can be effected rapidly, the rate depending on the lay-out of the storage ground and its service tracks. Careful consideration should, of course, be given to the number of cranes to be provided, which will depend on the frequency and extent of use, the capital outlay, and the possibility of utilising them for other services.

Types of Transporters for Stacking.

The usual forms of bridge transporters are largely employed on storage grounds, the trolley carrying the

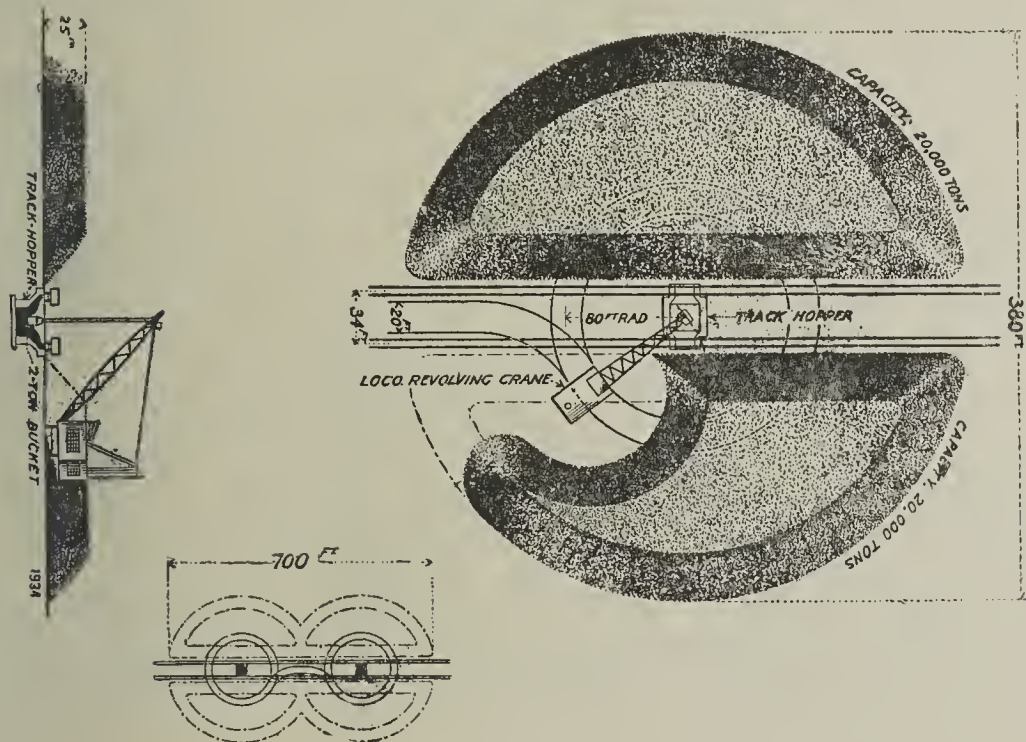


FIG. 1.—OPEN STACKING ON LARGE AREA, WITH CRANE.

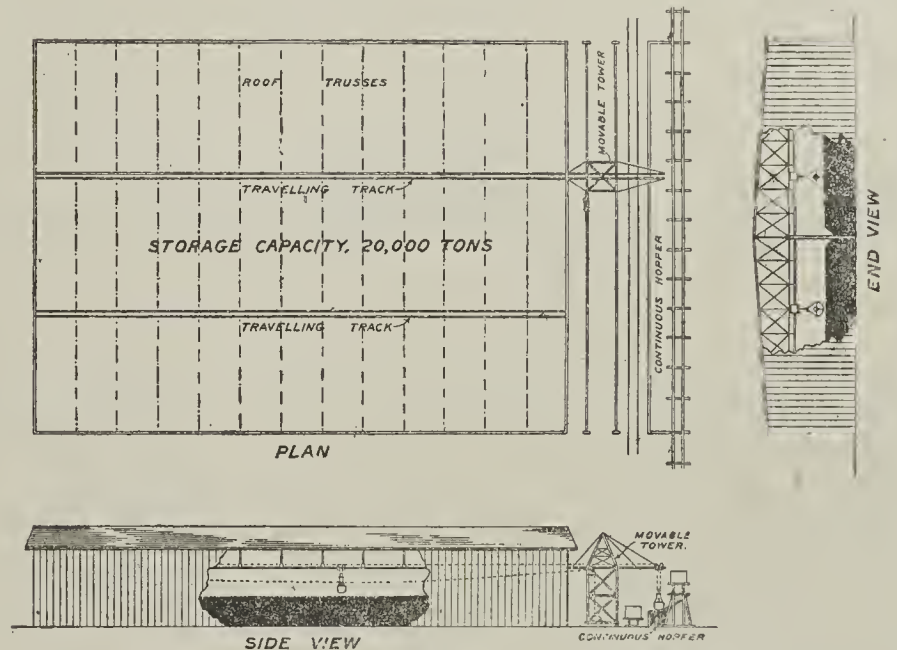


FIG. 3.—COVERED STACKING WITH TRANSPORTER AND MOVABLE TRACKS.

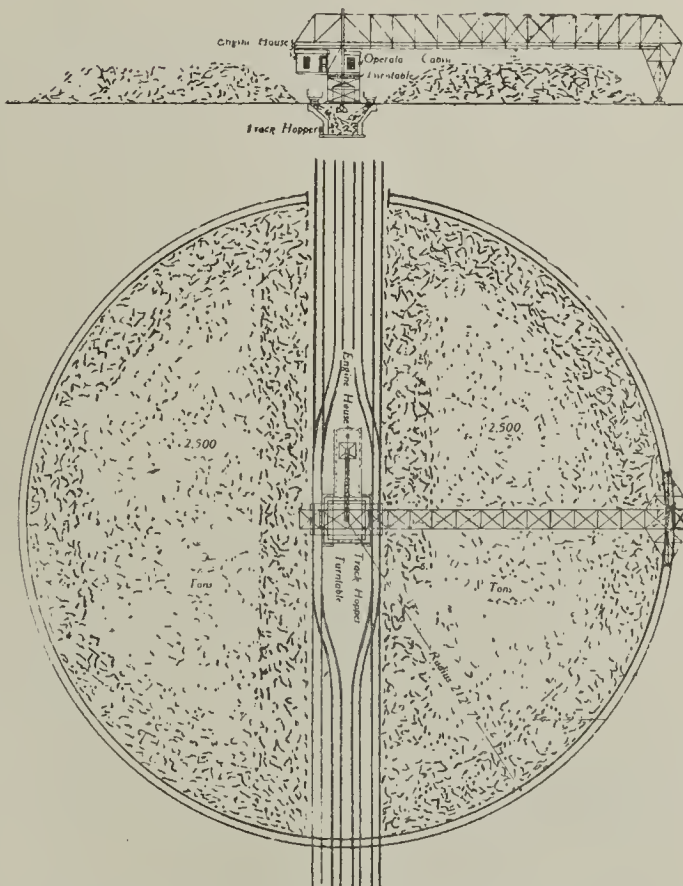


FIG. 2.—BRIDGE TRANSPORTER ARRANGED FOR RADIAL TRAVEL FROM A FIXED CENTRE.

grab or skip being operated either by wire ropes from a fixed cabin, or independently—the operator travelling in a cabin attached to the trolley. This type of plant is more costly than a jib crane, and can only be travelled longitudinally on tracks extending on either side of the ground; such a plant can, however, be used for re-handling and also for discharging if alongside the quay or railway sidings. An adaptation of the bridge transporter, to provide for radial travel from a fixed centre instead of longitudinal travel, is illustrated in fig. 2, from which it will be seen that a circular method of stacking is thus attainable, similar to that already referred to in connection with cranes. The tower or structure supporting the bridge at one end revolves on a turntable base, at a fixed position, whilst the other end of the bridge is supported by a tower frame on a wheel base, which travels on circular tracks around the storage ground. Under the turntable tower, and below the ground level, is a hopper, into which the coal is delivered from railway wagons on siding tracks. Other types of transporters which are used on coal storage grounds include the cantilever or gantry type, which provides for travel longitudinally on tracks at the centre of the ground. This form of equipment is frequently adopted when the conditions permit and the width of the ground is not of such extent as to necessitate a bridge (with supports at each end). Another type of cantilever transporter allows of radial movement of the trolley track on a turntable base supported by the gantry structure.

A simple and flexible system of stacking by means of portable transporters may also be mentioned as being adaptable for comparatively small storages. These transporters can be rigged from a mast and derrick and at different elevations to meet varying conditions; they are, however, not suitable for working with a grab, though a self-discharging skip can be used. The lifting and lowering motions of the skip can be effected, as well as traversing along the beam, thus preventing excessive fall of the coal. The arrangement can also be utilised for re-handling the coal. Stacking within the radius of the transporter can be effected, and a circular area can be covered by altering the direction of the beam radially around the mast; and, by duplicating or multiplying the number in use, a larger area can be dealt with. The transporter can pick up the skip handled by another, traverse it a further distance, and discharge it, and in this manner they can be used for discharge from barge or railway wagon, conveyance, stacking, and re-handling. In addition, by having the mast or support

good getting on the face, and they had to get in that respect, which they might to some extent in getting the smaller bit of the coal went away as burgie, and it was a good condition for firing purposes. They had to get through falls of roof or break-off at the face. It had been questioned whether it was good policy for the getters to do their own ripping and stowing as against night turn men. It seemed to him that if they did a certain proportion daily they knew exactly how much they could withdraw or wind from the pit, and if there was a sufficient number of men to do ripping and stowing as well as feeding the haulage sufficiently, and they could do that proportion daily, they might as well have those men in. The collier was used to being under the low. When packing he kept close under the low, his drawer shovelled it in, and he put in a good sound bit of work on his own place—much better than any night men would put in for a collier he was not interested in. He also cleaned his place well, with a view to the better handling of the coal when he was filling out. They found it was very satisfactory to have the men doing their own packing. Of course, there was not the same amount of trouble in worrying other people about various matters; every man was responsible for his own part. Mr. Landless asked whether the cost of the collier included ripping and stowing. In the paper there was a separate figure of 8d. for ripping and stowing and drawing drifts, which was on the top of the cost of the collier; and also 4d. per ton for main roads, ripping and stowing. In the big roads they generally worked with four and five or six men together. It was not paid on tonnage, but on yardage in the roads. Mr. Landless misunderstood him if he thought there was a man and a lad to every 7½ yds. There was only one man and one boy on each gateway, and they took the high and the low sides of the place and worked together. The man paid the lad a drawer's wages.

The CHAIRMAN said if Mr. Dixon was content with his coal coming out as burgie, he was on as sound lines as possible; 60 per cent. of round and 40 per cent. small was very good. Seeing that the face was coincident with the line of cleavage, there was no need for machinery; it was easy enough to get by hand. If the advance was regular at the rate of 3 yds. per week, and the roof was fairly good, there was little danger of falls of rock.

COAL (PIT'S MOUTH) PRICES ORDER.

The Board of Trade, "deeming it expedient to take further steps for regulating the supply of coal, and being satisfied that special circumstances affect the coal mines in the United Kingdom," have issued the following Order, under date October 12:—

1. As from the dates hereafter mentioned, the price of coal sold or offered for sale at the pit's mouth directly or indirectly by the owner of the mine or on his behalf for use in the United Kingdom shall be a price exceeding by 9s. in the case of mines in the South Wales and Monmouthshire and Forest of Dean districts, and 6s. 6d. in other cases, or such lower sum as may be fixed by the Controller of Coal Mines in any particular case, the price of coal of the same description, sold in similar quantities, and under similar conditions affecting the sale at the pit's mouth at the same coal mine on the corresponding date (or as near thereto as having regard to the course of business, may be practicable) in the 12 months ended June 30, 1914.

2. These prices shall be charged on all such coal despatched from the colliery on and after October 15 in the case of coal for domestic consumption, and on and after September 17 in the case of coal for other purposes.

3. Where in consequence of this Order the price paid or to be paid by any person to whom coal is or has been sold is increased, the price paid or to be paid by any person to whom the coal is or has been sold in pursuance of any subsidiary contract shall be increased by the same amount.

HoLand Seizes British Consul's Coal.—Difficulties are said to have arisen at Hilversum, near Amsterdam, in regard to certain coal imported into the town which did not come under the Government coal distribution regulations. This seems to have given dissatisfaction to the Germans, who demand the right to supply 3,000 persons living in Hilversum with German coal. The local authority, apparently fearing disturbances, decided to requisition all the coal in the town, and has given notice to a British Vice-Consul who resides there that the coal imported from England for the use of members of the Consular Service, of which he received a proportion, will be seized in 24 hours. An appeal has been made to the Dutch Government to prevent this arbitrary proceeding.

Pyrometers and Pyrometry.—A general discussion on "Pyrometers and Pyrometry," organised by the Faraday Society, will be held on Wednesday, November 7, 1917, at 8 p.m., in the rooms of the Royal Society of Arts, John-street, Adelphi, London. Sir Robert Hadfield, Bart., F.R.S., president of the society, will preside over the discussion and deliver an introductory address. Dr. E. F. Northrup (Trenton, N.J.) will send in a communication entitled "High Temperature Production and its Measurement." Papers will be read by Dr. Ezer Griffiths and Mr. F. H. Schofield, B.A., B.Sc. (National Physical Laboratory), on "Pyrometer Standardisation"; by Mr. R. S. Whipple (Cambridge) on "The Advantage of Burying the Cold Junction of a Thermo-Couple as a Means of Maintaining it at a Constant Temperature"; by Mr. Richard P. Brown (Philadelphia) on "The Automatic Control Measurement of High Temperatures" (with demonstration by Mr. J. H. Atkin (Stoke-on-Trent) on "The Measurement of High Temperature by Means of Pottery"; by Mr. C. R. Darling on "Base Metal Pyrometers." Dr. J. W. Mellor, Mr. E. M. Stone will also contribute. Instruments will be exhibited by Mr. Cambridge Scientific Instrument Co., Ltd., Mr. H. L. Heathcote, Mr. J. and Siemens Brothers and Company.

REPORT OF THE FUEL RESEARCH BOARD.

The Fuel Research Board have presented to the Committee of the Privy Council for Scientific and Industrial Research a report on their scheme of research and on the establishment of a fuel research station.

In their first report,* the Board stated that they had in view two main lines of research:—First, a survey and classification of the coal seams in the various mining districts by means of chemical and physical tests in the laboratory; and, second, an investigation of the practical problems which must be solved if any large proportion of the raw coal at present burned in its natural state is to be replaced by the various forms of fuel obtainable from coal by carbonisation and gasification processes.

When the previous report was written, it was believed that the survey and classification of coal seams might be proceeded with in advance of the second line of enquiry; but further consideration has shown that, from the practical point of view, the two lines are so thoroughly inter-dependent that they can be most satisfactorily dealt with side by side. This view will be further developed after the position and prospects with regard to the second line of enquiry have been more fully explained.

In preparation for the organisation of the first line, however, an experimental study of standard methods for the examination of samples of coal in the laboratory has been made. Hitherto, in the systematic examination of coals in the laboratory, there has been no generally accepted low-temperature carbonisation test. In the survey and classification of coals for the purposes of the present enquiries, a test of this kind is practically indispensable. Certain existing tests are designed to ascertain the suitability of coal for gas or coke making, but as both these methods of carbonisation are carried out at temperatures above 900 degs. Cent., they give little or no direct information as to the behaviour of the coal when carbonised at 500 to 600 degs. Cent.

As a result of experimental work carried out for the Board in the Fuel Laboratory of the Imperial College of Science and Technology, a test has now been elaborated which by direct weighing and measurement gives the yields of gas, oil, water, and carbonaceous residue which result from carbonisation at any definite temperature. The apparatus is simple, and is so arranged that the progress of the distillation can be watched from start to finish. The products can be weighed or measured with reasonable accuracy, and any or all of them can, if desired, be submitted to further examination. The method has been tested on certain typical coals and at a variety of temperatures, but before publishing the results it is proposed to make further tests with a wider range of samples. At the same time steps will be taken to standardise the apparatus and to arrange for its regular production for laboratory use.

With regard to the organisation which will ultimately be required in the principal coal mining districts for the collection and registration of samples, the Board have found every disposition on the part of the representatives of the coal owners to co-operate in this work. It is not proposed to start any extensive organisation for this purpose till the preparations for the second line of enquiry are further advanced. The accumulation of large numbers of samples would serve no useful purpose at present, and would be decidedly inconvenient. It is certain that as soon as the arrangements for the examination and testing of samples are in working order, it will be an easy matter to maintain the necessary supply of samples to keep the laboratories and the research station fully occupied.

Carbonisation.

With regard to the second line of enquiry, whilst the gas retort and the coke oven have become highly developed appliances for the carbonisation of coal at temperatures ranging from 900 to 1,200 degs. Cent., and the distillation of oil shales at low temperatures for the production of mineral oils, paraffin wax, and ammonia is also a highly-developed industry, there is no corresponding volume of experience in existence on the carbonisation of coal at low temperatures, and there are very few properly accredited data available. Some work has been done by individual inventors and syndicates, and a certain amount of experience has been gained. Whilst only portions of this experience have been disclosed, enough is known to justify the conclusion that much still remains to be done in devising the special forms of apparatus required for the economical carrying out of this type of carbonisation.

The way is clearly open for a serious attempt to determine whether an economical and efficient apparatus can be devised for the carbonisation of coal at low temperatures, and whether, by the use of such an apparatus for the carbonisation of properly-selected coals, products will be obtained of a collective value greater than that of the original coal plus the cost of carbonisation and handling. Obviously the evolution of an economical and efficient apparatus is at the root of the whole matter, for only after a thoroughly practical apparatus is available can trustworthy tests of the various classes of coal be made, and the economic possibilities of the method be fully weighed and considered.

The solution of these fundamental problems will supply a new base from which to attack questions like the following:—

(1) Can the 35 to 40 million tons of raw coal which is used every year for domestic heating be wholly or partially replaced by smokeless fuel, solid and gaseous, prepared by the carbonisation of this coal?

(2) Can adequate supplies of fuel oil for the Navy be obtained by carbonisation of the coal which is at

present used in its raw form for industrial and domestic purposes?

(3) Can supplies of town gas be obtained more economically and conveniently by methods of carbonisation and gasification other than those at present in use in gas works?

(4) Can electric power be obtained more cheaply if the coal used for steam raising is first subjected to processes of carbonisation and gasification?

(5) Will the more scientific development of the preparation and use of fuel, which would be implied in the successful working out of the foregoing questions, enable the peat deposits of the United Kingdom to take a serious place as economic sources of fuel for industrial purposes?

(6) Can the use of gaseous fuel in industrial operations be forwarded by the development of more scientific methods of combustion in furnaces, muffles, and ovens used in metallurgical, ceramic, and chemical operations?

The answers to these questions will only be obtained by co-ordinated research carried out on the lines of a broad and well-considered scheme. The subjects to be dealt with are already attracting the attention of serious workers in the industries, and it is to be expected that solutions of some of the problems will be supplied by these workers. It would be a great misfortune if the establishment of a Government organisation for fuel research were to result in the discouragement or limitation in any way of the activities of outside workers or organisations. The Board venture to hope that many of these workers will be disposed to welcome a national scheme of research, the aims of which are broad and yet definite, and in which the more specialised contributions from all sides will naturally take their place.

New Outlets for Products.

In considering new and extensive schemes of carbonisation, it is necessary to bear in mind that outlets for all the products of carbonisation must be found. The gas, coke, and shale oil industries are all of old standing, and each has had to develop outlets for its products by patient and continuous effort. No new carbonisation scheme can be justified economically if it can only live by poaching on the preserves of the existing industries. Even if an efficient method of low-temperature carbonisation is evolved, it will be valueless in the wider sense unless profitable outlets for all the important products can be developed. The Fuel Research Board, which is in official touch with the Admiralty, the Ministry of Munitions, the Board of Trade, and other public departments, is exceptionally placed for the furtherance of schemes which involve the finding of large outlets for products new and old. For instance, the Admiralty attach great importance to the development of supplies of fuel oil from home sources, so that it may be taken for granted that this requirement alone would absorb all the oil which could be produced by the carbonisation of tens of millions of tons of coal per annum. This fact alone gives an entirely new aspect to the extension of carbonisation in hitherto untried directions; but while it will undoubtedly help on the economic side of the problem, it in no way relieves the pressure on the technical side. In a way, moreover, it accentuates the problem of the profitable disposal of the coke or carbonaceous residue left when the volatile products are distilled from the coal. The percentage of coke obtained varies with the quality of the coal and the temperature at which it is carbonised, but it may be taken on the average that each ton of coal carbonised will give about 15 cwt. of coke. Thus, to obtain one million tons of fuel oil for the Navy, it would be necessary to carbonise 20 million tons of coal, and the coke produced would amount to 15 million tons.

Utilisation of Coke.

The disposal of this very large quantity of coke or char at a profitable price must be regarded as the vital question if low-temperature carbonisation is to be established on a sound economic basis. The research scheme must therefore include a very complete enquiry on three main lines:—

(1) The use and value of this coke for the direct firing of steam boilers.

(2) Its gasification in producers for the manufacture of low-grade fuel gas, and the recovery of its nitrogen as ammonia.

(3) Its use for industrial and domestic heating either directly as it comes from the retorts, or after its conversion into briquettes.

The second of these enquiries will involve the development of a special form of gas producer and auxiliary plant if the best results are to be obtained from the coke. It will also involve the development of a system of boiler firing in which fuel gas of 130 British thermal units can be burned at least as efficiently as coal both as regards thermal efficiency and the effective evaporation per square foot of heating surface.

In all that concerns the preparation and use of special forms of fuel there are two distinct stages of development to be successfully passed. In the first stage, apparatus and methods have to be evolved and tested till a practical standard of efficiency is reached. In the second stage, the consumers of fuel must be induced to study the new apparatus and methods till they thoroughly understand, and in the end adopt them. This second stage will be most readily passed, if an expert staff trained at a fuel research station is available to undertake the education of those who desire to adopt the new methods and appliances.

Gas as Fuel.

The use of town gas as a fuel for industrial purposes has made great strides during the past few years, and a number of experts are to-day engaged on the design and adaptation of furnaces and apparatus for these purposes. The actual practice of gas heating still lags a long way behind the ideals of economy and efficiency, and there is room for much useful experimental enquiry into principles and methods.

* This report was not published.

The use of the lower grades of fuel gas, though successfully carried out in certain directions, is very imperfectly understood in the majority of industries in which gas might be used for heating and power purposes. In this direction there is scope for much useful work both in research and in the education of experts and consumers.

A single illustration may be given of the complicated enquiries which will have to be conducted before an answer can be given to what seems to be a simple question.

There is a very general belief among electrical experts that the future of British industry will be greatly affected by the cost at which power in bulk can be supplied in the form of electricity. It has been proposed, for instance, that large electro-chemical works should be established in this country for the manufacture of products which in the past have been manufactured in parts of the world where cheap water power is available. In this connection, it has been suggested that the cost of producing power from coal in this country would be substantially reduced if, instead of burning the coal directly under the steam boilers, it were first subjected to carbonisation and gasification processes, which, in addition to fuel gas, would yield valuable by-products. Plausible statements have been issued showing the enormous savings or profits which would accrue if schemes of this sort were adopted. Unfortunately, these estimates have generally been made on a very slender foundation of knowledge and experience. On the other hand, those who by experience and practice are best qualified to judge, hesitate to prophesy as to what the economic result of a combined carbonisation and power generating scheme would be, but they agree that the interests at stake are so great that the question ought to be authoritatively answered once for all. But no answer can be accepted which is not founded on the complete working out of the scheme, no important step in the series of operations being omitted or slurred over. This series of operations will start from the mechanical preparation of the coal and its conversion into solid, liquid, and gaseous products by carbonisation. It will end with the delivery of a known weight of high-pressure steam under the conditions most favourable for power production by turbo-generators. In the proposed scheme of research, it will be seen that the investigation of each of the steps involved in the above enquiry is provided for. Three, at least, of these steps involve pioneering work on an industrial scale, and the work may occupy a considerable time. The Board realise that it is possible that the net result of this particular enquiry may be to show that purely as a means of cheapening the cost of electric power, the use of carbonisation methods has not much to commend it, but that certain incidental advantages will justify its use in particular cases.

THE FUEL RESEARCH STATION.

The scheme of research which has been outlined in this report can only be efficiently carried out in a fuel research station designed and equipped for the purpose in which operations on an industrial scale can be carried out under proper working conditions. The following is a description of the equipment which will be required for the research work at present in view:—

A railway siding will pass through or alongside of the station, and the coal to be used in tests will be received in railway wagons at an unloading platform, provided with a sampling floor, a coal breaker and screens, a weighing machine, an elevator, and high-level bunkers, from which the coal will be passed on to

Retort House.—In this house ample space will be provided for the erection of the various forms of carbonising apparatus which are under investigation. Facilities will be provided for quickly carrying out the necessary changes and improvements in the apparatus as the experimental work proceeds. The hot gases will be led from the retort house into

Condenser and Exhaust House.—This will be equipped with condensers, washers, scrubbers, exhausters, compressors, meters, pressure regulators, gauges, pumps, motors, and tanks.

For the collection and examination of the gases in bulk gas holders will be provided.

The hot coke from the retort house will be elevated to high-level bunkers, from which it can be supplied to gas producers, steam boilers, briquetting plant, or to railway wagons.

Gas Producer House.—This is provided with one or more gas producers with heat exchangers, washers, scrubbers, and liquor tanks.

Steam Boiler House.—Provided with one or more water tube boilers of modern type, and with feed water tanks, water and steam meters, pumps, etc.

Briquetting House.—Provided with grinding, mixing, and briquetting machines.

Tar and oil stills and condensers will be provided for dealing with the liquid products.

Gas Furnace House.—This will be equipped for the testing of gas muffles, annealing ovens, and melting furnaces.

Laboratories, offices, and workshops suitably equipped will also be necessary.

As regards the location of this station, the desiderata are:—That it should be within easy reach of London, that there should be ample railway and other facilities for the transport of coal from all parts of the kingdom, that there should be ready means for the disposal of the large quantities of coke, oil, and gas which would be produced in the regular course of experimental work, and that a supply of labour, skilled and unskilled, should be available.

Site Selected.

It is realised that these conditions can only be fulfilled by a site in the neighbourhood of a large gas works, and Dr. Charles Carpenter, on behalf of the board of the South Metropolitan Gas Company (of which he is chairman) has offered:—(1) To lease to the Government at a peppercorn rent sufficient land at the East Greenwich Gas Works for the erection of a

research station; (2) to prepare drawings and specifications for this station on lines to be laid down by the Fuel Research Board, and to make contracts for its erection; (3) to give every facility for the transport of coal and other supplies to the station, and to take over at market prices the surplus products, gas, tar, liquor, and coke resulting from the operations at the station. After further conferences a suitable site was agreed upon. The proposed site is a strip of level ground about 250 ft. wide by 700 to 800 ft. long, situated on the main siding which connects the gas works with the South-Eastern Railway and with access to an existing road.

The foregoing scheme of research is obviously not intended to cover the whole of the territory which is open for exploration to-day. Still less ought it to be regarded as setting any limits to the exploration of new territories in the future. The root idea of the scheme is that certain fundamental changes in the preparation and use of fuel which have been proposed are of such far-reaching importance that the solution of the technical and economic problems involved ought to take precedence of all other matters. This does not mean that other lines of research will be ignored, but only that the larger issues must be kept well to the front till definite solutions of those technical and economic problems can be given. Though no direct reference has been made to the preparation and use of fuels from oil shales, brown coals, and peat, experimental enquiries on these matters will naturally find a place in the developments of the present scheme.

The research station, as planned, will be capable of any extensions which will be required for future researches. Out of the four acres which it is proposed to lease for the station, only one acre will be occupied by buildings under the present scheme. Further, a large part of the equipment of these buildings will be of a permanent character, and will serve all the general purposes of a research station. Future extensions will, therefore, not repeat this permanent equipment, but will be based upon it.

MANCHESTER ASSOCIATION OF ENGINEERS.

Mr. JOSEPH PHILLIPS BEDSON, M.Inst.C.E., M.I.Mech.E., in the course of his inaugural address as president of the Manchester Association of Engineers, at the first meeting of the session on Saturday last, referred to the ambitions of Germany to retain Alsace-Lorraine, and secure Belgium and the North of France. In the north, he said, covering parts of France, Lorraine, Luxemburg, and Belgium, was the great iron basin of Briey, the richest and most extensive of all Europe, estimated to contain 3,000 to 4,000 million tons of ore. Thirty miles away nature had deposited 10,000 million tons of coal in the great coal-bearing basin of the Sarre, which covered part of Lorraine, the Bavarian palatinate, and Rhenish Prussia. Without equalling in quality the Westphalian coal, that of Saarebrück was very useful in metallurgy. The annual output was 17 million tons, or exactly what France was obliged to buy abroad for her own needs. The deposits of the Sarre exceeded in richness all the French coal mines. Moreover, they were for the most part fiscal mines: that was, they were owned by Prussia and Bavaria, and being State property, could be rightly considered a prize of war. East of Nancy, towards Dieuze, partly in France and partly in Lorraine, was an outcrop of rock salt, 160 square miles in extent, and sometimes 225 ft. thick, the remains of some dried-up ocean of geologic times. That was one of the longest salt beds in the world, and would undoubtedly attract the many chemical industries connected with sodium and its salts. Further to the east, at Pechelbronn, was an oil district where 30,000 tons of mineral oil were yearly extracted from wells 1,000 to 1,200 ft. deep. Finally, more to the south, near Müllhausen, was a wonderful deposit of potash, rivalling the mines of Stassfurt, which had enriched Germany. The deposit covered an area of about 70 square miles. The German administration had carefully refrained from working it to the utmost, for fear of interfering with the product of Stassfurt. Germany before the war was very poorly off for iron. On her own territory she only had 710 million tons in sight. Her conquest of 1871 gave her a reserve of more than 2,000 million tons in Lorraine. With all this, however, Germany had latterly been obliged to import 12 million tons from Sweden, Spain, and Algeria, and had been looking to Morocco to aid her supply. Dealing with the question of transport, he said the need of unified control of the railways had led to a demand for State control, so that the entire railway system might be worked to better advantage in the common interest. The vital importance of effective unification was unexpectedly demonstrated in August 1914, when the Government took general control for war purposes. One of the most obvious results of this Government control had been the pooling of wagons. Quite recently at Swansea docks he himself had seen no less than 17 different wagons. One could imagine the amount of wastage there had been in this country in that item alone. As an instance of what the British manufacturer was up against in the matter of transport cost, he said that, before the war, Belgian nail makers, buying their rods in Germany, 400 miles from their own works, could get them delivered for 1s. 6d. per ton by water, and could deliver into the Thames for 5s. per ton, a total of 6s. 6d. per ton, whereas delivery from Manchester would have cost at least 15s. per ton. The cost of railroad transport in this country was 1-192d. per ton per mile, as compared with France 0-726d., Germany 0-637d., Holland 0-590d., Norway 0-867d., and Denmark 0-956d., the main reason for the high cost of transport in this country being our neglect of water transport. It could be shown that on the Prussian State Railways, where rates were notoriously low—approximately half those ruling here—the cost of

carrying coal between two places was from 6d. to 11d. per ton, higher than the cost of carrying it between the same places by canal only, by canal and coast, or by railway and canal. If our canals were brought up to date, he had no doubt the cost of carriage would be reduced at least 50 per cent. Canal and river transport on the Continent had been developed to a remarkable extent. The ton-mile traffic on the Rhine alone was 4,025,660,000; that on the Elbe, 2,222,080,000; on the Seine, 610,000,000; on the St. Quentin, 291,075,000; and on the Scheldt, 177,673,000. To reach that level in this country he imagined State aid would be necessary, and should a Ministry of Commerce be appointed, the State might be led to realise that our canals should be improved, utilised, and nationalised at the very earliest moment; in fact, they should be made free, on the same principle as highways.

DIRECTIONS AS TO THE SALE OF COAL.

Dated June 28, 1917.

It is officially announced that the following amendments have been made to the Directions as to the Sale of Coal, dated June 28, 1917 (*Colliery Guardian*, June 29, p. 1217):—

Part I.

Sale of Coal for Consumption in the United Kingdom.

1. The Channel Islands shall be deemed to be part of the United Kingdom for the purposes of the Directions, and the maximum prices for coal for consumption in the United Kingdom shall apply to all sales of coal for consumption in the Channel Islands.

2. The requirement that no coal shall be sold by collieries for consumption in the United Kingdom, except at the maximum prices under the Price of Coal (Limitation) Act, shall be subject to the condition that in any case in which the maximum price chargeable by a colliery for a particular class of coal for consumption in the United Kingdom is higher than the price specified in the schedule appended hereto, the colliery may charge for such coal for inland consumption prices lower than the said maximum, but in no case (whether sold in truck at pit or f.o.b.) less than the price specified in the schedule.

Parts II. and III.

Sale of Coal for Shipment.

1. Sales of coal for shipment to British Possessions and Protectorates, and to coaling stations therein, shall be subject to the conditions as to coal prices and exporters' services prescribed in Part II. of the Directions relating to shipments to France and Italy, instead of, as heretofore, Part III. of the Directions relating to shipments to other destinations outside the United Kingdom.

2. The following provision is hereby substituted for clause 2 (A) of Parts II. and III. of the Directions:—

Except where otherwise specified in the schedule, these prices are net f.o.b. at the nearest shipping places to the collieries and for cash within seven days after shipment; if shipped at a more distant place the extra railway and shipping dues may be charged; provided that in the case of anthracite from collieries in South Wales, shipped at ports east of Port Talbot, the extra railway and shipping dues as compared with those for shipments at the nearest shipping place to the colliery shall in all cases be charged.

3. The following provisions shall apply to the sale of coal for bunkering ships at ports in the United Kingdom, such coal being limited to coal for the ship's own use:—

(i.) In the case of—

(a) all ships sailing under the British flag,

(b) ships sailing under the flags of the Allied nations at limited freights in the French and Italian coal trade,

(c) such other ships as may be specified from time to time by the Controller of Coal Mines, the prices specified in the schedule hereto shall be charged by the collieries as fixed prices for all coal delivered hereafter, except as provided in clause 4 of Part IV. of the Directions.

These prices shall apply whether the coal is sold by the colliery to a broker, merchant, or exporter, or direct to the ship owner. Where the coal is sold to a broker, merchant, or exporter, the broker's, merchant's, or exporter's commission on re-sale must be charged by way of addition to the colliery price. The amount of such commission to be arranged between the parties.

(ii.) In the case of other ships, coal shall not hereafter be delivered by collieries for bunkering at prices less than those specified in the schedule hereto, except as provided in clause 4 of Part IV. of the Directions; and commission at a rate of not less than 5 per cent. on the f.o.b. price shall be charged in addition to the schedule price by the broker, merchant, or exporter, or by a colliery selling direct to the ship owner.

(iii.) Except where otherwise specified in the schedule, these prices are net f.o.b. at the nearest shipping places to the collieries and for cash within seven days after shipment. Where it has been the custom for owners of regular liners to receive longer credit, the practice may be continued in respect of bunkers supplied to them for such liners, provided that the above net payment shall in every case be made not later than the 25th of the month following the delivery of the coal. If the coal is shipped at a more distant place, the extra railway and shipping dues shall be charged.

4. The following provision is hereby substituted for clause 6 of Part II. (B) and clause 4 of Part III. (B) of the Directions with regard to commissions to local agents:—

(a) "Where it has been customary for a colliery to utilise the services of agents, not being exporters, to

...ers coal for shipment as cargo, or to ship brokers, or merchants, coal for bunkers, this practice may be continued, any utilising such agents' services may commission not exceeding 2d. per ton. No commission shall be paid by any colliery to any agent in any one year on quantities in excess of the quantity on which commission was paid by the same colliery to the same agent during the 12 months ended June 30, 1916. The word 'agent' in this clause shall include middlemen not being exporters, who have acted as intermediaries between collieries and exporters or merchants; and the word 'commission' shall apply to any allowance which they received from the collieries during the above-named period. This does not affect recognised agents of collieries under selling agreements in operation prior to June 29, 1917."

(b) "In no case shall any part of the commission paid to such agents be paid over by the agent to the purchaser of the coal."

5. The following provisions shall apply to the sale of coal for shipment to neutral countries:—

(1) "An exporter may not pay more than 4½d. per ton commission to his agent abroad (including any payment to a sub-agent). In no case shall any payment or rebate be made to a receiver or consumer."

(2) "Insurance of cargo for account of buyers to be as customary. Advance of freight not exceeding one-third of estimated freight may be given. The cost of war risk insurance on such advance to be paid by ship in addition to the usual percentage on such advance."

6. These amendments operate as from October 15, 1917.

code will be issued as early as possible. With reference to the clause regarding commissions to agents, it is pointed out that the tonnage of coal on which a colliery may pay commission to an agent is limited to the tonnage on which commission was similarly paid by the colliery to the same agent in the 12 months ended June 30, 1916. The Controller has reason to think that this requirement is not being observed by a number of collieries, and that commissions are being paid irregularly with a view to securing orders. Such cases will be strictly investigated, and, in the meantime, unless the payment of commissions is strictly confined within the prescribed limits, the whole question of allowing such commissions out of the schedule prices will have to be reconsidered.

It has been brought to the notice of the Controller that merchants who had bought coal before May 1 last at prices below those specified in the schedule, and whose contracts are not affected by the Directions of June 28, 1917, have been re-selling the coal to other merchants or exporters in this country at prices below the schedule prices. This practice is irregular, and in no case must the coal be sold to exporters or merchants in this country at less than the schedule prices, or to purchasers abroad (or ship owners in the case of bunker coal), at less than the schedule prices plus the necessary commissions where such are prescribed by the Directions, as amended in the enclosure.

In all new contracts for the sale of coal for shipment, whether for export or as bunkers, a clause must be inserted providing that the price shall be subject to any variation which may be authorised or required by the Controller of Coal Mines.

It will be observed that the schedule of prices has been amended and amplified. The prices specified in the schedule operate as fixed prices in the case of

SCHEDULE OF PRICES*.

MONMOUTHSHIRE AND SOUTH WALES.			
Class of coal.	Price.	Class of coal.	Price.
<i>Steam.</i>	s. d.	<i>Bituminous (continued).</i>	s. d.
Smokeless best	33 0	No. 2 Rhondda large	27 0
" second quality	31 6	No. 2 Rhondda through	23 6
Seconds	30 9	Ditto and other through	
Ordinaries	30 0	(seconds)	22 0
Best dries	30 0	No. 2 Rhondda smalls (best)	19 0
Ordinary dries	28 6	" " (seconds)	17 0
Steam smalls, No. 1	21 6	Gas through	25 0
" " " 2	21 0	" small	21 0
" " " 3	20 6	<i>Anthracite.</i>	
" " " 4	20 0	Best breaking large	30 0
" " " 5	19 6	2nd breaking large	29 0
" " " 6	19 0	3rd breaking large	27 6
" " " 7	18 6	Red Vein large	25 6
" " " 8	18 0	<i>Machine-made Cobbles.</i>	
Washed smalls	22 6	Best	42 6
Best Black Vein, large	30 0	2nd	41 0
Ordinary Western Valley	29 0	3rd	39 0
Best Eastern Valleys	29 0	Red Vein cobbles	36 0
Second Eastern Valleys	28 0	<i>Machine-broken Nuts.</i>	
Best washed nuts	30 0	(French, Paris and stove.)	
Seconds	28 6	Best	42 6
Best washed peas and beans	27 6	2nd	41 0
Seconds	26 6	3rd	39 0
Unwashed duff, 1st quality	18 0	Red Vein nuts	36 0
" " 2nd	16 0	<i>Machine-broken Beans.</i>	
" " 3rd	14 0	Best	35 0
<i>Bituminous.</i>		2nd	34 0
Best households	33 0	3rd	33 0
Good households	31 9		
No. 3 Rhondda large	30 9		
Smalls	26 0		

NOTTS, DERBY AND YORKS.			
Class of coal.	Price.	Class of coal.	Price.
<i>Steam.</i>	s. d.	<i>Anthracite (continued).</i>	s. d.
Large screened steam	30 0	Red Vein beans	31 0
Hartley's	27 6	Price of screened cobbles, nuts	
Yorkshire washed steam	27 6	and beans of 3rd quality	1s. per
Screened gas	26 0	ton resp less	
Gas nuts	25 6	than above.	
Unscreened gas	25 0	Peas (all qualities)	20 0
House and cobbles	27 6	Rubbly culm	13 0
Trebles (unwashed)	24 0	Red Vein culm	11 0
Do. (washed)	25 0	Breaker duff	8 0
Doubles (unwashed)	24 0	Billy duff	6 6
Do. (washed)	25 0	<i>Steam (Swansea).</i>	
Singles and smithy peas (unwashed)	23 0	Best large	30 0
Singles & smithy peas (washed)	24 0	Second large	27 0
Smalls (unwashed)	20 0	Best through	23 6
Do. (washed)	21 0	Second through	22 0
Coke-oven coke	42 6	Best smalls	19 0
<i>LANCASHIRE.</i>		Second smalls	17 0
Best steam coal (screened)	27 6	Screened cobbles	30 0
Do. do. (unscreened)	25 6	" nuts	30 0
Second steam coal (screened)	26 6	" beans	27 6
Do. do. (unscreened)	24 6	<i>Bituminous (Swansea).</i>	
Screened gas coal	26 0	Through and through	27 0
Unscreened gas coal	25 0	Smalls	24 0
Nuts	24 0	<i>Gas (Swansea).</i>	
Slack	20 0	Through	23 6
House coal	27 6	Smalls	21 0
<i>NORTH WALES.</i>		Patent fuel	30 0
Best screened steam coal	27 6	Coke-oven coke	47 6
Best unscreened do.	25 6		
Best slack	17 6		
House coal	27 6		

NORTH STAFFORDSHIRE.			
Class of coal.	Price.	Class of coal.	Price.
<i>Steam.</i>	s. d.	<i>Anthracite (continued).</i>	s. d.
House coal	27 6	Red Vein beans	31 0
Large screened steam coal	30 0	Price of screened cobbles, nuts	
<i>FOREST OF DEAN.</i>		and beans of 3rd quality	1s. per
Large coal	27 0	ton resp less	
Through coal	25 0	than above.	
<i>CUMBERLAND.</i>		Peas (all qualities)	20 0
Screened bunker coal	28 6	Rubbly culm	13 0
<i>BRISTOL.</i>		Red Vein culm	11 0
Large coal	30 0	Breaker duff	8 0
Unscreened coal	25 0	Billy duff	6 6
<i>FIFESHIRE.</i>		<i>Steam (Swansea).</i>	
First Fife large coal	28 0	Best large	30 0
Third do.	24 0	Second large	27 0
East of Fife Jewel coal	25 6	Best through	23 6
Best Navigation screened coal	31 0	Second through	22 0
Second do.	29 0	Best smalls	19 0
Best Navigation unscreened coal	25 0†	Second smalls	17 0
Second do.	24 0†	Screened cobbles	30 0
Third do.	23 6†	" nuts	30 0
First Navigation smalls	22 0	" beans	27 6
Second do.	20 6	<i>Bituminous (Swansea).</i>	
<i>MID AND EAST LOTHIAN.</i>		Through and through	27 0
First quality coal	26 6	Smalls	24 0
Second do.	25 6	<i>Gas (Swansea).</i>	
Whitehill Splint coal	28 0	Through	23 6
Niddrie do.	28 0	Smalls	21 0
Screened bunker coal	26 6	Patent fuel	30 0
Unscreened do.	25 6	Coke-oven coke	47 6
<i>WEST LOTHIAN.</i>			
Screened coal (first quality)	26 6		
<i>LANARKSHIRE.</i>			
Best Splint coal	30 0		
Second do.	28 0		

LANARKSHIRE—(cont.).			
Class of coal.	Price.	Class of coal.	Price.
<i>Steam.</i>	s. d.	<i>Anthracite (continued).</i>	s. d.
Best Hartley coal	29 0	Red Vein beans	31 0
Named brands Ell coal	28 0	Price of screened cobbles, nuts	
Second Ell coal	26 6	and beans of 3rd quality	1s. per
First Navigation screened coal	30 0	ton resp less	
Second do.	28 0	than above.	
Best steam screened coal	27 6	Peas (all qualities)	20 0
First Navigation unscreened coal	29 0	Rubbly culm	13 0
Second do.	26 6	Red Vein culm	11 0
Third do.	25 6	Breaker duff	8 0
<i>AYRSHIRE.</i>		Billy duff	6 6
Jewel coal	28 6	<i>Steam (Swansea).</i>	
Soft do.	26 6	Best large	30 0
Splint do.	28 0	Second large	27 0
Ayrshire hard coal	26 6	Best through	23 6
Steam coal	26 6	Second through	22 0
Navigation screened coal	30 0	Best smalls	19 0
First Navigation unscreened coal	29 0	Second smalls	17 0
Second do.	26 6	Screened cobbles	30 0
Third do.	25 6	" nuts	30 0
<i>SCOTCH WASHED NUTS (FROM ALL DISTRICTS).</i>		" beans	27 6
Trebles	23 0	<i>Bituminous (Swansea).</i>	
Doubles	22 0	Through and through	27 0
Singles	21 0	Smalls	24 0
Pearls	18 0	<i>Gas (Swansea).</i>	
Unwashed dross	15 0	Through	23 6
<i>SCOTCH ANTHRACITE.</i>		Smalls	21 0
Round coal	28 0	Patent fuel	30 0
Jumbo and treble nuts	28 0	Coke-oven coke	47 6
Doubles	28 0		
Singles	25 0		
Pearls	20 0		
Coke-oven coke from Scotland	40 0		
<i>KENT.</i>			
Screened coal (at pit)	30 0		
Unscreened coal (at pit)	25 0		
Nuts (at pit)	24 0		
Slack (at pit)	20 0		

* These prices are subject to an increase of 2s. 6d. per ton to meet the recent war wage increase, except in the case of shipments to France and Italy, and coal for the manufacture of patent fuel for shipment thereto.

† Where these coals are shipped at Leith or at Glasgow or other west of Scotland ports for bunker purposes the prices are to be:—

Class of coal.	Price.
Navigation unscreened coal	s. d.
do.	29 0
do.	26 6
do.	25 6

to coal for the ship's own bunkers and do not apply to coal shipped to coaling stations abroad.

dated October 12, 1917, from the Board of Trade, it is under revision, and that the revised

shipments of coal to France and Italy and coal for the manufacture of patent fuel for shipment to such destinations. In the case of all coal for shipment as cargo to other destinations abroad, or for the manufacture

Schedule of Prices—cont.

NORTHUMBERLAND.											
HARD COAL COLLIERIES.											
Screened, Un-steam and screened. Nuts. Small. Duff.											
house.											
s. d. s. d. s. d. s. d. s. d. s. d.											
Bothal	30	0	25	0	26	0	20	0	10	0	0
Cowpen	30	0	25	0	26	0	20	0	10	0	0
Davison	30	0	25	0	26	0	20	0	10	0	0
Newbiggin	30	0	25	0	26	0	20	0	10	0	0
Bentinck	30	0	25	0	26	0	20	0	10	0	0
Bowers*	30	0	25	0	26	0	20	0	10	0	0
Buddles*	29	6	25	0	26	0	20	6	10	0	0
East Hartley*	29	6	25	0	26	0	20	6	10	0	0
Ravensworth	29	6	25	0	26	0	20	6	10	0	0
Chevely*	29	6	25	0	26	0	20	6	10	0	0
Howards*	28	6	24	6	26	0	19	0	10	0	0
Fern-ybeds*	28	6	24	6	26	0	19	0	10	0	0
Scremerston	28	6	24	6	26	0	19	0	10	0	0
Broomhill*—	28	6	24	6	26	0	19	0	10	0	0
(Warkworth)	28	0	25	0	26	0	20	0	10	0	0
(Blyth)	30	0	25	0	26	0	20	0	10	0	0
Hastings*	27	0	24	0	26	0	18	6	10	0	0
West Hartley	27	0	24	0	26	0	18	6	10	0	0
Main & Stobs-wood	27	0	24	0	26	0	18	6	10	0	0
Bebside*	25	6	23	6	26	0	18	6	10	0	0
Carrs	25	6	23	6	26	0	18	6	10	0	0
Preston	25	6	23	6	26	0	18	6	10	0	0

* These collieries do not make nuts.

SOFT COAL COLLIERIES.

Gas. s. d. Class 1. 26 6 ... Mickley.

Class 2. 23 6 ... All other gas coals from Northumberland.

Screened Steam. Class 1. 30 0 ... Whorlton and Mickley.

Class 2. 27 0 ... Montagu, Throckley and Tynedale.

Smithy Small. 25 0 ... All smithy small from Northumberland.

Manufacturing Rough Small (Non-coking). 19 0 ... All manufacturing rough small (non-coking) from Northumberland.

House. 30 0 ... Whorlton.

Manufacturing and Bunkers. Class 1. 25 0 ... Mickley.

Class 2. 24 0 ... All others.

Coking (Unscreened and Small). Class 1. 25 0 ... Mickley.

Class 2. 24 0 ... All others.

Coke-oven Coke. 42 6 ...

Gas. s. d. Class 1. 26 6 ... Easington, Towneley, Thornley, London-derry, Wearmouth.

Class 2. 25 0 ... Boldon, Hetton, Holmside, New Pelton, Ryhope.

Class 3. 23 6 ... Brandon, Burnhope, West Leversons Consett, Deafhill, Deans Primrose, East Pontop, Felling, Horden, Lambton, Pelaw Main, Pelton, Priestmans, Ravensworth, Sherburn, South Derwent, South Pelaw, Usworth Wallsend and Hebburn, Washington, West Pelaw Main (and other coals not specified).

Screened Steam. Class 1. 30 0 ... Hetton, Lambton, Ryhope, South Hetton.

Class 2. 28 6 ... Auckland, East Hetton, Eldon, Horden, Randolph (and other coals not specified).

Nuts and Peas. Class 1. 26 0 ... Lambton, Ryhope, Sherburn, Silks-worth, South Hetton.

Class 2. 24 6 ... Auckland, Eldon, East Hetton, Horden, Randolph (and other coals not specified).

Smithy Small. 25 0 ... Beamish, Hebburn, Holmside, Ryhope, Towneley (and other coals not specified).

Manufacturing Rough Small (Non-coking). 20 0 ... Hetton, Lambton, South Hetton (and other coals not specified).

Duff. Class 1. 18 0 ... Ryhope, Silksworth.

Class 2. 16 0 ... Hetton, Lambton, South Hetton (and other coals not specified).

House. Class 1. 30 0 ... Carrodock Wallsend, Dean and Chapter Wallsend, Elemore Wallsend, Hetton Best Wallsend, Sherburn Finchale Wallsend, Tees Best Wallsend, Tinstall Wallsend, Vanes Wallsend.

Class 2. 28 6 ... East Hetton Wallsend, Hawthorne Wallsend, Hetton Lyons, Mainsforth Wallsend, South Hetton Wallsend (and other coals not specified).

Manufacturing and Bunkers. Class 1. 25 0 ... Auckland, Easington, Harton, London-derry, Marley Hill, Morisons, Tanfield, Towneley, Weardale, Wearmouth.

Class 2. 24 0 ... Bearpark, Brancepeth, Browney, Burnhope, Consett, Deafhill, Deans Primrose, Framwellgate, Hamsteels, Hamsterley, Hebburn, Horden, Lambton, North Brancepeth, Peases, Pelaw Main, Priestmans, Sacriston, Sherburn, South Derwent, South Garesfield, South Medomsley, South Pelaw, Washington, West Stanley, Usworth (& other coals not specified).

Coking (Unscreened and Small). Class 1. 25 0 ... Bearpa A, Brancepeth, Brandon, Burnhope, Consett, Dunston, Hamsterley, Marley Hill, Peases West, Priestmans, Redheugh, Sacriston, South Garesfield, South Medomsley, Tanfield, Towneley, Weardale, West Brancepeth, West Stanley (and other coals not specified).

Coke-oven Coke. 42 6 ...

of patent fuel for shipment to such destinations, and of all coal shipped as bunkers, an addition of 2s. 6d. per ton is to be made to the schedule prices to meet the recent war wage increase. This increase of 2s. 6d. per ton is to be made in the case of all such coal despatched from the colliery on or after October 15, 1917, including deliveries under existing contracts. Apart from the alterations referred to herein, the Directions of June 28, and the instructions contained in the covering letter thereto, remain in operation.

MINERS' HOUSING IN SCOTLAND.

(Continued from page 693.)

Gardens in Mining Villages.

There are three other matters of sufficient importance to be mentioned here, viz., gardens, roads and footpaths, and lighting. A reference has already been made to the absence of cultivated gardens in certain even of the more progressive mining communities of Fife, though ground can be had; and the same observation would apply to the West of Scotland. From this it may be deduced that the miner has no taste for gardening, but the examples of several villages in the Fife coal fields, of Cowie in Stirlingshire, of Larkhall in Lanarkshire, and Niddrie in Midlothian, show that this is not necessarily the case, but that, under favourable circumstances, the miner shows great taste for and skill in gardening. The three chief conditions to be fulfilled if this is to be developed are: (a) Sufficiently prolonged tenure of his dwelling and garden; (b) the adequate fencing of the latter; and (c) proximity of the garden to his house.

Where there is constant shifting of the mining population, the taste for gardening cannot develop; but when families remain long in the same village, either as tenants or, still more, as occupying owners, their gardens are often the subject of genuine pride. Thus it happens that, in some villages, especially in East Fife, good and well-cultivated gardens are associated with houses of a somewhat poor and antiquated type, the reason being that these are inhabited by families who have worked long and steadily in the same locality. In the same district, good houses and good gardens are found in conjunction, but in this case also there has been continuous residence.

It is also worthy of note that, where occupying ownership is common among miners, as in the Windygates district (East Fife) and at Larkhall, gardens are numerous and well kept. One miner, in Larkhall, when his garden was compulsorily taken by the railway company received £400 in compensation.

In a new village, however, much depends on the extent to which the incoming miner finds the garden plot prepared. It should not be too large, as it was found at Kirkconnel that the large gardens originally provided were not taken advantage of until they were reduced to a more easily-managed size. They also need some preparation by the company. But the chief point is that they should be adequately fenced. It was stated by a leading representative of the miners that, where direct access from the house to the garden was not possible, small garden allotments might be provided a little way off. In this case, if the whole garden ground is fenced, the individual plots do not need to be. If local authorities receive and exercise in the future larger powers to control the lay-out of new villages, they can in this way secure the provision of garden ground; but it must rest with the providers of the houses to promote the actual gardening. If this could be generally brought about, it would do a great deal to redeem the mining villages of the future from the drab monotony of the past.

Roads and Footpaths.

In the evidence from all the chief coal fields reference was made to the extremely defective roads and footpaths which are common in mining villages. Strong expressions were used in this connection by the miners' representatives, but, after some personal experience, the Commission say they could hardly take exception to their strength. It was stated that in one village in Stirlingshire the roads in wet weather "resembled the miniature bed of a river," and that in another case the sanitary inspector had to leave his vehicle at some distance from the village lest it should get stuck in the mud. In Ayrshire, the difficulty seems particularly acute, perhaps because of the number of isolated "rows" at a distance from a high road. The representative of the Miners' Union quoted several instances of excessively dirty roads and footpaths, but remarked on the great improvement caused in one row by the laying down of a clean concrete footpath.

On the employers' side, the evidence varied somewhat, and represented a variety of practice, while it was claimed that considerable improvements had been made. The manager of the Wemyss Coal Company expressed himself as satisfied with the footpath made up with ashes in ordinary circumstances; but Mr. Forgie, speaking for Messrs. William Baird and Company, claimed that part of the deterioration of service roads was due to the immensely heavier traffic, including many delivery vans, which they now have to carry, and stated that it was difficult to persuade the local authority to take over roads even when they had acquired a definitely public character; the same point was spoken to by the representatives of the Ayrshire coal masters.

As against the criticism of landward local authorities by the coal masters, the Commission takes the complaint regarding many of the owners of miners' houses by officials of the Mid-Lanark District Committee. They stated that in the original lay-out of building land, while attention was paid to the structure of the houses, little or none was paid to surroundings and means of access—as, indeed, the Commission themselves saw to be the case. But, even though there may have been a disposition in more than one quarter in the past to shirk responsibility for the provision of proper roads and footpaths in mining villages, it was made quite clear by various witnesses that the statutory powers of control in landward areas are insufficient, and there are practically no powers for county areas outside special scavenging districts to secure the proper upkeep of private streets and footpaths. It seems clear that this matter should be dealt with on the footing that suitable access is necessary to every habitable dwelling, rather than under the "nuisance" clause of the Public Health Act. To a considerable extent the difficulty would be met if all local authorities, in counties as well as burghs, received authority to approve of the sites of and

access to new houses. As regards the upkeep of private streets and footpaths, there seems no reason why the powers which county local authorities at present possess, but which are exercisable only in special scavenging districts, should not be available outside these districts, and it is recommended that at least this additional power should be given, and that at the same time the maintenance of roads should in future devolve largely on the local authority. There is a steady movement in favour either of the main through roads being taken over and maintained by the State, or of a substantial grant being given from State funds to assist local authorities in the upkeep of these roads. It is recognised that the main roads are in no sense local, and that the nation as a whole should take them over, or, at any rate, bear a proportion of the cost of their upkeep. In the same way, the Commission considers that roads, other than the main roads and highways, are in no sense private roads, being available to and used by the public generally, and serving their convenience, and, accordingly, they recommend that, whenever an owner (or a series of owners) puts a road belonging to him (or them) in order to the satisfaction of the local authority, the latter should be under obligation to take over and maintain the road in future as a public highway. Wherever a dispute arises between an owner and the local authority as to whether a road has been put in proper order, the dispute should be referable to the Local Government Board. The above suggestions would leave open for dispute between an owner of a road and a local authority the question of whether a road was a private road or a public road, and, accordingly, it is recommended that in the event of any such disagreement the point should be referred to the Local Government Board for decision.

Lighting of Mining Villages.

As regards lighting also many of the mining villages appear to have been neglected; and when the above account of the condition of their roads and footpaths is taken into account—not to mention the even worse condition of filth that persist in certain of the older and more neglected rows—it seems clear that they have an even stronger claim to adequate lighting than other communities of similar size. It was, for instance, stated that in Fife the colliery villages had until recently been entirely unlit. In Stirlingshire it was indicated that only in rows within or adjacent to county lighting districts were there any lighting schemes. In the West of Scotland the position appears to be the same; while the Ayrshire coal masters stated that the lighting of villages is not usual, but that in several instances gas lighting is provided by the owners, even for villages not lying within lighting districts. It should, however, be stated that in the Middle Ward of Lanarkshire there are 24 special lighting districts, with a total population of 129,813, as against 23 special drainage districts, with a total population of 124,731.

In 1914 the Mid-Lanark District Committee obtained a Provisional Order to remove difficulties in putting into force certain powers of the Burghs Gas Supply (Scotland) Act, 1876, which are adoptive in landward areas. They anticipated great benefit from this Order in the supply of certain of the smaller villages. At the time of giving evidence, they were hopeful that it might be found possible to establish one or two main gas works, from which gas could be conveyed throughout the whole district. If, after the war, this scheme proves a success in the Middle Ward of Lanarkshire, it would help to solve the problem of lighting mining and similar villages where the powers now obtained by this district committee to be made applicable throughout the county areas of Scotland. It is also possible that in colliery villages which could not well be lit by a local authority, the works installation might be extended more frequently to the miners' dwellings.

Ashpits.

Ashpits are not confined to mining villages, but in the older "rows" they are particularly numerous, prominent, and offensive. In the detailed evidence submitted by sanitary officials and miners' representatives, complaint as to these structures and their condition is a recurring note. Thus a miners' agent in Clackmannanshire spoke of the system of ashpits as almost universal, and stated that they were emptied about once a week; in some of the older rows they stand along the front, 10 or 12 ft. from the windows of the houses. Representatives from West Lothian and Stirlingshire spoke of the odour from the ashpits in summer and their harmful influence as a breeding place for flies. The evidence on the West of Scotland coal fields is punctuated with descriptions of the filthy ashpits, which in the older rows are commonly combined with privies.

In view of these facts, it was natural that all sanitary officers who gave evidence on mining villages laid great emphasis on the establishment of adequate scavenging arrangements. When examined on the point, they stated that the emptying of ashpits should take place at least twice a week, which would enable them to be greatly reduced in size. But the system of daily collection with portable ashbins is much to be preferred. The Commissioners' own observation and the reports of witnesses led them to speak with assurance on the improvement that is effected when ashpits are abolished and daily collections of refuse are instituted. In the Blantyre district of Lanarkshire this was particularly marked. The most satisfactory procedure in this connection is the formation of special scavenging districts; and it was repeatedly suggested that the restriction by which these can only be formed on a requisition should be removed, as it is sometimes difficult to obtain a requisition from a parish council or from 10 electors, and, as in the case of special water supply and drainage districts, district committees should be empowered to form them on their own initiative; this recommendation is endorsed without hesitation. The same recommendation applies to

the procedure for the formation of special scavenging districts. To meet the case of the special villages where the colliery company can arrange to be economically for the carrying out of scavenging which they frequently do effectively, even when other sanitary arrangements are defective—the Commissioners suggest that power should be given to the local authority to call on the owners to make arrangements for cleansing to the satisfaction of the local authority. These suggestions, which are parallel to those regarding lighting, would bring to all mining villages the improvement already enjoyed by many. If the older "rows" must remain featureless and monotonous, the surroundings of the houses can at least be made clean and wholesome.

Pithead Baths v. Baths in Miners' Houses.

Much stress was laid both by miners' representatives and by county public health officers on the need for some adequate provision to enable miners to wash in comfort on coming off duty. Two forms of this provision were suggested: baths at the pithead or baths in individual houses. The question of pithead baths was before the House of Commons during the passage of the Coal Mines Act in 1911. The law now stands that if a majority of two-thirds of the workmen employed in any mine to whom the section applies demand the provision for baths and drying clothes at the mine, and undertake to pay half the cost of maintenance, including interest on capital expenditure, the owner shall be obliged to provide such facilities, so long as the estimated cost does not amount to more than 3d. per man per week; to be paid, 1½d. by the employer and 1½d. by the worker. The Commissioners report that there did not seem much prospect of this section being at all generally enforced. At one pit belonging to the Wemyss Coal Company, the company were, at the time of the enquiry, proceeding voluntarily to erect a large installation for bathing and for drying clothes. In this case, there was a large free space available close to the shaft under the pithead building, which was to be utilised for this purpose; and the manager gave as a special reason for the provision of these facilities that many of the miners came several miles to their work by tramcar. At the same time, he stated that there did not seem to be much enthusiasm for the project among the men.

The evidence makes it quite clear that the direction in which demand is increasing is towards the bath in the individual house. Several witnesses, both among the miners and the public health officials, held that this was the first necessity, while a pithead bath might be a valuable addition where it could be afforded, especially where miners had to travel long distances in their wet clothes. Among the witnesses who expressed a desire both for pithead and private baths was the chairman of the Miners' Association in Leadhills, where many of the miners have built their own houses.

Another argument, supported by experience in America of one witness, was that the Scots miner has a rooted objection against bathing in a public institution. Thus it appears that, while there is considerable hesitation in regard to pithead baths, the demand for accommodation at home is growing rapidly, though there were differences of opinion in various districts as to how far it had already become urgent; but one significant fact is that, in their new housing schemes, the Mid-Lanark District Committee have decided to instal baths in all houses erected, with a hot water connection both from the kitchen range and from the boiler in the scullery.

Facilities for Washing and Clothes Drying.

In the main, the requirements for washing in a miner's family are not dissimilar from those elsewhere, but many of the older houses have no separate washing accommodation. In this case, the washing is frequently carried on outside the cottage in fine weather, and sometimes even in bad weather. In other cases, the washing is done in the kitchen, to the accompaniment of general damp and discomfort, which is emphasised in miners' houses by the fact that they are generally fully occupied; and if the man is working on a night shift he has to sleep while the washing proceeds, and the kitchen is filled with steam. It thus seems clear that local authorities should have power to require the provision of suitable washing accommodation in new houses, and its addition to old houses where the water supply and other circumstances permit.

In regard to the drying of clothes, miners' houses stand in a position by themselves; provision for this purpose being not less necessary than for farm workers, and much more necessary than for those who work at a dry and clean occupation. There are two possible ways of meeting this need. The best plan appears to be that adopted in Germany, by which drying rooms are provided along with baths at the pithead, where the miner leaves his soiled working clothes at the end of his shift. This plan affords a complete solution, and several witnesses urged its adoption. But, as shown, the provision of baths at the pithead seems, so far, to have met with only a qualified support. Short of this, or pending its general adoption, most witnesses were agreed that something might be done in providing and fitting up the scullery in new miners' houses to allow of the boiler fire being kept on all night, in which case clothes could be placed on a rack or pipes in the scullery. The atmosphere of the kitchen would thus be purified, nor would it be necessary for it to be overheated on account of the clothes requiring to be dried.

(To be continued.)

The total amount collected amongst London chauts for the French Red Cross Society was £30 1

Wagon Hire for Iron Ore.—Representative coal owners from all parts of the country have had a conference with the Ministry of Munitions and the Coal Controller in regard to the price to be paid for wagons which were requisitioned to carry iron ore. It is understood that an amicable arrangement was arrived at.

CONTENTS.

ARTICLES:—	PAGE
Arch Station	743
Mining in Scotland	743
Coal and Shipping	735
Coal (Pit's Mouth) Prices Order	738
Report of the Fuel Research Board	738
Directions as to the Sale of Coal	739
Miners' Housing in Scotland	741
South Wales Mining Timber Trade	743
Miners' War Bonus	748
Carriage of Goods on Canals	749
Mining Employment Statistics	750
Labour and Wages	752
Obituary	752
The Freight Market	754
Open Contracts	754
Abstracts of Patent Specifications Recently Accepted	754
New Patents Connected with the Coal and Iron Trades	756
Government Publications	756
Publications Received	756
REPORTS OF MEETINGS:—	
Manchester Geological and Mining Society	737
Manchester Association of Engineers	739
North of England Institute of Mining and Mechanical Engineers	749
THE COAL AND IRON TRADES	744-748
The Tin-plate Trade	747
The London Coal Trade	748
The By-Products Trade	748
PARLIAMENTARY INTELLIGENCE	748
LAW INTELLIGENCE	750
NOTES FROM THE COAL FIELDS	750
COAL, IRON AND ENGINEERING COMPANIES	752
MISCELLANEA:—	
Iron and Steel Works for Spain	737
Holland Seizes British Consul's Coal—Pyrometers and Pyrometry	738
Peruvian Coal Output	740
Wagon Hire for Iron Ore	741
The Ceramic Society	747
Miners and Industrial Trade Unionism—Imports and Exports of Coal Products	748
Certifying Surgeons Appointed	749
Imports of Pit Props—Japanese Coal and Iron Outputs—Exports and Imports of Mining Machinery—New Zealand Coal—Household Coal Distribution Order, 1917	752
Coal for France	754

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The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, OCTOBER 19, 1917.

The London trade continues very brisk, but the late heavy rains have seriously militated against the ordinary delivery. The principal topic of conversation during the whole of the week has been the recent advance of 2s. 6d. per ton on all house coal invoiced on and from October 15. Considerable difference of opinion has been expressed. Notwithstanding the higher price, the demand continues strong. Steam coals are difficult to obtain. At the depots strong efforts are in progress for putting coal on the ground. Very little free coal is on offer.

Northumberland and Durham are considerably disturbed by the multiplicity of new regulations regarding prices and conditions of sale, and very little business has passed locally.

All classes of fuel are in very strong demand in Cumberland; local disputes and breakdowns have reduced output slightly, and there is a shortage of fuel for shipping and landsale.

In Yorkshire and Derbyshire there is no diminution in requirements for home purposes, and strong pressure is being put on collieries for increased deliveries of steam sorts. Conditions at Humber ports are without any real change.

The feature of Lancashire trade is the increased consumption of slacks, the surplus stocks having disappeared.

South Wales reports great unsettlement, and outside of contract business, trade is almost at a standstill. Chartering has been rather more active, but many stoppages are recorded. Households are in good demand.

The Scotch trade continues quiet, with a tendency to await developments; collieries, however, report fair employment, the industrial demand being steady; the demand for house coal shows an improvement. In Ireland business generally continues active.

In nearly every district prices have now been adjusted to include the increase of 2s. 6d. per ton allowed by the Controller to meet the recently granted increase in wages.

Freights are rather better, although there is still a shortage of tonnage on the north-east coast. At South Wales most of the business done is for French-Atlantic ports, a fairly large charter list being shown. Tonnage everywhere is in very keen request, and high rates for neutral ports are on offer.

New Fuel Research Station. A SHORT time back we called attention to the activities of the Fuel Research Board. A report has now been issued, for official use, in which details are given of the scheme of research upon which the Board proposes to embark, the substance of which appears in another column. Briefly, it is intended to establish a fuel research station, with suitable equipment for carrying out the investigations which are to be taken in hand.

Originally these researches were designed to cover two separate fields of study—viz., (1) a survey and classification of all our coal seams, (2) the investigation of certain practical problems bearing upon the utilisation of coal to the best advantage. There may be some difference of opinion as to which of these two lines of research is the more important to the nation at large; but all will probably agree that the task, in either case, is considerable, and will involve much prolonged and patient work. At first it was thought that the general survey should precede the carbonisation and gasification experiments. Apparently, however, the Fuel Research Board have come to the conclusion that the two investigations can best be carried out side by side. The decision seems to be sound, and certainly promises to produce more speedy results than would otherwise be the case. It is satisfactory, therefore, to know that standard methods have now been devised, both for chemical analyses and also for low-temperature carbonisation tests. Equally gratifying is the assurance, of which we never had any doubt, that the coal owners have shown every disposition to co-operate in the work, and will give facilities for the collection and registration of samples from the individual seams.

As the Fuel Research Board points out, the importance of low-temperature carbonisation tests has assumed special prominence in recent years. Various modern tendencies have contributed to this result. Amongst them may be mentioned the growing demand for cheaper electrical energy, the pressing need for home supplies of oil fuel and motor spirit for military purposes, and the desirability of smoke prevention in industrial centres. The most promising solution of all these problems seems unquestionably to lie in the direction of a general abandonment of the use of raw fuel as a direct source of power and heat. It need scarcely be said that such a proceeding would involve a complete revolution in current practice, both in the power house and in the home. The prospect of such an industrial upheaval has induced a contemporary to declare that 10 years hence not a scuttle of coal will be burned in any British household. The problem involves two essential practical considerations. In the first place it is necessary to devise an economical and efficient apparatus for low-temperature carbonisation. In spite of much experimental work, it cannot yet be said that this object has been achieved. It is one thing to produce a satisfactory result with a particular kind of coal, and another to evolve a process suitable for any kind. In the second place, there is the question of the profitable utilisation of the by-products, in which respect many otherwise promising methods have hitherto failed.

It is in some respects regrettable, although perfectly intelligible under existing conditions, that those who have hitherto experimented on low-temperature carbonisation have maintained more or less secrecy as to the details of their work. For this reason much of the valuable experience they have gained is not available for general use. In regard to the high-temperature coke oven this secrecy has not been observed, with the result that we now

possess a great deal of experience as to the possibilities of this method of coking. It is, of course, to be assumed that finality has yet been reached in the evolution of the modern by-product coke oven, but it is unlikely that further progress in this direction will materially affect the fundamental principles already established.

In low-temperature carbonisation, however, there is still much to be learned before it can be assured that the collective value of the products will exceed the cost of the raw coal plus the cost of carbonisation and handling. After, all we are concerned with a commercial proposition. However crude and wasteful our present methods of utilising coal may be, it is useless to expect that these can be economically replaced unless there is a balance on the right side in the profit and loss account. It is necessary at the outset to reflect that the carbonisation of twenty million tons of coal produces in existing practice only one million tons of fuel oil, and leaves for disposal no less than fifteen million tons of coke. Herein lies the crux of the question, and the profitable utilisation of this coke will be one of the main questions which the Fuel Research Board will have to discover.

Experience shows that the most promising line of enquiry is that which concerns the better utilisation of low-grade fuels. It is therefore satisfactory to note that one of the problems which the Fuel Research Board will attack will be the possibility that the peat deposits of the United Kingdom may become an economic source of fuel for industrial purposes. War time has on previous occasions caused attention to be directed to the use of peat, but no success has hitherto followed. The conditions now existing, however, differ materially from any that have previously arisen, the whole fuel question having assumed a new aspect in the light of modern discoveries.

In the meantime a word should be said in commendation of the generosity of the South Metropolitan Gas Company, who have given a site and other facilities for the erection of a research station at East Greenwich, and have agreed to take over at market prices the surplus products arising from the experimental operations.

Miners' Housing in Scotland.

A BULKY Blue Book has just been issued by the Royal Commission on Housing in Scotland. This Commission, under the chairmanship of Sir HENRY BALLANTYNE, was appointed on October 30, 1912, and nearly five years have, therefore, been occupied in the enquiry. The late Sir CHARLES DILKE's Commission had previously reported upon certain aspects of the question in 1885, previous to the passing of the Local Government (Scotland) Act, 1889; and the position was further modified in 1894 by the establishment of the parish councils, while the powers of local authorities were further extended in 1897 by the Public Health (Scotland) Act, passed in that year. Sir HENRY BALLANTYNE's Commission, therefore, have had an administrative machinery to deal with which was very different from that investigated by the DILKE Commission. The origin of this later enquiry may be ascribed to representations made by various county medical officers, as a result of an interview between Lord PENTLAND, then Secretary of State for Scotland, and the Scottish Miners' Federation, on the question of the condition of the housing accommodation available in certain colliery districts. The Commission, however, have covered the whole question of the housing of all classes of the industrial population of Scotland, both rural and urban, which accounts both for the length of time taken in the investigation and for the voluminous nature of the report. In the present notice we propose to confine our attention to that portion which concerns particularly the housing of miners.

The Commissioners draw a gloomy picture of the "miners' row of inferior class, often a dreary and featureless place, with houses, dismal in themselves, arranged in monotonous lines or in squares," with accommodation which can often be described as sanitary abominations. It is fair to add, however, that these are gradually being replaced by better appliances. The mining industries naturally give rise to special housing problems, being determined by geological situation rather than by the factors controlling ordinary industrial sites. For reasons of convenience, the mining villages are usually placed

possible to the colliery shafts. These present special difficulties in regard to planning. Some of the houses date from the earlier days of coal mining, and, in some instances, houses built more than a century ago continue to be occupied. In certain localities the "tied house" system still predominates, and generally the influence of tradition too often leads the miner to regard his house as a portion of the mining plant, in which he takes but little personal interest.

The report contains an interesting historical review of the position of the Scottish miner from the sixteenth century to the present time. The earlier conditions were deplorable as judged by modern standards. It was not until the middle of last century that any improvement in housing conditions began to be felt. About this time, in parts of Lanarkshire and Midlothian, some of the colliers built new houses with assistance from coalowners through the agency of building societies. About this time there was a rapid development of the mining industry in certain areas, accompanied by a corresponding increase in house congestion. The selection of sites and the planning of villages were regulated mainly by three principles—viz., convenience to the mine, economy in construction, and the life of the mine, no consideration being paid to soil or drainage. Planning followed the line of least resistance, being confined either to rows or squares, with the most primitive provision for sanitary appliances and the common decencies of domestic life. There were a few exceptions, and occasionally mining communities even developed a taste for gardening, but too often the spaces allocated to this purpose were not even made use of. Notable examples of better taste are sometimes exhibited, as, for example, at Valleyfield in Fifeshire, and Kirkcannel in Dumfriesshire; and in Mid-Lanark, at Harthill and Cleland, even "garden villages" have sprung up. The miners' representatives drew particular attention to the question of roads and footpaths, which are often in a deplorable condition. In this direction the colliery management has sometimes made considerable improvements, with little or no encouragement from the local authorities, who appear reluctant to take over roads leading only to small colliery villages. The Commissioners find that statutory powers are defective in this respect, and suggest that the local authorities should be under obligation to take over and maintain all roads which have been put into a satisfactory condition. Equally unsatisfactory are the provisions for lighting and scavenging in certain areas. As in many other industrial areas, the parish council system does not always appear to be effectual in regard either to scavenging arrangements or lighting, and the removal of existing restrictions is recommended.

The question of pit-head baths, as is known, has been provided for in the Coal Mines Act, but it has been put on an optional basis. In Scotland, while the medical officers are in favour of this provision, the miners' representatives appear to prefer baths in the houses. The Wemyss Coal Company have recently gone to the expense of erecting baths and drying rooms for clothes near the shaft, but the men, it is said, evince little enthusiasm for the project, and in other districts where pit-head baths have been installed, the evidence as to the extent to which they are used was somewhat uncertain. On the whole, the general tendency seems to be rather in favour of baths in the home, even when such accommodation is already provided at the pit-head. The provision of drying rooms for clothes seems to be quite as urgent as that of baths, and the best solution would appear to be the German plan of having proper accommodation for this purpose at the pit-head, enabling the miner to leave his working apparel behind at the end of his shift. The Commissioners remark that the possession of a good water supply and house drainage presents a real difficulty both to the colliery companies and the local authorities. In some cases no solution of this problem is yet in evidence.

With regard to house rent, there has been a gradual departure from the old system under which the miner was given his house rent free in return for his labour and service. It is still, however, a system which the Commissioners, especially in cases where the houses by the companies are old and poor in

type. The amounts deducted vary as a rule from one-tenth to one-twelfth of the miners' wages, but there are wide differences in the proportion of rent to income. The majority of the miners' witnesses were in favour of the exaction of higher rent for increased accommodation. It is clear by the examples quoted in the report that the rent paid for houses owned by the colliery companies yields only a modest return on the capital sunk in them. The position of the owners is rendered difficult on account of the prospective exhaustion of the mine, but the Commissioners are of the opinion that there is little danger of colliery houses lacking occupants even in that event so long as they are kept in good structural condition. More serious is the question of the termination of mining leases before the exhaustion of the pits. This may involve either the removal of the houses or their transfer to the superior landlord. The best solution appears to be that the colliery company should obtain the land required for housing as a feu independent of the mineral lease, and this method is, in fact, adopted in certain cases. Alternatively, there might be inserted in the mining lease a provision for the valuation of the houses at the end of the term, in which case the colliery owner would not have to incur loss for keeping the houses in repair.

In the event of a new colliery being started, there are many uncertainties as regards the life of the venture. Faults or other difficulties may be encountered, and may cause the mine to be abandoned. In such cases it would be unreasonable to expect the mine owner to erect permanent buildings in the first stages of development, and the Commissioners therefore recommend the provision of temporary huts of wood and iron, under the supervision of the local authority. After a reasonable interval, say 10 years, if the mine should prove profitable, the provision of more permanent housing is advocated, either at the expense of the mine owner, or of the local authority, subject to the power of special assessment of the owner. It is possible, in such cases, that the mining community might, by the aid of building societies, embark upon a scheme of separate ownership, examples of which already exist at Leadhills and Larkhall. In East Fife, also, promising schemes of occupying ownership have been successfully developed. Arrangements of this kind are rendered more hazardous owing to the danger of damage to property by subsidence, which has caused serious injury to houses in Fife and Lanark. The Commissioners discuss at considerable length possible remedies for this contingency, which fall under two heads—viz., prevention and compensation. There are obvious difficulties in either case, into which we cannot now enter in detail, but the matter is discussed impartially in the report, and deserves the serious attention of colliery owners.

THE IRISH COAL TRADE.

THURSDAY, OCTOBER 18.

Dublin.

There is no change in prices so far in this port, and business generally continues to be active both locally and elsewhere. Supplies of best Orrell coal are exceedingly difficult to obtain, and at present Yorkshire brights are not being shipped to Ireland. The Dublin coal merchants have as yet received no notice of the Controller's fixed price, although representations have been made as to the diminution in cost. It is stated that the Board of Trade decision must of necessity mean an increase in price to Dublin consumers when matters are finally adjusted. Current quotations in the city are as follow: Best Orrell, 46s. per ton; best Arley, 45s.; best Wigan, 44s.; Pemberton Wigan, 42s.; best Whitehaven, 44s.; Scotch, 38s.; best kitchen coal, 43s.; slack, 35s.—all less 1s. per ton discount for cash. Scotch steam coal, 41s.; Welsh steam, 48s.; coke, 46s. per ton. The coal vessels arriving during the past week amounted to 71, the total quantity of coal discharged upon the quays from English, Scotch, and Welsh ports being 27,480 tons, as compared with 25,053 tons the week previously. At a recent meeting of the Clonmel Asylum Committee, a letter was read from the Irish Mining Company, Wolfhill, Queen's County, stating that, owing to the number of orders on hand, and the number of contracts they held, they were not in a position to quote for a supply of coal to that institution. A similar communication was received from the Castlecomer Company, co. Kilkenny, stating it was not possible to quote for 100 tons owing to the Government orders, which had precedence.

Belfast.

Business has been rather quiet, but there is an improving tendency, prices of all qualities remaining unaltered. Stocks, particularly of household coals, are below the average in the port. Quotations stand as follow: Best Arley house coal, 43s. 6d. per ton; Scotch house, 39s. 6d.; Orrell nuts, 42s. 6d.; English house, 41s. 6d.; Orrell slack, 39s. 6d. Scotch steam coal is about 29s. per ton, best qualities up to 35s. and 37s. 6d. per ton. Irish coal at Craigahulliar pits, Portrush, co. Antrim, is 14s. per ton, and 30s. per ton delivered in Belfast. At Enniskillen, the price of coal is now £2 11s. 8d. per ton, and turf has also reached a prohibitive figure.

THE COAL AND IRON TRADES.

THURSDAY, OCTOBER 18.

Scotland.—Western District.

COAL.

The general situation in the Scotch coal trade continues quiet and uncertain, owing partly to the new conditions contingent on the distribution scheme, and the question of increased prices under the Price of Coal (Limitation) Act. Even where business is possible, consumers seem prepared to wait until things are more settled. In the West of Scotland district the turnover is pretty much of a day-to-day character. The collieries, however, report comparatively full employment, the industrial demand being steadily maintained, and household sorts were readily sold owing to colder weather. The latter are now being retailed in some districts of Glasgow at 1s. 11d. per cwt. bag, an increase of 2d. per cwt. Shipments for the week amounted to 94,186 tons, against 108,396 in the preceding week and 105,411 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	21/-27/6
Ell	26/6-28/	26/6-28/	25/-27/
Splint.....	28/-30/	28/-30/	24/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The demand for all classes of iron products is as fully maintained as ever, and makers find considerable difficulty in meeting obligations. The labour scarcity is always apparent, while of late there has been a decided shortage in the raw material supply, and it seems as if one difficulty only disappeared in order to make room for another. In the pig iron trade, everything produced is quickly absorbed at local works, and only in national interests can supplies for export be secured. Foundry and forge iron are now very scarce, as the majority of the furnaces are on the production of basic. Prices are firm and unchanged. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Malleable iron makers are actively employed in all branches. In high tensile steel, made from shell discards, which is purely a war product, the finished material is now being put to uses unknown when Siemens or other soft steels were plentiful. The price for galvanised sheets is still prohibitive, and red or black painted corrugated sheets are now extensively used for roofing and other purposes.

Scotland.—Eastern District.

COAL.

The coal trade in the Lothians is running on very restricted lines, and employment is not so steady as it was a month ago. The demand for house coal now shows an improving tendency, however, and local industrial enquiries are also expanding, and collieries are hopeful of much better times ahead. Shipments amounted to 18,800 tons against 19,903 in the preceding week and 37,063 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	30/-32/
Secondary qualities.....	25/6	25/6	28/-29/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

No change is reported from the Fifeshire district. Collieries are still depending on the local demands to get rid of outputs, export orders being few and far between and of little account. Clearances for the week amounted to 31,302 tons against 27,143 in the preceding week and 39,844 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	35/-37/6
Unscreened do.....	24/-25/	24/-25/	30/-32/6
First-class steam coal.....	28/	28/	33/-35/
Third-class do.	24/	24/	23/-25/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/
Single do.	21/	21/	21/-21/6

The aggregate shipments from Scottish ports during the past week amounted to 144,288 tons, compared with 155,442 in the preceding week and 182,318 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

At any time, nowadays, the coal trade has a sufficiency of troubles, in the shape of shortage of tonnage supplies, and the necessity of conformity to a thousand and one Government regulations and restrictions, and so on. During the past week, however, these have been added to by the fact that the Coal Controller has issued a new Order, which literally bristles with points that the ordinary unlearned mind finds difficult fully to comprehend. The advisability of completely digesting the Controller's new ideas as to the regulation of prices has resulted in business being practically brought to a standstill, what time "coal men" metaphorically tied wet cloths round their foreheads and studied the latest official communications with a view to arriving at a clear conception of what exactly the Coal Controller was driving at. Little by little, the nebulae are being pierced, and perhaps, in a few days, by the time the

Coal Controller has furnished some much-needed explanations, it will be found possible to resume bargaining with the assurance that no bad error in the interpretation of the Order is likely to be made. Thus, the position of bunker coals under the new régime has led to much discussion. It now seems clear that, whether the bunkers are for British or Allied vessels or for foreigners, the price has been advanced by 2s. 6d. per ton. Why that class of coal, which is at present the least sought after and the most plentifully offered, should be singled out for ennoblement in this fashion it is very difficult indeed to guess; the only good point being that it is hardly possible that the increase can adversely affect the taking-up of bunker coal, inasmuch as this class of fuel is absolutely indispensable if the voyages of steamers are to be made at all. A permissible comment on the new schedule—whereby prices of coal for home consumption and those for all directions abroad, save France, Italy, British Possessions and Protectorates and coal stations therein, shall be increased in price by 2s. 6d. per ton—is that it seems rather extraordinary that British Peter at home shall be penalised to pay for the coal required by British Paul resident beyond the seas, although the same criticism cannot be made against the notion that neutrals should help to finance the cost of the war by paying more for their fuel than will our Allies. On the other hand, consumers of coal for use, other than for domestic consumption, in the United Kingdom may well chafe at having to pay 2s. 6d. more for their coals from September 17, whilst the neutral is only called upon to pay the increase as from October 15. If it were impossible to make the Order retrospective in regard to neutrals, it would have been more just to have put British consumers “off the same mark” as neutrals and to have abandoned the retrospective idea altogether, giving redress to the coal owners for increased wages, which accrue as from September 17, by making a Treasury grant. Only the most meagre hand-to-mouth business has been done in the local market since last week. The only item of new business worthy of mention is the enquiry, which is now becoming a hardy bi-monthly, from the Norwegian State Railways for offers of 18,500 tons of best steams for delivery over December-January. Tenders are due on Friday of this week. With two totally different sets of prices to be quoted—figures based on the old schedule for the Allied destinations, detailed earlier, and on 2s. 6d. per ton advance for home and neutral directions, excepting in the case of bunkers, the price of which is advanced all round, irrespective of the nationality of the purchaser—it has therefore been thought advisable in the accompanying price-list to “lump” the two sets of prices. The reader will understand, therefore, that the lower prices quoted are the minimum fixed figures for Allies, and the higher figures at which coal is now offered to neutrals. It should be noted that coke is unaffected by the Order.

Prices f.o.b. for prompt shipment.

Steam coals :—	Current prices.	L'st week's prices.	Last year's prices.
Best, Blyths (D.C.B.) ...	30/-32/6	30/-	35/-37/6
Do. Tynes (Bowers,&c.) ...	29/6-32/-	29/6	35/-37/6
Secondary, Blyths	25/6-28/-	25/6	30/-32/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-	30/-32/6
Unscreened	23/6-27/6	23/6-25/-	25/-27/6
Small, Blyths	20/-22/6	20/-	22/6
Do. Tynes.....	18/6-21/-	18/6	20/-
Do. specials.....	20/6-23/-	20/6	25/-
Other sorts :—			
Smithies.....	25/-30/6	25/-30/6	25/-
Best gas coals (New Pelton or Holmside) ...	25/-27/6	25/-	32/6-35/-
Secondary gas coals (Pelaw Main or similar) ...	23/6-26/-	23/6	27/6
Special gas coals	26/6-32/6	26/6-30/-	34/-35/-
Unscreened bunkers, Durhams	26/6-27/6	24/-25/-	24/-26/-
Do. do. Northumbrians	26/6-27/6	24/-25/-	22/6-25/-
Coking coals	24/-27/6	24/-25/-	24/-25/-
Do. smalls	24/-27/6	24/-25/-	21/-23/-
House coals	28/6-32/6	28/6-30/-	37/6-40/-
Coke, foundry	42/6	42/6	38/-45/-
Do. blast-furnace	42/6	42/6	36/-40/-
Do. gas	32/6-35/-	32/6-35/-	33/-35/-

Sunderland.

COAL.

The Coal Controller has withdrawn his retrospective clause as from September 17, in so far as it affected the supply of coal for domestic use. A revised schedule of prices has been issued, making provision for a general increase of 2s. 6d. per ton (except in the case of shipments to France and Italy) to cover the war wage recently granted to the miners. Coke prices are not affected. On the whole the tendency of the market is to accept the new conditions and settle down to business as quietly as possible but it will naturally take a few days to accomplish this. There is some enquiry from neutral sources and licences are being granted more freely. Collieries, however, are still working badly, losing considerable time. Quotations are now under the 2s. 6d. advance and are as follow :

Prices f.o.b. Sunderland.

Gas coals :—	Current prices.	L'st week's prices.	Last year's prices.
Special Wear gas coals	29/-32/6	26/6-30/-	35/-
Secondary do.	25/-27/6	23/6-25/-	28/-
House coals :—			
Best house coals	32/6	30/-	35/-
Ordinary do.	30/6	28/-	25/-
Other sorts :—			
Lambton screened	31/-32/6	28/6-30/-	32/6
South Hetton do.	31/-32/6	28/6-30/-	32/6
Lambton unscreened ...	26/6	24/-	25/-
South Hetton do.	26/6	24/-	25/-
Do. treble nuts	22/6	20/-	26/-
Coking coals unscreened	27/6	25/-	25/-
Do. smalls	27/6	25/-	24/-
Smithies.....	27/6	25/-	25/-
Peas and nuts	27/-28/6	24/6-26/-	26/6
Best bunkers.....	27/6	25/-	25/6
Ordinary bunkers.....	26/6	24/-	20/-
Coke :—			
Foundry coke	42/6	42/6	37/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/-	28/-	28/-
Gas coke.....	31/-	31/-	31/6

The Norwegian State Railways are again in the market for 18,500 tons of steam coal for December-January delivery, tenders to be sent in this week.

Middlesbrough-on-Tees.

COAL.

Interest in the fuel trade centres in the coal situation under the new sales Order, and its bearing upon business and contracts, many points of interest being raised by traders. Generally the market lacks animation. Moderate enquiries on behalf of neutrals are reported, amongst them being another from the Norwegian State Railways. Several of the Durham collieries are working irregularly, due very largely to backward boats and shortage of railway trucks. Coal quotations are, of course, under the half-crown advance where prescribed by the Order. Delivery of gas coal is fairly good. Good manufacturing fuel and washed nuts continue in very good request, and household coal is in large and increasing demand. Coking coal is well taken up. The coke position is unaltered. Beehive and patent oven remain at 42s. 6d., and gashouse product is in active request at 31s. to 32s. All descriptions of coke needed for the blast furnaces are in heavy local demand, and fixed maximum quotations rule, though supply is much more than ample. Average kinds are 28s. at the ovens, and qualities low in phosphorus 30s. 6d. at the ovens.

IRON.

No surprise is felt at the falling away of home demand for Cleveland pig iron, consumers of foundry kinds now being well covered under the October allocations. A few allotments, however, continue to be made in cases where purchasers have for individual convenience split up their parcels. Current month's demands are exceptionally heavy, pressure for delivery being insistent, particularly from Scotland, where foundries are very busy. Forge iron—a quality not subject to allocation—has been sold extensively for delivery to the end of the year. Some apprehension is expressed that it will be found impossible to fully fulfil this month's contracts in consequence of the shortage of pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., railway wagons. For home consumption No. 3 Cleveland and No. 1 is 96s. 6d.; and for shipment to France and Italy No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Conditions continue stringent in the east coast hæmatite branch, but the situation is regarded as slightly better, and further improvement is confidently looked for. Nos. 1, 2 and 3 are 122s. 6d. for home use and 141s. for export to the Allies. In foreign ore a moderate hand-to-mouth business is passing at current rates. Finished iron and steel manufacturers are running at very high pressure to cope with the huge Government requirements and overwhelming demands of the ship yards, and with so much of this class of work on hand they are indifferent to ordinary commercial business.

Cumberland.

Maryport.

COAL.

An all-round advance in prices, the first since June 8, 1915, to cover the increased cost of production consequent upon the recent advance in miners' wages, is the only new feature of interest that has occurred since last week in the conditions prevailing throughout the Cumberland coalfield. All varieties of coal both for shipping and local consumption have advanced 2s. 6d. per ton. The price of house coal was increased on Monday, and in the case of other varieties the increase takes effect from September 17 last. The coal trade is still as busy as it can possibly be, and there is a very strong market for all classes of fuel. There has again been some reduction in output owing to disputes and breakdowns, and while local needs are being adequately coped with, there is still a marked shortage both for shipping and landsale. In the home market the demand for fuel is very firm, requirements are still increasing, and the clamour for all sorts for local use is keener than ever this week. Manufacturing fuel is in keen request and local needs are now so heavy that large consignments of both works and coking fuels are still being imported from the east coast for the iron and steel works and the by-product coke ovens in West Cumberland. All the output is now practically reserved for local consumption and very little of any description is being sent out of the district. Landsale is very brisk, and most of the depots have been busier than ever during the last few days. Orders for house coal are coming in quicker than they can be executed, and agents are still finding it extremely difficult to get sufficient to satisfy the needs of their customers. Coal for gas-making purposes is in keen request, and engine fuels are very firm, but the collieries have now so much on hand that little or no outside business is being accepted, and, with the exception of shipping, the only consignments being sent away by rail are being sent to users in the county. The export trade is brisk, but supplies of all sorts are very scarce, and the amount available for shipment is gradually becoming smaller. The demand for all sorts for the Irish market is undiminished, and export consumers could easily take twice as much coal as they are at present receiving. Production has been barely sufficient to satisfy the needs of all important home consumers, and the collieries have, therefore, not been in a position to deal with very much export business this week. During the week, 14 vessels have sailed with coals, all from

Current quotations.

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	23/4	23/4
Best washed nuts at pit...	24/2	21/8	21/8
Seconds at pit	23/4	20/10	20/10
Washed nuts at pit	23/4	20/10	20/10
Do. smalls „	19/2	16/8	16/8
Do. peas „	17/6	15/-	15/-
Buckhill best coal at pit...	25/-	22/6	22/6
Do. double-scrned washed nuts at pit	23/6	21/-	21/-
Oughterside best coal at pit	25/-	22/6	22/6
Oughterside best washed nuts at pit.....	23/6	21/-	21/-
St. Helens (Siddick) best coal at pit	25/-	22/6	22/6
St. Helens best house nuts at pit	23/6	21/-	21/-
Best Cumberl'nd coal, f.o.b.	22/-	19/6	19/6
Best washed nuts, f.o.b. ...	20/-	17/6	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/-	28/6	30/-
Best works fuel.....	22/6	20/-	20/-
Best coal for gasworks ...	22/6	20/-	20/-
Best washed nuts for gas-works	21/6	19/-	19/-

Irish ports, and the shipments have amounted to 2,000 tons compared with 3,175 tons at the corresponding time of last year, or an increase of 710 tons compared with the previous week. The largest cargoes were consigned to Belfast, Dublin, Carrickfergus and Larne. The coal industry is tremendously brisk, and all the by-product coke ovens in the district are in full operation. Production is steadily increasing, but all the output from the Cumberland ovens, in addition to large quantities from the east coast, are still being taken by smelters in the district. The chemical industry is very busy, and all the plants in the district are working at top pressure.

IRON.

The hæmatite pig iron trade in West Cumberland and the Furness district continues to be characterised by very great strength. There is intense activity in every department of the iron and steel industry, and although production is now more satisfactory, it is still inadequate to meet needs, and no sensible relief will be afforded until it is possible to put more furnaces into blast. The call for metal, both ordinary and special sorts, is unprecedented, and requirements of local and outside users are so large that there is not enough to go round, and even approved users are merely existing from hand to mouth. Makers are so pressed with orders that no outside business can be accepted. The number of furnaces blowing is 30, 20 of which are in Cumberland and 10 in the Furness area, and the entire output is going into home consumption. No additional furnaces have been lighted, but the prospects of securing an expansion of production were probably never brighter than they are at the present time. Efforts are being made to recruit 700 additional hands from the Scottish mines to work in the Cumberland iron ore mines, and if this is successful it is believed that it will soon be possible to increase the output of native ore to the extent of between 9,000 and 10,000 tons weekly. If such a substantial increase in the production of local iron ore can be secured—and there is now some reasonable hope that it can—it would enable smelters to light all the furnaces in the district that are ready. The amount of iron in Cumberland storing yards still stands at 430 tons. Prices are unchanged at the Government maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at cash at 115s. per ton. Special low phosphorus iron is 140s. per ton and semi-special iron is quoted at 135s. per ton f.o.t. Consumers in Scotland and the Midlands are still taking the bulk of the make of special iron, and a big proportion of the ordinary Bessemer iron is going into consumption locally at the steel works. The steel trade is exceedingly brisk, and all the plants at Barrow and Workington are very fully employed. Steel rails, heavy sections, are quoted at from £10 17s. 6d. to £11 per ton, with light rails at from £14 to £14 10s. per ton. Heavy tram rails are quoted at £14 per ton, ship plates £11 10s. per ton, and boiler plates are £12 10s. per ton. Engineers are very busy, and most of the shops in this district are heavily engaged on Government account.

South-West Lancashire.

COAL.

There is little change with regard to the inland household coal trade. Orders are in advance of the supply, and arrears are as numerous as ever. Steam and bunker coal is in good request both on contract account and for shipment to Allies and others. There is only a very limited quantity of free coal to be had, and this is readily disposed of. Best Lancashire steam coal, 30s. to 30s. 6d. f.o.b. Mersey tips, this, of course, including the 2s. 6d. per ton recent advance, Controller's terms. In the coastwise and cross-channel trade there is nothing new to report. The consumption of slack is steadily increasing, and whatever weekly surplus was on the market caused by the summer holidays has practically disappeared. The prices have been advanced in accordance with the Controller's circular of last week.

Prices at pit (except where otherwise stated).

House coal :—	Current prices.	L'st week's prices.	Last year's prices.
Best	23/6-24/6	21/-22/-	21/-
Do. (f.o.b. Garston, net)	27/ upwds.	25/6	25/6
Medium	21/6-22/6	19/-20/-	19/-20/-
Do. (f.o.b. Garston, net)	26/ upwds.	24/6	24/6
Kitchen	20/6	18/-	18/-
Do. (f.o.b. Garston, net)	25/ upwds.	23/ upwds.	24/ upwds
Screened forge coal	20/6	18/-	18/-
Best scrnd. steam coal f.o.b.	30/-30/6	—*	23/-24/-
Best slack	18/6	16/-	16/-
Secondary slack	17/6	15/-	15/6
Common do.	16/6	14/-	14/6

* As per official list.

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday, and the chief business was to discuss the advance in prices authorised by the Coal Controller. The air is not clear even yet as to the intention, but, of course, it has to be understood that the colliery owners have to carry this out. House coal is in heavy demand, with restricted supplies. Manufacturing fuel, too, is lively, with the exception of slack. There is no change in shipping fuel. Prices generally are as below :—

Prices at pit (except where otherwise stated).

House coal :—	Current prices.	L'st week's prices.	Last year's prices.
Best	24/6	22/-23/-	22/-23/-
Medium	22/-23/-	19/6-21/-	19/6-21/-
Common	20/6-21/-	18/-18/6	18/-18/6
Furnace coal	20/-20/6	17/6-18/-	17/-18/-
Bunker (f.o.b. Partington) ..	—*	—*	25/-26/-
Best slack	18/6 upwds	16/ upwds	16/ upwds
Common slack	17/ upwds	14/ upwds	14/6 upwds

* As per official list.

IRON.

There is nothing new to report, the situation being unchanged. The utmost output of both steel mills and iron forges is required by the Government. There have been no changes in the prices to report. The wagon works and engineers, both heavy and light, are very busy, and more enquiry is noticeable in the foundry trade.

Yorkshire and Derbyshire.

COAL.

ce at the market on Tuesday was again existing conditions and restrictions as to supply leave very little scope for new business. West Yorkshire is exceedingly active, and generally speaking the output of the pits is so completely disposed of by contract, or reserved for regular customers, or controlled by official instructions, that there is practically no surplus at all for current sale. Indeed, to keep abreast of their present obligations is in many cases more than the collieries can manage. The increase of pit prices, to cover the advance in miners' wages, naturally came in for considerable discussion on 'Change, and in order to settle a doubt as to whether the 2s. 6d. per ton addition is intended to apply to coke, it was stated that the factors' organisation had that morning wired the Coal Controller, but no reply had been received at the close of the market. It hardly need be said that if coking smalls are to be 2s. 6d. dearer, without a corresponding rise in the price of coke, the difficulties of coke-makers, already great because of the short supply of suitable material, are going to be greatly increased and the position very complicated. The pits are working full time, but the wagon supply threatens to become precarious. There are many complaints of railway delays to long distance traffic, which seem to occur mainly on the return journey, and are thought to be probably increased by the use that is being made of private trucks by the railway companies for the conveyance of other material. With regard to the agitation of the factors and merchants for the repeal of the Coal Transport Order, last week's interview with the Controller was a topic of conversation on the market, and it was hinted the matter is not to be allowed to rest with the Controller's negative reply, a strong case for the abandonment of the scheme being in preparation. The demand for house coal for London is still very great, especially for depots south of the Thames, where extra deliveries are being ordered, and it is reported that the situation in Area 13, cut off from Yorkshire supplies, is exceedingly grave, owing to the dearth of deliveries and the general dislocation. Coastwise, only a comparatively small tonnage is being sent from the Humber ports to the Thames wharves. High freights, which show a tendency to increase, and scarcity of boats, have a marked restrictive influence. In an exceptional case as much as 21s., Goolse to London, has been paid this week. It is not thought that the Order requiring merchants to accumulate depot stocks equal to three weeks' highest turnover is intended to apply to the provinces. Otherwise, West Riding merchants who have not for some time been getting sufficient deliveries to prevent public orders accumulating, see no way of complying with it. With the recent increase added, pit prices for the West Riding are: Haigh Moor selected 22s. 6d. to 23s. 6d., Silkstone best 22s. to 22s. 6d., Silkstone house 21s. to 21s. 6d., and house nuts 19s. 6d. to 20s. 6d. There would be a great demand for gas coal if the collieries had any to spare. On the contrary, in most cases contract deliveries are in arrears, and stocks at the works are diminishing somewhat rapidly. The 2s. 6d. increase in price applies to all gas coal contracts. Manufacturing fuel shows no change. There is a very keen enquiry for washed furnace coke, with coking slacks scarce, large coal still being crushed to augment the supply in some cases. The revised list of pit prices are subject to the Coal Controller's decision in regard to coke.

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ..	21/6-22/6	19/-20/	20/-21/
Wallsend & London best	21/-21/6	18/6-19/	19/-20/
Silkstone best	21/-21/6	18/6-19/	19/-20/
Do. house	20/-20/6	17/6-18/	17/-20/
House nuts	18/6-19/6	16/-17/	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	22/6-23/6	23/-24/
Silkstone best	24/-25/	21/6-22/6	22/-23/
Do. house	23/-24/	20/6-21/6	20/-21/
Other qualities	20/6-22/	18/-19/6	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	17/6-18/6	15/-16/	16/-17/
Gas nuts	17/-18/	14/6-15/6	15/6-16/6
Unscreened gas coal ..	16/6-17/6	14/-15/	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	16/-17/	17/-18/
Large double-screened engine nuts	17/6-18/6	15/-16/	16/-17/
Small nuts	16/6-17/6	14/-15/	15/-16/
Rough unscreened engine coal	16/6-17/6	14/-15/	15/-16/
Best rough slacks	15/6-16/6	13/-14/	14/-15/
Small do.	13/6-14/6	11/-12/	12/-13/
Coking smalls	14/-15/	11/6-12/6	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8 (?)	25/8	25/8

Barnsley.

COAL.

Business has become of a more settled character, owing to the fact that a decision has been made regarding the raising of the selling prices of all classes of coal. Consumers recognise that this was inevitable, owing to the increased wages paid to colliery workers; but a good deal of complaint is heard of the unequal effect owing to the fact that ordinary markets have been subjected to reduced supplies, which has prevented stocks being laid in to the degree that would have been possible otherwise. This is especially the case in respect to house coal; London and long-distanced areas having gained considerable advantage in this respect. There is some satisfaction expressed that now the orders for larger supplies to London have been relaxed and greater opportunity will be available to provide for the coming winter months. In other respects, although the deliveries are not quite satisfactory, the local distribution committees are working energetically to make conditions satisfactory, at all events in regard to manufacturing fuel. The demand all round continues to be exceptionally strong, and the shortage of fuel is generally speaking, very marked. The delay in producing steam sorts have been intended for shipment to the home market, but, of course, there is no diminution in the supply for home purposes, especially for the railways and engineering concerns. The steamers have still to be taken to the ports, which continue to be largely

absorbed by the munition works; and the diversion of traffic for this purpose continues to be experienced. The difficulty in obtaining an adequate supply of gas coal becomes more apparent, and is causing much anxiety. Many gas concerns find an unexpected demand upon them for supplies of gas used for heating and cooking purposes which cannot be met by the ordinary contract tonnage. This is the case of all kinds of small fuel, and the delivery of coking slacks is hardly sufficient to keep the plants in full operation. All house coal collieries are heavily booked up with orders for the West Riding and nearer districts, which will cover a considerable period before they are fully executed. The output of furnace coke still hardly appears to be sufficient to meet the needs of the North Lincolnshire and Midland districts, and in regard to prices, a meeting of makers has been called, when undoubtedly a similar increase will result as in the case of the gas supplies. The revised prices are now all as follow:—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	22/6-24/6	20/-22/	20/-22/
Best Barnsley softs	21/-21/6	18/6-19/	18/6-19/
Secondary do.	19/6-20/	17/-17/6	17/-17/6
Best house nuts	18/6-19/6	16/-17/	16/-17/
Secondary do.	18/-18/6	15/6-16/	15/6-16/
Steam coals:—			
Best hard coals	20/-21/	17/6-18/6	17/6-18/6
Secondary do.	19/-20/	16/6-17/6	16/6-17/6
Best washed nuts	18/9-19/	16/3-16/6	16/3-16/6
Secondary do.	18/-18/9	15/6-16/3	15/9-16/3
Best slack	15/-15/6	12/6-13/	12/6-13/
Secondary do.	13/-13/6	10/6-11/	10/6-11/
Gas coals:—			
Screened gas coals	19/-19/6	16/6-17/	16/6-17/6
Unscreened do.	18/-18/6	15/6-16/	15/6-16/
Gas nuts	18/6	16/	16/
Furnace coke	25/8	25/8	25/8

Hull.

COAL.

Business conditions here are without any real change, though the atmosphere is clearer since the official announcement regarding the extra charge to be made to cover the recent advance in miners' wages. While prices to the Allies remain as before, coal for bunkers and neutrals will have to submit to the increase. There will not be any difficulty in regard to prompt business, but exporters who have contracts to supply abroad fully realise the difficulties that exist in passing the addition on to the foreign buyers. From the Humber, however, neutral business is somewhat restricted, and of late has been chiefly with Holland, supplies being short and licences difficult to obtain. This still represents the position. Moreover, deliveries from the collieries continue irregular, and difficulties in arranging loading are by no means uncommon. Large steams are fully firm and up to 37s. 6d. quoted for best South Yorkshire hards for prompt shipment. Derbyshire hards are practically unobtainable for export. West Yorkshire Hartleys are scarce, and largely absorbed by France. All kinds of industrial fuel are difficult to buy, and values well sustained.

Chesterfield.

COAL.

Every class of coal is in great demand and supplies continue much below market requirements. House coal orders come to hand freely, and great pressure is applied to collieries to expedite deliveries. Fuel for industrial purposes is in active request. Cobbles and nuts suitable for gas-producers are in specially urgent demand. Slack for boiler firing is in steady request, supplies of which are going forward to Lancashire in somewhat larger quantities owing to resumption of work at certain cotton mills where a strike had taken place. Railway companies are pressing for deliveries of locomotive fuel, and gas companies continue in need of increased supplies of gas coal. The export trade is at a standstill so far as this district is concerned, the shipment of Derbyshire coal being prohibited. The Controller has issued instructions to collieries to increase by 2s. 6d. per ton the price of coal for domestic consumption on and after October 15, and a similar amount for coal for other purposes from September 17. The coke trade is unchanged. The demand is of a steady character, and the whole consumption is readily disposed of. Prices of all qualities of coal are firm at limitation figures.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

There is no new feature in connection with the iron trade of the district, where every branch is actively employed.

Nottingham.

COAL.

Merchants in this district are being kept fairly busy in executing current orders for domestic fuel, but supplies in some cases are not sufficient to carry these out without some delay. It is anticipated that the advance of 2s. 6d. per ton, which comes into operation on Monday, according to the Order by the Board of Trade, will have a tendency to steady the demand, as householders who have already secured a reasonable supply for winter use will not be so ready to add to their stock. There is a good deal of pressure on collieries by merchants for supplies on contract

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/	18/6-19/6	18/6-19/6
Good house coals	20/6-21/	18/-18/6	17/-17/6
Secondary do.	19/6-20/	17/-18/	16/-16/6
Best hard coals	19/3-20/	16/9-17/6	17/-17/6
Secondary do.	18/6-19/	16/-16/6	16/-16/6
Slacks (best hards)	—	12/-13/	12/-13/
Do. (second)	—	10/6-11/6	10/6-11/6
Do. (soft)	—	11/	11/

accounts. In the steam coal branch the demand continues brisk, all classes meeting with ready sale. Cobbles and nuts for manufacturing purposes are only obtainable in very limited supplies by ordinary customers, owing to the heavy demand by firms engaged on war work. The railway companies are taking a considerable tonnage of large steams. Slacks are in good request, more especially the better class qualities, but common sorts are not going out of hand so readily, and of these there is a fairly good supply. There is scarcely any gas coal obtainable except on contracts, which absorb the output of most of the collieries.

Leicestershire.

COAL.

A certain transformation in the conditions has completely upset the output of coal at all the chief collieries, and several thousand miners were thrown idle by a very remarkable strike. With all the extra worry and strain of altered rates of pay and the bringing into operation new prices, some of which were retrospective and some of which were not, at the beginning of the week there came a strike of enginemakers and other skilled men essential to working. One extraordinary incidence of the strike was that at collieries where there were no members of the union objected to, work was entirely suspended, whereas at some of the collieries where such men were engaged work was wholly or partly continued. It ought to be clearly understood that neither the miners nor the colliery proprietors had the slightest concern with the cause of the trouble, which undoubtedly was solely and entirely due to issues being raised between a large national organisation and another small union belonging to another adjoining district. Large munition works drawing all their supplies from this district had to be advised that the deliveries were suspended, as well as those to London and country merchants. Fortunately arrangements were made to enable the pit ponies to be fed, and pumping continued to keep the mines in order. The strain placed on the administration has been intensified almost beyond endurance. Prices have been adjusted to meet the altered conditions, but deliveries have been greatly upset just at the critical period when the domestic consumption is rapidly extending owing to the cold weather. There is a feeling of great uncertainty in the district, and there is severe comment that so comparatively small an outside matter should have produced serious loss and injury to mining interests and general consumers. Under any circumstances, the deliveries to London must be seriously curtailed and delayed, and the same applies to country merchants. It is hoped that the strike will be settled speedily, but all those with expert knowledge recognise that the situation will require delicate and diplomatic handling.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	17/6-19/	17/-19/
Second, hand picked	19/-20/	16/6-17/6	15/6-17/
Deep screened cobbles ..	18/6-19/6	17/-18/	16/6-17/6
Deep large nuts	18/6-19/6	17/-17/6	16/-17/
Bakers' nuts	17/6-18/6	16/-16/6	15/-16/
Small nuts	17/-18/	15/6-16/	14/6-15/6
Deep breeze	15/3-16/	13/9-14/6	12/9-13/6
Peas	14/6-14/9	13/-13/3	12/-12/3
Small dust	8/6-9/6	6/-7/	6/-7/
Main nuts for London			
kitcheners	16/-17/6	14/6-15/	13/6-14/6
Steams, best hand picked	16/6-17/6	15/-15/6	14/-15/
Steams, seconds	15/6-17/	14/-14/6	13/-14/6
Main cobbles for kitcheners	16/-17/6	14/6-15/	13/6-14/6
Main breeze	14/9-15/6	13/6-14/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The increase of 2s. 6d. a ton in coal prices to meet increased wages, forms the chief item of interest in trade circles this week. The matter will materially affect the consumer. Half-a-crown will more than meet the extra cost owing to the advance in wages, but people in the trade contend that since the 4s. was granted on pit-head prices under the Coal Prices (Limitation) Act of 1915, costs of production have risen considerably, and the half-crown is probably intended to meet these as well. The consumer will, therefore, in all probability be called upon to pay the full amount. The merchant is relieved to learn that as far as household coal is concerned the advance is not retrospective. They are carrying practically no reserve stocks, every ton is going to factories and works of all descriptions, and merchants are gratified to learn that the Order to keep three weeks' output on hand as reserve stock applies only to London and district. Nuts are scarce, and there is also a lack of the better class slacks. Inferior lots are more plentiful, for the reason that they are not wanted so long as better stuff is available. Demand all round overlaps supply, and there is a long list of waiting orders for household fuel. The new pithead prices are:—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ..	24/6	22/	22/
Do. seconds deep	22/6	20/	20/
Do. best shallow	21/6	19/	19/
Do. seconds do.	20/6	18/	18/
Best hard	21/	18/6	18/6
Forge coal	18/6	16/	16/
Slack	13/6	11/6	11/6
Warwickshire:—			
House coal, best Ryder ..	21/6	19/	19/
Do. hand-picked			
cobs	20/6	18/	18/
Best hard spires	22/6	20/	20/
Forge (steam)	18/6	16/	16/
D.S. nuts (steam)	17/	14/6	14/6
Small (do.)	17/	14/6	14/6

IRON.

The quarterly meeting was somewhat uneventful, the chief business being the distribution of material according to Government orders. Since then, however, it has been announced that fuel of all descriptions is to be increased by 2s. 6d. a ton, which will upset the balance of the iron market, as it is anticipated that coke will go even higher

probably to 5s. a ton. There was a deputation of coal representatives at the Ministry of Munitions early this week, but nothing definite has been decided. In all probability an application will shortly be made for a readjustment of iron prices. The scarcity of certain makes of pig iron is becoming accentuated, and the demands of customers cannot be met by a long way. A fair amount of basic iron is now being produced in this district, and is allotted to customers without any responsibility on the part of the makers. Puddled iron is not forthcoming in anything like the required quantities. Some of it is going into bars, at £12 10s. to £12 15s. a ton, and a large proportion is wanted for billets, which sell for £13 10s. Despite the large output of bar iron the mills have heavy arrears to grapple with against old contracts, and the material is mostly used for war purposes, directly or indirectly. Full authorised prices prevail, and civil customers who succeed in getting merchant bars are willing to pay £14 10s. delivered. The dearth of billets is felt by makers of steel rounds, squares and flats. There is also less export demand, not because the stuff is not wanted, but because of the difficulty of getting it. The basis for three-eighths iron rounds is £16 10s., and for steel rounds £18 10s. The extras for thinner gauges are arranged according to circumstances, and especially the date of delivery. Copper sheets are now £150 a ton. Large quantities are absorbed in aeroplane construction, shell cases, and other war appurtenances. Makers of black sheets have not taken kindly to the controlled price of £17, which they consider inadequate in view of the high cost of the steel they use. A more active demand is experienced on Government account, but up to now no further mills have been re-started, and the bulk of the galvanising plant is idle. Steel output is growing steadily, but more and more is wanted, and the strain on the productive capacity is tremendous.

Forest of Dean.

Lydney.

COAL.

If anything, the house coal market has gained further strength since last writing and the demand continues exceedingly keen, all the collieries having considerable arrears of deliveries to make up—an impossibility with the colder season immediately in front of us. A continued shortage of supplies of all steam qualities is reported, and the position on the whole is similar to that of the last few weeks.

Prices at pithead.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Block	26/6	24/	21/6
Forest	25/6	23/	20/6
Rubble	25/9	23/3	20/9
Nuts	24/	21/6	19/
Rough slack	16/	13/6	12/6
Steam coal —			
Large	22/6-23/6	20/ -21/	18/ -19/
Small	18/6-19/	16/ -16/6	16/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

Plymouth.

COAL.

Messrs. W. Wade and Son report that the position as regards the supplies of coal to the No. 13 area has become still more serious. The attention of the Controller of Coal Mines is being constantly appealed to by the West of England Coal Traders' Association, as well as through members of Parliament for the south-western constituencies. The oppressive regulations of the recent Coal Transport Orders have caused the utmost confusion in the wholesale and retail coal trade throughout this district, and it is generally felt that these orders will have to be withdrawn in order to save the community from being paralysed by the entire breakdown in the wholesale supply and retail distribution of house coal. The large vendors of coal who are the chief owners of coal wagons state plainly that they cannot afford to send their wagons to the No. 13 area—which is situated at such a great distance from the coal fields—at the regulated rate of 1s. 10½d. per ton, and that unless they are allowed a much higher rate for the wagons or a more liberal profit, this district will run short of most of its coal. The Controller could meet this difficulty by treating the west as he has for months treated London, namely, by supplying immediately a large quantity of emergency house coal. It is pointed out that the London district has been very liberally supplied all along through the great quantities of excellent burning coals from Yorkshire and the Midland coal fields. The real remedy, however, is the withdrawal of the restraint of trade regulations of the Coal Transport Orders as far as regards the No. 13 area, which area is of the first importance from a naval and military point of view, and, therefore, for the Defence of the Realm.

THE TIN-PLATE TRADE.

Liverpool.

The tone of the market is firm, the official maximum of 30s. basis net, f.o.t. at works, being well maintained. A somewhat better supply of steel is being allotted for tinplate purposes, but this is not likely to relieve the position to any extent worth mentioning, as works are all very full of class A orders for the next two or three months, at least, on Government and Allied account. There is the greatest difficulty in obtaining licences, so that the export trade, outside war requirements, is practically at a standstill. Merchant associations are now being formed in all the principal centres in the country, and these will work together to watch over the interests of the iron, steel, tin-plate, and hardware merchant and factor, both during and after the war.

The Ceramic Society.—On the occasion of the recent Glasgow meeting of the Refractory Materials Section of the Ceramic Society, the council appointed two sub-committees (with power to co-opt additional members) to prepare reports respectively on (1) standardisation of methods of testing, and (2) refractories for spelter furnaces. It is anticipated that the former will be ready for the spring meeting in Sheffield, and the latter for the subsequent autumn meeting at Cardiff.

THE WELSH COAL AND IRON TRADES.

THURSDAY, OCTOBER 18.

Monmouthshire, South Wales, &c.

Newport.

COAL.

There has been a considerable improvement in the arrival of tonnage of late and the shipment of coal has consequently been expedited. The collieries have been working more steadily and stocks of coal have been slightly reduced. But there is still a great deal of small in stock ready for favourable outlets. The Coal Controller has consented to an all-round increase of 2s. 6d. per ton in prices to cover the increased wage allowed to the miners. This of course was foreseen, but there were some complications which tended to make the market uneasy and sales were considerably interfered with. There is still a very large demand for house and gas coals.

Prices f.o.b. cash 30 days.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Black Vein large...	—	30/	38/ -40/
Western-valleys, ordin'y	32/6	29/	37/ -38/
Best Eastern-valleys ...	31/6	29/	36/ -37/
Secondary do.	31/6	28/	32/ -34/
Best small coals	30/6	21/6	25/ 26/
Secondary do.	24/	20/	23/ -24/
Inferior do.	22/6	18/	20/ -23/
Screenings	25/6	23/	25/ -26/
Through coals	29/6	27/	26/ -27/
Best washed nuts.....	32/6	30/	30/ -31/
Other sorts:—			
Best house coal, at pit ..	35/6	33/	24/ -26/6
Secondary coal, do. ...	33/3	30/9	22/ -24/
Patent fuel	35/	32/6	40/ -43/6
Furnace coke.....	47/6	47/6	50/ -52/6
Foundry coke	47/6	47/6	57/6-60/

IRON.

All the iron and steel works are fully employed, chiefly on Government account, and prices are purely nominal. There is now much more activity in the tin-plate trade, consequent upon the Government Controller allowing more steel for use in the manufacture of plates. Orders are plentiful, and the mills are now well occupied. Pitwood is scarce, and the price keeps up to 75s. for best fir.

Cardiff.

COAL.

Probably never since the outbreak of war has the trade of this district been in so unsettled a state as it is to-day, with the result that, outside contractual obligations, business is almost at a standstill. This is due to a variety of causes, all arising out of "control." In the first place, the miners were granted an advance in wages out of all proportion with the increased cost of living, and this was done without consultation with the colliery owners, who have to pay the piper. Then the Controller considered it only fair and just that the increased remuneration to the men should be placed upon the consumer. Again the owners were not consulted, and an advance on the scheduled rates of 2s. 6d. per ton was conceded, with one very vital and important exception, so far as South Wales is concerned. That was that French and Italian consumers were not to be subject to the extra increase, but were to be supplied at the old limitation rates. Here, again, the coal owners have been badly hit, for the great bulk of the trade with these countries is done in South Wales, and the concession offered with one hand is taken away by the other. As a matter of fact, 60 per cent. of the total shipments of coal to France and Italy are from South Wales ports, 30 per cent. from the Tyne district, and 10 per cent. from other ports. For many months past, owing to the shortage of tonnage, very little business has been done with neutral countries, and the great proportion of the industry has been carried out on British and Allied Governments account. A plea for discrimination between South Wales and other centres has been rejected, and the position now stands that local producers are in the position of having to pay a very high increase in wages, without having an opportunity of recouping even a small proportion of the outlay. Throughout the war, the colliery owners have endeavoured to carry out the various Orders and regulations with the utmost loyalty, but the new conditions are so severe and so manifestly unfair that their loyalty is being strained to the utmost degree. In many instances, not only are the collieries faced with a direct loss, but they are being deprived of the incentive to develop their properties, and there is not even enough margin to provide an economic maintenance. To add to the many anxieties which the local owners have to bear, a report has been current this week that the Furness, Withy Company were negotiating with the French Committee to supply consumers in France with a million tons per month, which would mean the creation of a vast monopoly to the detriment of the many exporters who have been carrying on their businesses for years. The rumour was promptly denied by Lord Furness, who disclaimed all knowledge of the proposal, but the matter was looked upon as too serious to be neglected, and a private meeting of the Chamber of Commerce was held on Tuesday to discuss the position. No definite information was forthcoming, but it was agreed that the strongest possible protest should be made against any such scheme, and any suggestion to limit the existing area of operations will be fought with the utmost tenacity. It may be that the position has been created through a misunderstanding and lack of knowledge, and here again comes the importance of having a local representative on the Coal Control Committee. The trade of South Wales is different from that of any other district, yet there is no separate representation on the body which controls the destinies of the industry. Whatever may be the ultimate result, there is no doubt that the greatest dissatisfaction exist with regard to present methods, and the sooner a change takes place the better it will be for all concerned. Chartering has been a little more active this week, but last week's fixtures were far below ordinary requirements. Admiralty shipments are well maintained, but the dearth of tonnage continues and stoppages are prevalent throughout the coalfield. In some districts thousands of men are only working two or three days a week; in several instances collieries were idle all last week. For best descriptions for Government and Allied purposes, facilities are available, but for the ordinary and inferior grades there is little demand and the many miles of sidings are chock-a-block with wagons which cannot be liberated until tonnage conditions are improved. Household and bituminous coals generally are in good demand and

there is a pronounced scarcity in some districts. Bituminous and coke are plentiful. The pitwood market remains very active with a shortage in supplies, and French fir is in demand at 100s. per ton.

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s 6d. allowed by Controller, except in shipments to France and Italy.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	37/ -39/
Ordinary	30/	30/	36/ -37/
Steam smalls No. 1	21/6	23/	26/ -27/
Do. 2	21/		
Do. 3	20/6	21/6	25/ -26/
Do. 4	20/		
Do. 5	19/6	20/	22/ -23/
Do. 6	19/		
Do. 7	18/6	18/	20/ -22/
Do. 8	18/		
Best dry coals	30/	30/	37/ -39/
Ordinary drys	28/6	28/6	34/ -36/
Best washed nuts	30/	30/	33/ -35/
Seconds	28/6	28/6	32/ -33/
Best washed peas.....	27/6	27/6	31/ -32/
Seconds	26/6	26/6	30/ -31/
Monmouthshire—			
Black Veins	30/	30/	38/ -40/
Western-valleys	29/	29/	37/ -38/
Eastern-valleys	29/	29/	35/ -36/
Inferior do.	28/	28/	34/ -35/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	24/6-25/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	36/ -38/
Small	26/	26/	28/ -30/
No. 2 Rhondda—			
Large	27/	27/	30/ -32/
Through-and-through	22/ -23/6	25/	26/ -27/
Small	17/ -19/	20/	20/ -22/
Best patent fuel	30/	30/	43/ -45/
Seconds	30/	30/	40/ -43/
Special foundry coke	47/6	47/6	62/6-65/
Ordinary do.	47/6	47/6	57/6-62/6
Furnace coke	47/6	47/6	50/ -52/6
Pitwood (ex-ship)	75/	70/ -72/6	43/ -45/

* Nominal.

IRON.

The tinplate trade remains steady and firm, and permits are difficult to obtain. A report is current that the authorities have agreed to allocate a further 2,000 tons per week of steel bars for tinplate manufacture, and this ought to relieve the pressure to some extent. Order books are well filled, and makers are unwilling to undertake further commitments, especially as the cost of production is advancing continually. The increase of 2s. 6d. per ton in the cost of coal is made retrospective to the 17th of September, and it is contended that a corresponding increase in the limitation price should also be allowed. Last week's shipments were only 12,806 boxes as compared with 30,782 boxes in the previous six days. Receipts from works were 12,772 boxes, against 11,436 in the previous week, leaving 58,249 boxes in stock in the docks warehouses and vans as compared with 134,168 boxes a year ago. In the general iron and steel trade outputs are being increased week by week owing to the many extensions and alterations which are taking place, but the demands for munition purposes continue unabated, and there is practically no surplus for the ordinary commercial consumer. There is a heavy demand for rails, especially light sections, and the mills are all working at high pressure. In the galvanised sheet trade makers continue to be chiefly occupied in turning out black plate and trench sheets for Government purposes. Spelter works are busy, and the price remains steady at £51 per ton. There is no alteration in the pig iron and iron ore market, and conditions are reported to be satisfactory. Scrap metals are in strong request at maximum rates.

Llanelli.

COAL.

There is little if any change to report as to the local market. Tonnage arrivals are still below the market requirements, and many collieries are experiencing idle days. Anthracite large kinds maintain their steady tone,

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite ..	30/	30/	31/6-32/6
Seconds	29/	29/	29/ -30/6
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-41/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/ -31/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	22/ -23/
Rubbly culm.....	18/	13/	14/6-15/
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/ - 6/6
Steam:—			
Best large steam	30/	30/	34/6-36/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Small	19/	19/	—
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Small.....	24/	24/	—
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

The lower grades are not so firm. The machine-made of the lower large sorts are unchanged, and are in particular difficult to secure. Cullings are very easy. Large steams are not so firm, and smalls moving very slowly and stocks of manufacturing coals are in good demand, and house coals are also well enquired for. The Coal Controller has advised an increase of 2s. 6d. per ton on all coals for inland consumption. The increase on house coals dates from the 15th inst., but on other qualities from September 17. The prices in list are subject to an increase of 2s. 6d. per ton to meet the war wage increase, except in the case of shipments to France and Italy, and coal for the manufacture of patent fuel for shipment thereto.

Swansea.

COAL.

There was a good attendance on 'Change this morning, and the new Order of the Coal Controller advancing prices by 2s. 6d. per ton except for France and Italy, was the chief topic. The anthracite coal market was without material alteration; all classes continued busy, with the exception of cullm and duff. Large was practically unobtainable, and machine-made sizes were very difficult to secure. The steam coal market was quiet.

THE LONDON COAL TRADE.

THURSDAY, OCTOBER 18.

The London coal trade still continues exceedingly busy, but the recent heavy rains have made the cartage and delivery somewhat slow. The settlement of the price question on Monday's market created much discussion. The decision to advance all house coals 2s. 6d. per ton from October 15 came as a great surprise to the bulk of the buyers, and in many cases was severely criticised. Opinions had varied considerably as to what the amount would be, and for some time the probable advance had been looked upon with much anxiety. It was, however, satisfactory to find that the advance on house coals was not made retrospective, especially in view of the large quantity that had been sold in small quantities in the poorer neighbourhoods, and the impossibility of tracing in these smaller deliveries who really had the coal. The official announcement indicates that steam coal prices will date back to September 17, but here again a serious difficulty arises, as a very large quantity of hard steam coal, and especially hard steam cobbles, has been used as house and kitchen coal. Many of the orders from the general public have been on the books of the merchants for a considerable time, and householders now claim that the delay in delivery arises from no fault of theirs, and naturally they resent very much being mulcted in the recent advance of 2s. 6d. per ton. Old customers are especially calling out at what they deem the unfairness of this proceeding. Amongst the standing orders of the Coal Controller is the decision that a reserve stock must be kept in every wharf and depot in London, and this reserve stock must be completed by November 30 next. Merchants are to declare their reserve stock. Special supplies of about 25,000 tons of coal are being sent to South London depots, and the Controller requires that 25 per cent. of the coal received each week is to be put into stock at the wharf or depot. Exporters and shippers also are up against a big problem when trying to pass on the increase on all their foreign trade, particularly where contracts have been entered into with neutral countries. Notwithstanding the higher prices, the demand continues firm and strong. Steam coals are very scarce, but slacks are moving freely. Colliery representatives are declining all orders except for contract coals, and both the seaborne and the railborne markets have had very little open sale or free coal for disposal. On Monday's market 22 vessels were reported as arriving in the River Thames, and 14 for Wednesday. The freight to London from the Humber is reported to be strong at 20s. per ton, but very few vessels are available. The attendance on market has not been very good lately, but it is not to be wondered at when the difficulties of travel are taken into account, and the small quantity offering for open sale.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, OCTOBER 12.—There was no alteration in the seaborne house coal market to-day. The demand, owing to the unsettled weather, continued good, but no cargoes on offer. Cargoes, 20.

MONDAY, OCTOBER 15.—The weather continuing cold, the enquiry for seaborne house coal was good, but the supplies coming forward are not equal to the demand, no sales being reported. Cargoes, 22.

WEDNESDAY, OCTOBER 17.—The seaborne house coal market was somewhat quiet to-day, with no sales reported. Cargoes, 14.

THE BY-PRODUCTS TRADE.

Tar Products.—A very good feeling pervades the markets for products in which unrestricted operations are still possible. London pitch remains at about 48s. per ton f.o.b., but the provincial position has undergone further improvement as the result of better shipping facilities. Some good lots have gone to France from the north-east coast at about 27s. per ton f.o.b., and this has had a hardening effect upon quotations for home consumption. Difficulty is now experienced in buying pitch at 20s., and the position generally is considerably better than was the case a few weeks back. At the same time, it must be remembered that stocks are still accumulating on balance. The strength of solvent naphtha is maintained, and up to 3s. 6d. is obtainable for spot, and from 3s. to 3s. 3d. per gallon for forward delivery. Naphthalenes, both crude and refined, are much sought after at improving prices. Aniline oil is dull, but cresylic acid is very firm at 2s. 5d. to 2s. 7d. per gallon. Beyond Government requirements, there is little doing in creosote and carbolic acid, crude and crystals, and prices are nominal. Toluol and benzol are in like condition. Average quotations are as follow:—Coal tar, 25s. to 30s. Pitch, east coast, 20s. to 21s.; west coast, 19s. 6d. to 20s. 6d.; Liverpool, 19s. 6d. Benzol, 90 per cent., north, 10½d. to 11½d.; naked, north, 1s. 3d. to 1s. 4d. Coal tar crude naphtha, in bulk, 4½d. Solvent naphtha, naked, north, 1s. 5d. to 1s. 7d. Heavy naphtha, north, 1s. 5d. to 1s. 7d. Carbolic acid, 33½d. to 4½d. Carbolic acid, west coasts, 3s. 4d., naked. Naphthalene, 3s. bags included. Anthracene, "A" per unit; "B" quality, 2d. to 2½d.

Sulphate of Ammonia.—Home agricultural and other requirements are absorbing the greater part of the make, and there is very little available for export, even if licences could be obtained. Production is increasing, and plants generally are working satisfactorily, and it is just possible that a few lots may be allowed for export at the end of the month. There is a good foreign demand at advancing prices. Recent export business has been done on the basis of £24 to £25 per ton f.o.b. During September, 4,691 tons of sulphate were exported, valued at £93,074. The control of supplies has now been taken over by the Distribution Committee of the Food Production Department, and all orders, unless for delivery within a 10-mile radius of makers' works, must be placed through that department, at 72, Victoria-street, London, S.W. 1.

SOUTH WALES MINING TIMBER TRADE.

Scarcity of Foreign Wood Pronounced.

The scarcity of foreign mining timber has been most pronounced, and for the week ending October 12 the total quantity imported into South Wales ports was only 840 loads, consigned to Messrs. A. Bromage and Company, Cardiff. This is the smallest quantity of pitwood received in any week since the outbreak of war, and the scarcity of this particular class of timber has resulted in rising prices, quotations being strongly held at 75s. per ton ex ship, with the prospect of a substantial advance if better supplies do not come to hand within the next few days.

Home-Grown Timber Deliveries.

The quantity of foreign wood taken last month was below the amount sanctioned by the Controller of Import Restrictions, and there is every indication that the full quantity allowed to be imported this month will not be taken up. Pitwood importers have found it extremely difficult, if not impossible, to secure the tonnage they require for carrying the wood to South Wales, as larger-sized vessels have deserted the near French trade with South Wales, and are engaging themselves on longer-distanced voyages. This has made the existing shortage of tonnage much more pronounced, with the result that the imports during the past few days have been practically negligible. Imports of Irish wood have been fair, and supplies have gone quickly into consumption at higher prices. Collieries have had to rely more and more upon home-grown supplies, and the exploitation of the woodland area in South Wales and the West of England continues at a great pace, notwithstanding the great difficulty met with owing to the scarcity of labour. The Monmouthshire and South Wales Coal Owners' Pitwood Association Limited, which was formed some months ago to purchase, cut, and deliver home-grown wood for delivery to its colliery-owning members, has succeeded in increasing its weekly deliveries to over 2,000 tons per week. This is exceptionally good, having regard to the difficulties met with in connection with both transport and labour, for few men over military age can be secured for the arduous labour of tree felling. Importers of foreign pitwood have in a few notable cases transferred their attention to the home-grown trade. Messrs. Vyvyan Kelly and Company are working large estates down Cornwall; Messrs. Evans and Reid are exploiting Wooda Bay, Somerset; while Messrs. F. R. Howe and Company are completing the cutting down of large woods purchased in Somersetshire some months ago from the Marquis of Bath.

Enterprise outside of the Coal Owners' Pitwood Association is busy, and the hope is entertained that, providing sufficient labour is attracted (and retained), the South Wales collieries will be totally independent of foreign supplies. The exploitation of the forests and woods of South Wales and the West of England is going on apace, and it is stated that if the ratio of cutting is maintained there will be very few trees of importance standing in another 10 months. Having regard to the fact that little or no attempt is being made to re-plant, this is a matter of regret.

Fixed Prices for Pitwood.

It is understood that efforts will shortly be made to fix a maximum selling price on foreign and home pitwood. Much difficulty will be experienced in any attempt to schedule the prices of foreign timber, and will involve an agreement on the part of the French authorities to limit the delivered price of wood at the French ports. For the collieries under the régime of State control are expected to be run at a profit, even though colliery costs are mounting to higher and higher levels. Next to labour, the heaviest item of cost in coal production is that of mining timber, and at 75s. per ton the expenses are rising, while the cost of coal to our Allies remains unchanged.

MINERS' WAR BONUS.

The Coal Controller on Wednesday discussed with a sub-committee of the Miners' Federation executive several outstanding points in the new war wage agreement. An important question was with respect to the amount of bonus to be paid in those districts where the working week is five days, and also in districts where 11 days a fortnight are worked. It was agreed that wherever the custom of a district is to work only five days, the war wage bonus for a full week, that is, six days' payment at 1s. 6d., shall be paid, but in the event of a workman being absent from avoidable causes on one of the working days, only four days' wage war bonus shall be paid. In certain cases where workmen have worked overtime under the emergency clause of the Mines (Eight Hours) Act in the repair of roads or falls of roof, an additional payment shall be made.

Miners and Industrial Trade Unionism.—A further step towards the complete industrial organisation of the coal mining industry was taken on Tuesday, when the executive of the Miners' Federation of Great Britain, meeting in London, received deputations from the National Union of Cokemen and from the North of England Colliery Mechanics' Association, who asked for affiliation as branches of the Miners' Federation. The executive agreed to consider the applications and give a reply to both unions at the earliest possible moment. A sub-committee from the executive of the Miners' Federation met the Minister of Munitions (Mr. Winston Churchill) and the Coal Controller (Mr. Guy Calthrop) on Wednesday for the purpose of making an arrangement as to persons working in ironstone mines and on by-product plants who are under the Ministry of Munitions. The two departments are reported to be in full agreement regarding the payment of the increased war wage to these workmen, and the matter is likely to be satisfactorily arranged within a short time.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—October 16.

Petroleum (Production) Bill.

On the motion for the second reading of this Bill, which makes provision with respect to the searching and boring for and the getting of petroleum in the United Kingdom, and for purposes connected therewith,

Mr. WATSON RUTHERFORD congratulated the Government on the step which they had taken. The Bill was a perfectly simple one, and did not really need explanation. It deserved the support of all people who were interested in the development of the petroleum industry. It was well known that all over the world there were difficulties in the way of getting petroleum owing to complications resulting from conditions of ownership and other causes. These difficulties the Bill would sweep away in the United Kingdom.

Mr. CHANCELLOR approved the Bill in principle, but asked why should payments be made to men who had only stood in the way of the development of a most necessary industry? If the petroleum which might be found in this country belonged to the nation, there was neither justice nor reason in paying a royalty in respect of it to the owners of the land in which it might be discovered.

Mr. LONG said this was not the occasion to discuss the whole question of land ownership. What the authorities were concerned with was that if there were oil to be obtained in this country—at present they did not know that there was—it should be obtained as expeditiously and cheaply as possible. The Bill would vest in the Crown the right and power to explore for oil and to fix a royalty to be paid. He submitted that this was the only way by which to secure two things which were essential—expedition and economy in administration. Outside this House the Bill had been generally discussed, but there had been practically no criticism of it, and therefore he thought it unnecessary to supplement the explanation which he gave when he asked leave to introduce the measure beyond saying that during the war the Government would adopt the method of proceeding in this matter under the Defence of the Realm Regulations, and that afterwards they would proceed as might be necessary by Provisional Orders or Private Bills. He hoped the House would agree to the second reading of the Bill without delay. The experience of other countries taught that the moment the idea was started that anything like petroleum could be found the spirit of enterprise and competition and speculation was aroused. In other countries immense sums spent in the search for oil had been wasted. The object of the Government was to prevent anything of that kind happening here.

Mr. DUNDAS WHITE supported the Bill; Mr. TENNANT asked whether the Bill was to continue indefinitely or only during the war; Capt. BARNETT and Mr. DENNIS also took part in the discussion.

Capt. PRETYMAN, replying on behalf of the Government, said the Bill would be permanent. Its principle was just as necessary, whether the country was at war or at peace. The main object of the Bill was to avoid the waste of natural resources, whether they belonged to private individuals or to the State. There had been no legislation up to now in regard to petroleum in this country; and it was felt that if the matter was to be dealt with in an economical way it must be dealt with under a single control. The Bill had been thought out on businesslike lines. It only proposed to interfere with rights of land owners in so far as this was necessary in the national interest, and it did not give any ground for the statement that the Bill was any precedent for spoliation or for taking away rights which belonged to anybody else under pretext of war legislation. Certain eminent geologists in this country and the United States held that the local conditions in some parts of the United Kingdom were such as to justify the spending of money on experiments, and it was impossible to exaggerate the value that the finding of oil here at home would be to us at the present crisis.

The Bill was read a second time.

October 18.

The Petroleum Executive.

Mr. LONG, in reply to Maj. D. DAVIES, said that in order to co-ordinate the work of the various Government departments interested in petroleum, a small Executive Department had been formed, known as the Petroleum Executive. The detailed control of petrol, in so far as the Service was concerned, was in the hands of each Department, and arrangements had been made for the staff of his executive to co-ordinate the control. The detailed control of civil supplies was handled by the Petrol Control Department working under the Board of Trade. The importation of petroleum products was dealt with by the Pool Board, consisting of members of the importing companies, with a chairman nominated by the Government. The home production of petroleum products was entrusted to the Ministry of Munitions. Besides the Executive Committee and the Pool Board, there was only one committee dealing with matters in connection with petroleum. It would not be in accordance with the national interests to state precisely what steps were being taken to build up a reserve of petroleum products in this country, but he could assure the House that the matter was receiving constant attention.

Coal Miners' Wages.

In reply to Mr. G. LAMBERT, Mr. WARDLE said that, owing to the divergencies between the earnings of coal miners in the different districts and in the different grades of employment, it was not possible to give any really representative figure of the weekly earnings of coal miners. The wage rates of hewers had been increased since the outbreak of war by percentages varying from 27.2 to 46.7 before the recent war wage was granted.

The agreement between German and Dutch negotiators about the supply of German coal to Holland, has been ratified by the German Government. Exports commenced on Tuesday last.

Imports and Exports of Coal Products.—In September the imports of coal products, not dyestuffs, amounted to 1,709 cwt., of the value of £25,693, compared with 3,914 cwt., value £48,321, a year ago. The total imports in the eight months just ended was 25,577 cwt., value £431,915, compared with 26,064 cwt., value £227,668, in the corresponding period of last year. The value of coal products, not dyestuffs, exported during September was £319,337, thus bringing the value of such exports during the eight months to £2,368,772.

North of England Institute of Mining and Mechanical Engineers.

Mr. JOHN SIMPSON presided over the usual bi-monthly meeting of the members of the North of England Institute of Mining and Mechanical Engineers, held in the Lecture Theatre of the Wood Memorial Hall, Westgate-road, Newcastle-on-Tyne, on Saturday afternoon last.

New Members.

The following gentlemen were admitted into the institute:—Honorary member: Mr. H. Walker, H.M. divisional inspector of mines, 2, Kinnear-road, Edinburgh. Member: Mr. S. Nakagawa, mining engineer, c/o Bureau of Mines, Department of Agriculture and Commerce, Kyobashi-Ku, Tokio, Japan. Associates: Mr. W. Cummings, mine examiner, 2, Dene View, Burnopfield, co. Durham; and Mr. R. W. Murray, miner, 8, Lintz Colliery, Burnopfield. Student: Mr. J. Taggart, land and mine surveyor, View House, Denton Burn, Scotswood, Northumberland.

The Flow of Water in Siphons.

Mr. MARK HALLIDAY's paper on "The Flow of Water in Siphons" was read.

An analysis of the flow of water in siphons, simple and compound, suggested itself to the author after the perusal of the discussion of Mr. George R. Nicholson's paper on "The Horsley and Nicholson Automatic Compound Siphon."

Consider first the simple siphon shown diagrammatically in fig. 1, which is arranged to siphon water from the tank A over the point B to the tank C.

Let H_1 = static head in tank A above datum; H_2 = static head at point B above datum; H_3 = static head in tank C above datum; p_1 = pressure in pipe at entrance A; p_2 = pressure in pipe at point B; p_3 = pressure in pipe at exit C; v_1 = velocity of water at entrance to pipe at A; v_2 = velocity of water in pipe at point B; v_3 = velocity of water in pipe at exit C; then, by Bernoulli's theorem—

$$\left. \begin{aligned} H_1 + \frac{p_1}{62.4} + \frac{v_1^2}{2g} \\ = H_2 + \frac{p_2}{62.4} + \frac{v_2^2}{2g} + \text{friction head from A to B} \\ = H_3 + \frac{p_3}{62.4} + \frac{v_3^2}{2g} + \text{friction head from A to C} \end{aligned} \right\} (1)$$

The friction head in feet $\frac{4flv^2}{2gd}$ for round pipes. (2)

where f = coefficient of friction; l = length of pipe, in feet; v = velocity of water, in feet per second, and d = diameter of pipe, in feet.

Transposing equation (1) gives—

$$H_2 - H_1 = \frac{p_1}{62.4} + \frac{v_1^2}{2g} - \frac{p_2}{62.4} - \frac{v_2^2}{2g} - \frac{4fl_1v_1^2}{2gd} \quad (3)$$

l_1 being the length of pipe from A to B, the loss at entry to the pipe is neglected.

Also, if the pipes are of equal diameter throughout, $v_1 = v_2$.

In order to obtain the maximum velocity at point B, $p_2 = 0$.

$$\text{Then } H_2 - H_1 = \frac{p_1}{62.4} - \frac{4fl_1v_1^2}{2gd} \quad (4)$$

but $\frac{p_1}{62.4}$ = head of water, in feet, equivalent to atmospheric pressure, or, say, 34 ft.

$$\text{Then } H_2 - H_1 = 34 - \frac{4fl_1v_1^2}{2gd} \quad (5)$$

$$\text{Let } H_2 - H_1 = h_2 \quad (6)$$

$$\text{Then } v_2 = \sqrt{\frac{2gd(34 - h_2)}{4fl_1}} \quad (7)$$

$$\text{Also let } H_1 - H_3 = h_3 \quad (8)$$

$$\frac{p_1}{62.4} = \frac{p_3}{62.4} = 34 \text{ ft.} \quad (9)$$

And $v_1 = v_3$ if the pipes are of equal diameter.

From equation (1)—

$$H_1 = H_3 + \frac{4fl_2v_3^2}{2gd} \quad (10)$$

l_2 being the length of pipe from A to C.

$$\therefore v_3 = \sqrt{\frac{2gdh_3}{4fl_2}} \quad (11)$$

$$v_3 = v_2 \quad (12)$$

$$\text{Then } \frac{2gdh_3}{4fl_2} = \frac{2gd(34 - h_2)}{4fl_1} \quad (13)$$

$$\text{or } \frac{h_3}{l_2} = \frac{34 - h_2}{l_1} \quad (14)$$

Unless this relationship holds, the siphon will not work continuously without a regulating valve. It will be noted that h_2 equally as much as h_3 governs the discharge. If h_3 is excessive, then v_2 tends to become larger than v_3 , and cavitation in the pipes will result.

This explains the statement made by so many that some siphons work better when the valve at the delivery end is partly closed. This must necessarily be the case, as the valve must be regulated until $(v_3 \times \text{area at C}) = (v_2 \times \text{area at B})$.

The same reasoning when applied to the Nicholson compound siphon results in the following deductions:

Fig. 2 shows the diagrammatic arrangement of the siphon; H_2 , $\frac{p_2}{62.4}$, and v_2 are the static pressure, velocity and energies per pound of water respectively at the air inlet N of the compound siphon. Then if the air inlet and trap N, S, N, is fixed in a position according to the relationship in equation (14), viz., such that $\frac{h_3}{l_2} = \frac{34 - h_2}{l_1}$ (14), the compound siphon will discharge as much water as any simple siphon.

It has been assumed throughout that f , the coefficient of friction, is the same for the whole length of pipe considered; also, in order to simplify the argument, that $p_2 = 0$.

For a maximum discharge, this would be so, but the analysis would hold equally well if p_2 had a value of a few feet.

In that case the figure could be inserted to slightly modify the result in equation (14).

Discussion.

Mr. G. R. NICHOLSON, whose paper had inspired Mr. Halliday's analysis, remarked that he wished Mr. Halliday had enlarged on the question of cavitation. Whenever a simple siphon was worked on a long length of pipe line, considerable friction occurred, and when an extensive length of pipe dropped a considerable depth below the level of the water at the intake, by the law of gravitation the velocity at the outlet would be greater than the velocity at the intake and cavitation occurred at the highest point of the siphon, i.e., a partial vacuum was formed by the increased speed of the falling or pulling leg being greater than the speed on the intake side. After a time, cavitation extended to a point at which the column of water in the siphon was broken in two parts, one column dropping down each leg of the siphon, which became empty. Many siphons worked better with a cock at the outlet. This required careful adjustment and close attention to get the best results. In the Nicholson automatic compound siphon, cavitation was impossible, and a regulating cock was not required. It was self-contained and self-

FIG. 1.—SINGLE SIPHON SHOWN DIAGRAMMATICALLY.

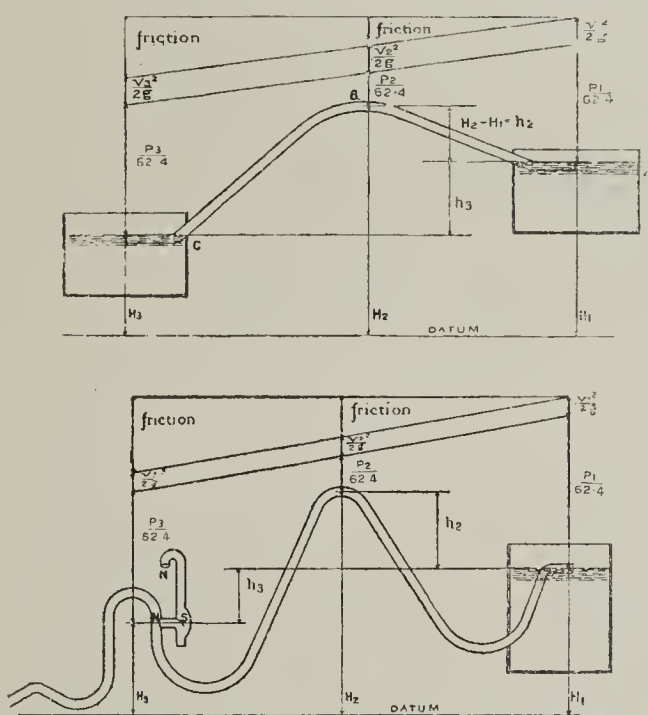


FIG. 2.—AMENDED DIAGRAMMATIC ARRANGEMENT OF SIPHON.

adjusting in every circumstance that might arise. It had no mechanical action, being entirely atmospherically controlled.

Mr. HALLIDAY stated that the whole analysis pointed to the fact that, unless the relationship in equation (14) held good, they must have a throttle outlet. If that were provided, and the velocity at the outlet equalled the velocity at the top of the pipe, cavitation would not take place. No doubt there were in that neighbourhood hundreds of siphons working under these conditions without ever breaking down. He had occasion to put in a siphon recently delivering quite 3,000 gals. per minute. It was a simple siphon, with a lift of a few feet. It had been working nine or 10 months now, and had never stopped once. He held that cavitation could occur with the Nicholson siphon.

Mr. NICHOLSON: Not to the extent of breaking up.

Mr. HALLIDAY added that, if the air trap were fixed in a certain position given by equation (14), the Nicholson siphon would deliver as much water as any other siphon. In the previous discussion on Mr. Nicholson's paper, that had been disputed, but it was so.

Mr. NICHOLSON said that a short time ago he had an enquiry from a Lancashire colliery where there was a siphon working. To make sure that it was perfectly tight, they had taken the pipes off and re-laid them three times. They put a valve on the outlet and said that, when it was left at full bore—it had an excessively long leg—it simply broke up after three or four hours' working. After he put a cock on and readjusted it, however, it sometimes worked for several days.

Mr. MARK FORD remarked that there was a good deal of bother with siphons in mines. He asked whether that was because mine water contained air and gas, and that the reduced pressure at the top of the siphon caused the air and gas to cling to the top of the pipe.

Mr. HALLIDAY replied that that might be the cause if air accumulated at the top of the siphon. When once that pressure reached a certain figure, the siphon would stop work. He assented to Mr. Ford's suggestion that the pressure of water would be reduced at that point, and that the tendency would be for the water to give up its air or gas at that point.

The PRESIDENT said he had seen gas gathering at the head of a siphon so that, if one opened the plug, one could have lit it. They had a lot of trouble many years ago with water containing so much gas. He dared say that that could be got rid of by regulating the outlet, so as to keep the gas out in a great measure.

Mr. FORD questioned whether there was anything to prevent the accumulation of gas at the top.

Mr. HALLIDAY agreed that, if they had considerable quantities of gas in solution in the water, when they

commenced siphoning the gas was naturally driven out at the highest point of the siphon. He asked Mr. Nicholson how he dealt with that problem.

Mr. NICHOLSON replied that there was a T-piece at the inlet end of his siphon, which stopped atmospheric air from getting into it. He quite admitted that gas in solution might be in the water, however. As the water passed through, this gas formed a small air lock in the first instance, and that air lock was carried through like a solid cartridge. The gas came off in small globules right through the pipe, but, if there was any flow of water at all, these globules did not adhere to the side, but were carried through. If the siphon were standing, these globules adhered and, after a time, rose to the top. The siphon would have to stand a very considerable time, however, before there was enough gas generated from the water to break up the siphon. In practice, he thought that the amount of gas generated in the pipe was very, very small.

Mr. HALLIDAY remarked that it might amount to 3 or 5 per cent.

No addition being forthcoming to the discussion, at previous meetings, on Mr. SIMON TATE's paper on "Safety Lamps"; Mr. F. C. LEE's paper on "Timber in Coal Mines"; Mr. F. W. JENKINS' paper on "Little Namaqualand"; or Mr. G. L. KERR's paper on "Colliery Managers," the meeting terminated.

CARRIAGE OF GOODS ON CANALS.

The chairman of the Canal Control Committee (Board of Trade) directs the attention of manufacturers, merchants, exporters, and importers to the desirability of their using the inland waterways of the country for the conveyance of all kinds of traffic which can be conveyed by water.

The principal object for which the Canal Control Committee has been appointed is to relieve the traffic on the railways by increasing the amount carried on canals, and in order that this object may be carried out three sub-committees have been appointed to render assistance, viz.: The Northern Sub-Committee, Aire and Calder Navigation Offices, Dock-street, Leeds; the Midland Sub-Committee, Norwich Union Chambers, Congreve-street, Birmingham; and the Southern Sub-Committee, Grand Junction Canal Company's Offices, 21, Surrey-street, Strand, London, W.C. 2. The canals have been placed under these three sub-committees in the following order:—

Northern Sub-Committee.—Leeds and Liverpool Canal; Aire and Calder Navigation; Bradford Canal; Sheffield and South Yorkshire Navigation; New Junction Canal; Calder and Hebble Navigation; Rochdale Canal; and Bridgewater Canals.

Midland Sub-Committee.—Trent Navigation; Weaver Navigation; Staffordshire and Worcester Canal; Birmingham Canals; Coventry Canal; Loughborough Navigation; Leicester Navigation; Shropshire Union Canals; Worcester and Birmingham Canal; Severn Navigation; Gloucester and Berkeley Ship Canal; and Erewash Canal.

Southern Sub-Committee.—Birmingham and Warwick Junction; Warwick and Birmingham Canal; Warwick and Napton Canal; Oxford Canal; Grand Junction Canal; and Regent's Canal.

The sub-committees are formed of representatives of the canal companies and of the carriers, with official representatives of the War Office, Ministry of Munitions, and the Railway Executive Committee, and each is presided over by an independent chairman. Since the beginning of the war both the canal companies and the carriers on the canals have lost a considerable number of their employees, but the Canal Control Committee is taking steps to provide crews for as large a number of boats as possible, and it is hoped that a greater number of boats capable of carrying traffic will be available at an early date. It is very desirable that all engaged in sending or receiving goods of any kind, but more especially those kinds which are suitable for canal transport, should realise the difficulties in connection with transport in this country, and that these difficulties are likely to increase owing to the requirements of the war. It is also desirable that all who have wharfage accommodation on, or who are in close proximity to, inland waterways, should not only use the existing facilities to a greater extent than heretofore, but should, when practicable, provide themselves with boats for canal traffic. Several firms at the present time have their own boats, but a number of boats are not in use, and it is possible that arrangements can be made to secure some of these idle boats for any firm who may be able to use them. (Information regarding these boats may be obtained on application to the sub-committees.) It is thought that most firms would be able to find one or two men in their own employment over military age, who, after a few weeks' training, would be able to work the firm's boat.

Canal carriers are now in a better position to deal with traffic than they were, and the Committee hope that the arrangements made will enable a greater amount of traffic to be dealt with by canals than has hitherto been the case. It is desired that these views and suggestions should be widely known among senders and receivers of heavy traffic, in order that every step may be taken to give relief to the railways by sending and receiving as often as may be possible their commodities by inland water. If there are any difficulties in the way, or if there are any suggestions to be made, the Committee will be glad to hear of them.

Communications should be addressed to the secretary, Mr. R. B. Dunwoody, at 7, Princes Street, Westminster, London, S.W. 1.

Certifying Surgeons Appointed.—The Chief Inspector of Factories notifies the following appointments as certifying surgeons under the Factory and Workshop Acts: Dr. J. Mathewson for Bromley (Kent) and Dr. C. Birch for Paignton (Devon). Vacancies are announced at Paignton (Devon) and Arnesby (Leicester).

MINING EMPLOYMENT STATISTICS.

The Board of Trade Labour Gazette reports that employment in coal mining during September was good, with a decrease of 1,920 (or 0.4 per cent.) in the number of workpeople employed at collieries making 16,133 (or 3.1 per cent.) on a year ago. Of the 536,308 workpeople included in the returns for September, 228,062 (or 42.5 per cent.) were employed at pits working 12 days during the fortnight to which the returns relate, while a further 175,044 (or 32.6 per cent.) were employed at pits working 11 but less than 12 days.

Districts.	Work-people employed in Sept. 1917.	Average No. of days worked per week by the collieries in fortnight ended				Inc. (+) or dec. (-) in Sept. 1917, on a	
		Sept. 1917.	Sept. 22, 1917.		Sept. 23, 1916.	Month ago.	Year ago.
			Aug. 25, 1917.	Days.			
<i>England & Wales.</i>							
Northumberland	36,181	5.17	5.42	5.31	+0.75	-0.14	
Durham	95,716	5.09	5.11	5.59	-0.02	-0.50	
Cumberland	5,761	5.67	5.68	5.57	-0.01	+0.10	
South Yorkshire	61,826	5.83	5.70	5.70	+0.13	+0.13	
West Yorkshire	23,672	5.84	5.65	5.77	+0.19	+0.07	
Lancs. & Cheshire	47,355	5.82	5.69	5.90	+0.13	-0.08	
Derbyshire	27,790	5.83	5.86	5.86	+0.02	+0.02	
Nott. & Leicester	32,501	5.65	5.68	5.69	-0.03	-0.04	
Staffordshire	27,508	5.71	5.58	5.86	+0.13	-0.15	
Warwick, Worcester and Salop	7,673	5.61	5.87	5.86	-0.26	-0.25	
Glo'ster & Somerset	5,688	5.88	5.37	5.95	+0.51	-0.07	
North Wales	9,716	5.89	5.94	6.00	-0.05	-0.11	
South Wales & Mon.	107,311	5.38	5.92	5.98	-0.54	-0.60	
Total	488,698	5.52	5.54	5.76	-0.02	-0.24	
<i>Scotland.</i>							
West Scotland	20,207	5.27	5.40	5.40	-0.13	-0.13	
The Lothians	1,753	5.77	5.39	5.51	+0.38	+0.26	
Fife	25,194	5.20	4.90	5.52	+0.30	-0.32	
Total	47,154	5.25	5.13	5.47	+0.12	-0.22	
Ireland	456	5.63	5.04	5.0	+0.59	+0.11	
Total, U.K.	536,308	5.50	5.50	5.74	—	-0.24	

† At the collieries included in the table.

The following table shows the numbers employed and the average number of days worked, distributed according to the principal kind of coal raised at pits at which the workpeople were engaged:—

Description of coal.	Work- people em- ployed in Sept. 1917.†	Average No. of days worked per week by the pits in fortnight ended				Inc. (+) or dec. (-) in Sept. 1917 on a	
		Sept.	Aug.	Sept.	Month	Year	
		1917.	1917.	1916.	ago.	ago.	
Days. Days. Days. Days. Days.							
Anthracite	5,793	5.39	5.79	5.99	-0.40	-0.60	
Coking	28,639	5.65	5.49	5.78	+0.16	-0.13	
Gas	37,358	4.81	4.92	5.58	-0.11	-0.77	
House	53,136	5.57	5.55	5.74	+0.02	-0.17	
Steam	191,189	5.55	5.59	5.80	-0.04	-0.25	
Mixed	220,173	5.53	5.51	5.69	+0.02	-0.16	

All descriptions .. 536,308 .. 5.50 .. 5.50 .. 5.74 .. -0.24
† At the collieries included in the table.

Iron Mining.—Employment continued very good at iron mines. Returns received for each of the three periods named below, relating to the same mines and open works in each case, show that 17,454 workpeople were employed at mines included in these returns in September 1917, an increase of nine compared with August, and of 2,072 (or 13.5 per cent.) compared with a year ago.

Districts.	Work-people employed in Sept. 1917.	Average No. of days worked per week by min- in fortnight ended				Inc. (+) or dec. (-) in Sept. 1917 on a	
		Sept. 22, 1917.	Aug. 25, 1917.	Sept. 23, 1916.			
						Month ago.	Year ago.
		Days. Days. Days. Days.				Days.	Days.
Cleveland	7,446	5.95	5.91	5.99	+ 0.04	- 0.04	
Cumberland and Lancashire	4,541	5.90	6.00	5.56	- 0.10	+ 0.34	
Scotland	727	5.81	6.00	5.50	- 0.19	- 0.09	
Other districts	4,740	5.82	5.91	5.95	- 0.09	- 0.13	
Total	17,454	5.90	5.94	5.86	- 0.04	+ 0.04	

† At mines included in the returns.

Pig Iron Industry.—Employment was good, and showed an improvement compared with either a month ago or a year ago. Shortages of materials and of labour were again reported in several districts.

District.	No. of furnaces, included in the returns, in blast at end of			Inc (+) or dec. (-) in Sept. 1917 on a	
	Sept. 1917.	Aug. 1917.	Sept. 1916.	Month ago.	Year ago.
<i>England & Wales :</i>					
Cleveland	76	75	71	+ 1	+ 5
Cumberland & Lancs.	34	31	34	+ 3	—
S. and S. W. Yorks	13	13	11	—	+ 2
Derby & Nottingham	32	32	26	—	+ 6
Leicester, Lincoln and Northampton	29	29	23	—	+ 1
Staffs and Worcester	31	30	30	+ 1	+ 1
S. Wales & Monmouth	12	12	12	—	—
Other districts	5	5	5	—	—
	232	227	217	+ 5	+ 15
<i>Scotland</i>	61	61	67	—	- 6
Total	293	288	284	+ 5	+ 9

Iron and Steel Works.—Employment at iron and steel works continued very good. There was little change from a month ago, but an improvement on a year ago. Shortage of labour was again reported from every district.

These trades continued to be busy during September, and a great amount of work was worked.

Trade unions with 301,819 members (mostly in skilled occupations) reported 0.1 per cent. unemployed at the end of September, compared with 0.1 per cent. a month ago and 0.2 per cent. a year ago. From one centre, however, a considerable reduction in overtime was reported, stated to be due to extension of works and improvements in machinery, enabling the required output of war material to be produced in less time.

Tinplate and Steel and Galvanised Sheet Trade.—The number of tinplate mills working at the end of September showed a decrease of 17 compared with the previous month, and of 90 on a year ago. The decrease was largely due to a dispute of steelworkers, which hindered the supply of steel bars.

The number of mills making steel and galvanised sheets, working at the end of September, showed a decrease of one compared with the previous month, and of nine on a year ago.

Nuts, Bolts, Nails, &c.—With nut and bolt makers employment continued good at Birmingham, Smethwick and Darlaston; it was also good at Blackheath and Halesowen, but showed a decline compared with both a month ago and a year ago. It was still very good with shoe rivet and wire nail makers at Birmingham.

Tubes.—Employment was good, and showed an improvement at Wednesbury; it continued good at Birmingham, and was good at South Wales.

Chain, Anchors, &c.—At Cradley Heath employment was good with shackle and anchor makers, and very good with block makers and cable chain makers. It was good with anvil and vice makers at Dudley; with axle and spring makers at Wednesbury employment continued good.

Sheet Metal Workers.—Employment continued good, with a large amount of overtime being worked.

Wire.—Employment was good; shortages of labour and of material were still reported from some districts.

Fatal Accidents.—The total number of fatal accidents at mines was 110, an increase of 10 on a month ago, but a decrease of seven on a year ago.

Disputes.—Twelve new disputes in coal mining occurred, affecting 22,628 persons directly and 1,398 indirectly.

LAW INTELLIGENCE.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.—October 18.

Before Justices DARLING, AVORY, and SANKEY.

A Colliery Lamp Case.

Neate v. Alcock.—Mr. J. B. Matthews, K.C., appeared in two cases relating to the prosecution of two youths under section 34 of the Coal Mines Act, 1911. The case came before a Divisional Court in the early part of the year, and after considerable discussion it was sent back in order that the justices might state further facts. (The case was reported in the *Colliery Guardian* on May 11, 1917, p. 911.)

In giving judgment, Mr. Justice Darling said that if there was any Act of Parliament which, in the interests of men employed in mines and their dependants, required to be carefully construed, it was this Act, which was expressly passed for their safety. In his opinion, the magistrates had wholly misunderstood their duty under the Act, and they had failed to come to any definite conclusion as to whether the persons charged had proved that the damage to the lamps was due to no fault of their own. All the justices found was that they were not satisfied that the evidence was sufficiently clear that the damage to the lamps was due to the fault of the respondents. It was manifestly their duty, in the circumstances, to convict, and the cases would be remitted with directions to this effect. Justices Avory and Sankey concurred.

COURT OF SESSION, SCOTLAND.

FIRST DIVISION.—October 15.

Before the LORD JUSTICE-GENERAL, the LORD JUSTICE-CLERK, and LORD DUNDAS.

Signals in Coal Mines.

W. Paterson, etc., v. Thos. W. Todrick.—The court heard counsel in an appeal for Wm. Paterson, manager, and David Mowat, agent, for the Summerlee Iron Company Limited, owners of Prestongrange Colliery, Prestonpans, who were charged at Haddington at the instance of Thos. W. Todrick, Procurator-Fiscal, with the consent of the Home Secretary, with having between September 20, 1916, and February 18, 1917, failed to comply with the general code of signals in mines as prescribed by the General Regulations made under the Coal Mines Act, 1911, in respect that they provided no means or apparatus by which the banksman could signal direct to the onsetter. The question in the case was whether it was compulsory under the Statute and Regulations to provide means by which the signals sent by the banksman down the pit must be sent direct, or whether the appellants were in compliance with the Statute and Regulations if they made those signals through the engineman, in order that the latter might know what movements were expected. Sheriff-Substitute Macleod held that Rule 92, which was said to be contravened, prescribed that the signals should be given by the banksman to the onsetter directly and not through the engineman. He found the charge proved, but having regard to extenuating circumstances, he dismissed the charge under the Probation of Offenders Act, 1907.

The court refused the appeal, and allowed the respondent 7 gs. expenses. The Lord Justice-General said that they were assuredly not called upon to pronounce upon the merits of the rival claims of signalling. The Statute expressly said that the signal was to be given by the banksman to the onsetter, and if it had been intended that the banksman should give the signal to the engineman as intermediary, it would have done so. At all events, his lordship was not going to construe so plain a rule as the one they had before them, so as to introduce one, two, or, it might be, three intermediaries between the two officials who were to signal according to the Regulation from the one to the other. If that were so, then he thought the charge was quite correctly brought against the appellants of failing to comply with the Regulation in respect that they provided an apparatus by which it was impossible when used to comply with the Regulation. That, it appeared to him, was exactly what they had done. Their apparatus confessedly did not enable the banksman to signal to the onsetter, but only enabled him to signal to the engineman, who in turn signalled to the onsetter.

The other judges agreed.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

South Wales Coal Owners Protest to Controller—High Compliment to Coal Owners' Secretary—New Provisions in Mines Act Overlooked—"Down Tools" Ballot Against Army Service.

The South Wales Coal Owners' Association has issued a protest against the action of the Government in granting an advance in wages to workmen, involving new principles, without having first conferred with the coal owners of the United Kingdom in order to ascertain the serious economic effect of that advance upon the coal trade. The protest is signed by Mr. B. Nicholas (chairman) and Mr. F. A. Gibson (secretary). It pointed out that the coal trade of the United Kingdom is one of its great peace-period, as well as war-period, industrial and commercial assets; and the coal owners consider it vital to the successful prosecution of the war, as well as to the after-war recovery of British international trade, that the economic value of this most precious asset should not be needlessly impaired.

The manifesto points out that, whilst the ostensible reason of the recent concession of 1s. 6d. per day to adults and 9d. to boys was the rise in the cost of living, "it is an established fact that in the South Wales coal field the average wages have not merely kept pace with, but, on the whole, have moved faster than, the rise in the prices of the commodities."

The new wage advance, it is stated, will mean an increase of 10s. 6d. per week; and, on the basis of actual attendances, represents a minimum addition to the wages bill in South Wales alone of over £4,000,000 per annum; and the miners are to be paid this special war wage whether they work or not. Not only has this advance been granted without consulting the employers, but also without any previous enquiry either into the actual earnings of the men, the increase in earnings since the war, or its general economic effects. Complaint is made that, whilst the authorities in London have, on practically every occasion, listened to representations by the miners' unions, they have not shown the same readiness to hear those made by the employers' organisations.

The Controller's instructions, however, it is pointed out, show that the new increase in price is not to apply to coal exported to Allied countries; and how unequal is the incidence of the Controller's decision may be judged from the fact that of the total quantity exported from the United Kingdom to France and Italy in August, no less than about 60 per cent. was shipped from South Wales, 30 per cent. from the north-eastern ports, and about 10 per cent. from the other ports.

The manifesto mentions another point to illustrate the alleged arbitrary and unreasonable methods of the present system of State control, viz., that whilst the price of coal for inland consumption is determined by the Price of Coal (Limitation) Act and Directions issued on June 28, yet (in direct conflict with that Act) the Controller has ordered South Wales colliery owners to supply house coal to south-western counties at the reduced and totally unremunerative price of 20s. per ton. The manifesto concludes: "The effect of these and similar measures has been to produce a serious economic crisis in the South Wales coal field, and therefore they inform the public of the conditions under which they are called upon to work the collieries, and give warning of the danger to the national interests which is involved by continuance of the present state of affairs."

Request has been made by the Controller that the South Wales coal owners would release their secretary (Mr. Finlay A. Gibson) for service in his department—especially in connection with the Coal Transport Reorganisation Scheme. The coal owners, however, find that they could not, at this critical juncture, spare Mr. Gibson from his very important duties in this district; and they have therefore notified the Controller that, with regret, they find themselves unable to comply with his request.

The proprietors of the Millbrook Colliery at Crumlin, with their agent, were summoned at Blackwood on Friday of last week for failing to have the colliery examined by a qualified fireman, and for allowing workmen to pass into the mine before its examination by a qualified fireman. Another summons was for not opening a station at the entrance to the colliery; another was for not measuring and entering in a book the quantity of air in the main current and splits. Defendants pleaded guilty. The proprietors were each fined £10 with £5 costs for not measuring the quantity of air, and the other summonses were dismissed upon the payment of costs.

A ballot of the miners is to be taken on the question of the "down tools" policy in relation to the "comb out" from the mines, and strong condemnation of the policy was uttered on Saturday evening at a meeting of miners in Ebbw Vale by Coun. G. Davies, who said that the question of the "combing out" was one of the most important ever submitted to the men. It was certainly not to the interests of the nation to talk about a "down tools" policy. Another speaker said he held very strong views, and would oppose the policy with all the strength of his nature. It was decided to hold mass meetings throughout the district on the question.

Mr. Vernon Hartshorn has also strongly condemned the suggestion of "down tools." He points out that to co-operate with the Government in the question of recruiting does not confer upon the military authorities any legal powers not already possessed by them, but would give the Miners' Federation an opportunity of preventing injustice and hardship in individual cases.

A banksman, named Walsh, was fined £2 at Bridgend on Saturday for not attending at his post during a shift—thus omitting an act necessary to the safety of the persons employed at the Caerau Colliery. The chairman of the Bench said the magistrates regarded the offence as very serious.

At Nine Mile Point Colliery on Monday, owing, it is stated, to the premature explosion of a shot-fire, Joe Passmore, of Bedwas, was killed almost instantaneously, whilst Frank Jordan, of Machen, received such injuries that it is feared he has lost the sight of one eye.

Whilst working at the British Mannesmann Tube Company's Works at Newport, Mon., on Saturday, John Person (45), of Manchester-street, fell from the roof and received grave injuries, including a fractured collar-bone. He was immediately removed on a motor ambulance to the Royal Gwent Hospital.

Northumberland and Durham.

Tyne Coal Shipments—Northumberland Miners' Association Returns—Tyne Improvement Commission—Overwinding Accident.

The coal and coke shipments from the Tyne last month were as follow:—Coal as cargo, 859,298 tons, a decrease of 229,799 tons when compared with September 1916, and of

655,764 tons when compared with September 1913 (the last pre-war year); coal as bunkers, 89,083 tons, decreases of 33,333 tons and 78,586 tons respectively; and coke, 67,450 tons, a decrease of 8,719 tons and an increase of 38,092 tons respectively.

Failure to appreciate a deputy overman's warning appears to have been responsible for the death of Wm. Willis (57), miner at the A pit, Greenside, according to the evidence given at the inquest. The deputy overman stated that he examined the place and found that the face of the canch was sprung a little. There was a break in the stone at the loose end of the coal. The roof was well timbered up to within 18 in. of the face. He warned Willis of the defect of the roof, and cut out a special head-tree, which he told Willis to put in when he had got sufficient coal out. Later, he heard that Willis had been injured by a fall of stone. The fall came away from the defective canch. The timber was about 5 ft. from the face, and the head-tree had not been used. Probably Willis had misjudged the distance of the defect in the stone. There was a quantity of coal lying about, which might have interfered with the setting of the timber. A verdict of "Accidental death" was returned.

Recently, a man named Thompson, working in one of the seams of the Adventure pit, Leamside, where naked lights are permitted, fired a shot, and after resuming his work "holed through." Gas coming through ignited, causing an explosion, and setting fire to Thompson's clothing and severely burning him upon the hands, face, and upper part of the body. Another miner, named Richardson, rushed to his rescue, and carried him into a place of safety, then returning with the deputy and rendering valuable assistance in extinguishing the flames, and preventing any further explosions. Those fully conversant with the details of the case speak highly of Richardson's heroism, and the general secretary of the Durham Miners' Association is taking the necessary steps to secure some official recognition of the brave deed.

The Durham County magistrates had several colliery cases before them at a recent session. They fined Reuben Wade (20), £1, and ordered him to make good a pony girth which he had damaged to the extent of 7s. It was stated that he had cut the long strap off the saddle, intending apparently to make a body belt of it. William Fleetham, who was stated to have deliberately hewed from the wall side at Cassop, in spite of a warning from an overman, was fined £1. Robert C. Stoker and T. Gerrard were fined—the former 30s. and the latter £2—for having gone into a place in the pit, in respect of which they were not authorised, at Cassop. It was stated that they simply set the management at defiance, and, despite several warnings, went to this place and commenced to fill coals.

The quarterly returns of the Northumberland Miners' Association show 25,423 full members and 4,497 half-members. The number of objectors to the political levy has shrunk from 289 to 123. At one colliery, Cramlington Ann, 251 members have withdrawn their objections. Of the full members 10,587, and of the half-members 904, are on military or naval service.

The Tyne Improvement Commissioners have decided to make application to the Board of Trade to increase the river dues up to 50 per cent. Mr. Arthur Scholefield, in moving that this recommendation of the finance committee should be adopted, said no one regretted the putting forward of such a proposition more than they did, but they had to safeguard the interests of the Commission as far as possible. Unfortunately, they could not control the amount of trade that came to the port. Some interests would be hit by the increase of dues, but they had to face a serious diminution in revenue, due, of course, to a diminution in the trade of the river. At the same time, they had to face increases in the demands by those who worked for them. When the Commission asked the Board of Trade some time ago to sanction an increase in the dues of 33½ per cent., it was felt that 50 per cent. would very soon be needed to meet the present position.

The Gateshead Coal Control Committee has fixed the following maximum prices for household coal delivered in the borough:—Durham coal, delivered in bulk of one ton or more, best, 28s. 6d. per ton; treble nuts, 27s. 6d.; small, 22s. The prices of Northumberland coal are 27s., 26s., and 21s. respectively. A charge of 1s. per ton extra may be made for coals delivered at Low Fell or Sheriff Hill, or for delivery in bags. The prices of small quantities sold by hawkers and shopkeepers have been fixed as follow: 1s. 8d. per cwt.; 10½d. per ½-cwt.; 5d. two stones; and 2½d. per stone; whilst purchasers of small quantities at merchants' depots can obtain them at 1s. 6d. per cwt.; 9d. per ½-cwt.; and 4½d. for two stones.

When the members of the Alnwick Rural District Council discussed the price of coals recently, they were informed that the district stationmasters who dealt in coals objected to being styled "merchants," as they were simply agents who sold the coals on commission. The average price of coal at 10 local railway stations before the war was 19s. 7½d. per ton. Now it was 23s. 7½d., an increase of 3s. 11½d., a price which, as one of the members remarked, was very satisfactory under the circumstances, and showed that colliery owners could not be classed among the profiteers.

A sudden attack of illness prevented the winding engine-man at the Willy pit, South Moor, from exercising due control over operations on Tuesday morning last, with the result that a double-deck cage, in which eight night shift men were being brought to bank, came into violent contact with the "knock-off," and the eight were thrown out upon the pithead. One had a thigh broken, and the others sustained bruises and shock. The engineman was found sitting at his post in a semi-conscious condition.

Cumberland.

Housing Problems—What is a Miss-Fire?

There is a great lack of housing accommodation in some of the mining villages in West Cumberland. More houses are needed at Broughton, Broughton Moor, Clifton, and Seaton, and at Workington suitable accommodation for working men and their families can scarcely be secured for love or money.

On Wednesday evening a presentation was made at Whitehaven to Pte. W. Cunningham, M.M., of the Border Regiment, who has recently won the Military Medal. The gifts consisted of a gold watch and albert to Pte. Cunningham's father, silver tea-service to his mother, lady's gold wristlet watch to his fiancée, and gold albert and pendant for himself, as well as the balance of £50 in notes. Coun. Hanlon, C.C., made the presentation on behalf of the Cumberland Conciliation Board, and, in doing so, said this was the 15th which had been made by the Board to Whitehaven miners who had gained honours in the present war, viz., 11 from William pit, three from Ladysmith, and one from Wellington pit.

An inquest was held at Whitehaven last week on Henry Trevaskis, who was fatally injured by shot-firing opera-

tions in the Lonsdale iron ore mine at Frizington. The evidence showed that three fuses had been lighted, one of which did not go off, and Trevaskis turned back to light it when the first shot caught him, and a second shot went off when he was lying on the ground. Mr. W. Leck, H.M. inspector, said this class of accident—returning with the object of re-lighting a hole—was one of the commonest forms of explosives accidents in metalliferous mines, although the last three years had shown a decided improvement. It was a standing rule in the district that, in the case of a miss-fire, nobody should return to the working within half an hour. The point was: "What was a miss-fire?" If the fuse runs, but fails to explode the explosive, it would, of course, be a miss-fire, but in order to secure safety the definition of a miss-fire must go beyond that. Two or three years ago a notice was posted at most of the iron ore mines in the district stating "that after an attempt has been made to light a shot, and the men have left the working, if for any reason the shot fails to explode, it must be treated as a miss-fire." That was the definition of a miss-fire which he (the inspector) should like to see universally accepted, and, if acted upon, he believed it would abolish accidents of that type. A verdict of "Accidental death" was returned. The jury strongly recommended that a rule should be made with regard to shot-firing on the lines suggested by the inspector.

Yorkshire.

The Doncaster Committee, under the Retail Coal Prices Order, have directed that Haigh Moor or best Silkstone coal shall be sold in the borough at 29s. per ton; Barnsley best bright at 24s. 6d. per ton and 1s. 4d. per cwt.; kitchen, or Barnsley second bright, at 23s. 6d. and 1s. 3½d.; and screened nuts at 22s. and 1s. 2½d. The prices are considered satisfactory.

The Manvers Main Colliery was the scene of a somewhat unusual fatality last week. A Mexboro' haulage hand, named Edward Greenwood (18), was walking to the bottom of the No. 3 pit, when his foot caught something, and he fell in front of three full tubs, two of which passed over him and dragged him some 15 yds. He died 10 minutes after being extricated. At the inquest at Mexboro' a verdict of "Accidental death" was returned.

An inquest was held last week on Alfred Smith, miner, Bentley, who was fatally injured in the colliery of Messrs. Barber, Walker and Company at Bentley. When clearing bottom dirt away with a shovel, a fall of coal suddenly occurred. A large piece caught his foot and crushed him between a prop and a tub. His leg was fractured, and he was so badly injured in other respects that he died two hours later. A verdict of "Accidental death" was returned.

When, at Doncaster Police Court last Saturday, Elijah Buck, miner, Swinton, was fined 30s. for damaging his safety lamp in the Denaby mine, it was stated carelessness with lamps was on the increase in the colliery. In 1915 there were 38 damaged lamps at the pit, but in the nine months of this year 44 lamps damaged had been reported, although, owing to the war, 400 fewer men were employed. The matter had assumed such a serious position that, by arrangement with the Yorkshire Miners' Association, a demonstration and lecture had been arranged at the colliery for the morrow on the care of lamps, in the hope of reducing the damage.

Mr. Fred Crowther, coal merchant, of City Road coal depot, Bradford, has been elected a member of the Bradford Chamber of Trade, and allocated to the Coal Merchants' section of the organisation.

Lancashire and Cheshire.

Manchester Association of Engineers' Meeting — Many Extensions Foreshadowed—Earl of Crawford Resigns Chairmanship of Wigan Coal and Iron Company Limited.

The 61st annual meeting of the Manchester Association of Engineers was held on Saturday evening last. In their report, the council stated that 32 new members had been made during the year, and, after taking into account the loss by deaths, resignations, and erasures, the total number of members and associate members on the roll amounted to 648, as against 638 in the previous year. The financial statement showed that the balance standing to the credit of the association was £6,692 5s. 6d., as against £6,669 4s. at the close of the preceding year, an excess of receipts over expenditure of £23 15s. 6d. on the 12 months' working.

The Right Hon. the Earl of Crawford, who for a long period has been a director, and, since the death of his father some years ago, the chairman of the Wigan Coal and Iron Company Limited, has resigned his directorship of the company, in consequence of his holding the post of Lord Privy Seal in the Government; and Mr. Arthur-Moore Lamb, J.P., of Wigan and Southport, one of the directors of the company, was appointed chairman at the annual meeting of shareholders just held.

The Wigan Corporation Committee on Coal Supplies have at the instance of the Controller of Coal Mines issued a public appeal, in which it is pointed out that it is desirable to try to lay in a reasonable stock of coal to meet winter demands, and that space not generally used for the purpose should be used if a stock cannot be accumulated otherwise. It is added that, though it is desirable to stock, such stocks must not be excessive, and steps are being taken by the committee, through the coal merchants, to check the accumulation of excessive stocks by individuals.

Following upon the carrying out of various improvements on the surface and below, bigger developments are foreshadowed for the near future at collieries in the Burnley districts belonging to the executors of Col. Hargreaves.

It was reported in Manchester coal trade circles on Tuesday that several big contracts for surface plant (including electrical installations) placed by leading colliery firms in South Lancashire, were being held up owing to scarcity of materials and labour. The opening out of various new mines in the Leigh district, however, is being pushed forward as quickly as possible.

Mr. Jesse Butler, of Fairfield, Manchester, is resigning the position of miners' agent to the Lancashire and Cheshire Miners' Federation, which position he has held for 30 years. He was very popular in different parts of the Lancashire and Cheshire coal fields.

It is understood that improvements, with a view to increasing output, etc., are to be effected on the surface and below at Lord Vernon's Collieries, Poynton, near Macclesfield.

A correspondent says various leading colliery firms in Southern Lancashire are now dispensing with charter-masters, or "butty-men," engaging the whole of the miners and other workers direct. The new system is preferred by the workers.

The Manchester Corporation Gas Department proposes to establish about 30 filling stations at which drivers of coal

gas-driven motors may secure fresh supplies of fuel, with all the gas undertakings within a radius of 10 miles for the provision of automatic meters for the purpose.

At a meeting of the Hindley District Council, last week, James Smith, of Ingram-street, Platt Bridge, was presented with the honorary testimonial of the Royal Humane Society, inscribed on vellum, awarded to him for having, on July 21, descended an old coal pit shaft, 40 yds. in depth, on Luce Moss, and rescued a boy named William Skuse, who had fallen down whilst bird-nesting.

The Swinton and Pendlebury District Council has under consideration town planning and housing schemes which embrace the building of 400 or 500 more houses, after the war. In Swinton and Pendlebury districts there are about 4,000 miners, and there is a big demand for houses by colliery workers.

Notts and Derbyshire.

Ald. A. Henshaw has been invited to become Mayor of Ilkeston for the ensuing year. He is checkweighman at Woodside Colliery, near Ilkeston.

At the council meeting of the Derbyshire Miners' Association on Saturday last, a resolution was passed requesting that 1d. per week be stopped from the men's wages at the various collieries to provide for the upkeep of the motor ambulance convoy which the coal owners and miners of Nottinghamshire and Derbyshire sent to the front.

The Notts County magistrates on Saturday last, awarded £1 apiece damages against 12 lads who absented themselves from work at the Gedling Colliery under somewhat unusual circumstances. The lads had ranged themselves against a man whose evidence caused a pony boy employed at the pit to be sent to gaol for cruelty to a pony. The man was moved to another part of the pit, but the boys wanted him dismissed, and stayed away from their work. The result was a loss of 200 tons of coal, men having to be brought from the coal face and paid 11s. per day to do the boys' work. In addition to the damages, the lads were each ordered to pay costs.

A sad fatality in the Waterloo pit of the Shipley Colliery Company was revealed at an inquest at Hearnor on Saturday on Geo. Wood (29), a pit employee. He was sent to repair a fall of roof and set timber. While he was hammering a lid on top of the covering wood holding up a big piece of stone, the latter fell on him, pinning him down, and killing him practically instantly. The jury returned a verdict of "Accidental death."

Messrs. Barber, Walker and Company, owners of the Eastwood Collieries, Notts, have just furnished a handsome suite of rooms—recently occupied as colliery offices—and placed the same at the disposal of their officials as an institute for purposes of recreation and education. The institute contains large concert and lecture hall, library, reading room, billiard and card rooms, and the entire management has been placed in the hands of the officials.

Kent.

From the Tilmanstone and Snowdown collieries the amount of coal raised last week was about 5,500 tons. Some of the men are, however, being called to the Colours, and unless labour to replace them is forthcoming, it is feared that the output cannot be maintained at this level. The matter is the subject of negotiation.

Scotland.

Transfer of Miners to Cumberland — Alien Miners' Request — Coal Shipment Figures — West Scotland Association of Mining Electrical Engineers.

A large number of men have sent forward their applications in response to the invitation by Mr. David Gilmour for 700 miners to supply the ironstone mines in Cumberland. The process of selection of suitable men from the list of applications will be proceeded with as speedily as possible.

The opening meeting for the session of the West of Scotland branch of the Association of Mining Electrical Engineers was held on Saturday evening in the Royal Technical College, Glasgow. Mr. H. A. McGuffie, electrical engineer, Glasgow (the new president), delivered an address of much practical value, in the course of which he touched upon many recent innovations which had been put into operation at collieries throughout the kingdom. These innovations, he explained, were intended to improve the efficiency of the electrical, steam-raising, and general engineering plant at collieries. It was hoped they would be successful, for efficiency must be the keynote of all interested in coal-producing operations if Great Britain was to make the headway that was anticipated in the future.

The Lithuanian miners throughout Lanarkshire, numbering not far short of 2,000, who are under orders to return to Russia, are seeking the good offices of the executive of the Lanarkshire Miners' Union to press a claim on the British Government for monetary compensation in respect of the time and wages lost in travelling from this country to Russia. It is possible that the representations put forward may be conveyed to the Government by the executive of the union, and it is understood if this step is taken the aliens will be satisfied.

For having been found at the bottom of the Dixie pit, Rosebank Colliery, with lucifer matches in his possession, a workman was fined 15s. at Dunfermline Sheriff Court.

At a meeting of the Glasgow Committee on Coal Supplies it was stated it would be necessary to obtain the release of a certain number of men to overtake the winter's work of distribution. It was reported that during the winter months of 1916-17 the house coal consumed in Glasgow was approximately 530,340 tons. The quantity of house coal which it is estimated will be required for the coming winter will be 539,183 tons.

Owing to the advance in miners' wages, the Fife and Clackmannan coal owners have advanced the price of workmen's fire coal to 13s. 1d. per ton.

The coal shipments during the past week from the Clyde amounted to 94,186 tons, as compared with 105,411 tons for the corresponding period last year. From the Fife ports the shipments were 31,302 tons, as compared with 39,844 tons a year ago; and from the Forth 18,800 tons, as against 37,063 tons.

An excellent outward trade was accomplished last week at Burntisland, when 16,080 tons of coal were despatched, as against 11,010 tons in the corresponding week last year. This was the highest total in a week for the current year. At Methil the export showed a decrease of 14,336 tons, against 15,355 tons in the previous week.

For riding on hutchies on a self-acting incline at Lidlithgum, near Edinburgh, a workman was, at Lidlithgum Sheriff Court, fined 10s. and 11s. 6d. of expenses.

A new line of railway, estimated to cost £140,000, to be constructed for the development of the ironstone industry in the district, will run through the site of the Battle of Edge Hill, near Banbury.

LABOUR AND WAGES.

South Wales and Monmouthshire.

On the decision of the Coal Controller that the collieries should operate in the Gwaun-cae-ferriollieries in preference to the Minimum Wage Act and his direction that the company should comply with this decision, it is understood that the company are making protest, their contention being that the issue should have been submitted to a court of law. There is a probability that they will take steps to raise the question in this form, although perhaps not till after the war. For the present it is understood that they will carry out the award of the Controller. The Gwaun-cae-gurwen workmen have made application to the Federation executive for strike pay in respect of the seven weeks they had been idle, but the executive decided to make only a grant equal in amount to strike pay from September 15, the date upon which the men placed their case before the committee and brought themselves into line with proper constitutional action.

A representative of the Coal Controller has been interviewed by a deputation from the Llwyn Colliery at Blaithwa where 200 men have been set idle because of the closure of the pit. They ask that the colliery shall recommence work and be continued in operation until such time as the men had obtained employment elsewhere. Promise was given to consider the representations made.

There being a fear prevalent that overmen and firemen would not share in the extra war wages of 1s. 6d. per day, a national conference was called, and the general secretary of the National Firemen's Federation sought an interview with the Controller in order to obtain a decision of the question. It has since been officially announced that the increase will be payable to these classes of men and to examiners.

Further disputes seem to have arisen between Federationists and members of the Winding Enginemen's Association. It was reported at a meeting of the latter, held in Pontypridd that one of their members who works at a Glamorgan colliery had been requested by an official of a local mining lodge to join the Federation, and this notwithstanding that the man explained that he was a member of the Enginemen's Association. The secretary (Mr. T. Jones) was instructed by the meeting to communicate with the Chief Industrial Commissioner, and desire that he would take steps for upholding his award of June 21.

A strike took place at Llandeib Colliery because of disagreement between the weigher and the checkweigher, and as a result 350 men were idle.

The Panteg Steel Smelters' Confederation, representing over 900 members, has renewed its threat to pursue a "down tools" policy unless the Confederation receives increased representation on the local Food Control Committee. The movements of the steel workers are being watched with much concern by the public, as at Panteg they represent a considerable proportion, if not a majority, of the working male population. It is a locality which is exceptionally prosperous to workers, it being freely stated that even boys, whose ages range from 14 to 16 years, are contributing astonishing amounts in income tax.

North of England.

The trimmers and teamers who are employed at the coal shipping ports on the north-east coast, have put in an application for an advance of 25 per cent. in the present tariff rates for dealing with coal, coke, etc. They have applied also for 1s. 6d. per hour for time worked between 12 noon and 4 p.m. on Saturdays, with 2s. 6d. per hour for work between the hours of 4 p.m. and 12 midnight on Saturdays. They are to take a ballot as to whether they are prepared to work by artificial light during the winter.

The quarterly council meeting of the Cleveland and Durham blastfurnacemen's and Cokemen's Association instructed the executive committee to take up the question of the unsatisfactory payment for week-end work at blastfurnaces and coke ovens, with a view to obtaining increased remuneration. It was stated that, at present, time and quarter was paid for 24 hours on Sundays only. All other workers received double time for Sunday work and extra pay after midday on Saturdays. It was mentioned that the membership of the association now numbered 8,750.

The Northern Colliery Officials' Mutual Aid Association has applied to the Coal Controller for a substantial advance in the wages of its members.

Mr. John Humphrey, secretary of the Northumberland Colliery Enginemen's and Firemen's Association, has received from the Coal Controller a reply to an enquiry on certain points relative to the war wage, to the effect that, in the case of men working a regular seven-day week, the war wage is payable for seven days, but is not payable in respect of overtime, except when involved in the changing over of shifts. In no case will more than 31s. 6d. (or 15s. 6d. for boys) be payable for any three weeks' work.

Leasingthorne Colliery has been laid idle owing to a labour dispute.

The position at Netherton Howard Pit remains unaltered. The men on strike are in receipt of a weekly allowance from the Northumberland Miners' Association.

Notice of a reduction on what is known as the 30 in. seam was posted at the Allhallows Colliery, near Mealsgate, a fortnight ago. Several meetings have been held, and the men have offered to submit the question to arbitration or the Conciliation Board. A deputation of the men met the managing director on Thursday afternoon, but unfortunately no agreement was reached. The question affects over 200 underground and surface workers.

A settlement of the trouble at the Workington Iron and Steel Company's No. 10 pit at Lowca, has been effected. About 60 men had been out of employment from Wednesday to last Monday owing, it was alleged, to having been refused the minimum wage.

Federated Area.

At meetings of trade union colliery firemen connected with the Lancashire and Cheshire Colliery Firemen's Association, held last week-end in Leigh, Bolton, Hindley, Pendlebury and Ashton districts, resolutions were adopted in favour of seeking an advance in wages. The recent increase of 1s. 6d. per day conceded by the Coal Controller did not include the firemen. As a result of active protest, a large number of firemen were lately been an accession of new members to the Firemen's Union.

At a meeting of the Ellesmere's Mosley Common miners, held on Thursday night last week, it was decided that a strike of miners who had served in the army should be invalidated out of service and that the miners in Walkden and adjoining districts should be being brought to bear upon non-combatants employed in Lancashire and Cheshire coal pits, and the union.

A special delegate meeting convened by the Lancashire and Cheshire Colliery Firemen's Association was held at Bolton on Monday to consider the position of colliery firemen in regard to the new war wage question. An interview had been held with the Coal Controller with the result that the different county associations of coal owners had been authorised to deal with the disputes arising out of the claim to the miners' additional war wage being applicable to colliery firemen also, and to pay the new war wage to them. The question now rests with the men's organisation and the coal owners, and a meeting is to be held as soon as possible to make the necessary adjustment. In the meantime, some of the collieries have paid the advance to the colliery firemen and the anticipation is that other collieries will follow suit, making the increased wage retrospective. It was decided to leave the matter in the hands of the association wages committee.

Scotland.

At Broomfield Colliery, Stonehouse, negotiations are still going on with the object of having satisfactory conditions of payment secured in a section of the Kiltongue seam. The expectation is that the manager and the men's representatives will be able to arrive at a satisfactory basis of understanding.

At Belhaven Colliery, Cragneuk, the manager has intimated a reduction of 1s. per ton in a section where he contends the working conditions have improved. The men assert that if any reduction at all is warranted, the amount claimed by the manager is certainly excessive.

Friction is threatened at the Wishaw Coal Company's pits in the Motherwell district. The point in dispute is as to whether the checkweighmen at the local collieries belonging to the company are entitled to take the prominent part they do in interfering in disputes between the masters and the men. The new manager recently appointed to the district by the company has taken up a definite stand on this point, and it will be interesting to watch developments.

There has been some dissatisfaction among the miners employed at Woodend Collieries, West Lothian, owing to loss of work and other causes. The agent of the county union has taken up the matter with the manager, and it is expected that new and more satisfactory arrangements will be made.

The coke-oven and by-product workers employed in the Dumfreck district of Kilsyth by Messrs. William Baird and Co. have approved of a scheme for the introduction of an eight hours day. It has been left to the local agent to see the representatives of Messrs. Baird and Co. with a view to the early operation of the scheme.

The wages earned in several sections of No. 2 Snab Pit, Kinneil, West Lothian, have been under consideration by the men affected. Before pressing a demand for an increase any further the executive of the county union have called for additional information.

After a somewhat lengthy strike, the miners employed at Dewshill Colliery, Salsburgh, Lanarkshire, have decided to resume work. It has been left to the miners working in the colliery to decide by ballot vote which branch of the Lanarkshire Miners' Union they shall become affiliated to.

An agitation has been started in the Lanarkshire mining districts with a view to securing increased wages for colliery clerks. A large and representative meeting of colliery clerks was held in Hamilton on Saturday, when arrangements were made for pressing a demand for higher emoluments so as to bring the clerks into line with all the other grades of colliery workers.

Reports submitted to the monthly conference of the Midlothian and Haddingtonshire Miners' Union on Saturday showed that the coal trade during the past four weeks was less satisfactory than in August and July. Several large collieries had suspended operations for one or more shifts, throwing many hundreds of men idle. It was further represented that only about 70 per cent. of the workmen were receiving full employment. It was gratifying to note, however, that there was an improved demand in household trade, and that large orders were being placed for manufacturers' requirements from various Scottish centres.

The miners employed at Loanend collieries have been agitating for some time to have coal contracting abolished. Following a resolution passed at a meeting of the men a deputation interviewed the management, who have promised to eliminate the system as speedily as possible. The same question is engaging the attention of the workers at Banknock collieries, and it has been decided to abolish the custom there also.

As the request for an increase to the drawers employed at Devon Colliery has not been granted, the Fife miners' executive have asked liberty from the national union to have strike notices lodged.

Imports of Pit Props.—In September 72,540 loads of pit props, to the value of £423,301, were imported into the United Kingdom. The imports in September last year were 141,893 loads, value £503,063, and in September of the previous year 178,529 loads, value £515,120.

Japanese Coal and Iron Outputs.—The following figures taken from the latest report of the Japanese Bureau of Mines show the quantity (metric tons) and value (yen) of coal and peat and pig iron and steel produced in Japan in 1916, the figures for 1915 being added for comparison:—

	1915.		1916.	
	Quantity.	Value.	Quantity.	Value.
	Met. tons.	Yen.	Met. tons.	Yen.
Coal	20,490,747	65,068,894	22,901,580	80,625,582
Peat	100,107	195,878	108,718	240,096
Pig iron	65,070	2,505,091	77,275	4,099,291
Steel	17,909	1,290,563	23,859	3,413,843

Exports and Imports of Mining Machinery.—The value of imports and exports of mining machinery during September is given below:—

	Sept.		Jan.-Sept.	
	1916.	1917.	1916.	1917.
	£	£	£	£
Imports	17,363	4,219	105,321	136,828
Exports	79,936	46,075	528,934	529,092

These figures are not inclusive of prime movers or electrical machinery. The following shows the value of exports of prime movers other than electrical:—

	Sept.		Jan.-Sept.	
	1916.	1917.	1916.	1917.
	£	£	£	£
All prime movers (except electrical)	169,424	93,806	1,550,175	1,222,501
Rail locomotives	97,268	251,574	923,955	1,345,428
Pumping	47,765	44,596	395,591	318,213
Winding	3,882	3,200	13,307	13,401

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Lancashire Dynamo and Motor Company Limited.—The ordinary share dividend is brought up to 12½ per cent., tax free. The preceding year's dividend was 10 per cent., of which only the second half was tax free.

NEW COMPANIES.

Amalgamated Foundries Limited.—Private company. Registered October 12. To carry on the businesses of founders, electricians, etc. Capital, £5,000. Directors: E. T. Pearson, D. E. Miller, H. Wilkins, and A. Doreys.

Fox (G. J.) and Sons Limited.—Private company. Registered office, 65, King's Cross-road, W.C. Registered October 8. To take over as a going concern the business of a manufacturing engineer. Capital, £3,000. Directors: G. R. Dagnall, C. J. Fox, and J. W. Barnecutt.

Grosvenor Engineering Works Limited.—Private company. Registered office, Poole-hill, Bournemouth. Registered October 8. To carry on the business of electric engineers and contractors, makers and dealers in munitions of war, etc. Capital, £2,000. Directors: R. J. Murray and A. E. Morgan.

Haig Colliery Company Limited.—Private company. Registered office, 79, Lichfield-street, Wolverhampton. Registered October 6. To carry on businesses of colliery proprietors, brick, tile, and pipe manufacturers, etc. Capital, £5,000. Subscribers: D. E. Campbell and T. G. Gatis.

Oldridge Engineering Company Limited.—Private company. Registered October 11. To carry on the business of electrical, general, and mechanical engineers, etc. Capital, £5,000. Directors: G. F. Goulder and F. R. Machin.

Pit Timber Supply Company Limited.—Private company. Registered October 11. Nature of business indicated by title. Capital, £10,000. Directors: T. Plesner and J. H. Cooper.

West Bromwich Metal Castings Company Limited.—Private company. Registered office, Edward-street, West Bromwich, Stafford. Registered October 11. To carry on the business of iron masters, iron founders, etc. Capital, £2,000. Directors: W. Lawley, junr., J. Lawley, junr., J. W. Gaunt, and S. F. Rogers.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

OBITUARY.

Mr. John Williams, agent of the Merthyr district of miners, died at Merthyr on Thursday of last week, after five months' illness. Born in Cefn Coed in 1866, he began life as a miner, working at the Cyfarthfa pit, and, taking an active interest in industrial affairs, became treasurer of the Merthyr district of miners, and in 1903 he was elected by the miners as their agent. He had been for many years a member of the executive council of the South Wales Miners' Federation and on the workmen's side of the Welsh Coal Board. In addition to being a member of the Merthyr Town Council, he had been chairman of the Vaynor Rural Council.

Second-Lieut. Herbert Crossley Carss, who has died from wounds at the age of 24, was, prior to enlistment in November 1914, an apprentice surveyor at Silksworth Colliery.

Mr. Robt. Rhodes, whose death at Cowpen-square, Blyth, is announced, had been in the service of the Cowpen Coal Company Limited for 59 years. He commenced work at the age of nine.

News has been received that Capt. William Godfrey Earlam Johnson, of the Manchester Regiment, has died of wounds received in action. The deceased officer, who was 24 years of age, was the second son of the late Mr. A. E. Johnson, J.P., C.C., colliery proprietor, of Bickershaw Hall, Wigan, and the grandson of the late Mr. J. H. Johnson, colliery proprietor, of Hall Garth, Carnforth. Capt. Johnson was educated at Park Gate School and Haileybury College, and was later articled with Messrs. Peace and Ellis, solicitors, of Wigan, of which firm Sir Thos. R. Ratchiffe-Ellis, secretary of the Coal Owners' Association, is the head. On the outbreak of the war, Capt. Johnson went on foreign service, serving through the Dardanelles campaign, and being wounded along with a younger brother on the Gallipoli Peninsula in June 1915.

The death took place on Wednesday last week of Mr. John Walshaw, of Astley, near Manchester, one of the best known of the old school of colliery managers in South Lancashire. The deceased gentleman, who was 70 years of age, had been manager of the Astley and Tyldesley Colliery Company's series of pits for over 40 years, and only retired from that position last March.

New Zealand Coal.—During 1916 New Zealand exported 328,183 tons of coal, valued at £326,555, compared with 323,992 tons, valued at £329,731, during 1915. In 1916 the quantity of coal consumed in the country was 1,928,952 tons, valued at £964,476, compared with 1,884,632 tons, valued at £942,316, during 1915.

Household Coal Distribution Order, 1917.—It is notified that the reserve stock of coal to be kept on every wharf or depot of a coal merchant must, except with the special assent of the Controller, amount to not less than three times the largest week's sales or output of the wharf or depot in this current year. This reserve stock must be completed not later than November 30 next, and to ensure this the Controller requires 25 per cent. of the coal received each week at the wharf or depot to be carried to stock, except in the few cases in South London where the outstanding orders are still considerably short of being discharged. Outstanding orders at October 15 must be confirmed, and before they can be confirmed the consumer must fill up a requisition and declare his stock of coal, and must show that he is entitled to the supply of the quantity of coal on order, otherwise the outstanding orders will be cancelled. When confirmed, the orders will be executed in rotation, in accordance with the dates of the original orders. Special supplies of coal amounting to about 25,000 tons are being sent to the South London depots referred to above to clear off the outstanding orders and establish a reserve stock. The existing stocks of coal in reserve at depots in London is at the close of this week approximately equal to 1½ weeks' full supply, a further half-week's supply being held in wagons on rail.

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, **MANCHESTER**
MOUNT ST.,

THE FREIGHT MARKET.

of outward chartering has been quite a fair one during the week. On the north-east coast, there is a very healthy demand for tonnage for the United Kingdom and Allied destinations, but fixtures have been delayed by the shortage of tonnage on offer. Scandinavia is a big customer for vessels, and could have taken many more had these been available. Thus, Stockholm has been fixed for thrice at 200 kr., once at 205 kr., and once at 207½ kr., for vessels aggregating rather over 10,000 tons, and Gothenburg has been arranged for at 190 kr. No fixtures for the Mediterranean are reported, although fully 220s. is offered for Barcelona discharge; and Port Said remains at 165s., with probably even more money for suitable shipping. Gibraltar has been done at 100s. Other chartering is confined to French Atlantic ports and to London at from 20s. to 20s. 6d. For Spanish Atlantic 150s. is offered for Bilbao or Santander. Portugal is represented by 90s. to Lisbon, and 105s. to Oporto. At South Wales, a fairly large charter list is shown. Most of the business done is for French Atlantic ports, however, the only other directions in which fixtures have been made being Algiers and Bona. Tonnage is in very keen request, and high rates for neutral directions are on offer.

Homewards, the River Plate is quiet, but firm, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. American coal freights are represented by 125s. from Virginia to the River Plate, with 33 dols. for Rio discharge. On Committee account, heavy grain is workable at from 30s. to 32s. 6d. from Northern Range to the United Kingdom or French Atlantic, with 35s. from the Gulf to West Italy, and 32s. 6d. to France. Net charter tonnage is quoted at from 210s. from Northern Range to the United Kingdom, 250s. to North France, and 350s. to Italy. At the Far East, Bombay to West Italy on d.w. basis is steady, at 400s. Haiphong-Saigon to French Atlantic with rice is firm, at 500s. That also is the rate for kernels from Madras Coast to Marseilles. Bombay or Kurrachee to the United Kingdom is steady, at 250s. There is a brisk demand for tonnage from the Mediterranean ore and phosphate ports, and rates are well maintained.

Tyne to Gothenburg, 2,000, 190 kr.; Gibraltar, 7,100 and 8,000, 100s.; Honfleur, 1,250, 62s. 6d., pitch; London, 2,000, 20s.; North French Range, 200, 50s., coke; Stockholm, 1,900, 200 kr.; 2,100, 207½ kr.; and 2,000, 205 kr.

Cardiff to Algiers, 3,500, 160s., 600, neutral; Bordeaux, 2,600, 69s., neutral; Brest, 1,200, 45s., neutral; Bona, 1,600, 165s., neutral, coal and coke terms; Chantenay, 1,300, 61s. 6d., neutral; Havre, 1,400, 45s. 9d., neutral; Nantes, 1,200, 62s. 6d., neutral; Rouen, 2,000 and 1,200, 48s. 9d., neutral; and St. Malo, 600, 45s., neutral.

Newport to Nantes, 1,200, 61s. 6d., neutral; Havre, 1,500, 45s. 9d., neutral; and Bordeaux, 1,400, 69s., neutral.

Port Talbot to Brest, 1,200, 45s., neutral.

Hull to Dieppe, 875, 52s., neutral.

Barry to St. Malo, 600, 44s. 6d., neutral.

Swansea to Rouen, 1,600, 48s. 9d., neutral; 3,000, 47s. 3d., neutral; 920, 50s. 3d., neutral; Cherbourg, 600, 48s. 9d., neutral; Algiers, 3,500, 160s., neutral; and Brest, 1,200 and 1,100, 45s., neutral.

Glasgow to Buenos Ayres, 2,900, 85s., sail, neutral.

Liverpool to Gibraltar, 5,000, 100s.

Wales to Rouen, handy neutral boats, 50s 3d.; large boat, 47s. 3d.

Wear to London, 1,500, 20s. 6d.

LATER.—Since the above was written, the following fixtures have been arranged:—

Tyne to Bilbao, 3,000, 160s.

Glasgow to Stockholm, 1,700, 210 kr.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ABERDEEN, OCTOBER 22.—Coal for the Temporary Hospital, Rosemount. Tenders to the Inspector of Poor, 20, Union-terrace.

ABERDEEN, OCTOBER 30.—Coal to the City District Board of Control. Forms from the clerk and treasurer, 20, Union-terrace.

BLEAN (CANTERBURY), OCTOBER 22.—Coal for the Guardians of Blean Union. Forms from the clerk, 39, Castle-street, Canterbury.

LOCHGILFHEAD, OCTOBER 22.—For supply of coal for six months from November 15, 1917, to May 15, 1918, to the Argyll and Bute Asylum. Forms to be obtained on application.

MANCHESTER, OCTOBER 22.—Coal to the several establishments of the Guardians as required. Forms from the clerk to the Guardians, Union Offices, All Saints'.

STOWMARKET, OCTOBER 31.—100 tons of coal for the Guardians. Forms from the clerk.

The date given is the latest upon which tenders can be received.

The difficulty of obtaining tonnage has caused the idleness of several thousands of men in the Rhondda Valley, and further west the anthracite collieries are seriously affected.

Sir Charles Stamp Milburn, Bart., head of the firm of Messrs. William Milburn and Company, ship owners, merchants, and coal exporters, Newcastle, who died on July 1 last, left estate valued at £183,917 6s. 4d., with net personality £178,157 12s. 9d. He left £15,750 to charities, including £1,000 to the Northumberland Aged Mine Workers' Homes Association, for cottages at Hirst and Seaton, and £1,000 to the Durham Aged Mine Workers' Association.

Coal for France.—A report, which occasioned considerable disquiet, has been current in South Wales that a leading firm of ship owners and coal exporters in the country had offered to supply a million tons of coal per month to the French authorities, and that they would receive a commission of 2½ per cent. on the f.o.b. price; and that the offer was considered of serious importance by the French authorities. The offer was made by Messrs. Furness, Withy and Co., Ltd., who had made the offer, but Lord Furness had contradicted, stating that "he knew of no such arrangement."

ABSTRACTS OF PATENT SPECIFICATIONS
RECENTLY ACCEPTED.

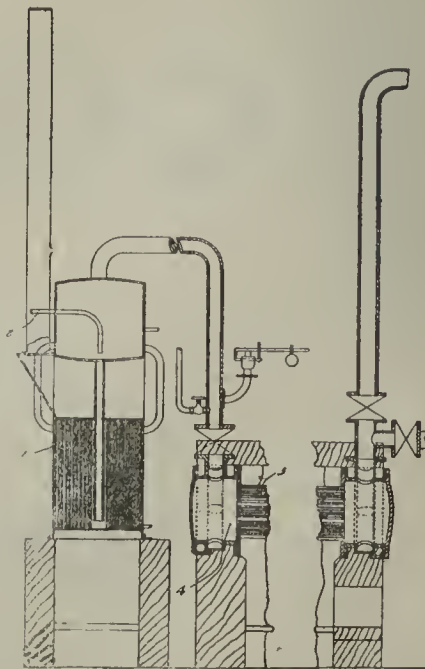
104341. *Improvements in Boring Tools.* H. Anschütz-Kaempfe, 9, Heikendorfer Weg, Neumühlen, near Kiel, Germany.—This invention is an improvement in or modification of that described in Specification No. 100130 which relates to a boring tool intended to sink vertical holes for deep boring. Fig. 1 is a vertical section through the bar holding the chisel or bit; figs. 2 and 3 show parts of this section on an enlarged scale, at an angle of 90 degs. to each other; fig. 4 shows the circuit of the electric drive used; and fig. 5 is a detail view of the same. When a blow is executed with the boring bit, the plunger 25, owing to momentum, will continue its downward movement at the moment when the boring tool strikes and the bit holder stops, the plunger compressing the suitably calculated springs 27 and 28. This will result in the pressure pin 24 being moved downwards, and accordingly the shaft 18 of the screw spindle 18 will be turned downwards about the ball 23 as the pivot, until the screw spindle is disengaged from the half-nut 19. A movement of the slide 19 would therefore no longer take place. But owing to the downward movement of the plunger 25, the contact 29 is also broken, so that the motor 9, and accordingly the screw spindle 18, stop. After the blow, the plunger 25 cannot at once move up under the action of the springs 27 and 28, as the valve 30, closed in the meantime, admits air only slowly into the hollow space 25. The speed with which the plunger can move upwards is calculated so that, before the screw spindle can return to its working position and the contact 29 close, a new blow—assuming regular working—and therefore a new downward movement of the plunger take place. The condition of things is maintained as long regular boring goes on. If the blows on the boring rods are interrupted for a longer time than that determined by the springs 27, 28, the mass of the plunger 25, the adjustment of the valve 30, etc.—for instance for more than 20 seconds—only then can the plunger 25 return to its initial position, and therefore the screw spindle 18 be thrown in again and the contact 29 closed. The motor 9 would then start working if at this moment the contact 21 were also closed. Whether, however, it will be or not, depends on the position of the pendulum 31, if the latter, and therefore the bit holder, still remain vertical, or if the bottom end of the bit holder became inclined to the left, and the pendulum accordingly moved to the right or engaged with the stop 32, the contact 21 will not be closed, and the motor and the parts connected to it will remain at a standstill. If, on the contrary, the bottom end of the bit holder has deviated—in the construction illustrated, to the left—that is to say, assumed the position shown on an exaggerated scale in fig. 5, the contact 21, and therefore the working circuit, will be closed, the motor will start, and the worm 10 will begin to work. The latter will drive first the worm wheel 11 provided with the pins 13, as already stated, the said pins will move the hammer 15 so that the latter will execute a blow on the wall of the inner casing 5 at each passage of a pin 13 past the projection 14. These blows are transmitted to the surface through the outer casing 4 of the transmitter, through the bit holder, and through the boring rods firmly screwed to the latter, and can there be clearly perceived and counted, for instance, by means of a listening ear-piece with rubber and the like, placed in the boring rods. Simultaneously with the worm wheel 11 will start, under the action of the toothed wheels 12, 17, the screw spindle 18, which will move the slide 19 to the left in opposition to the action of the spring 20. This movement is followed by the pendulum 31, which rests on the slide, until it again hangs vertically and lags behind, whereupon the contact 21 is broken, and the motor, and accordingly the other parts connected to it, as well as the slide, will come to a standstill. Until this takes place, four hammer blows are executed at each revolution of the worm wheel 11. The observed total number of blows indicates therefore to what extent the slide 19 must have moved to the left in order to re-establish the vertical position of the pendulum 31, that is to say, it is also a measure of the obliquity of the bit holder with the boring bit. The observer on the surface has therefore merely to stop the boring blows from time to time, and to listen to the signal blows of the hammer 15 against the boring rods, in order to find out whether and to what extent the chisel has deviated from the vertical position. (Twelve claims.)

108619. *Improvements in the Manufacture of a Porous Mineral Product for Use as a Refractory Material, etc.* M. Barrett, 30, Cliff-road, Hyde Park, Leeds.—The invention relates to an improved permanent porous mineral product which is resistant to heat, organic or inorganic acids, and alkalies, and which can be made any desired shape or size, either in the form of blocks, slabs, cylinders, or the like, and which possesses an extremely high degree of porosity, great physical strength, and uniformity of structure. In carrying the invention into practice, crushed but not finely-ground sandstone, quartz, chert, or any crystalline silica or vitrified silica containing substance, as, for example, porcelain or stoneware, is intimately mixed with finely divided felspar or feldspathic rock, with or without the addition of dextrine, gum, or similar organic body possessing adhesive properties, and for preference also with the addition of small proportions of tar and sodium silicate or potassium silicate. Sufficient water is added to the mixture to produce a slightly coherent mass, which is pressed into the desired shape or form between metal dies under high pressure, or which, in the case of particularly intricate shapes, can be formed by hand in wooden, plaster of paris, or metal moulds. If the latter method be used, rather more water is necessary in the mixture. After being thus formed, the articles are dried and then kilned at a temperature of at least 2,000 degs. Fahr., although the actual temperature employed is dependent on the relative

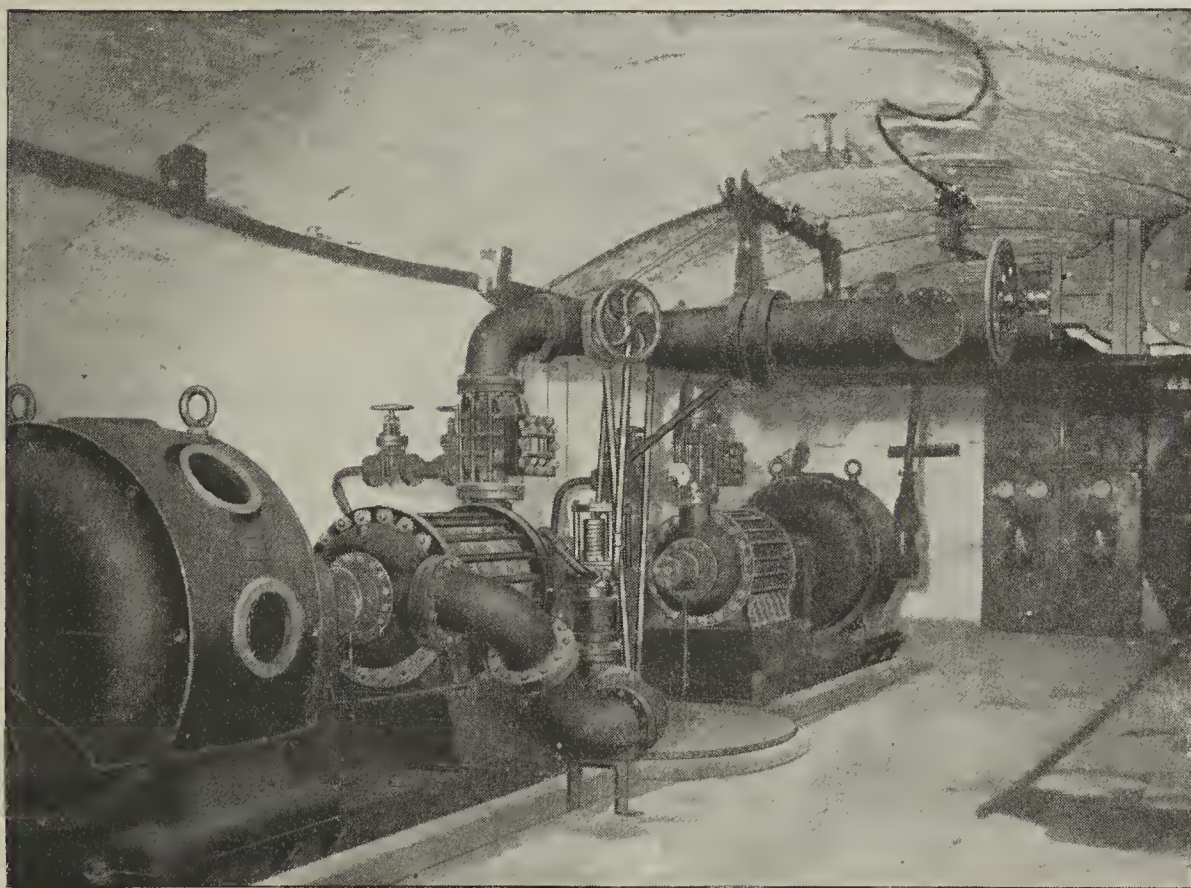
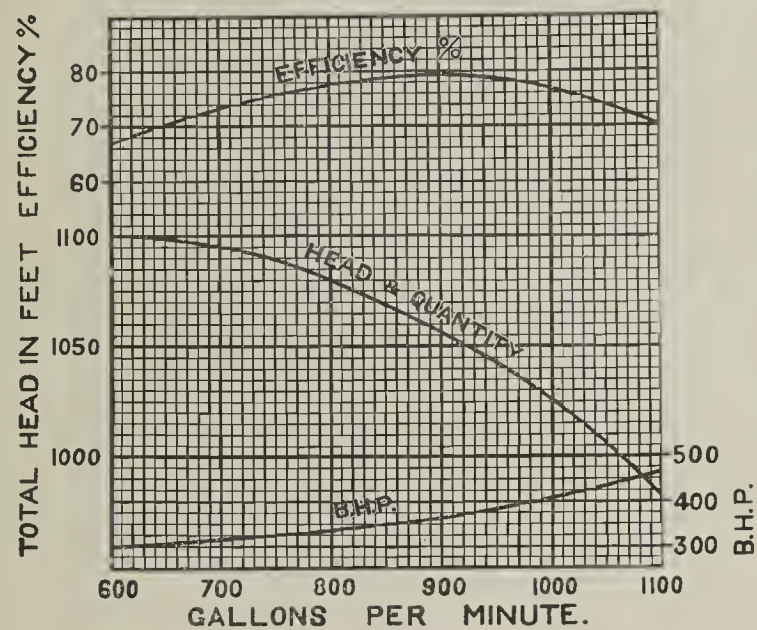
proportions of the various constituents, and on the quality of the raw materials employed. If the resulting product has to resist high temperatures, or highly corrosive liquids or gases, it is an advantage to employ a considerably higher temperature than that mentioned, and a correspondingly less proportion of the feldspathic matrix. The felspar or feldspathic mineral employed should, for preference, be dry cylinder ground; and to get the best results should be sufficiently finely ground as to pass through a sieve containing 150 meshes to the linear inch. The use of felspar or a feldspathic mineral as the matrix is an important factor, as it possesses appreciable plasticity, and has considerable cementing properties at all stages of manufacture, and this results in easier handling and less loss in manufacture. This class of mineral possesses also a high degree of resistance to chemical action after incorporation with the aggregate. The use of a vitrified silica containing substance, as, for example, stoneware or porcelain, offers many advantages when the product has to be used in direct and intimate contact with highly alkaline liquids, or where an intensely hard and mechanically strong material is required. The product, after being kilned, retains practically its original shape and size, showing no appreciable expansion, contraction, or distortion. As examples of possible mixtures, the following are cited:—(1) 4 cwt. crushed sandstone, chert, or crystalline silica; 1 cwt. finely divided felspar; 7 lb. dextrine; 14 lb. tar. (2) 4 cwt. crushed vitrified porcelain; ½ cwt. felspar; 28 lb. sodium silicate (sp. gr. 1.7); 14 lb. tar. (3) 4 cwt. vitrified crushed stoneware; ½ cwt. finely divided felspar; 10 lb. powdered gum arabic. It should be noted, however, that these relative proportions of the various constituents are given for a kilning temperature of 2,000 degs. Fahr., and that if higher temperatures are to be used, then a smaller proportion of the feldspathic matrix must be employed. (Four claims.)

108503. *Improvements in Apparatus for Expressing Liquid from Peat.* J. W. Hinchley, 55, Redcliffe-road, London, S.W.—This invention consists of improvements in apparatus for expressing liquid from materials such as peat and other fibrous or carboniferous materials, and particularly of improvements of the invention claimed in the Complete Specification accompanying the Patent Application No. 101782, which has been divided from 3998/15, referred to in the Provisional Specification. The improvement consists in furnishing the apparatus in question, which is provided with strainers which are not employed for the admission of gaseous fluid, with means for pumping the expressed liquid, after it has preferably been filtered, down the courses formed by grooves (for example, previously followed by it after passing through the strainers), the object being to carry away any of the finely divided matter which may have passed through the strainers and which may or might have partially or wholly obstructed or choked said courses or strainers. Such obstruction or choking is most likely to occur when the amount of liquid expressed is small. Instead of employing the expressed liquid, other liquid, for instance, clear water, may be employed. A press with the improvement according to the present invention is illustrated by way of example in the accompanying drawings, in which fig. 1 is a vertical section of the press; and fig. 2 a horizontal section of the outer cylinder wall on the line IV.—IV. in fig. 1. This press is clearly described in the Specification 101782, and the improvement of the apparatus in fig. 1 consists in the provision of the pump 40 and pipe 38 and groove 39, which pump pumps water through said pipe and along the groove 39 to the grooves 51 at the back of the strainer 52, and so washes away obstructive matter through the exit pipe 15. The provision of the perforated liners 53 forms the subject matter of the Application No. 14606/16. (Two claims.)

108509. *Apparatus for the Carbonisation of Coal, etc.* W. Anderson, Inistore, Helensburgh, Dumbartonshire; and J. Meikle, 14, Garrioch-drive, Maryhill, Glasgow.—This invention relates to an improved process of and apparatus for carbonising coal, wood, peat, and other carbonaceous matter, by retorting the carbonaceous matter in the presence of hydrocarbon vapour at a high temperature. According to the invention, the operation is effected with the vapour under pressure, the vapour being the product of the process described in the Specification of a co-pending Application, No. 108508/16. In the figure of the accompanying drawing is illustrated a construction of apparatus for performance of the process described, the said apparatus being the same as that described in the Specification of a co-pending Application for Letters Patent, No. 11033/16. Referring to the drawings, a retort is interposed in a by-pass connection between a condenser 5 and a superheater comprising tubes 3 expanded into headers 4, through which superheater are or may be led, and the steam and the distillation products from the still 1 provided with the oil inlet 2, there being



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introduced an expansion chamber between the condenser 5 to receive the heavier hydrocarbon matter. It will be understood that of the total volume of vapour emerging from the condenser, the residue available for the same uses as coal gas, the carbonised product will be of high value.

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Adams, R., and Groves, F. H. Winding gear for lifts, etc. (14520)
- Anthony, A. H. Automatic regulators for boiler feed apparatus. (14686)
- Apeldoornsche Machinefabriek en Metaalgieterij voorheen L. Landaal. Ammonia compressors. (14735)
- Bowhill, J. H. Internal combustion engines. (14573)
- Brampton Brothers. Driving or conveying chains. (14578)
- Chinese-American Company. Producing gas. (14850)
- Chitty, H. Dynamo electric machines. (14727)
- Crossley, Sir K. I. Internal combustion engines. (14709)
- Davis, W. H., and Davis and Son, J. Clinometers. (14863)
- Deering, H., and Cooper-Murray, R. J. Forced induction four-stroke engine. (14581)
- Field, G. K. Internal combustion, etc., engines. (14688, 14689, 14690)
- Guy, S. S. Internal combustion engines. (14495)
- Hamblet, J., and Morris, W. Production of hydrocarbon gas for power purposes. (14505)
- Harvey, Frost and Company. Liquid fuel burners. (14617)
- Hope, J. A. Steam boilers or generators. (14705)
- Ketley, G. P. Method of re-calcining mine ash, etc. (14706)
- Kievits, J. E. P., and Kynoch Limited. Electric furnaces of the heated coil type. (14838)
- Lindley, W. Apparatus for sinking shafts. (14555)
- Lyon, F. Apparatus for heating, cooling, or condensing air, water, steam, etc. (14496)
- McDonald, D. Reinforced refractory covers. (14507)
- McDonald, D. Smoke prevention furnace. (14508)
- Mangnall, N. Locking mechanism for hoists, lifts, etc. (14501)
- Manley, W. V. Boiler. (14644)
- Morriss, H. E. Liquid fuel burners. (14617)
- Murphy, J. Device for coupling and uncoupling railway wagons, etc. (14583)
- Pearse, A. L. Distillation of carbonisable materials. (14725)
- Reisert Ges., H. Producing means for softening water. (14620)
- Ritson, F. Means for hoisting and discharging loads. (14657)
- Somerville, J. M., and South Metropolitan Gas Company. Method of oxidising carbon monoxide. (14737)
- Steele, A. M. Clinometers, etc. (14776)
- Tankard, H., and Tankard and Smith. Gas carburettors. (14635)
- Tissier, L. E. Calcining and roasting ores. (14541)
- Wadhams, G. Driving or conveying chains. (14578)

- Wall, T. F. Alternating current generators. (14598)
- Wallis, E. F. Rotary pumps. (14577)
- Walthew, J. G. Internal combustion engines. (14549)
- Watkins, W. H. Aerial ropeways, cableways, etc. (14666)
- Watkinson, W. H. Internal combustion engines. (14530)
- Webb, W. Le P. Internal combustion engines. (14709)
- Westinghouse Machine Company. Geared turbines. (14550)
- White, J. W. Overhead rope railways, etc. (14778)
- Williams, H. A. W. Internal combustion engines. (14549)
- Williamson, E. H. Gravity separating apparatus. (14767)
- Wilton, G. Distillation and recovery of ammonia from ammoniacal liquor. (14745)
- (Wolf Akt.-Ges., R.) Feed water heaters. (14614)
- Young, A. Machine for generation of electric currents. (14538)

Complete Specifications Accepted.

(To be published on November 1.)

[NOTE.—The number following the application is that which the specification will finally bear.]

10794. Green Fuel Economizer Company. Centrifugal fans. (101094)
13914. Bowen, R. Solid fuel. (109995)
14035. Constantinesco, G., and Haddon, W. Alternating liquid current motors. (110003)
14036. Constantinesco, G., and Haddon, W. Apparatus for transmitting pressure between fluid columns and moving surfaces. (110004)
14037. Constantinesco, G., and Haddon, W. Synchronous alternating liquid current motors. (110005)
14039. Constantinesco, G., and Haddon, W. High-frequency liquid wave transmission generator. (110006)
14148. Heyl, G. E. Liquid fuels for firing furnaces and for high compression oil engines. (110023)
14680. Farley, J. Smoke consuming furnaces and water heaters. (110034)
15632. Price, W. Hook couplings and the like suitable for mining and like wagons. (110043)
16553. Wale, A. E. Conveyor driving and other belts. (110049)
18509. Ellis, A. G., and Thompson, J. L. Electrical transformers. (110070)
- 1916.
1726. Baldwin, J., and Kevill, T. Means for and method of automatically lubricating the wheel axles of colliery wagons, tubs, corves, and the like. (110085)
1788. Holdsworth, G. B., and Horsfall, A. E. Automatic elevator. (110086)
9954. Stoneham, J. A. Method of combining liquid hydrocarbons in order to render them suitable as fuel when used in internal combustion engines. (110132)
11841. Mower, G. A., and Spencer, H. W. Feed water regulators for steam boilers. (110141)
12745. Bengtsson, O. Gravity motor. (110144)
13532. Baumann, K. Axial flow steam turbines. (110146)
- Complete Specifications Open to Public Inspection Before Acceptance.**
- [NOTE.—The number following the application is that which the specification will finally bear.]
- 1916.
17865. Stowe, C. B. Process of making basic refractory materials. (110147)

1917.

4647. General Engineering Company. Method of and apparatus for burning fuel. (110150)
4648. General Engineering Company. Steam generators. (110151)
12681. Akt.-Ges. Brown, Boveri et Cie. Method and apparatus for balancing the axial thrust in impulse reaction turbines. (110159)
13491. Schmidt, H. F. Turbines. (110161)
14238. Gibbs, W. E. Control of air in breathing apparatus for use in mines, etc. (110163)

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named **post free**.

Committee of the Privy Council for Scientific and Industrial Research: Report of the Fuel Research Board on their Scheme of Research and on the Establishment of a Fuel Research Station. (London: Published for the Department of Scientific and Industrial Research by H.M. Stationery Office). Price 2½d.

PUBLICATIONS RECEIVED.

"Transactions of the North-East Coast Institution of Engineers and Shipbuilders" (Vol. 33, Part 6), September 1917, edited by E. W. Fraser Smith, secretary (Newcastle-upon-Tyne: Published by the Institution, Bolbec Hall), price 5s.; "The M. and C. Apprentices Magazine" (Vol. 1, No. 3), price 3d.; "Concrete and Constructional Engineering" (Vol. 12, No. 10), October 1917 (published monthly at 4, Catherine-street, Aldwyck, W.C.), price 1s. net; "Bulletin et Comptes Rendus Mensuels de la Société Minérale" (1re livraison de 1917); "Heat Drop Tables—H.P. Gauge Pressures—L.P. Absolute Pressures" (calculated by Herbert Moss) (London: Edward Arnold), price 5s. net; "Compressed Air Magazine" (Vol. 22, No. 9), September 1917, price 10c.; "The North of England Institute of Mining and Mechanical Engineers—Annual Report of the Council and Accounts for the Year 1916-17, List of Council, Officers, and Members for the Year 1917-18, etc., and Roll of Honour" (Newcastle-upon-Tyne: Published by the Institute), price 5s.

Japan has prohibited the export of sulphate of ammonia, superphosphate of lime, and compound fertilisers containing these products, also of nitrate of soda.

The Controller of the Foreign Trade Department has issued a new list of additions to the statutory list of firms of enemy nationality or enemy association with whom persons in the United Kingdom are forbidden to trade. Copies of this list can be obtained at a trifling cost from the Superintendent of Publications, H.M. Stationery Office, Imperial House, Kingsway, W.C.

Shipments of iron and steel from the port of Middlesbrough during September were officially returned at 5,529 tons, of which 45,384 tons were pig iron, 1,452 tons manufactured iron, and 6,693 tons steel. Clearances of pig for the previous month reached 59,083 tons, and for September last year the shipments of pig were given at 44,969 tons.

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JOURNAL OF THE COAL AND IRON TRADES.

VOL. CXIV.

FRIDAY, OCTOBER 26, 1917.

No. 2965.

Working Costs of Prime Movers.*

By OSWALD WANS.

The problem of economical power is one that must repeatedly present itself to those responsible for the welfare of industrial concerns, or indeed to anyone upon whom falls the onus to provide power for whatever purpose. Yet the available data are seldom complete, and are frequently misleading. The claims and working costs advanced in favour of the several prime movers are often conflicting and difficult to reconcile with fact, owing to the too limited basis upon which they have been founded. The condition that a certain type of engine possesses an exceptionally high thermal efficiency does not necessarily establish its commercial superiority. On the contrary, an engine of lower thermal efficiency may, under favourable conditions, be a sounder proposition from the commercial standpoint, and this in practice is the ultimate criterion of the engine's worth.

Working costs based mainly upon the low rate of fuel consumption are practically useless, and although the statement may be termed obvious, nevertheless, not infrequently one finds that the capital charges are either inadequately covered or entirely ignored.

The author's object is to give data that will be of service in estimating capital expenditures and working costs, and in establishing the relative commercial value of the principal prime movers. For this purpose, typical examples of the following prime movers will be considered:—Suction gas engines and plants burning anthracite, coke, and wood refuse; gas engines using town gas; oil engines of the solid injection high compression type; Diesel engines; and steam engines. Units are included up to a working load of 500 b.h.p., a range embracing the engines in greatest demand. For higher powers two or more units can be used sometimes with advantage, for such installations possess a considerable power flexibility, in that the units may be cut out or put into service to suit the load requirements. This facility largely obviates the disadvantages of underloading, particularly valuable in the case of an internal combustion engine, and offers a further advantage in the event of a breakdown of one unit, for a complete stoppage of work may be prevented. In a multi-unit installation the expenditure and working costs may be taken as proportional to the number of units.

The factors governing the costs of the larger installations are distinct. For example, the possibility of using bituminous coal with a recovery plant, live and exhaust steam turbines, etc., should be considered, thus introducing another set of conditions. It is perhaps hardly necessary to state that working costs, to be of commercial value, must contain the charges due to capital expenditure, depreciation, etc., as well as those arising from the direct running expenses (founded upon "everyday" performances).

Capital Expenditure.

The capital expenditure should cover the total cost of the completed installation in working order. The following list gives the items included in the expenditure curves, fig. 1:—

Installation.	Items included in Expenditure.
Suction gas engine, Town gas engine, Solid injection oil engine, Diesel engine.	Industrial engine, pulley, foundation bolts, compressed air starter with receiver and connections, exhaust pipe and silencer, barring gear, cooling tower, tanks, water circulating pipes and pump, foundations, erection.
Additional for suction gas engine.	Producer, cleaning plant and charging platform, air and gas piping, producer foundation and bolts, erection.
Additional for town gas engine.	Gas-bag, connections, and air-piping.
Additional for solid injection oil engine and Diesel engine.	Fuel tanks and piping.
Steam engine.	Industrial jet and surface condensing superheated steam engines, barring gear, foundation and bolts, steam, exhaust and feed piping, boiler, seatings and flues, superheater, feed-water heater and pump, steel chimney, economiser for 150 b.h.p. and upwards, erection.

Buildings and flooring have not been included, as their cost varies widely, being largely dependent upon the taste of the purchaser, and may therefore range from a bare galvanised structure to a substantial stone or brick building. Furthermore, existing buildings are frequently used with more or less modification.

The cost of the buildings for internal combustion engines would be less than for a steam plant, and this applies equally to suction gas engines, for the producer and cleaning plant do not require a covering, whereas some form of protection is necessary for a boiler. A well-equipped engine house should possess a crane, but the cost of this item is dependent to a certain extent

upon the proportions of the engine house, and has consequently not been taken into consideration; but its cost would not be materially different for the several types of engines. Cooling towers have been included in all cases, with the exception of the smaller gas and oil engines of about 50 b.h.p., as the more usual practice is to employ cooling tanks suitable for thermo-siphon circulation.

When deciding the size of the engine, it is necessary to consider its overload capacity, for this factor greatly affects the capital expenditure, the reliability, and the fuel economy. Much of the trouble at times experienced with internal combustion engines is solely due to excessive overloading; and that gas and oil engines should have a large power margin is therefore

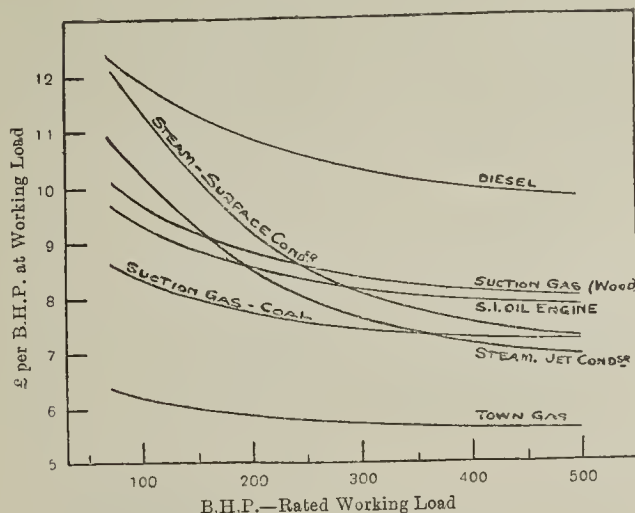


FIG. 1.—EXPENDITURE CURVES.

an essential of reliability. The maximum overload that may be depended upon varies considerably with the type of engine, thus:—

Above rated working load.	Per cent.
Steam engine	35
Solid injection oil engine	15
Diesel engine	15
Gas engine	10

The larger overload carried by a steam engine is a characteristic of considerable value in the handling of fluctuating and peak loads. Moreover, this advantage is attained without impairing the fuel economy at the working load. Unfortunately this feature is not possessed by an internal combustion engine. An overload of 35 per cent. may be carried, but only at the expense of the fuel economy at the mean working load, which in the case of a gas engine would be about 18½ per cent. below the rated working load.

The degree of importance to be attached to the overload capacity of an engine can be decided only after full consideration of the duty required, but for the purposes of comparison it is necessary that similar load conditions be considered for all installations. A common maximum load of 35 per cent. above the mean working load consequently has been assumed, and the effect upon the capital expenditure is illustrated by Table I:—

Plant.	TABLE I.			Necessary increase in rated maximum load to give 35 per cent. overload.
	B.H.P.	Rated working load.	Rated maximum load.	
Steam engine...	100	135	180	Nil.
Oil engine	100	115	155	17½
Diesel engine	100	115	155	17½
Gas engine	100	110	147	23

For a mean working load of 100 b.h.p. and 135 b.h.p. maximum load, it will be seen from the fourth column that a larger internal combustion engine is required than is indicated by the rated working load. For example, the gas engine must have a maximum load some 23 per cent. greater than the rated maximum load usual for a 100 b.h.p. rated working load engine requiring, it follows, a larger engine and outlay than appears at first sight to be necessary.

The expenditure curves, fig. 1, give the total cost per b.h.p. at the rated working load, and show that the cost of suction gas engine and plant of 100 to 110 b.h.p. is £8.3 × 100 = £830, as against £8.1 × 123 = £997, for a 100 to 135 b.h.p. engine. That is to say, the cost of the gas engine is increased by approximately 20 per cent. in order that it may perform a duty equivalent to a steam engine of 100 b.h.p. rated working load. This example serves to illustrate how necessary it is when comparing capital expenditures to place the comparison on "all fours" as regards power capacity.

The expenditure curves are based upon the costs of horizontal engines, excepting Diesel engines, but would

not be greatly different for the vertical type. Generally speaking, vertical engines cost more per horsepower, but a saving is effected in the cost of the foundations.

Depreciation.—A divergence of opinion appears to exist as to the annual charge that should be made to cover depreciation. The seller naturally wishes to place as favourable a complexion as possible upon the engine in which he is particularly interested, and it is to be feared that this desire tends to under- rather than over-estimation of the charges under this heading. Generally speaking, the estimated costs of steam installations show a greater uniformity and liberality in this respect than is usual with internal combustion engines. As an example of the low rate for depreciation for the latter, the not uncommon charge of 5 per cent. may be cited. A little reflection should show how inadequate a provision this affords. It will be well to explain briefly what is here implied by the term depreciation. The depreciation charge is considered as the annual amount that should be written off the capital expenditure to cover the deteriorating value of the plant as regards obsolescence. This definition does not agree with general usage, inasmuch as wear and tear are not included.

In the author's opinion, this departure is justified because: (1) Developments are nowadays so rapid that there is an increasing tendency for a power plant to become economically obsolete before it is worn out. (2) The allowance made for repairs should be sufficient, in a modern engine, to cover wear and tear during its economical life, whilst serious breakages should be covered by insurance.

It follows, therefore, that the depreciation charge is solely dependent upon the anticipated economical life of the installation, i.e., the period it can be reasonably expected to maintain its economical superiority over competing prime movers irrespective of type. Immediately this superiority is lost, the commercial value of the installation, as a source of power, falls, and the advisability of replacing it by an up-to-date plant should be considered.

It is false economy to keep a plant in service merely because it continues to perform the duty for which it was originally installed, though one often finds an antiquated engine struggling along with its load, and positively eating money that could be saved by substituting a modern plant. The depreciation of 5 per cent. above corresponds to a life of well over 50 years, if based upon the diminished value and allowing a high scrap value, or about 20 years if taken in equal annual instalments. In either case, the anticipated life is obviously

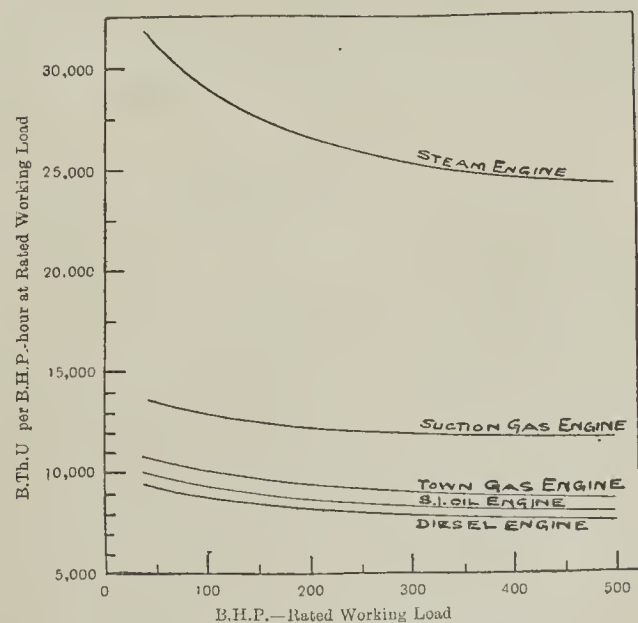


FIG. 2.—FUEL CONSUMPTION CURVES.

excessive, and, from past experience, it may be inferred that an internal combustion engine before the expiry of 20 years' service would be an extravagant consumer of fuel, and in a generally worn-out condition; indeed, this would be equally true of a steam installation.

The depreciation rate should spread the expenditure burden over a reasonable number of years, and permit in good time of the removal of the power plant in favour of a more modern type, should the developments in later-day practice render the running costs comparatively high. It is considered that a uniform annual rate of 8 per cent., equivalent to 12½ years' service, fulfils these conditions, and that this rate should apply to all the prime movers under consideration, seeing that the commercial life is dependent upon the best practice irrespective of the type of engine. The amount written off annually should then be 8 per cent. of the total expenditure given by the curves in fig. 1.

This uniform rate is intended to apply to cases in which the several prime movers under consideration are applicable and therefore in competition. The competitive factor applies to the large majority of installa-

* Paper read before the Institution of Mechanical Engineers on October 19.

there may be instances in which the work renders a particular type of prime mover suitable, thus eliminating this factor, and determining the probable date at which the plant is considered obsolescent.

Cost and Interest.—The cost of insuring is variable and varies with the power unit and the insuring company. The premium for engines usually covers breakages, but not wear and tear, and this fact should not be lost sight of when fixing the annual reservation for repairs. The premiums range from about $\frac{1}{2}$ per cent. of the cost in the case of boilers to about 3 per cent. for Diesel engines. The charges under this heading are therefore comparatively small, whereas the accruing advantages are self-evident. The rate of

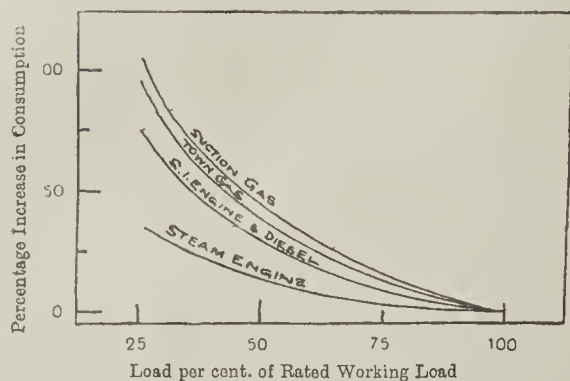


FIG. 3.—CONSUMPTION AND LOAD CURVES.

interest upon the capital expenditure has been taken as 5 per cent. in the working cost curves, figs. 5 and 6.

Running Charges.

Cost of Fuel.—Estimated working costs, founded upon the fuel consumption possible at the most-economical load, are of little value. Everyday figures only should be considered, and failure in this respect is frequently the cause of erroneous estimates. In practice an engine seldom runs at the rated working load, having to cope alternatively with loads that may be temporarily greatly in excess and at other times considerably less. These practical conditions have a marked bearing upon the working costs, and particularly so in the case of an internal combustion engine.

The accompanying curves, fig. 2, show the average consumption in British thermal units per b.h.p. hour at the rated working load. These values, however, hold good only when these loads are carried continuously; and the extent to which modification is necessary to suit practical conditions is contingent upon the load factor and the peak loads to be handled. These factors may vary widely, consequently each case must be considered upon its merits, but to effect a comparison a common overload of 35 per cent. will be assumed again. This condition necessitates the underloading of all the installations with the exception of the steam plant, that is to say, the mean working load will be below the rated working load to an extent dependent upon the maximum load capacity of the unit. (Tables I. and II.) This underloading increases the consumption, and the curves, fig. 3, show the average percentage increase for a given decrease in load below the rated working load.

These curves clearly indicate the importance of the correct determination of the load factor, and the absolute necessity to consider similar load conditions in order that a true comparison may be made. Table II. shows the increase in fuel consumption due to the underloading necessitated by an overload of 35 per cent.

TABLE II.

Installation.	Mean working load below rated working load.	Increase in consumption due to underloading. (From fig. 3.)
	Per cent.	
Steam engine	Nil.	Nil.
Oil engine	14.5	2.5
Diesel engine	14.5	2.5
Suction gas engine	18.5	12
Town gas engine	18.5	8

A further allowance must be made for stand-by losses, which will depend upon the frequency and length

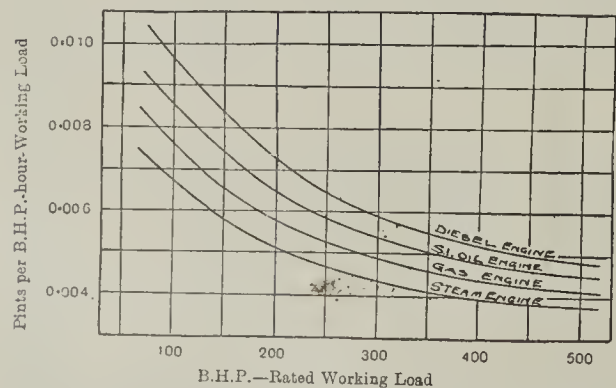


FIG. 4.—LUBRICATING OIL CONSUMPTION CURVES.

of the stoppages. This loss, of course, applies only to suction gas and steam installations, and the amount may vary considerably according to the care exercised. The following values, expressed as a percentage of the fuel consumption at the rated working load for a working week of 60 hours, have been included in the working costs, curves, figs. 5 and 6:—

Suction gas installations	Anthracite	Per cent.
do.	Wood	6
do.	Coal	15

When a plant runs continuously throughout the week, the losses would be considerably less, and, third, assuming that the boiler or engine is at night over the week-end.

Cost of Oil.—The quantity of lubricant

necessarily varies widely in practice, even in similar engines, due partly to the differences in manufacture and to the care or negligence on the part of the attendant. To cover these factors, the charges should be of a liberal nature.

The curves in fig. 4 give representative consumptions for new oil, no allowance having been made for filtering and re-using the oil. The saving effected by filtering is worthy of consideration, but filtered oil cannot be recommended for use in cylinders, unless enriched by about 30 per cent. of new oil. The quantity of oil given includes both cylinder and bearing oils. For internal combustion engines, it is customary to use one grade for both purposes, whereas two qualities are usual for steam engines—about one-third for the cylinders and the remainder for bearings, etc. The adoption of one grade of oil has a practical advantage in preventing the use of the wrong oil for, say, the cylinders, a mistake likely to have serious results in an oil or gas engine.

Cost of Water Supply.—In many localities a plentiful and gratuitous water service is not available, and the cost of the necessary supply becomes a matter of moment. With a free and suitable supply the water may be returned, directly after use, to the source, thus obviating the cost of a cooling plant. Frequently, however, the local charges render necessary a closed system whereby, with little loss, the water can be used repeatedly. For the smaller internal combustion engines, up to 50 b.h.p., cooling tanks are very general, but for larger powers a cooler, of, say, the tower type, becomes necessary. The tower cooler is equally applicable for cooling condenser water, and possesses the advantages of simplicity and low cost, but owing to its bulk is not always adaptable. When the requisite space is not available, a more costly form of cooler may be a necessity, but such cases are not general, and must be considered individually.

In the expenditure curves, fig. 1, the cost of a cooling tower is included for internal combustion engines above 50 horse-power and for surface, but not jet condensing steam engines. In the latter case it is assumed that the water is run to waste. The water lost by evaporation, in passing through the cooler, may be taken as 5 per cent. of the total water in circulation.

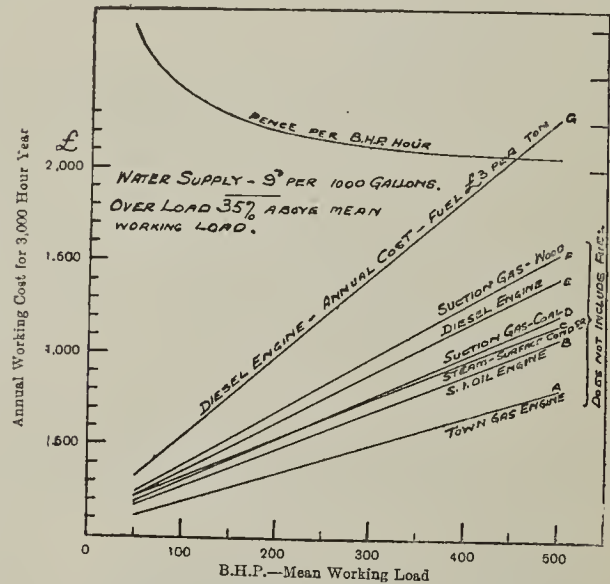


FIG. 5.—WORKING COST CURVES.

In a well-kept installation the loss due to leakages is negligible; but there is a further loss in a suction gas plant in the water required for supplying steam to the gas producer and in the effluent from the cleaning plant. The former water is, of course, not recoverable, and the latter can be and is sometimes used several times before disposal. Unless special provision is made, the water is prone to foul the circulating pump and pipe lines, and, when ultimately disposed of, is apt to arouse suspicion in the municipal mind owing to its more concentrated nature, this applying particularly to wood refuse fuel.

Often the cleaning water can be taken continuously from and returned to a neighbouring pond or river without charge. The effluent, after once passing through the cleaning plant, is of a harmless nature; but if turned into a sewer or a river all traces of tar must be removed, as this appears to be the *bête noire* of local authorities.

TABLE III.—WATER CONSUMPTIONS.

Installation.	Surface condenser water. Gals. per b.h.p.-hour.	Jacket water. Gals. per b.h.p.-hour.	Piston and exhaust valve. Gals. per b.h.p.-hour over 100 b.h.p.	Scrubber water. Gals. per b.h.p.-hour.	Dust collector. Gals. per b.h.p.-hour.	Tar extractor. Gals. per b.h.p.-hour.	Steam to producer. Gals. per b.h.p.-hour.	Water lost by A, B, C, D.	Water lost by cooler evaporation.	Total water lost. Gals. per working load, b.h.p.
Steam engine	45-55.	—	—	A	B	C	D	—	24-24	24-24
S.I. oil engine	—	6	0.5	—	—	—	—	—	0.325	0.325
Diesel engine	—	5	0.5	—	—	—	—	—	0.275	0.275
Gas engine. Town gas	—	6	1.5	—	—	—	—	—	0.375	0.375
Gas engine. Anthracite & coke	—	6	1.5	1.75	—	—	0.075	1.825	0.375	2.2
Gas engine. Wood, etc.	—	6	1.5	—	4	1.5	—	5.5	0.375	5.87

Table III. gives the total quantity of water in service and the make-up water necessary to replace the cooler and cleaning plant losses. The latter quantities only need be considered in working costs, for the cost of the initial supply of water is negligible.

Cost of Sundry Stores.—The payments arising from these items are small, and are generally covered by a charge of 0.01d. per rated b.h.p. hour for any of the prime movers under consideration.

Cost of Labour.—The charges under this heading should include not only the attendant's time during

running hours, but also that needed to clean, grind in valves, etc., and generally to keep the installation in good condition. In the case of steam and suction gas plants, the time spent in handling the fuel and removing the ashes must be covered. The attendance time is fairly uniform for similar installations, and, generally speaking, is on a minimum basis. Usually it is not necessary to employ highly-skilled labour; nevertheless sufficient should be paid to command the services of the intelligent and handy type of man. Wages at the rate of 6d. per hour have been allowed for in the cost curves, figs. 5 and 6.

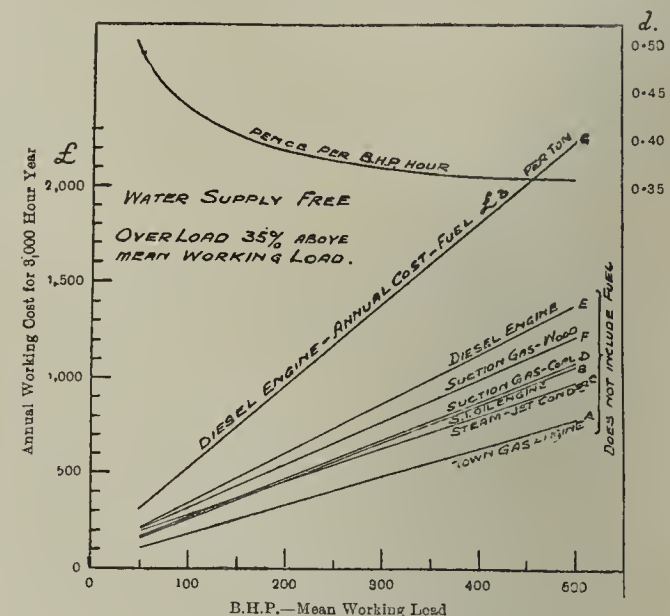


FIG. 6.—WORKING COST CURVES.

The following formulae give a fair indication of the time that is spent solely upon the prime movers under consideration:—

Suction gas (wood fuel) and steam engine plants	0.8 + 0.0047 b.h.p.
Suction gas (coal and coke fuel)	0.6 + 0.0041 ..
S.I. and Diesel engines	0.3 + 0.0036 ..
Town-gas engines	0.2 + 0.0017 ..

These expressions give the labour in hours per rated working load per hour. Thus, for a 100 b.h.p. suction gas plant using wood fuel, and 100 b.h.p. town gas engine, the labour would be respectively 1.27 and 0.37 hours per hour's run.

Cost of Repairs.—The annual charge should provide amply for wear and tear and such breakages as are not covered by insurance. The actual payments may form an appreciable portion of the running costs, and must in some cases exceed the estimated amount in view of the small provision made. This applies particularly to internal combustion engines. In many gas and oil engines the repair bill over, say, five or six years, does not exceed 2 per cent. per annum of the engine cost, but such a figure should not be taken as a basis, since internal combustion engines are more prone to minor mishaps than steam engines, and due allowance must be made. For a well-designed gas or oil engine, ample margin for this contingency is given by an annual charge of 3 per cent. of the engine cost.

The following are the repair charges allowed for in the working cost curves, figs. 5-6:—

Diesel and S.I. oil engines, town gas engines	3 % of engine cost.
Suction gas installations	3 % of engine and producer costs.
Steam installations	2½ % of engine, boiler and auxiliary costs.

Annual Working Costs.

The annual working costs of the engines under consideration will be found to differ appreciably with the locality, due mainly to the fluctuations in the prices of water and fuel. In some districts a free water supply may be available, and in others the charge may be high, whilst the price of fuel, particularly oil, varies considerably from time to time and with the locality, thus rendering these two items almost the ruling factors of economical working.

In order to establish a relationship between the fuel prices that may be paid, and to show the influence of the water charges upon these prices, the curves, figs. 5 and 6, have been plotted. The curves A to F, fig. 5,

maximum prices that may be paid can be easily computed, and have been plotted in curves, figs. 7 and 8, whilst the fuel prices given by those curves for plants of 250 b.h.p. mean working load are given in Table IV.

TABLE IV.

	Price of fuel. (Curve fig. 7.) Per ton.	Price ratio.	Price of fuel. (Curve fig. 8.) Per ton.	Price ratio.
	s. d.		s. d.	
Diesel engine.....	60 0	0.79	60 0	0.785
Solid injection oil engine	76 0	1.0	76 6	1.0
Suction gas. Anthracite	29 0	0.38	31 6	0.41
" Coke.....	21 0	0.27	23 0	0.3
" Wood.....	8 6	0.113	12 0	0.157
Steam engine. Jet condenser	—	—	16 0	0.21
Steam engine. Surface condenser	14 0	0.184	15 0	0.195
Town gas engine.....	1s. 1d. per 1,000 cu. ft.	0.014	1s. 1d. per 1,000 cu. ft.	0.014

In the curves, figs. 5 to 8, the engine possessing the highest thermal efficiency, namely, the Diesel engine, has been taken as a convenient basis using fuel oil at £3 per ton. Reference to these curves shows that the relative fuel prices for the several installations are fairly uniform for the range of powers under consideration. The widest variation is that shown for the steam plants, due to the comparatively higher initial cost and lower thermal efficiency of the smaller powered engines. The fuel consumptions represented

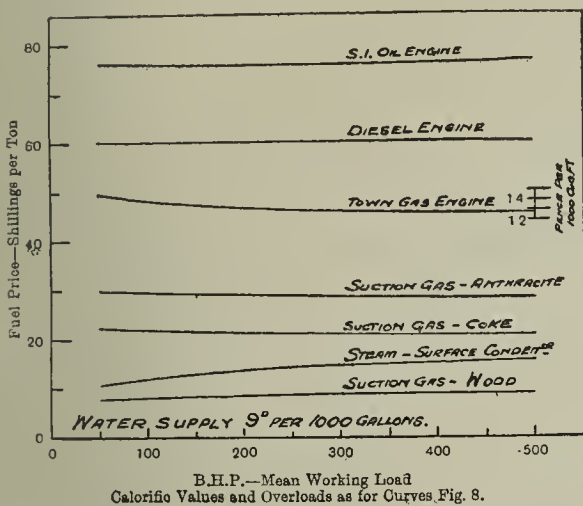


FIG. 7.—FUEL PRICE CURVES.

by the curves, fig. 2, are favourable to the steam engine, and apply to compound condensing installations using superheated steam. In general practice, consumptions as much as twice those represented are not unusual, thus nearly halving the fuel prices shown by the curves, figs. 7 and 8, and further limiting the districts in which the use of the steam engine can be defended on the score of minimum working costs.

As the power increases a higher price may be paid for coal, and the steam engine becomes a more serious rival of the suction gas plant; nevertheless, for installations up to 500 b.h.p. working load the latter well holds its own, for it is possible to obtain even running costs with fuel ranging in price (according to the power) from two to three times that permissible for a steam plant. The price allowable for town gas is practically constant at 1s. 1d. per 1,000 cu. ft., and consequently confines the use of the town gas engine to cities in which gas is procurable at this low rate.

Turning now to the high-compression solid injection oil engine, a high price may be paid for fuel oil, namely, £3 16s. per ton, as compared with £3 for the Diesel engine, or a price some 26 per cent. higher, notwithstanding the higher thermal efficiency of the latter engine. The lower capital expenditure and other running charges of the solid injection engine are responsible for this result. The future of the oil engine must be obviously dependent upon a regular supply of uniformly low-priced fuel oil, and it is to be feared that past irregularities in these respects have to a certain extent militated against their more extended application. An adequate supply of fuel oil, in view of the high thermal efficiency of the oil engine, is of the utmost importance to manufacturers, for it offers a means by which minimum working costs may be obtained. It is usual in the supply of electrical and hydraulic energy for power purposes for the suppliers to charge specially reduced rates, and it is suggested that a similar procedure might be followed with advantage in the case of fuel oil.

With fuel oil at £3 per ton, the price of coal must not exceed on the average £1 5s. and 12s. per ton respectively for suction gas and the larger steam plants over 250 b.h.p. in order that the total annual running charges do not exceed an oil engine of the solid injection type, clearly indicating the wide field of action of this type of engine. The cheaper grades of fuel oil of not less than 0.95 specific gravity alone are considered, as the charges of engines using the more costly and refined oils are appreciably higher and therefore commercially inferior.

Considering, lastly, the refuse suction gas plant, the price of the fuel ranging as it does from 11s. to 13s. per ton, even with a free water supply, limits its use to industries in which the wood or other refuse (sawdust, husks, spent tan, etc.) is a waste product of the industry, for it is seldom possible to obtain a constant supply at these rates. Under this condition refuse installations are unquestionably the cheapest form of power.

The use of suction gas as a heating agent is yet in its infancy, but very satisfactory results have already been obtained. The gas is drawn from the producer through a purifier and pumped to a gas holder, from which it is piped under slight pressure to any part of the factory, and by the aid of an air-mixer and burner used in a similar manner to town gas. This feature adds to the general utility of the suction gas

installation, and may in some cases effect an appreciable economy in the working costs.

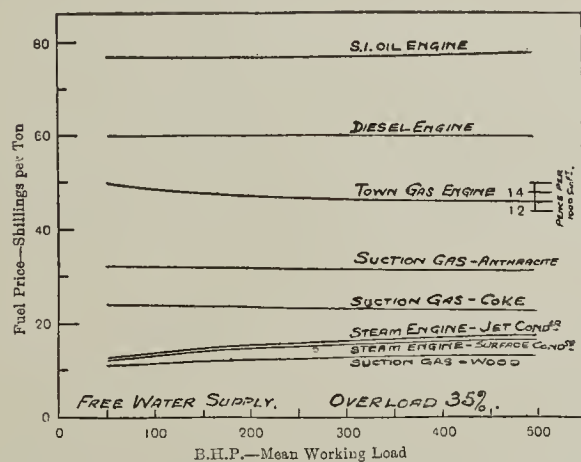
An objection sometimes advanced against the adoption of the internal combustion engine for certain classes of works as, for example, tanneries, laundries, cotton mills, factory heating, etc., is its inability to provide a steam supply. This difficulty has, however, been met to a large extent by the exhaust heated boiler which is capable of supplying about 2 lb. of steam from and at 212 degs. Fahr. per b.h.p. hour of the engine. The steam, being otherwise wasted, costs nothing beyond the small additional charges due to depreciation and interest upon capital. A boiler working in conjunction with a 250 b.h.p. suction gas engine is capable of supplying about 500 lb. of steam per hour, which is equivalent to the saving of 65 lb. of coal per hour.

Conclusion.

It is evident from the foregoing that statements to the effect that a certain class of engine is the most economical requires qualification. It has been shown that the cost of fuel has a deciding influence upon the working cost, although that due to the necessary water supply may be serious in some districts. Now, as the cost of fuel is regulated largely by railway and shipping freights, it is clear that the distance from the source of supply has an important bearing upon the kind of fuel, and it follows the type of engine that should be installed.

The maximum permissible prices that may be paid in any locality are indicated generally by the ratios (Table IV.), and more particularly by the curves, figs. 7 and 8. The practical application of these price ratios shows that each type of engine has its particular field of action, in which it can be used with commercial advantage, provided due regard is paid to the local conditions. An exclusive claim to minimum working costs cannot be rightly made on behalf of any one of the prime movers under consideration.

The relative fuel prices do, however, indicate that the scope of the steam engine is less than the oil engine, for in the best practice of the former the price of coal for the larger installations of 250 horse-power and upwards may not exceed on the average one-fifth of the price of fuel oil for an engine of the solid injection type and one-fourth for Diesel engines, and appreciably less for smaller powers. Between these extremes stands the suction gas plant, for which the prices of coal and coke may be respectively twice and 1½ times the price of coal for steam engines of the larger powers. The use of town gas engines is clearly confined to the few cities in which gas can be obtained at about 1s. 1d. per 1,000 cu. ft., and the refuse suction gas installations in which there is an ample supply of suitable waste material.



Calorific values as used—

Anthracite.....	14,500 B.Th U. per lb.
Coal (boiler) ..	13,500 " "
Fuel oil	18,000 " "
Wood refuse ..	5,800 " "
Town gas.....	540 " " 1,000 cu. ft.

FIG. 8.—FUEL PRICE CURVES.

It is obvious, therefore, that the commercial superiority of a prime mover is not established by reference to its thermal efficiency, but by the local conditions regulating the price of fuel. However thermally efficient an engine may be, the ultimate test is a commercial one, involving the market price of fuel, which must always depend upon the facilities for distribution from the source of supply. In practice, therefore, railway and shipping freights have a marked and direct influence upon the type of engine giving the most favourable performance from the commercial standpoint.

The whole problem is one that cannot but force itself more and more upon manufacturers with the keener competition that may be expected in the near future, and unless correctly solved must tend to handicap any industrial concern by the higher establishment charges that must necessarily follow. The right solution not only benefits the manufacturer, but also effects an economy in the national resources by preventing the waste of fuel.

United States Coal Industry Warned.—A cabled message from Washington, dated October 18, states that the Government, through Mr. Garfield, the Fuel Administrator, has served notice upon coal owners and miners that there must be no strikes while the country is at war, and that the burden rests with them to produce the coal needed without interruption. This notice was accompanied by a clear statement that unless all differences are adjusted, the Government will take immediate and drastic action—which, it is no secret, means that the United States will take over and work the mines. The Government is far from satisfied with the attitude of both capital and labour engaged in the coal industry. The Fuel Administration has discovered that approximately 1,000,000 tons of soft coal had been "cached" in the Cleveland district by private interests. This will probably be commandeered.

NORTH STAFFORDSHIRE INSTITUTE OF MINING ENGINEERS.

The 45th annual meeting of the North Staffordshire Institute of Mining Engineers was held at the Mining School, Stoke-on-Trent, on Monday evening, the chair being occupied by Mr. JOHN GREGORY (president).

Second-Lieut. C. A. Philip Southwell, Stoke, was elected an associate member; Mr. A. L. Lovatt, Kidsgrove, was transferred from associate to member; and Mr. Harry Mason, Scholar Green, was transferred from student to associate member.

Report of Council.

Mr. T. YATES (hon. secretary) read the report of the council for the year ended July 31, 1917, which stated that the membership at that date was: Honorary members, 3; ordinary members, 95; associate members, 16; associates, 26; students, 18—total 158, being four less than for the previous year.

The bank balance at the end of the year was £155 1s. 7d., as against £92 4s. last year; but at July 31 last there was a sum of £40 9s. owing to the Institution of Mining Engineers for calls due. The balance to the credit of the building fund was £667 1s. 5d., and to the credit of the capital fund account £50 17s. 8d. The balance standing to the credit of the institute in the balance-sheet was £910 15s. 7d. The council urged members who were in arrears to reduce the amount outstanding. They had decided to excuse the payment of subscriptions by members serving with the Forces.

Owing to the continuance of the war, the only meetings held during the period under review were such as were necessary for the conduct of the business of the institute.

The institute deeply regretted the death of Mr. R. H. Cole, a past-president and member of the council, who had been a member of the institute since 1875; and Mr. William Barber, also a member of the council—both of whom had rendered valuable service to the institute.

At the end of July, 15 members of the institute were known to be serving in H.M. Forces. Two members had been killed during the year, and two discharged as unfit for further service. The council deeply regretted to record the death in action of Lieut. C. J. Cadman, M.C., and Lieut. P. J. Bates, and extended their heartfelt sympathy and condolence to the families. The council offered hearty congratulations to Capt. R. Yates, R.E., and Lieut. R. C. Wain, R.E., upon having been awarded the Military Cross.

In reply to Mr. A. M. Henshaw, the PRESIDENT said the so-called building fund was the fund applied to the equipment of the mining school. A considerable amount had been expended, and £667 remained. In years to come, that might be required to bring the equipment of the school up to date.

Mr. E. B. WAIN suggested that the fund should be invested, instead of its remaining at the bank at a comparatively low rate of interest.

The PRESIDENT said that the treasurer and he, in accordance with instructions from the council, proposed to invest it in 5 per cent. War Bonds.

Election of Officers.

The officers for the ensuing year were elected by ballot as follows:—President, Mr. J. Gregory; vice-presidents, Dr. J. Cadman, Mr. F. Rigby, and Mr. W. Statham; hon. treasurer, Mr. A. Hassam; secretary, Mr. A. J. B. Atkinson; council, Messrs. J. R. L. Allott, F. E. Buckley, H. J. Crofts, N. R. H. MacGowan, R. C. MacGowan, A. Marshall, T. T. Mawson, R. A. Passmore, W. Saint, W. G. Salt, W. Tellwright, and T. Yates.

Presidential Address.

The PRESIDENT said when elected, in October 1914, he little thought he should be asked by the members to continue in office for the year 1917-18. He highly appreciated the compliment paid to him by the council and members in electing him for the fourth year in succession, but he deeply regretted that the reason for adopting that course was that the great struggle in which the nation was engaged in August 1914 had not yet been brought to a conclusion. At the time his first presidential address was delivered, few, if any of them, realised how far-reaching would be the effects of the world-war on which we had just entered, and of the personal sacrifice and individual strain which would be imposed upon every one of them.

He felt proud of his connection with that and kindred institutes of mining engineers when he considered how well the profession to which they belonged had responded to the nation's call—many by the sacrifice of their lives, others by service under the Crown in military or civil capacities, and all by assisting to carry on under immense difficulties the industry which more than any other was necessary for the successful prosecution of the war.

Coal mining had always called for the best efforts and the utmost skill of those responsible for its direction; and, year by year, owing to increased physical difficulties, the use of improved mechanical and electrical appliances, the restrictions imposed by legislation, and the economic relations with labour, the qualifications necessary for successful management had been more difficult of attainment. In all these directions, however, progress had been gradual, and the improved training facilities available for young engineers had provided men capable of still further advancing the development of the industry. During the past few years, however, entirely new problems had been thrust upon them with startling suddenness, and difficulties had had to be met such as could never have been contemplated by their predecessors in the mining world. The shortage of labour, and the difficulty and delay in obtaining necessary plant and materials alone, had taxed the patience and resources of those responsible for the management of collieries to the utmost, and

...itely to their credit that the output of the
...d been so well maintained.
... immediate future, he was convinced that
... continued the loyalty and co-operation
... mining engineers of the kingdom would stand
... as an example to the country of what could be
... accomplished under the most exceptional trials and
... difficulties, in order to ensure full and final victory for
... our cause. It was, however, the future of the industry
... after peace had been declared that they had to view
... with the greatest concern. He was glad to see that
... the Government had already taken the problem of
... reconstruction in hand, and were considering the effect
... of after-war conditions in all industries whilst war was
... still with us. It was certain that in many directions
... we could never revert to the conditions prevailing in
... August 1914, even if it were desirable to do so, and it
... would require the most careful consideration and the
... soundest judgment to ensure that the new conditions
... to be set up were an improvement on what had gone
... before. Labour would seek, and probably obtain,
... better terms than prevailed in the past, and a larger
... share in the control of the industries in which they
... were employed. The bureaucratic tendency of the
... various Government departments which had been
... fostered under the administration of the Defence of
... the Realm Act would require to be carefully watched,
... if private effort were not to be subordinated to the rule
... of permanent officialdom. Skilled labour would prob-
... ably be scarce for some years to come, and the substi-
... tution of machinery for heavy manual toil would no
... doubt make rapid progress, with advantage to both
... employer and employed. The whole problem was so
... vast, however, that he could only indicate the more
... obvious directions in which change might be expected
... to occur, and it would be for his successors in the
... chair in the years to come to put on record the ulti-
... mate effects of what might well be the most revolu-
... tionary change of our time in industrial relationship.

On the proposition of Mr. E. B. WAIN, seconded by
Mr. A. M. HENSHAW, the president was thanked for
his services during the year.

The PRESIDENT, in reply, thanked the members for
their co-operation, and said the council had decided
that it was not advisable to call more meetings than
were necessary for the transaction of business
required by the rules. On each occasion of his elec-
tion to the presidency, he had expressed the hope that
the end of his year of office would see the end of the
war and the resumption of normal conditions. He was
more hopeful now than last year that the next 12
months would see the achievement of our national
ends.

On the motion of Mr. G. P. HYSLOP, seconded by the
PRESIDENT, the members heartily thanked Mr. T.
Yates for his efficient and willing services as hon.
secretary, which he had undertaken during the
absence of Mr. A. J. B. Atkinson on military service,
the PRESIDENT remarking that though the meetings
were few, the secretarial work was unabated.

Mr. YATES, in acknowledging the vote of thanks,
said as long as Mr. Atkinson was away he should feel
it his duty, as well as a pleasure, to assist him and the
institute.

SLIDING SCALE CHANCES IN WAGES.

The result of recent ascertainment of the selling
prices of coal and iron is given below:—

Product & District.	Price according to last audit.		Inc. (+) or Dec. (−) of last audit on	
	Period covered by last audit.	Average selling price per ton.	Previous audit.	A year ago.
Coal.	1917.	s. d.	s. d.	s. d.
(Average of all classes of coal at pit's mouth.)				
Northumberland	June-Aug....	15 9½...	+0 7½...	− 3 2½
Pig Iron.				
Cleveland	July-Sept....	95 9½...	+1 4¾...	+ 7 10½
Cumberland	July-Sept. No sales	—	—	—
Manufactured Iron.				
North of England	July-Aug.	273 4½...	+2 6½...	+26 4½
(Rails, plates, bars and angles.)				
Midlands	July-Aug.	305 9¾...	−0 3 ...	+23 7¾
(Bars, angles, tees, sheets, plates, hoops, strips, etc.)				
West of Scotland	July-Aug.	259 5 ...	+0 6 ...	+26 8¾
(Rounds, squares, flats, tees, angles, hoops and rods.)				

Coal.—No change in miners' wages took place as a result of the ascertainment.

Pig Iron.—The ascertained selling price of No. 3 Cleveland pig iron for July, August and September resulted in an increase of 1·5 per cent. in the wages of blastfurnacemen, making wages 79·5 per cent. above the standard. This increase took effect from October 7.

Manufactured Iron.—In the North of England the ascertainment of the selling price of the various classes of manufactured iron resulted in an increase in wages of 3d. per ton to puddlers and of 2½ per cent. to millmen, to take effect from October 7. In the Midlands and in the West of Scotland the wages of puddlers and millmen remained unchanged as a result of the ascertainments of the specified classes of manufactured iron in those districts.

... Limited, electrical and general engi-
... Kingsway, London, have recently
... the Glasgow Corporation for 16
... and from the Birmingham Cor-
... Corporation, Manchester Cor-
... Thomson-Houston Company Limited,
... Power Company Limited, and the
... and Chemical Manufacturing Company,
... phase transformers,

SAFE COMPRESSIVE STRESSES ON COLLIERY BRICKWORK.

By W. C. POPPLEWELL.

The great extent to which brickwork is used in collieries, especially for the lining of shafts, is a reason for examining the actual known strength of this material as found by experiment. When employed in any kind of engineering work, including mining, the essential quality of a given sample of brickwork is its power to withstand compressive loads. Definite information as to the proved strength of brick masonry has always been very meagre, but at the present time the whole question appears to be in a more healthy condition than heretofore, and promises to become even more so. The total number of strength tests carried out and published is certainly small, but the performance of such tests is costly, and has so far been dependent on private effort. Below will be quoted a few of the more important of the tests which have been made; and the results of these ought to serve as some sort of guide to the mining engineer who is intending to use brickwork. He is further helped by the fact that a gradual improvement is taking place in the quality of the materials, especially the cement.

What is called brickwork is a composite material, made up of bricks, set in mortar, and its strength depends on the separate strengths of the two, as well as on the quality of the workmanship and the age of the brickwork. It is proposed to give below some of the data obtained in tests, and from an examination of these to see how far the customary safe stresses are reasonable; and, at the same time, to see what are the magnitudes of the stresses actually applied to brickwork in given cases.

The following are the results of tests on a number of bricks of varying type and quality, omitting those which are principally used for architectural work.

Crushing Tests of Bricks.

Kind of brick.	First crack. Crushed.		Authority.
	Tons per sq. ft.	Tons per sq. ft.	
Aylesford red, pressed ...	71	141	Unwin
Rugby, common red	158	190	"
Leicester wire-cut	115	229	"
Manchester wire-cut	87	264	Popplewell
Do. common red	74	120	"
"Engineering," pressed ...	110	290	"
Do. do.	160	280	"
Red, shale	67	220	"
Enfield shale, red	205	496	"
Accrington plastic (Hun- coat)	118	250	"
Digby Colliery (Notts)	248	353*	Unwin
Common blue Staffordshire ..	240	358*	"
Blue Staffordshire	82	356	Popplewell
Blue brindled, Staffords ...	204	485	"

* Not crushed.

In the above tests by the writer, each brick was placed in the testing machine with a layer of plaster of paris between it and the platen of the machine. This manner of distributing the load evenly over the surface of the brick was replaced in cases of other authorities by thin cardboard or wood.

In these results, the load at first crack has less significance than the crushing load, because its determination depends on the alertness of the observer.

Tests of Mortar.

Kind of mortar.	Load at first crack. Crushed.	
	Tons per sq. ft.	Tons per sq. ft.
Black mortar (lime, sand and ground destructor clinker)	31·8	31·8 (28 weeks old). (A)
Portland cement mortar (3 sand—1 cement)	10·0	10·0 (24 weeks old). (B)
Portland cement mortar (five samples)—		
1—1	—	98 (20 weeks old). (C).
2—1	—	51 " "
3—1	—	28 " "
4—1	—	24 " "
5—1	—	21 " "

The above samples were all in the form of 4 in. cubes. It will be observed that the (3—1) Portland cement mortar in the last set is more than twice as strong as the (3—1) previously quoted. This discrepancy is no doubt due to the difference in the two sands used, because the cement was distinctly good (475 lb. per sq. in. at seven days).

Below is a table containing the results of a number of tests of brickwork columns, carried out by the writer. In every case the column was square in section, two bricks to the side. Thus the section was 1½ ft. square, giving an area of section equal to 2¼ sq. ft. The height was 15 courses, equal to about 4 ft.

Tests of Brickwork Piers.

Kind of bricks.	Mortar.	Age.	Crushing strength.	
			Tons per sq. ft.	Tons per sq. ft.
Common wire-cut	Lime	4 weeks	53	
Do. do.	P.C. 3—1	39	84	
Do. do.	P.C. 1—1	3 days	189	
Best common brick	1 sand, 2 ground clinker, 1 lias lime	3 weeks	80	
Accrington, best engineering brick	Black (A)	4	96	
Blue Staff'dshire	P.C. 3—1 (B)	39	98	
Brindled	Black (A)	12	165	
Do.	Black (A)	25½	185	
Do.	P.C. 3—1 (B)	12	169	
Do.	P.C. 3—1 (B)	26	161	
Accrington	P.C. v. 1—1 (C)	6	125	
Do.	P.C. v. 2—1 (C)	6	159	
Do.	P.C. v. 3—1 (C)	6	125	
Do.	P.C. v. 4—1 (C)	6	116	
Do.	P.C. v. 5—1 (C)	6	125	
Accrington, best	Port. Cement.	1	242*	

* Withstood without sign of distress.

This last is an example of what can be done with good bricks and first-class mortar. These bricks had shallow frogs. They were laid by a first-class brick-setter—in English bond. The column was taken out

of the machine, because it was at the moment impossible to increase the load further on account of pipe joint failure.

The following table shows the ratios between the strength of the brickwork and that of the bricks, used in the above tests, and between the strength of the brickwork and that of the mortar:—

Kind of brick.	Strength of Brickwork.	
	Strength of brick.	Strength of mortar.
Accrington (A)	0·34	3·0
Blue Staffords (B)	0·275	9·8
Brindled (A)	0·480	5·8
Do. (B)	0·33	3·2
Accrington (C)	0·322	1·3
Do. (C)	0·410	3·1
Do. (C)	0·322	4·5
Do. (C)	0·300	4·0
Do. (C)	0·322	7·0

When the above were being tested, fine measurements were taken of the shortenings caused by the loads, and afterwards loads and corresponding shortenings were plotted, to enable the limit of proportionality or approximate elastic limit to be fixed; at the same time, the modulus of elasticity was calculated—within the above limit. The length measurements were observed with a mirror extensometer reading to one 100,000th of an inch. Below are the results:—

Pier.	Approx. elastic limit.		Modulus of elasticity.
	Tons per sq. ft.	Lb. per sq. in.	
Wire-cut, P.C. mortar	25	1,400,000	
Accrington, black mortar	24	(800,000)	
Blue Stafford, P.C. mortar ...	55	1,880,000	
Brindle, black mortar	40	2,330,000	
Do. 3—1 P.C. mortar	30	1,895,000	

Within the limits specified, the material may be regarded as a perfectly elastic material.

The modulus of elasticity of the bricks themselves was: Accrington plastic, 5,920,000; blue Staffordshire, 5,280,000; blue brindled, 2,830,000—all in lb. per sq. in. Also, for the mortar, the modulus was: Black, 352,000; Portland cement (3—1), 131,500.

Several general rules emerge from the above data:—

(1) The strength of brick masonry is largely dependent on that of the mortar used. Thus, a medium quality brick with a first-class mortar will be stronger than a first-class brick with a poor mortar. This has been disputed, but from all the evidence available it seems to be certain that the actual strength of the mortar plays a large part in governing the strength of the brickwork, and that the mortar is not simply useful as a pad for distributing the pressure.

(2) Where the mortar is of sand and Portland cement, greater strength of the mortar, and therefore of the brickwork, is found when the ratio of cement to sand is high.

(3) In the best mortars, strength increases with the lapse of time.

(4) There appears to be an analogy between the order of elastic limit and the modulus in a number of samples of brickwork, and the order of the strengths.

Safe Compressive Stresses.

From the above table of strengths of brickwork, two typical grades may be selected:—

Brickwork.	Elastic limit.		Crushing strength.
	Tons per sq. ft.	Tons per sq. ft.	
Brindled Staffords, in best black clinker or P.C. mortar (3—1), six months old	40 to 30	160	
Best Accrington plastic, in P.C. mortar, six weeks	25	125	

Unwin recommends a factor of safety for brickwork of 20, for steady loads. Using this, and taking the above crushing stresses of 160 and 125, the safe working stresses would be 8 and 6·25 tons on the square foot. Using a somewhat lower factor, 16, the corresponding safe stresses come out to be 10 and 7·8. These last practically coincide with the leading United States practice of 10 and 8 tons per square foot on respectively best brickwork in (2—1) Portland cement mortar and "good" brickwork in (2—1) Portland cement mortar. Baker thinks these too low, and suggests 30 and 20 tons per square foot as possible for "good bricks laid in good Portland cement mortar" and "reasonably good bricks in lime mortar" respectively. In view of the approximate elastic limits given above, these last values appear to be too high, and approaching too near the danger limit. As a compromise, the writer thinks it possible with safety to employ a factor of safety of 8, making the safe compressive stresses 20 and 15·6 tons per square foot. These are intended to apply to brickwork formed of really first-class bricks laid in either Portland cement mortar (3—1), or, better still, (2—1), or the best ground clinker mortar, and the good sound "engineering" bricks in (3—1) Portland cement mortar. In neither the bricks nor the mortar is the strength supposed to be exceptional.

Application to Coal Mining Work.

When brickwork is used for the purpose of lining mine shafts, the pressure which it is called upon to withstand is that due to the weight of the brickwork itself, and, of course, increases as the depth of the lining increases. The usual depth of a brick is 3 in., though some may be slightly below and others somewhat over this dimension. This would give four bricks to a vertical foot, without joints. A mortar joint is generally about ¼ in. thick, so that to each foot must be added 1 in. of mortar. A first-class brick such as would be employed for this purpose weighs about 10 lb., but as the mortar is lighter than the brick, it will not be very far wrong to call the weight of each vertical foot per one brick area = 9 × 4 = 36 lb. The area of a brick on its bed is, in the usual sizes, 9 in. by 4½ in. = ¾ sq. ft., or = 0·281 sq. ft. This means that the pressure beneath each brick caused by its own weight is = 9/0·281, or 32 lb. per sq. ft., or per foot of

height = $32 \times 4 = 128$ lb. In the case of a shaft lining, this means that for each 100 ft. of height there is developed in the brickwork a compressive stress of—

$$\frac{128 \times 100}{2,240} = 5.7 \text{ tons per sq. ft.}$$

This means that if the depth of lining is H feet,

$$\frac{H}{100} \times 5.7 = \text{the compressive stress developed.}$$

If the writer's suggested value for safe stress of 15.6 tons per sq. ft. be taken, then the limiting depth of lining is reached when

$$\frac{H}{100} \times 5.7 = 15.6, \text{ or } H = 272.5 \text{ ft.}$$

as the limiting depth on the above assumptions.

The above safe stress of 15.6 tons on the square foot may at first sight appear excessive, but a little consideration will modify this view. The brickwork to which it refers is supposed to be thoroughly good of its kind, built under careful supervision, of sound and well-selected materials. In support of this proposed safe stress, it may be mentioned that the pressure at the base of a tall chimney in Glasgow is normally nine tons per square foot, rising in gales to 15 tons on the leeward side. Reference should also be made to the writer's experimental column, previously mentioned, in which a pressure of 242 tons per square foot was maintained for some considerable time without damage; but it must not be forgotten that the pier was built with (1—1) Portland cement mortar, which must account for much of its great strength.

It is important to remember that the kind of brick selected for the purpose should be chosen not because it possesses excessive strength, but for the reason that, while of distinctly good quality as regards strength, it has the further important advantages of great surface durability, and at the same time a low absorption percentage. The quality of durability is often of more importance than mere strength, especially where the bricks are to be used in such damp positions as the shafts of coal mines. At the same time, a brick which is initially good may be expected to retain much of its strength, even after many years of exposure in a very damp position. The writer has tested the strength of many bricks after long years of such use, and has generally found them to be surprisingly good, often giving more than 120 tons per square foot ultimate crushing strength.

There are two influences which tend to affect the strength of brickwork in colliery shafts: one is against the strength, and the other in its favour. These are: First, the effect of the increase of outside diameter when a footing is to be effected. It is doubtful to what extent the brickwork is weakened by the curvature given to it, and by the more or less imperfect bedding at the lower surface of the brickwork. The second influence is that due to the earth surrounding the brick tube; the friction between the earth and the brickwork should tend to hold up the latter and so relieve the compressive stress lower down. This is to the good of the brickwork. At the same time, the pressure of the surrounding earth must squeeze the brickwork ring so as to induce circumferential compressive stresses.

The sum total gathered from the tests quoted above seems to be something like the following, not only for colliery work, but for engineering uses in general:—

The bricks should be sound and uniformly so; a bad brick here and there may cause failure by giving a start to a fracture surface. This uniformity is only to be secured by careful and rigid inspection of all bricks.

The mortar used must be of the best. Nothing beats a really first-rate ground clinker mortar, but most likely it is safer to use a strong (3—I), or, better still, (2—I) mortar of Portland cement and sand. The advantage of cement is that its strength may be known very definitely from standard tests, and there need be no doubt as to its quality. The sand used in the mortar must be clean and hard, and free from dust and peaty soil. If there is any doubt, the sand should be washed.

The laying of the bricks must be carried out with rigid care: no slap-dash thick joints should be permitted. Here again inspection is indispensable.

Lastly, no load should be allowed on the brickwork until sufficiently hard to carry it without squeezing out the mortar.

Partnership Dissolved.—The partnership of Mr. D. P. Thomas and Mr. C. E. Elliott, carrying on business as D. P. Thomas and Elliott, mining engineers, Pontypridd, has been dissolved.

Collierymen's Wages.—Pit workers from different parts of the country were represented by a deputation from the National Council of Collierymen other than miners which waited upon the Government authorities in Whitehall on Wednesday in regard to a dispute which has arisen between the council and the Miners' Federation of Great Britain as to the observance of an award given by Sir George Askwith, the Chief Industrial Commissioner, in June last. Under the terms of this award, to which both the Miners' Federation and the National Council of Collierymen subscribed their agreement, it was laid down that during the period of the war neither organisation should take away members from one another. It is now alleged that the agreement has been broken by the Federation, and the conference was the result of reported violations which are said to have occurred in certain districts in South Wales, which have taken up the question for the protection of the principle generally. Members of the Colliery Winding Enginemen's Union, when compelled by local circumstances to seek work in other districts, find difficulty in obtaining employment unless they join the Miners' Federation, and it was claimed on their behalf that the award should be carried out in its entirety, without prejudice to any conditions which may arise after the war. At the close of the proceedings, which were private, it was stated that the deputation had received an assurance that their alleged grievance would be carefully investigated, and that a decision would be communicated to them later.

COAL MINING IN NEW ZEALAND IN 1916.

The mines statement drawn up by the Hon. W. D. S. MacDonald, Minister of Mines, gives the following particulars of coal mining in New Zealand for the year 1916:—

The output of coal amounted to 2,257,135 tons, as compared with 2,208,624 tons during 1915, being an increase of 48,511 tons. The principal activity in the coal mining industry occurred in the Westport, Greymouth, and Huntly districts.

The following is a comparative statement of the coal and lignite raised during the years 1915 and 1916:—

Inspection district.	Output for 1915. Tons.	Output for 1916. Tons.	Increase 1916. Tons.
Northern (North Island) ...	460,415 ...	486,114 ...	25,699
West Coast (South Island) ...	1,278,994 ...	1,295,635 ...	16,641
Southern (Canterbury, Otago, and Southland) ...	469,215 ...	475,386 ...	6,171
Totals	2,208,624 ...	2,257,135 ...	48,511

The comparative tonnage of the various classes of coal for the years 1915 and 1916 is summarised as follows:—

Class.	Output for 1916. Tons.	Output for 1915. Tons.	Inc. (+) or dec. (—) for 1916. Tons.
Bituminous and semi-bituminous coal ...	1,422,074 ...	1,404,400 ...	+ 17,674
Brown coal	633,898 ...	725,001 ...	— 71,103
Lignite	181,163 ...	79,223 ...	+ 101,940
Totals	2,237,135 ...	2,208,624 ...	+ 48,511

The coal production, satisfactory as it is, would have been greater had the coal miners continued to maintain the maximum output, but unfortunately the output was considerably curtailed during November and December in several of the mines. This restriction, which became more general during February and March of the current year, culminated in strikes lasting a fortnight or more in several coal mining districts. However, since the resumption of work, no trace of the go-slow policy has been seen, and the output of all the mines has been normal.

The number of persons employed in and about the coal mines of the Dominion during 1916 was 3,988, a decrease of 168. The numbers in each inspection district were as follow: Northern, 833; West Coast, 2,221; Southern, 929.

Mining Accidents.

The number of lives lost at collieries was six, being at the rate of 1.5 per 1,000 persons employed, or an output of 376,189 tons per life lost. At the North Island collieries no fatal accident happened during the year, and at the collieries of Canterbury, Otago, and Southland none has occurred during the past three years and a half—a remarkable record.

State Collieries.

The output from State collieries during 1916 was 277,845 tons, of which 140,917 tons was produced from the Point Elizabeth Colliery, and 136,928 tons from the Liverpool Colliery. The output from the two collieries exceeded that of the previous year by 39,645 tons. The State coal business during the year ended March 31 last resulted in a profit of £18,521 5s. 9d., as compared with a profit of £2,515 during the previous year. The average price realised for State coal during the 12 months was 19s. 4.76d. per ton, as compared with 16s. 8.71d. per ton for the preceding year.

The Point Elizabeth Colliery will probably be worked out within the next 12 months, and thereafter considerable difficulty will be experienced in supplying coal to meet the demand, especially for railway and household requirements. Investigations have been made during the past 18 months with a view to discovering a locality where a new State mine could be successfully established. The reports obtained were not sufficiently encouraging to enable any decided opinion as to the advisability of embarking on a new colliery to be formed.

Schools of Mines.

The expenditure by the Department on the schools of mines situated at Coromandel, Thames, Karangahake, Waihi, and Huntly, in the North Island, and at Westport and Reefton, in the South Island, amounted during the year ended March 31, 1917, to £3,792 13s. 6d. The total expenditures on these schools, exclusive of subsidies paid to the University of Otago School of Mines, amounted on March 31, 1917, to £70,390 9s. 1d. At the annual Government examinations at these schools no student competed for any of the six scholarships offered annually by the Government. It is now several years since a scholarship has been gained, notwithstanding that the conditions have been considerably relaxed.

Coal Miners' Relief Fund.

As required by the Coal Mines Act, 1908, the owner of every coal mine contributes 1d. per ton on all coal sold, for the relief of coal miners who may be injured whilst working, and for the relief of coal miners who may be killed or injured. The following is a statement of the accounts of the fund: During the last financial year contributions amounted to £1,980 (£1,966 in 1915-16); allowances on account of accidents, etc., £1,427 (£1,526 in 1915-16); balance, £8,172 (£7,303 in 1915-16).

Ventilation.

The annual report of Mr. Frank Reed, Chief Inspector of Mines, New Zealand, states that the ventilation of New Zealand collieries has attained a high standard. From the experience gained in connection with firedamp explosions in 1914, it is considered that no quantity standard, viz., a minimum of a certain quantity of air per man per minute, is applicable to all mines or to all the ventilating districts of one mine, and that any standard should be in the oxygen contents, i.e., a quality standard. Furthermore, that the New Zealand law (which is copied from

the British law) that no lamp or light other than a locked safety lamp shall be allowed used in any seam where the air current in any return airway from the ventilating district is found normally to contain ½ per cent. of inflammable gas, is entirely too lax as a qualification for the installation of safety lamps. The statutory provision appears to overlook the possibility of blowers and accumulations of gas in old workings therefrom, and that the contents of the mine air vary greatly. Mr. Reed generally finds an appreciable increase in return air from occluded gas towards the end of a shift, i.e., if much coal has been broken during the shift.

With regard to the effect of atmospheric humidity on coal dust explosions, it was found that the explosion at Ralph's Colliery (1914) was extremely violent, notwithstanding that the air is permanently saturated to the extent of at least 94 per cent. (without artificial watering), and the coal contains water to the extent of 13.14 per cent. These facts may be of interest as serving to prevent undue importance being attached to the alleged advantage of humidity in mine air as an allayer of coal dust and preventive more or less of coal dust ignition.

Systematic Timbering.

The most prolific cause of fatal colliery accidents is fall of ground, especially of top coal, containing "sooty backs" or other concealed joints. To prevent such accidents, systematic timbering is now required by law, the British law regarding systematic timbering having been adopted verbatim, with an extra clause that an Additional Rules Committee, if set up by the Minister, might have power to vary the Regulation, which now provides that where timber is used to support the roof at the working face, and all parts of a roadway the roof or sides of which require support, shall be systematically and adequately supported at such regular intervals and in such manner as shall be specified in a notice by the mine manager. It is also provided that if the inspector considers the system of supporting the roof and sides adopted in any part of a mine is unsatisfactory, he may require the manager to fix some less distance or otherwise modify the system, and the manager shall comply with the requisition. If complied with conscientiously, the Regulation regarding systematic timbering is probably one of the most satisfactory measures ever introduced in the Dominion for the safety of persons employed in the coal mines. Inspection shows, however, that miners on the West Coast frequently neglect to erect timber within the specified distance of the working face, with the result that lives are being lost chiefly through the carelessness of the sufferers. Hitherto there has not been any appeal by miners to an Additional Rules Committee to vary the specification regarding the maximum interval and manner of timbering notified by the manager and approved by the inspector.

COAL BRIQUETTING.

At the meeting of the South Wales Institute of Engineers held at Swansea on September 25 (*Colliery Guardian*, September 28, p. 595), Mr. E. Gevers-Orban spoke at some length during the discussion on Mr. J. A. Yeadon's paper on "Coal Briquetting, with Special Reference to Anthracite."

We have now been able to obtain a full report of Mr. Gevers-Orban's speech, which was to the following effect:—

It had been claimed by Mr. Yeadon that ovoid briquettes made from coke breeze or from anthracite duff were satisfactory for house fires and for boiler consumption. In Belgium plenty of ovoids used to be made, but, said Mr. Gevers-Orban, they were only partially satisfactory. Ovoids differed from big block briquettes only in size and shape, but not in quality. Of course, owing to their size, they were easier to handle in bunkers, chutes, elevators, mechanical stokers, and in house fires; they also burned somewhat easier. But the roll presses for ovoids, often called Belgian presses, did not give the same tonnage yield nor the same high compression as the double presses, which Mr. Yeadon praised so highly. According to American reports, there were presses in that country making up to 50 tons of nuggets per hour with double compression. He hoped some reliable expert would have an opportunity of visiting the United States to examine such a plant and furnish an authoritative report upon it. The drawbacks of ovoids or nuggets made in roller presses as compared with big briquettes were: (1) Big cost of machinery for equal yield; (2) more pitch was used, therefore more expense; (3) more smoke and a greater accumulation of tar in the house chimney; and (4) more breakage in handling and stocking. As to briquetting anthracite duff, the ovoid was no better than the big block. The best looking briquettes he ever saw were made six years ago from two wagon loads of anthracite, which he prepared for a boiler test. They were not a success. They were hard and dense, and when broken were as shining as pure anthracite lump; but, as was well known, pitch burned at about 400 degs. Cent., while anthracite ignited only towards 550 degs. Cent. Thus, after a short time the pitch had burnt and smoked away, while the dull anthracite duff soon blocked the grate and choked the fire. In household fires of moderate red temperature this drawback was not vital, but in boiler furnaces with their white hot temperature it made the use of anthracite briquettes absolutely impossible. It was common knowledge that the failure of anthracite briquettes for a boiler furnace was due to their inability to retain shape; in other words, to their lack of the coking property. Thus the anthracite briquetting problem was the coking problem on a less scale. According to his experience, the pitch added a trifle to the coking property of coal in the following circumstances: (1) A well-dried finely ground slack; (2) a thoroughly intimate mixture of the coal and pitch, best obtained with hot liquid pitch; (3) high pressure in the press, which, making the pitch stick better with the coal and lessening the required

of pitch strengthened the skeleton of the (1) a high sticky quality of pitch, which was poor in free carbon and rich in bitumen. To ensure the binding qualities of pitch was difficult, as there was no proper meter for this purpose, but a cheap and the proper way of getting a high quality pitch was to make it one's self, provided the tar was available. At Liège they made the pitch in close proximity to the briquette factory. The tar was distilled continuously, which meant low cost; the distillation was rather an evaporation in an air current, which oxidised the pitch, and dried it in the same well-known manner as air dried linseed oil, with the production of a more sticky bitumen. This distillation in air current proceeded at the low temperature of 250 degs. Cent., and prevented the development of free carbon in the pitch. Thus distilled, a pitch with 20 per cent. of free carbon was left, compared with about 30 per cent. of free carbon in pitch distilled in an ordinary still. The hot liquid pitch then flowed straight to the briquette factory, which meant a large saving in handling the pitch, avoided dangerous dust, and resulted in a more intimate mixture with the coal. As a result of this method of pitch making, they obtained cheap pitch; strong briquettes with only 5 or 6 per cent. of pitch; smokeless briquettes which stood perfectly in the white hot furnaces of a locomotive, although the coal in them was comparatively poor in bitumen, or, which was the same, with a fair admixture of anthracite, say, 15 per cent. So much for his own experiments.

Reverting to the American product, liquid pitch seemed to be successfully used in those American factories, with their large outputs of nuggets in double-acting presses, for railway engines. He was told the Americans had discovered a new binder developing coking qualities in the anthracite duff, and that a Welsh firm would soon begin to erect a factory adopting the process. Another remarkable innovation in America was the burning of powdered anthracite duff while suspended in an air current. This was being done on a large scale, and if all that was claimed for it could be relied upon, it would give full commercial value to anthracite small, and set back for a few years the necessity of briquetting it. All these things pointed to the desirability of his suggestion being adopted of an expert crossing the Atlantic to bring back full data.

Now, to come back to the coking question and the possibility of giving coking properties to anthracite. In most coking plants, coal was stamped in order to develop its coking properties. Admittedly, too, if soft coke was compressed in red hot conditions it would become strong coke. He had on the table in front of him practical examples of this. They were "eggettes," some of which were made with three-quarters of anthracite and one-quarter of bituminous coking slack; others with three-quarters of coke breeze and a quarter of bituminous coking slack. By baking them from 15 to 20 minutes in a closed mould at red hot temperature, the volatile matter escaped and burned, and the coking slack swelled and brought forth a compression which turned the briquette into coke. These briquettes were made by Mr. John Armstrong, civil engineer, 5, Victoria-street, Westminster. He (the speaker) picked them from the bunker on the plant a few days after they had been made. This was not really a mechanical compression at red hot temperature, but a physical expansion, giving exactly the same effects. It was not a pure anthracite briquette, but it was approximately so. It seemed obvious to him that an admixture of pitch instead of coking slack might give similar results, as a good pitch at red hot temperature gave a very swollen and porous coke. Mr. Yeaton attributed the commercial failure of heating the ground coal to a high temperature to four causes, namely: (1) The required high temperature released, and allowed to escape a considerable proportion of the volatile matter in coal; (2) the required machinery was of high cost; (3) the machinery underwent an excessive wear and tear; (4) plants of that kind yield small tonnage. He (the speaker) concurred; and he proposed to approach a solution of the problem by a roundabout way. They had all heard, more or less, of low-temperature coking for dividing bituminous coal into by-products and a smokeless fuel, the latter being obtained in the form of a red hot soft coke with plenty of breeze or dust. The main difficulty was to give a high commercial value to this soft coke, which fell regularly down a screw extractor. Similar extractors had been working underneath vertical gas retorts in Glasgow, Manchester, London, Birmingham, and St. Helens, but not on low temperatures. Well, the soft stuff from low-temperature coking was obviously in the best condition for passing between the rollers of a Yeaton ovoid press, with the only precaution of cooling the rollers. Thus, Mr. Yeaton's objections No. 1 and No. 2 against red hot briquetting, the escaping of volatile matter, and high cost of machinery, were overcome. Mr. Yeaton was the man to make at once splendid smokeless briquettes underneath a low-temperature retort, and he would doubtless receive powerful help from the Fuel Research Board, and also from the British Association Committee on Fuel Economy. If the briquette maker succeeded in this splendid dream of recovering the by-products of bituminous coal while making a first-class smokeless fuel, then, thanks to the experience thus gained, the red hot briquetting of anthracite with pitch would be close at hand. If he were a member of the South Wales Institute of Engineers, he would ask the president to endeavour to secure the help of the Fuel Research Board and the Fuel Economy Committee of the British Association in investigating this problem, and in sending an expert to the purpose which he had indicated.

He would summarise his own present conclusions regarding anthracite as follows:—The process of heating for handling and burning than the process of heating did not improve the quality of the briquette. Improvements in quality of briquette, and strong compression as used in

Belgium showed no prospect of further big improvement. So far, the only solution he could see was the red hot briquetting, but here the financial and practical difficulties were serious. It was wise to proceed with their experimenting hand in hand with that of low-temperature carbonisation, which was faced with exactly the same problem.

IMPROVEMENTS IN THE MANUFACTURE OF SILICA BRICKS.*

By C. E. NESBITT and M. L. BELL.

The study of silica refractories is receiving more and more attention, as shown by the increased number of articles appearing in the technical Press. The published literature so far has dealt mainly with the theoretical study of the raw materials, while the practical side has received very little attention. Theoretical information is of extreme importance, but its importance is negative until put to practical use. The brick manufacturer is not, as a rule, a man of theoretical training, hence theoretical investigations to be of use to him must be expressed in simple and explicit terms, easily understood. This does not, however, excuse the maker, who in most cases has been negligent in regard to investigations of the properties and to improvement of his own product. The consumer has also been at fault in that he has not freely co-operated with the maker, and informed him wherein the bricks failed. To obtain the best result, it is necessary that these three—the investigator, the maker, and the consumer—should work together with heartiest co-operation.

In the manufacture of iron and steel, silica bricks find their greatest use in the open-hearth furnace. The demand here is for a brick of high refractoriness which does not become soft or plastic at working temperatures. The silica brick fulfils these requirements in that it is refractory, and does not yield to compression unless the stress is sufficient to crush it. The ability of silica bricks to stand when only a small portion of the original wall is left is well illustrated in the bulkheads. The wall when built is 18 in. thick, but wears away in spots to less than 1 in. in thickness, and still the brick retains its place.

In the by-product coke industry the development of the use of silica bricks is interesting. Formerly a quartzite brick was used which was made of a mixture of clay and ganister. The object of the quartzite brick was to overcome the shrinkage and settling common to firebricks. Some 12 years ago silica bricks were used experimentally in both beehive and by-product ovens. The experiment proved so successful that their use increased rapidly; not only did their expansion make a close, well-fitting joint, and overcome settling difficulties, but their better heat conductivity greatly reduced the coking time.

The Manufacture of Silica Bricks.

In the manufacture of silica bricks in the United States, the raw material used is ganister. The important deposits are found in Huntingdon and Blair counties, of Pennsylvania, Devil's Lake region of Wisconsin, and in Alabama and Colorado. It is essential for high-grade silica bricks that the ganister be hard and dense. The rock should analyse about 98 per cent. silica, with 1 per cent. each of iron and alumina. The raw material is broken to convenient size, dumped into a wet pan, and ground with water and lime. The degree of fineness and the amount of water is left to the judgment of the operator. This is a source of considerable variation, as it will be shown later that the degree of fineness has considerable influence on the strength of the finished brick.

The binder commonly used is lime; 2 per cent. has been found to give the most satisfactory results. Percentages greater than this lower the refractoriness and decrease the strength of the brick, while percentages below 1½ per cent. do not give a satisfactory bond. Binders such as iron, alumina, talc, water glass, and other substances have been tried with more or less success.

The amount of water necessary to produce a satisfactorily working mud varies somewhat with the kind of rock used, amount of calcined material present, and the method of manufacture. The percentage of moisture present is important. About 10 per cent. of available moisture is the proper amount for hand-made brick. Too wet a mud will produce bricks and shapes which distort after being taken from the mould, while too dry a mud is responsible for a number of very serious defects, such as unfilled corners, sponginess, improper slicking, and lack of cohesion—all of which tend to give a finished product of low mechanical strength, susceptible to spall and slag penetration.

The moulding is a very critical point in the manufacture of silica bricks. Improper filling of the moulds, too wet or too dry mud, improper slicking, dirty palette boards, or careless handling, all contribute their share to the making of a defective product. The defects can largely be eliminated by close inspection and rejection of all but good bricks. As an illustration, bricks were received from a certain company which were poor in quality. The spalling loss was very high, running from 50 to 60 per cent. An investigation was made of the methods at the plant, and irregularities of mixing, moulding, and burning were found. Careful inspection was applied to certain points in the brick manufacture, and now this same plant, with no radical change in its general method, is producing bricks much more uniform in shape, strength, and appearance, and with a spalling loss of only 25 per cent.

Drying the bricks after moulding is accomplished either on a hot floor, heated by steam, or in tunnels heated by hot air from the kilns. Drying on the floor is naturally the slower of the two methods, four to six days being required for 9 in. bricks, and proportion-

ately longer for larger shapes, while drying in tunnels may be accomplished in 18 to 24 hours. It is important that drying shall be done carefully and thoroughly, for unless the material is bone dry when placed in the kilns, fire cracks are apt to result.

The dried bricks are set in kilns, which are usually of the down-draught type, ranging in capacity from 50,000 to 150,000 bricks. It is important in setting that the bricks shall be true to shape in order that they have a proper bearing and stack well. Green bricks will not sustain a load of much more than 100 lb. per square inch; hence care should be taken not to overload them. Shapes should not be placed near fire boxes, nor bear much weight. They are frequently boxed in.

Complete burning requires from 10 to 15 days, with a gradual increase in temperature until cone 16 is attained at least (1,450 degs. Cent.). The final temperature must be held a sufficient length of time to thoroughly and uniformly heat the entire kiln, which may require anywhere from one to three days, depending on the size of the kiln.

The cooling usually requires about five days, and is accomplished by gradually opening the fire holes and doors until the bricks are cool, when they are removed and placed directly on cars or in the stock house.

Tests of Silica Bricks.

With a view to studying the effect of degree of fineness of material and pressure, an experimental series of silica bricks was made with these two factors as the only variables. A good quality of Pennsylvania ganister was selected and ground dry in three lots to pass a 12-, 8-, and 4-mesh screen respectively. To the ground material was then added the water and lime so as to give 9 per cent. of moisture and 2 per cent. of lime. From each of the above meshes standard 9 in. bricks were made on a small hydraulic press at eight different pressures varying from 187 to 2,500 lb. per square inch. The bricks were dried, burned, and cooled, following regular silica brick practice, and were then subjected to physical tests to determine density, resistance to impact, resistance to spall, resistance to corrosive action of slag, and expansion due to heating. A summary of the results is given in Table I., in which the results of the three meshes are averaged according to pressure.

TABLE I.—TESTS OF SILICA BRICK, ARRANGED ACCORDING TO PRESSURES.

Pressure under which bricks were made, lb. per sq. in.	Apparent specific gravity.	Impact. In.	Per-centage spalled.	Slag penetration, sq. in.		Expansion. Lin. in. per ft.
				Open-hearth slag.	Heating-furnace slag.	
187	1.50	47	45.5	3.48	2.28	0.155
500	1.8	46	48.3	3.68	2.42	0.155
750	1.9	60	53.2	3.63	2.41	0.158
1,000	1.63	65	51.4	3.79	2.42	0.160
1,250	1.65	68	47.9	3.65	2.50	0.155
1,500	1.66	65	43.6	3.82	2.50	0.160
2,000	1.67	67	44.8	3.64	2.45	0.159
2,500	1.68	71	42.0	3.72	2.50	0.160

Table II. shows the results of the various pressures averaged according to mesh.

TABLE II.—TESTS OF SILICA BRICK, ARRANGED ACCORDING TO MESH.

Mesh.	Apparent specific gravity.	Impact. In.	Per-centage spalled.	Slag penetration, sq. in.		Expansion. Lin. in. per ft.
				Open-hearth slag.	Heating-furnace slag.	
4	1.66	57	30.4	3.92	2.63	0.156
8	1.62	63	47.6	3.67	2.39	0.159
12	1.58	64	63.2	3.44	2.29	0.159

Table I. indicates that little is gained by increasing the pressure. Table II., however, shows the importance of the selection of mesh. It will be observed that the strength as indicated by the impact test is greatest with the fine-ground material, while the percentage loss by spalling increases with fineness of mesh. Two very important properties in first-class silica bricks are the mechanical strength and resistance to spalling; hence from the data we must select a mesh at the expense of one of these properties. More is gained by the coarse mesh; hence for silica bricks a coarse-ground material is recommended.

Table III. gives the individual losses by spalling for each pressure and mesh.

TABLE III.—LOSSES BY SPALLING, EXPRESSED AS PERCENTAGE. Pressure under which bricks were made, lb. per sq. in.

Mesh.	187	500	750	1,000	1,250	1,500	2,000	2,500
4	21.9	34.9	37.9	38.7	31.4	30.4	19.1	29.1
8	51.6	45.9	62.6	51.0	43.3	34.8	38.3	43.3
12	62.9	64.0	59.2	64.4	69.1	65.8	67.0	53.6

The average spalling loss for hand-made silica bricks is about 30 per cent. From Table III. it will be noted that power-pressed silica bricks were made with the same spalling loss from 4-mesh material pressed at 1,500 lb. per square inch. These bricks were true to shape, sharp-cornered, dense, and had smooth, marble-like surfaces. Moulding defects such as soft corners, sponginess, improper slicking, and lack of cohesion were all eliminated. The prospect of the adoption of power pressing as a step towards better and more uniform silica bricks was clearly brought out by this series of tests. The idea of power pressing is not entirely new, yet little has been done in a commercial way. One of the large concerns is now manufacturing bricks this way on a commercial basis. The average spalling loss of these bricks is 25 per cent.

In actual service, although well guarded as far as practice and construction will permit, silica bricks fail from three primary causes: spalling, crushing, and slagging. These cannot be entirely eliminated, but by a deeper study of the manufacturing of bricks they can be reduced to a minimum. An ideal brick must be well moulded, true to shape, thoroughly bonded, and of good mechanical strength.

A visual inspection of almost any shipment will show at least 20 per cent. of defective bricks. Six shipments of bricks of different brands brought out the

* From a paper read before the American Society for Testing Materials.

fact that 60 per cent. of the defects were due to moulding, 30 per cent. to fire cracks, and 10 per cent. to improper setting and irregular shapes. These defects can be largely overcome in the present method of manufacture by careful inspection and rejection of the improperly made bricks at certain points in the manufacture.

The ganister must be carefully selected and sorted; all stock that is soft or which carries considerable iron, clay, sandstone, or other foreign matter should be rejected. The ganister selected should be ground to just pass a 4-mesh screen, care being taken to avoid an excessive amount of finely-ground material. To ensure uniformity, frequent sieve tests of the mud should be made. To secure a sufficient bond, 1.75 to 2 per cent. of lime should be used. In order to avoid irregular shapes and moulding defects, 9 to 11 per cent. of water should be used for hand-made bricks, and the material should be pounded into the mould. The bricks should be thoroughly dried, so as to avoid fire cracks when placed in the kiln. Great care should be used when heating, especially during the first part of the burn, to prevent fire cracking; this applies also to the cooling. The bricks as they are removed from the kiln should be carefully inspected, and all bricks showing moulding defects, fire cracks, and irregular shapes should be rejected.

The consumer should be allowed to inspect the bricks before they are loaded on the car, and a place provided for the storage of such bricks as he may desire to test.

COAL CARBONISING AT GAS WORKS.

Mr. RICHARD NELSON, of Hull, in his inaugural address as president of the North of England Gas Managers' Association, at the half-yearly meeting recently held in Newcastle, spoke of the success of the intermittent vertical retort installation erected in 1911 at the East Hull Gas Works, with which he is associated.

Coke Conveyors.

Mr. Nelson stated that the conveyor in use with the vertical retort installation was of the "D. B." type. Immediately on leaving the retort house, the trough rose at an angle of 27 degs. to deliver the coke through a rotary screen into the hoppers. The three chains already renewed had handled, respectively, 30,000, 27,000, and 19,500 tons of coke, an average of 25,500 tons per chain, and the first costs equalled 1.28d., 0.98d., and 1.53d., per ton of coke carried, or an average of 1.25d. Prior to fixing the third chain, it was thought that to base the comparative life of a chain on the tonnage only was not quite equitable, so a mileage recorder was fixed so that ton-miles might be taken as the basis for future comparison. No. 3 chain ran 1,580 miles, and carried 19,500 tons of coke. The first cost (£125) was, therefore, equal to 0.97d. per 1,000 ton-miles. The coke conveyor trough was originally lined with renewable steel plates, but owing to the time consumed in repairs, these had been replaced by short cast iron plates, which proved quite satisfactory.

Corrosion Due to Coke Quenching.

One matter in connection with that intermittent vertical retort installation which had been causing them a little trouble was the comparatively rapid corrosion, in some parts, of the structural steel work through the steam generated by the hot coke in the conveyor trough. After trying various paints on the main stanchions with practically no success, they had obtained fair results by wrapping the stanchions with wire netting and plastering about 1 in. of a mixture of cement and sand on the faces. Even that had not been entirely successful, owing to the difficulty of obtaining perfect adhesion. The interior of all stanchions had been filled with concrete shortly after the installation was put to work. He suggested that, in future work, protection of all exposed structural steel work of the main stanchions with concrete or otherwise should be carried out during the erection, and that a little more space should be allowed by the builders to enable it to be done effectively.

Coal Tar Oil for Gas Making.

Owing to the difficulty in obtaining supplies of gas oil, various trials had been made with the substitution of coal tar oil, which had resulted in the production of a gas with a calorific value of 472 British thermal units (Beasley recording calorimeter), using 1.38 gals. of oil per 1,000 cu. ft. of gas made. Although the heating value of the gas was fairly good, the illuminating power was poor—about 12 candles (No. 2 Metropolitan burner). The composition was such that it required less air for combustion than a gas made with "gas oil" only. Altogether, the trials were so satisfactory that it was intended to continue the use of that oil, although, unfortunately, the supply was limited.

The Question of By-Products.

Under the pressure of abnormal conditions, were they, as gas manufacturers primarily, in danger of forgetting the importance of their primary commodity—gas? It had been said that they were becoming manufacturers of by-products, and that these by-products would eventually assume the position of staple products. His experience during the last three years was that of the residuals only one—coke—had held an all-important position in contributing to the right side of the balance-sheet. The value of tar, which was inestimable to the nation in these times, had depreciated to his company to the extent of over 50 per cent., and, occasionally, there was a real difficulty in getting rid of it at any price. As to sulphate of ammonia, the commercial value of that important by-product to the manufacturer had nearly reached vanishing point.

An Order made by the Home Secretary regarding ambulance and first-aid arrangements at blast furnaces, copper mills, iron mills, foundries, and metal works, will come into force on December 1.

METHODS OF MINING IN CROW'S NEST PASS DISTRICT, ALBERTA.*

By R. GREEN.

The method of mining adopted in the Crow's Nest district, situated along the Canadian Pacific Railway between Passburg and Crow's Nest Lake, depends to a great extent on the geological and physical features of the region.

Geological and Physical Features.

The main ranges of mountains are composed of devonian limestone, and have a general trend north-south. The overlying formation is Fernie shale, which outcrops along the edge of the limestone; this in turn is overlain by cretaceous rocks, of which the most important member is the coal measures, or Kootenay formation. These rocks, in general, form the foothills and are faulted parallel to the main ranges, forming a series of coal basins with the outcrops occurring along the crests of the hills. The Canadian Pacific Railway follows a transverse valley, cutting the coal measures at approximately right angles, thus affording facility for developing the coal seams at a number of different points. The mines are opened up by means of adits or tunnels driven from the level of the railway along the strike of the seam, and, as the tunnel advances, the distance to the outcrop increases, so that it is possible to develop considerable coal without recourse to working "to the dip."

The following is an example of an actual developed coal basin:—The east limb has a dip of 30 to 45 degs., but this gradually decreases till the lowest point of the basin is reached; whilst the western limb is sharply folded. This method of folding is repeated several times, and most of the mines of this district are situated on the eastern limb. In a few instances slopes have been driven below the valley level towards the lowest portion of the basin, but although there is some decrease in the dip, the workings have not yet extended to the western limb of the basin.

A variation of the above manner of folding often occurs when faulting takes place at the lowest point, and the eastern limb is repeated.

The coal measures average 400 ft. in thickness, and are overlain by a bed of hard conglomerate. Five seams have been found, but, with one or two exceptions, one seam only has proven of present economic value. This seam is 12 ft. in thickness, and has a fair roof and floor, so that conditions are suitable for mining. The seam produces some slack, but it is of good quality, and makes a most suitable fuel for locomotive or stationary boiler use. Several of the transcontinental railways have already extended its use to British Columbia and the Pacific provinces. The lump or screened coal is considered to be equal to any imported coal on the market.

System of Mining.

Two systems are used in the extraction of this coal, viz., up the pitch and across the pitch systems. In order to put either system into operation, the method of development is the same, namely—main gangways, 500 to 600 ft. apart, are driven along the strike, airways are driven for ventilation at from 30 to 50 ft. above these, and the rooms are opened off above the airways.

Up the Pitch System.

In this system rooms are driven from the airway over the lower level or gangway, to the succeeding level above, or to an airway beneath the level. These rooms are from 10 to 20 ft. wide, and the pillars left between rooms have a width of from 30 to 40 ft.

Roof conditions determine, to a great extent, both the width of rooms and pillars and the timbering method to be used. With a compact roof, a single row of props is sufficient to maintain a room width of 20 ft., but where the roof is soft it may be necessary to reduce the room width to 10 or 12 ft., and substitute the square set method of timbering with lagging over the cap pieces and along the ribs. In this case, the pillar width would be reduced also to about 20 or 30 ft.

In some cases where cap rock is encountered, it may be mined separately and stored behind, but it is advantageous, wherever possible, to leave it, or any dirty coal adjoining the roof, in place, and adopt a closer method of timbering.

In all cases where up the pitch system is adopted, it is necessary to carry a chute up to the face of each working for carrying the coal by gravity to the level below. The chute is constructed of boards 1 in. or 2 in. in thickness for the sides, and 2 in. plank for the bottom, lined with galvanised sheet iron of 22 to 28 gauge. One side of the chute is used for ventilation and as a travelling way.

Cross-cuts, 6 ft. by 6 ft., connecting the rooms, are driven every 50 or 60 ft., to keep the ventilating current well up to the working face. After a certain number of rooms have been driven to the level or airway above, the extraction of pillars is begun. The pillars are drawn from the top downwards; but, in a seam 12 to 14 ft. thick, it is necessary to leave protection pillars in order to safeguard the miner against fall of *débris* from above. If the roof is soft, neither protection pillars nor any practical system of timbering is sufficient, so that this method has to be abandoned, and the pillars split by driving a room up the centre of the pillar. By the latter method, some 30 to 50 per cent. of the pillar coal is recovered. Where the pitch is over 35 degs., or the roof conditions unsuitable, it is evident that this system is unsatisfactory, as the recovery is too small.

An adaptation of "up the pitch" system is often used where the dip is over 35 degs. This is called the angle system, and differs from the first, inasmuch as the rooms are driven at an angle to the pitch so that the rooms have a pitch of from 28 to 30 degs. The pillars are from 40 to 50 ft. in width, and from 60 to 70 ft. in length. In the extraction of these pillars,

the workmen are well protected by leaving behind a small portion of a pillar to act as a guard against falls, or caves from above. Under favourable roof conditions, this barrier is blasted out, and it is possible to recover over 80 per cent. of the pillar.

This system is also of special advantage in connection with the resumption of work after an extensive "crush," as it is possible to close the rooms immediately below the cave, thus preventing the *débris* from following down, and, at the same time, permitting of attack on the next pillar in the usual way. Where the roof is friable, it may be necessary to split the pillars in the manner outlined above, but by this method 60 per cent. of the pillars may be recovered, as against from 30 to 50 per cent. by the "up the pitch" system.

Where the roof is hard, and can be kept up by props, and the pitch from 30 to 35 degs., the up the pitch system is a cheap, safe, and rapid method of mining coal; and the lower the pitch adopted in the rooms the greater the reduction in the breakage of coal.

Across the Pitch System.

In this system two parallel rooms are driven up the pitch to the level above. Rooms 40 to 50 ft. apart are driven at right angles to them, and continued to the next pair of parallel rooms, some 150 to 200 ft. distant. The rooms are from 10 to 20 ft. wide, and the pillar width is from 20 to 30 ft.; cross-cuts for ventilation are driven every 50 to 80 ft. apart. By this system, the coal is loaded into small cars and trammed to the loading chute. For this reason it is not favoured by the miner, so that its use is not general, which is regretted, as this system approaches the most ideal one for working a pitching coal seam. Its advantages are as follow:—

(1) In the case of a bad roof, some method of timbering can be devised which will afford ample protection to the miner both in driving the room and extracting the pillars.

(2) Where rock occurs in the seam it can readily be stowed behind.

(3) When the room is finished, the pillar can be drawn immediately. This is a great advantage, as it causes a more uniform caving of the strata above, thus reducing the pressure, which is a condition most desired in the working of a coal mine.

(4) The ventilation problem is simpler, as there is less difficulty in keeping the working faces well ventilated.

(5) The worked out areas cave more easily; consequently there is less liability of the lodgment of gas.

Firing Shots and the Use of Explosives.

Where the coal is hard, blasting is resorted to. In some seams of the softer kinds the coal is mined by hand exclusively, no explosives being used. As a rule, the face of the working places, which are about 12 ft. wide, are undercut about 6 ft. deep by 6 ft. wide near the floor of the seam, and the holes are placed above this and the coal brought down; the rib coal afterwards is shot out toward the opening already made.

In some cases the undercutting may be done in the centre of the seam, thus allowing the lower portion of the seam to be lifted up by shooting. These two methods are particularly applicable where there is a soft stratum of coal in the seam for "mining." Where the coal is hard and blocky, it is often found necessary to shear the coal by making either a vertical cutting along the rib or in the centre of the working place, the coal being shot to the shearing or cutting.

Permitted explosives alone are allowed, the one most commonly used consisting of a mixture containing approximately 9 per cent. nitro-glycerine, 70 per cent. nitrate of ammonia, and 15 per cent. potassium salts. All shots are fired by means of electric battery used by an official holding a certificate under the Coal Mines Regulation Act.

The amount of coal extracted per pound of explosive varies from four tons in very tough and compact coals to 12 tons or more in seams where the mining is soft and the cleavage good. Owing to the heavy pitch of the seams in this district, it has not been found advisable to use undercutting machines, the use of which could only be found of value where the coal is hard and compact; if some light machine, of the reciprocating type, could be devised, it would prove worth while investigating.

Ventilation.

Where the coal to be extracted is above water level, and where the outcrop can be followed for several miles along the hillside, it has been found economical to move the fans so as to follow the advancing levels or gangways below. In this way the ventilating current is generated at a point as near as practicable to the working faces. By this method a smaller volume of air is required, less resistance has to be overcome, and therefore less power is consumed. Further, there is no necessity to maintain long airways, with their heavy bills for repairs, etc.

At one coal mine, having an output of 1,000 tons per day, the power consumption for ventilation is not over 25 horse-power, and the water gauge 0.5 in. These results were obtained by the use of a fan of the multi-blade high-speed type, 4 ft. in diameter and 2½ ft. in width. This fan was easily set up or moved, and was operated by an induction motor at 110 volts reduced from 2,300 volts—the voltage of transmission. The efficiency of the fan proper was 79 per cent.

When workings to the dip become necessary, the longer airways and larger volumes of air required will necessitate a different type of fan. This district has now come to the point where the upper workings are rapidly becoming smaller in extent, and slopes are being driven at several of the mines to develop the coal to the dip. This will involve the solution of some problems, and will unquestionably increase the cost of production.

Mr. James Whiteside, Inverdene, St. Catherine's-road, Giffnock, Glasgow, has been appointed an inspector of factories and workshops.

* Canadian Mining Institute Bulletin.

CURRENT SCIENCE AND TECHNOLOGY.

Gas and Gas-Fired Boilers.

Mr. H. Schaller (*Gas World*) gives data and results recently obtained at a large coke oven power plant with a rust, 4-drum, water tube boiler, having a grate surface of $94\frac{1}{2}$ sq. ft., water heating surface of 4,320 sq. ft., drums 14 in. diameter, 16 ft. long, water feed line $2\frac{1}{2}$ in., and steam header 10 in.

In one test the boiler was hand-stoked, and the fire was cleaned every four hours, 10 to 15 minutes being required for cleaning and restarting. The feed water was cooler than usual, as a separate supply was not taken from the water heater. Forced draught was made by the use of steam jets ejecting air under the grates, connected to a constant steam pressure regulator, and blowing 65 per cent. of the time of the test. The flues were blown twice during the test. Considerable breeze (about 25 per cent.) was carried over the grate, some of it depositing between the flues at the back end of the boiler, and some discharging out of the stack.

In the other test four gas burners were used, pointing at flues through the front wall of the boiler. Steam jets, connected as in the first test, ejected the necessary air for combustion, also partially regulating the flow of gas to the burners. The gas was metered with a rotary velocity meter, and the temperature and static pressure were obtained at the meter at regular intervals of 15 minutes. The gas volume was corrected to dry gas at 30 in. mercury pressure and 60 degs. Fahr.

The results were as follow, those of the second test being in parentheses:—Weight of breeze as fired in 24 hours, 96,230 lb. (—); total gas consumed (corr.), — (1,278,928 cu. ft.); weight of breeze (dry), 84,528 lb. (—); ash and refuse, 12,208 lb. (—); total weight of water fed to boiler, 364,884 lb. (316,656 lb.); water actually evaporated, corrected for moisture in steam 97 per cent., 353,937 lb. (307,156 lb.); equivalent water evaporated into dry steam from and at 212 degs. Fahr., 415,867 lb. (361,780 lb.); breeze consumed (dry) per sq. ft. of grate surface per hour, 37.2 lb. (—); corr. gas consumed per hour, — (53,247 cu. ft.); water evaporated per hour, 14,747.4 lb. (12,798.1 lb.); equivalent evaporation per hour from and at 212 degs. Fahr., 17,327 lb. (15,074.2 lb.); equivalent evaporation per hour from and at 212 degs. Fahr. per sq. ft. of heating surface, 4 lb. (3.72 lb.); horse-power developed, 502.2 (439.6); builder's rating, 430 horse-power (—); percentage of builder's horse-power developed, 116.7 (101.6); efficiency, 43.3 per cent. (54.6 per cent.).

Low-Temperature Carbonisation of Waste Coal.

Mr. T. F. Winnill, in the *Journal* of the Society of Chemical Industry, deals with the possibility of treating waste coal for the recovery of by-products. The seams of inferior coal often found accompanying the main seams have a very high ash content, ranging between 10 and 80 per cent. Large quantities of this waste coal have to be raised, and, being unsaleable, additional expense is incurred in disposing of them. Bastard cannel contains 20 to 30 per cent. of ash, the carbonaceous matter consisting of: carbon, 78 to 81 per cent.; hydrogen, 5.7 to 6 per cent.; nitrogen, 1.2 to 1.5 per cent.; sulphur, 1.5 to 5 per cent.; and oxygen, 10 to 10.5 per cent. One hundred tons of the coal therefore contain from 70 to 80 tons of what, could it be utilised, would be an excellent fuel. The author tried to treat this bastard cannel for the recovery of residuals by low-temperature carbonisation, but the results were disappointing. A ton of the coal yielded about 30 gals. of tar, which was very difficult to separate from water. The net yield of by-products from this tar amounted to 100 lb. of pitch, 50 lb. of semi-solid wax, 4 gals. of soda-soluble oil, $\frac{1}{2}$ gal. of phenolic ethers, and 6.5 gals. of hydrocarbon oils per ton of coal. These hydrocarbon oils seem only suitable for use as a fuel, having neither sufficient viscosity nor body to serve as lubricants. The sulphate of ammonia extracted amounted to 25 lb. per ton, which could be increased to 35 or 40 lb. A good quality of gas was obtained, very similar in composition to ordinary coal gas, the yield being about 6,000 cu. ft. per ton of coal treated, and of which some 3,000 to 4,000 cu. ft. would be required for working the distilling plant. The coke produced was too high in ash to have any commercial value. The conclusion, therefore, is that working these inferior coals for their by-products would be unprofitable.

The Motion of Ions and Electrons Through Gases.

This subject is discussed by Mr. E. M. Wellisch, in the *University of Sydney Philosophical Magazine*. It has long been known that in air at very low pressures the current of negative electricity is due practically entirely to free electrons; at higher pressures, however, it is due to the motion of negative ions. If the ion at high gas pressure be conceived as a cluster of molecules, it would follow that as the pressure was reduced the average number of molecules in the cluster would decrease; as the pressure was still further reduced, an individual negative carrier would be for part of the time in the ionic state (say now as a single molecule), and for the remainder would exist as a free electron. Ultimately, at very low pressures, the carriers would be all free electrons. New experiments described in the paper show that while the law $p \propto k$ is constant (where k is the mobility of the ion, p the pressure of the gas) holds good to the lowest pressure for the positive ion, the negative carriers were found to consist of two distinct kinds, electrons and single-molecule ions, the former being in evidence as the pressure of the gas was reduced. The electrons travel freely without attaching themselves to the molecules. When the ions were considered apart from the electrons, the noted anomalies disappear, the law $p \propto k$ is still valid in the form $v = k_o \frac{w}{p}$. In the permanent gases free electrons will therefore at all pressures, even if a very small relative

number. In inert gases the negative carriers are almost entirely electrons, even at atmospheric pressure, but in all instances a slight trace of impurity (especially oxygen) was sufficient to convert the carriers into ions. Inert gases and hydrogen are now regarded as being exceptional, not in their power of containing free electrons, but by reason of their reluctance to form great negative ions, i.e., by reason of the exceptionally large proportion of electrons to ions. It would seem probable that in order to supply an appreciable number of negative ions, the molecules must contain atoms either of oxygen or chlorine, bromine or iodine. An explanation for this is advanced that an electron cannot effect a permanent union with an uncharged molecule to form a negative ion unless the relative velocity at collision exceed a critical value characteristic of the molecule concerned, which value is reduced by oxygen and halogen atoms.

The difference in mobility of the positive and negative ions in a gas is ascribed by the author to a difference in the attractive forces between each kind of ion and the uncharged molecules and their elastic properties. If the law of impact is different between the molecules of the gas and the positive and negative ions respectively, it follows that the rate of diffusion of the two sets of ions will in general be different. The general effects can be accounted for by two considerations: firstly, the discrete nature of the electronic charge, and secondly, the assumption that the positive and negative charges are differently distributed in the respective ions.

MINERS' HOUSING IN SCOTLAND.

(Continued from page 741.)

General Sanitation.

In certain of the newer mining villages overcrowding is probably the chief blot upon housing; but, taking the coal fields of Scotland as a whole, there is no doubt that the privy accommodation is the very worst feature. This is beyond question true of the older villages, especially in the West. In certain small "rows" sanitary accommodation is non-existent, and the people have to make what shift they can; in many other cases it is of a primitive and most objectionable order. A row of old colliers' houses in the largest burgh in Fife was visited, where the sanitary accommodation consisted of a "trough closet," only 16 ft. from the nearest house; and from the stench issuing from it at the time of the visit early in spring it was possible to form some conception of the nuisance and danger which it would constitute in summer. One degree better in design are the blocks of two, four, or six privies which are common in the older Fife villages; but, owing to their position and the divided responsibility for attending to them, they are frequently allowed to become semi-ruinous.

It is in the West of Scotland, where the "conservancy system" of sanitation has persisted longer than in the East, that the worst conditions are most commonly found in mining villages. Here the privy-midden, or common dry-closet combined with the ashpit for a group of houses, till recently formed the rule, and is still found in full offensiveness in not a few places.

But these general descriptions do not and cannot give a proper conception of the grossly insanitary conditions found by the Commissioners on their tours of inspection, which tours were arranged by the mine owners and the representatives of the miners' associations. Since the agitation against the conditions of miners' houses became acute, considerable improvements, with and without pressure from the local authorities, have been effected in the mining districts; and even the Commissioners' visits to some of these districts have been followed by, if they have not resulted in, the local authorities being more insistent in enforcing their powers. So far as can be judged, the neglect to secure a reasonable standard of sanitary decency may have some excuse in the inadequacy of the administrative powers, but it has none in the economics of the industry concerned. For in that industry profits, if not uniformly good, have at least been equal to any of the best industries in the country, and the wages of miners have been at least as good as any other industry requiring equal skill.

Sanitary Improvement and Retarding Causes.

Mid-Lanark.—Although the most deplorable sanitation was seen in the more neglected "rows" in Mid-Lanark, many signs of an effort after better things were noted, such as the addition of annexes containing scullery, washhouse, and water-closet to individual houses; and the replacement of large common ashpits by individual bins. The summary of improvements effected in the Middle Ward during the first five years' operation of the Housing, etc., Act, 1909, is worth quoting in full at this point, as the properties referred to (nearly 100 in number) are practically all miners' rows:—

Houses closed	699
Sanitary improvements completed	1,221
„ „ in progress	1,065
„ „ under negotiation	1,365
Total	4,350

The cost of such improvements naturally varies, according to whether a more extensive reconstruction is carried out at the same time; but even when the cost of adding a scullery and boiler to each house, and a water-closet for every two houses, is taken separately, it amounted a year or two before the war to about £25 per house. Two such improvements, one of 276 miners' houses in Lanarkshire, the other of about 300 in Midlothian, both brought out this figure, which may thus be taken as typical. Usually an addition is made to the rent to cover this outlay—a reasonable proceeding if the previous rents were reasonable. But this

is a point on which it would be hazardous to express too confident an opinion without inspection of the houses before and after the improvement was carried out.

The explanation advanced for the delay in this greatly needed improvement which has taken place in the Middle Ward in very recent years was threefold:—(1) There was the fact that the system of common dry privies remained much longer in the West of Scotland than in the East, and that 30 years ago it might be argued that what was good enough for the city of Glasgow could not be condemned in a mining village; (2) there was a lack of statutory powers in landward districts—a point dealt with elsewhere; (3) till a water supply adequate for the provision of at least one closet for every two houses was available, no really satisfactory substitute for the common privy could be devised in these congested villages. Of the three matters referred to, that of the water supply has perhaps the greatest importance; and it is the completion of the District Committee's very extensive water scheme which has opened the way most directly for the recent advance. Across the watershed in West Lothian, the sanitary inspector told the same tale—the introduction of adequate water supplies had led to a general introduction of sanitation by water carriage at Broxburn and elsewhere. These facts emphasise the need for a systematic survey of the country's resources in the matter of water, so that competition for the use of particular catchment areas may be avoided, and the resources of the country in this essential respect economically and extensively developed.

The possession of a good water supply is not the only pre-condition of improved sanitation, however, as the question of drainage works and sewage purification also comes in, and occasions real difficulty both to companies and local authorities. This is especially so on high ground, such as Shotts district, both because the streams are small and readily polluted, and because such a watershed is often an administrative boundary, as in this case between Mid-Lanark and West Lothian. If a special commission is appointed, or if Government engineers are instructed to survey the watersheds of Scotland, their instructions might with advantage include the question of drainage schemes in neighbouring administrative areas, as well as that of water supplies.

Ayrshire.—In many of the Ayrshire villages privy accommodation was found to be of a particularly inadequate order, and were without doors, although these very unsatisfactory ones were comparatively few in number, and were gradually decreasing. The local authorities were apparently satisfied with the gradual decrease. Nor was attention generally called to the matter until it was taken up by the Ayrshire Miners' Union and by others in the Press and elsewhere, as the result of a resolution passed by the Ayr County Insurance Committee on January 17, 1914, calling for action in regard to the insanitary state of many of the miners' rows, which was held accountable for much of the infectious disease in the county.

Considerable improvements were being carried forward at the time of the Commissioners' visit, but no action was being taken comparable in thoroughness to that of the Mid-Lanark District Committee. The difficulties to be encountered are the same in both cases, except that the scattered nature of certain of the Ayrshire "rows" may form an additional handicap by rendering the introduction of an adequate water supply more difficult and expensive.

Use of Modern Sanitary Appliances and Suggested Minimum Standard.

On the whole, there was testimony that, where modern sanitation had been introduced, the closets are well looked after in mining villages; the replacement of the old privies by water-closets had made an absolute change in the habits of the people; and, on the whole, the adjustment to the new conditions appears to have been rapid.

There are, however, two points, closely connected with one another, which either facilitate or hinder the proper care of water-closets, viz., their position relative to the house, and the number of houses that share the use of each.

The representative of one large mining firm gave it as his personal opinion that one water-closet for each house was desirable in mining communities, and this was the suggested standard of sanitation. But where water supply and drainage schemes are prohibitive in expense (which will not often be the case in mining villages), a pail-privy should be provided for each house at the end of the garden, not less than 20 yds. from the dwelling, and, if possible, further away; in selecting a site for earth closets, privacy should be aimed at. It was argued that, as regards old houses, some discretion should perhaps be left to the local authorities; but that, broadly speaking, a building should not be considered to be in a state of habitability which does not provide (where reasonably practicable) for at least one water-closet for every two separate houses, and that even this concession should only be allowed in the case of old properties. On the other hand, it was stated that water closets were kept perfectly clean when shared by two tenants, each of whom had a key.

Sizes and Description of Houses.

There are no exact figures obtainable as to the number of rooms in houses occupied by miners, as these are naturally included in the general figures for each area in the Census Report. But statements were made by witnesses, and other figures on this point are to be found in the special reports of the medical officers who gave evidence; so that a general idea can be obtained of the proportion of one- and two-room houses in certain of the mining districts. As regards the total number of houses, the following figures may be taken as more or less typical. In the mining districts of Midlothian and West Lothian, excluding larger houses for managers and others, about 11 per cent. of the total have one apartment, 65 per cent. have two, and 24 per cent. have three or more. The one-apartment houses are for the most part old, and a considerable

number of them have now been joined to form larger houses. In many of the old two-room houses, however, while the kitchen is of fair size, the room is hardly worth the name of room, being very small and frequently without a fireplace. Often it is used only as a store or lumber room. The smallness of the second room in certain of the older houses may lead to a discrepancy as to the number of one-and two-room houses respectively. In one instance in Lanarkshire, the employers reckoned a group of houses as having two apartments which the medical officer described as "houses of one apartment and small bed closet." The representatives of the Shale Miners' Association estimated the proportions as follow in the Lothian shale field: 13 per cent. one apartment; 72 per cent. two apartments; 15 per cent. three apartments. The Fife Coal Company own a large percentage of the miners' houses in Fife. Their houses have less than 2 per cent. one room, about 80 per cent. of two rooms, and the balance of three. Of 1,024 houses owned by the Lochgelly Coal Company, 106 have one room, 121 have three rooms, and the balance two rooms. In the burghs of Lochgelly and Cowdenbeath, which are chiefly occupied by miners, though a large proportion of the houses are privately owned, and which are largely of recent construction, there were, in 1911, 11.5 and 16.6 per cent. of one-room houses respectively; 65.2 and 58 per cent. of two-room respectively; and 16.2 and 18.4 per cent. of three-room houses respectively. In Lanarkshire the number of one-room houses is very much larger. In 1911 the percentages in the county of Lanark, excluding burghs of over 2,000 inhabitants, were as follow: 21.2 per cent. one-room houses, 48.3 per cent. two-room houses, 12.5 per cent. three-room houses, the balance of 18 per cent. having four or more apartments. But in the large mining burghs the standard was even lower, as the following table shows (the figures representing percentages):—

	One apartment.	Two apartments.	Total of one and two.
Coatbridge	27.3	51.4	78.7
Hamilton	24.6	46.4	71.0
Motherwell	21.9	51.9	73.8
Wishaw	28.5	49.4	77.9

In Ayrshire the proportions of one- and two-room houses respectively in the county, exclusive of the larger burghs, are 15.2 and 44.5 per cent., but in the mining burgh of Galston they are 28.2 and 46.7 respectively. The Ayrshire Coal Owners' Association gave the following figures representing the houses owned or leased by their members:—

(1) One apartment	1,095=17.0 per cent.
(2) Two apartments	4,546=70.8 "
(3) Three apartments	516=8.0 "
(4) More than three apartments...	269=4.2 "
	6,426=100 "

The typical miner's house has only one storey, though in a few recent cases attics have been added, or cottages have been built on the double-flatted principle. In the older rows the houses are commonly "but and ben," or "single end." It is exceptional for them to be built back-to-back, but even where this is not the case, the window in the back wall is either non-existent or too small to be effective. The more recent rows consist for the most part of "through" houses of two apartments. There is usually a small square lobby inside the door. The kitchen, which also serves as living room, has two bed recesses in the wall opposite the fireplace. Usually these are open for their whole width and height, but may be partially screened by curtains. Opposite the window a door gives communication directly into the "room," which commonly has a fireplace on one side and a single bedplace on the other. The average size of these apartments in the central coal fields is 15 ft. by 10 or 11 ft. by 9 ft., the cubic capacity being about 1,400 cu. ft., or with the bedplaces about 2,000 cu. ft.

In many parts of Lanarkshire, Ayrshire, and Fife-shire the old houses occupied by miners and other workmen are barely above the habitable standard, this being due to these houses being from 60 to 100 years old. They have, as a rule, the plaster placed hard on the outside walls; there are no rones or down pipes to carry off roof water, no damp-proof course at the ground level of the outside walls; they have tile or brick floors with the bare earth exposed under the beds, and where wood floors have been laid there is no ventilation underneath them; in many cases the roof timbers have sagged, and the tile or slate roof covering has been left unrepaired; and, finally, all these defects tend to bring a dwelling house into such a state of structural disrepair that the house sooner or later falls below the habitable standard. Reports on other districts show that the same defects are apparent in the older rows in most of the coal fields. It may be added that, owing to the absence of coal cellars, coals were kept below the beds.

Specific Defects.

Damp.—In the evidence of miners' unions, the most frequent complaint regarding the structure of the houses was that of persistent dampness, the chief causes being lack of damp-proof courses and the frequent absence of proper rones and conductors. In regard to the Ayrshire villages, the complaints of damp were particularly frequent, while a square in Stirlingshire was described as having no gutter pipes, so that the rain from the tile roof dripping down the sides made the houses very damp and formed a channel for itself.

Defective Floors.—The state of the flooring of the older houses also provided considerable occasion for complaint, especially where the floor was of bricks unevenly laid, or of wood without proper ventilation beneath. Indeed, this defect is closely connected with the more extreme cases of dampness which have just been referred to. In one house at Kelty, when a new floor was provided, 6 in. of clay and water had been found below the old one. In other cases, the making up of the roadway has resulted in the floors being below the level of the adjacent ground. The representatives of the Ayrshire Miners' Union gave similar evidence regarding brick floors in the older rows, cracked and uneven through subsidence. They

described one house in which half the floor was of wood which had rotted, the other half of the original brick. In another village they reported that the coals are kept below the bed; that the floors are of the usual brick-tiled type; and, as is the case wherever they have seen this kind of floor provided, that the surface is very uneven and cracked, and it is a heartbreak to the housewife to keep it clean; that if waxcloth is laid on it it is cut up in a short time; and where no covering is put on, the children carry the "muck" in from the quagmire of a road outside; and that there is no covering on the earth below the beds. The remedy clearly is that an impervious floor through the whole extent of the living rooms should be considered an essential condition of habitability, and that any house not so furnished should be considered as *co ipso* in a state of "nuisance."

Defective Windows.—Other specific defects in the structure of houses in the older colliery villages are similar to those found in houses of the same age and type elsewhere. Such, for instance, are windows inadequate in point of size, or failing to open through faulty construction, disrepair, or disuse; with the consequence that lighting, ventilation, or both are permanently defective. It was argued that when windows are made to open, this fact is often not taken advantage of; and that miners, coming up from work at a high temperature, are sensitive to draughts and cold houses. The argument, which may indeed be true for a time, before habits have had time to change, would, if taken literally, dispose of all motives for reform. This would simplify matters certainly, but it can hardly be questioned that the provision of windows of adequate size and suitably hung is a consideration of the first importance.

Improved Modern Houses.

From this description of the common defects in miners' houses of the older type, the report passes to a consideration of the newly-erected houses; it was generally recognised that these newer houses represented not only a decided improvement on the standard common even in the fairly recent past, but also a commodious and satisfactory type of miner's dwelling. In a considerable proportion, while the structure and surroundings of the houses and the sanitary arrangements were described as adequate, the houses themselves were still of the room and kitchen type, though in some cases a large scullery was added. Elsewhere, however, there was a welcome increase in the proportion of three-room houses. In some of these there is a large attic bedroom with storm windows; but in most cases the traditional plan of the one-storey house is adhered to. On the whole, the occupiers probably prefer this; and as sufficient land is usually obtainable in mining villages, it is argued that there is no need to build above a single storey.

It may be worth while to refer in more detail to three or four examples of the improved miner's cottage. The houses at Newtongrange (Midlothian) were claimed to be the best miners' houses in Scotland, as they contained a kitchen and four or five rooms, with conveniences and gardens. The rents of the best houses are 10s. 6d. a fortnight, and these large houses are taken chiefly by families with several members working. In West Lothian good houses have been built in several centres, some of them being arranged on the garden suburb principle. Those contain, in addition to three rooms and a scullery, a small pantry off the kitchen, bathroom, etc., the rental being 6s. per week, including all rates. In a group of new three-room miners' houses in the burgh of Bo'ness, the house has a total size, interior measurement, of 6,171 cu. ft. In Raasay, the island adjacent to Skye, a West of Scotland iron firm has built a group of miners' houses which are stated to have set a new sanitary standard for that part of the world. As regards Ayrshire, the miners' representatives specially called attention to cottages erected by the Dalmellington Coal and Iron Company at Broom Knowe, which are built in two rows, and are of brick and rough cast. There is a small garden plot of ground, surrounded with a wooden railing, in front of every house. Each house has both a front door and a back, and the accommodation provided is two rooms, a kitchen, a scullery, with washing house, boiler, and a water-closet and coal house. The dimensions of the apartments are: Kitchen, 21 ft. by 10½ ft. (exclusive of set-in beds); two rooms, 11 ft. by 10 ft.; and a back kitchen or scullery, 10 ft. by 9 ft. The rent of this house is 4s. per week, including rates. The kitchen is fitted up with a large press reaching from the ceiling to the floor, and is arranged so that one compartment serves as a wardrobe and another serves as a cupboard. The back kitchen, the water-closet, and coal house are built like outhouses, but joined to the main building. There is no ashpit, but the people put their refuse in pails, and this is collected by the scavenger every day. This is almost an ideal house for a miner's family. The addition of a bathroom would have made it complete, and it will be observed that the length of the kitchen, 21 ft., leaves almost sufficient room to take a portion of it for a bathroom, and still leave an ordinary sized kitchen. This could have probably been done at a cost of another 3d. per week on the rent. The miners' representatives were of opinion that if this were done, and houses of that description supplied to the miners, the housing problem, so far as these workers are concerned, would be practically solved.

The question naturally arises how far miners are prepared to take advantage of the improved accommodation now being provided in certain districts. In Midlothian and West Lothian there was strong testimony as to their appreciation, thought it was indicated that at first the additional rent might be felt to be something of a hardship. There was evidence also regarding the improvement in the use made of the houses when families formerly housed in inferior dwellings had grown accustomed to them. On the other hand, it was stated by witnesses speaking for coal owners both in Fife and Lanarkshire that the urgent demand was for houses of two rooms, and that larger houses sometimes stood

vacant. But while the response to the improved accommodation was not immediate, especially in the older rows of fields, the evidence goes to show that the demand is both rapid and progressive. The demand for new houses at rentals of from 4s. to 5s. 6d. per week involving a rise of perhaps £5 or £6 per annum on the rent previously paid; and one witness stated that in recent building schemes the proportion of three- and four-room houses had been increased beyond that originally contemplated owing to the readiness with which the larger houses were applied for. One of the miners' agents specially referred to the anxiety of the women to obtain better houses. But as regards the readiness of the women to make good use of a better type of house, the Commissioners felt that the strongest evidence consisted in a care and cleanliness which were very widely, though not, of course, universally, shown in the keeping of houses which are structurally defective. The dwellers even in the worst places showed a remarkable and successful ingenuity in making bad houses, damp walls, cracked ceilings, defective and uneven floors appear attractive, and in putting the best face upon their surroundings.

(To be continued.)

SOUTH WALES MINING TIMBER TRADE.

Scarcity of Foreign Wood.

Owing to the difficulty in procuring vessels, there has been a sharp falling off in the quantity of foreign mining timber imported into South Wales. Importers have found it extremely difficult to procure tonnage, and, with the end of the month approaching, their imports are some thousands of tons below the quantity allowed to enter by the Controller of Import Restrictions. The quantity per month permitted to enter amounts to 40 tons. If importers have not taken their full quantity in any one month they are not allowed to import the balance the following month. For the week ending October 19, the actual quantity of mining timber imported from foreign countries amounted to but 3,540 loads, the whole of which was for the agents supplying the Admiralty collieries. No supplies were therefore received by the other importers. The actual quantities imported were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Oct. 13	Lysberg Limited	600
" 17	Lysberg Limited	2,280
" 18	Lysberg Limited	660

Total..... 3,540

Newport, Swansea and Port Talbot: Nil.

Market quotations for best French fir ruled at 75s., but this figure was nominal owing to the fact that no disposable supplies were available. Higher prices are confidently anticipated to rule over the next few days, as the difficulty of procuring tonnage is as pronounced as ever.

The scarcity of foreign mining timber has naturally led to a greatly increased demand for home-grown wood, with the result that prices are advancing. Best sorts command 75s. per ton, and inferiors 70s. Thus the prices of foreign and home-grown timber are round about the same figures. Deliveries of home-grown wood to the collieries continue to be upon a good scale, but there is very little balance left to provide for any rainy period which may ensue. A three or four weeks rainy period is bound to produce endless difficulties, for the roads adjacent to the woods in the district have never been designed for heavy traffic, and are quickly converted into quagmires, making transport difficult and materially reducing the output of wood. Stocks at the collieries are known to be low, and as no dependence must now be placed upon foreign imports, it is imperative that the authorities should take such steps as would ensure the accumulation of stocks of home-grown wood sufficient to tide over any possible period when the output is likely to be scarce. The great difficulty in the matter of timber cutting is the scarcity of suitable labour. Its attraction and retention is most difficult, for wood-cutting calls for men of stamina, especially during the winter season.

THE TIN-PLATE TRADE.

Liverpool.

There is nothing of importance to report on the week. The official maximum price of 30s. net f.o.t. at works is firmly maintained on the whole, only exceptionally favourable specifications being entered at a slight reduction. A fair amount of business was placed for the home trade requirements, but export trade is practically at a standstill (barring Government orders), owing to the great difficulty in obtaining licences to ship. Makers are all well booked up for the next two or three months, and are not anxious to sell beyond this.

Faraday Society.—According to alterations in the agenda of the Faraday Society proceedings on November 7 (5.30 p.m. to 7 p.m. and 8.30 p.m. to 10.30 p.m.), Sir Richard Glazebrook, C.B., will preside, and Prof. F. G. Donnan, F.R.S., will speak on "Optical Pyrometry in Non-Ferrous Metallurgy." The remainder of the agenda is unaltered.

Coke Oven Patents.—The Patents Court on Thursday heard arguments for and against the granting to Messrs. Simon-Carves Limited, of Manchester, a licence to use the two Koppers' coke oven patents—20870 of 1904 and 16386 of 1905. The Controller said that the question of royalty would have to be considered. He would make his report to the Board of Trade.

Miners' Wages and Compensation.—The House of Lords last week dismissed the appeal of the Woodilee Coal and Coke Company Limited relative to John McNeill, a miner who had earned an average wage of 40s. per week before disablement by accident, and who became disabled in 1911, receiving 27s. 6d. a week while receiving 15s. a week in compensation (reduced from 20s.). The company contended that the compensation should be reduced to 50 per cent. of the difference between the wages he had received since he was injured, his usual pay was increased to 55s. An arbitrator took cognisance of the rise in wages, and awarded 12s. 6d. The House of Lords upheld that award.

CONTENTS.

ARTICLES:—	PAGE
Coal Exports.....	793
Councils.....	793
Working Costs of Prime Movers.....	783
Sliding Scale Changes in Wages.....	786
Safe Compressive Stresses on Colliery Brickwork.....	786
Coal Mining in New Zealand in 1916.....	787
Coal Briquetting.....	787
Improvements in the Manufacture of Silica Bricks.....	788
Coal Carbonising at Gas Works.....	789
Methods of Mining in Crow's Nest Pass District, Alberta.....	789
Miners' Housing in Scotland.....	790
South Wales Mining Timber Trade.....	791
Coastwise Shipments in September.....	797
Edward Medals for Miners.....	797
The American Coal Trade.....	798
Labour and Wages.....	801
Open Contracts.....	801
The Freight Market.....	801
Government Publications.....	802
Abstracts of Patent Specifications Recently Accepted.....	804
New Patents Connected with the Coal and Iron Trades.....	806
Publications Received.....	806
REPORTS OF MEETINGS:—	
North Staffordshire Institute of Mining Engineers.....	785
THE COAL AND IRON TRADES.....	794-797
The Tin-plate Trade.....	791
The London Coal Trade.....	797
The By-Products Trade.....	797
CURRENT SCIENCE AND TECHNOLOGY.....	790
PARLIAMENTARY INTELLIGENCE.....	797
INDIAN AND COLONIAL NOTES.....	798
NOTES FROM THE COAL FIELDS.....	798
COAL, IRON AND ENGINEERING COMPANIES.....	800
MONTHLY LIST OF RECENT COAL LITERATURE.....	802
MISCELLANEA:—	
United States Coal Industry Warned.....	785
Partnership Dissolved—Collierymen's Wages.....	787
Faraday Society—Coke Oven Patents—Miners' Wages and Compensation.....	791
Development of Spanish Mining—Ascertainment of Selling Prices: Workmen's Dissatisfaction.....	794
Appeal to Motor Lorry Owners—The Stanton Iron Works.....	797
United States Coal for Canada—Escape Openings for Coal Trimmers—Miners' Food Blockade—Directory of Colliery Companies in South Wales.....	798
Petroleum Research.....	806

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Hargreaves, Corliss valves, pumps for 2½ tons pressure per square inch.

Set Steam driven Hydraulic Pumps, two 16 in. cylinders, 24 in. stroke, 2½ in. rams; £400.
Fielding & Platt Hydraulic Pump, cylinder 10 in. by 15 in. stroke, 1,500 lb. pressure, rams 1½ in. diameter; £110.
Worthington Compound Pump, cylns 12 in. and 20 in. by 15 in. stroke, 160 lb. steam pressure, rams 4½ in. diameter, 1,500 lb. w.p.; £250.
Hydraulic Accumulator, 9½ in. ram, 11 ft. stroke, self-contained with O.I. weights, weight about 100 tons.
Hydraulic Accumulator, 5 in. ram, 10 ft. stroke, steel casing; £115.
Massive New Horizontal Bending and Joggling Machine 14 in. ram; £250.
3 Hydraulic Single end Punching and Shearing Machines, by Fielding & Platt.
Two Hinge Type Hydraulic Riveters, 25 in. gap, 1,500 lb. w.p., by Rice.
One Bear Type Hydraulic Riveter, 36 in. gap, by Barry.
One Bear Type Portable Hydraulic Riveter, 18½ in. gap, 1,500 lb. w.p.
Two Sets Electrically-driven Geared Pumps, 3 in. rams, without motors; £20 each.

JOHN F. WAKE, DARLINGTON.

Wanted, Belt-driven Air-compressor,
400 cubic feet per minute, capacity 80 to 100 lb. pressure.—
Box 6868, Colliery Guardian Office, 30 & 31, FURNIVAL STREET, HOLBORN, LONDON, E.C. 4.

For Sale, 2 Cornish Boilers, 28 ft. long
by 6 ft. 6 in. diameter, each with furnace tube 3 ft. 3 in. diameter. They left off working insured at 170 lb. pressure, and then worked at 160 lb. They are of Messrs. Bealey & Sons make, and can be seen at **MELDRUMS LTD.,** Timperley, nr. Manchester. We shall be pleased to have an offer for same where seated.

Wanted Enquiries from all

the Collieries in the United Kingdom as to our Agency for REPORT BOOKS and FORMS, as prescribed by the Coal Mines Act, 1911.—Full particulars on application to the **COLLIERY GUARDIAN CO. LTD.,** 30 & 31, FURNIVAL STREET, HOLBORN, LONDON, E.C. 4.

TANKS.

45 ft. 6 in. by 5 ft. 6 in. Egg-end Boiler
Tank; £110.
30 ft. by 7 ft. very fine Boiler Tank; £150.

STEAM PUMPS.

Special 300 ft. series Tangye Pump, 14 in. cylr., 10 in. pump, 24 in. stroke, 10 in. suction; £80.
Evans Sinking Pump, 12 in. cylr., 7 in. pump, 12 in. stroke, 5 in. suction; £80.
Four Pulsometer Pumps; low prices.
Six Centrifugal Pumps, 4 in. to 8 in. outlets, belt- and engine driven.

STEAM HAMMERS.

Massive 4 ton Hammer, by Thwaites second-hand; £650.
15-cwt. Single Standard Massey Steam Hammer; £220.
2 " " " " " " £45.

AERIAL ROPEWAY.

Aerial Ropeway, by Bullivant, 500 yards long; £600.

BOILER.

Babcock & Wilcox Water-tube Boiler 150 lb. w.p., 870 s.f. heating surface with water softener and tanks complete; £300.

CRANES.

Two 20-ton Hand-operated Travelling Goliath Cranes, 40 ft. span, good condition; £300 each.
15-ton Steam-driven Overhead Travelling Crane, 44 ft. 8 in. span.
5-ton Overhead Hand Travelling Crane, 32 ft. span.

STEAM NAVVIES.

Fine 12-ton Whittaker Navy, almost new, rebuilt and ready; £1,600.
12-ton Wilson Crane-type Navy, being rebuilt; £1,400.
10-ton Whittaker Crane-type Navy; £900.
Modern 10-h.p. Ruston Proctor Tower-type Navy; £750.
10-h.p. " " " " " £500.

JOHN F. WAKE, DARLINGTON.

For Sale, Air Compressor, 1,000 cubic
feet air per min., 2 stage vertical compound steam engine, by Brotherhood. Immediate delivery.
A. UNDERWOOD, 3, Queen street, E.C. 4.

For Sale, Piping, eight 18 ft. lengths,
4½ in. inside dia., loose flanged.
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For Sale, Hauling or Winding Engines,
by Schram. Self contained on steel frame. Drum 2 ft. 6 in., cylns. 6 in. and 9 in. Also 2 WINCHES, by Holman, 4½ in. by 7½ in.
A. UNDERWOOD, 3, Queen-street, E.C. 4.

For Sale, Hauling Engines, pair 12 in.
cylns., 18 in. stroke with two drums 4 ft. 6 in., by Holman.
A. UNDERWOOD, 3, Queen-street, London, E.C. 4.

For Sale, Capstan Winch, pair 7 in. cylns.,
2 drums, by Joseph Evans.
A. UNDERWOOD, 3, Queen-street, E.C. 4.

For Sale, Pulsometers (2), 5 in. and
7 in.; also about 250 ft. seamless FLANGED PIPING, BENDS NON-RETURN VALVES, STRAINERS, &c.
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For Sale, Boilers:—

CORNISH, 22 ft. by 6 ft., 90 lb. steam.
" 24 by 5 ft. 6 in., 100 lb. steam.
" 16 ft. by 6 ft., 120 lb. steam.
ECONOMIC, 14 ft. by 9 ft., 100 lb. steam.
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A. UNDERWOOD, 3, Queen-street, E.C. 4.

For Sale:—One capital Second-hand
20-ton WEIGHING MACHINE, made by Hodgson & Stead, platform 12 ft. by 6 ft. 4 in.; in perfect condition.
WANTED—2,000 yards of 14 lb. PORTABLE RAILWAY, 24 in. gauge, with points and crossings turntables, and 20 3/4 or 1 yard SIDE TIP WAGONS to match. Apply—
M. J. DEVILLE & CO., Millhouses, Sheffield.

LOCOMOTIVES AND WAGONS.

Two 8-wheeled 4 coupled 2-4-2 type
Side Tank Mainline Engines, 17 in. cylinders, being rebuilt; £2,500 each.
11 in. 4 coupled Manning Wardle Locomotive, 140 lb. w.p.; £750.
9 in. 4 coupled Locomotive, 120 lb. w.p.; £455.
8 in. 4 coupled Manning Wardle Locomotive, 120 lb. w.p.; £500.
3 ft. gauge Hudswell Clarke Loco., 10 in. cylns., rebuilt; £750.
3 ft. gauge Loco., 5 in. cylns., thoroughly overhauled; £500.
Two 4 coupled 0-4-2 type Side Tank Kerr Stuart Locos., 7½ in. cylns., 150 lb. w.p., for 2 ft. 6 in. or 2 ft. 9 in. gauge; £650 each.
50 12 ton Main-line Coal Wagons, side and end doors, pitch pine bodies, fine oil, immediate delivery.
40 large 12-ton Hopper Wagons, bottom doors; £75 each.
100 10-tonners, side and end doors, full length rebuilt; £75 each.
100 10-ton Gipsy Wagons side doors; £50 each.
10 2-ton Double Bolster Wagons; £75 each.
15 10-ton Single Bolster Wagons; £55 each.
The above wagons have laminated spring buffers, are thoroughly overhauled; also a number of 10- and 12-ton Mainline Wagons for coals, &c. Enquiries invited.
40 3 ft. gauge Side-tip Wagons, steel tops, oak underframes; £25 each.
JOHN F. WAKE, DARLINGTON.

J. W. BAIRD AND COMPANY,
PITWOOD IMPORTERS,
WEST HARTLEPOOL,
YEARLY CONTRACTS ENTERED INTO WITH COLLIERIES.

OSBECK & COMPANY LIMITED,
PIT-TIMBER MERCHANTS,
NEWCASTLE-ON-TYNE.
SUPPLY ALL KINDS OF COLLIERY TIMBER.
TELEGRAMS—"OSBECKS, NEWCASTLE-ON-TYNE."

* * For other Miscellaneous Advertisements see Last White Page.

The Colliery Guardian

AND
Journal of the Coal and Iron Trades

Joint Editors—
J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
(At present on Active Service).

LONDON, FRIDAY, OCTOBER 26, 1917.

The London coal trade consists chiefly of comparatively small quantities offered by contractors and factors. Seaborne qualities are in strong demand, but all are contract cargoes, and principally gas coals. Steam coals continue unusually scarce. Slacks are plentiful.

On the Tyne and Wear the tonnage arrivals increased a little this week, and steams improved in consequence. Gas coal is slow, and small in very moderate request. The difficulty regarding household coal continues in Lancashire. Slack is freely offered. No material change has occurred in Yorkshire, from which county a big tonnage is going to southern destinations. Excessive stocks on sidings and numerous stoppages at collieries are unfavourable features in South Wales. The newly issued classification list for small steams (eight grades) ranges from 18s. to 21s. 6d. per ton. The Scottish market retains a quiet tone.

The Controller of Coal Mines is reported to be considering the question of better allocation of business among Northumberland and Durham collieries.

The executive council of the South Wales Miners' Federation have decided to issue a manifesto to the workmen strongly recommending them to vote against the proposed "down tools" policy. The men's leaders outside the executive appear to be adverse to the policy, and meetings of workmen employed in Ebbw Vale, Crumlin Collieries, Nixon Duffryn Collieries, Ogmere and Garw, and other places, have also expressed opposition.

Outward chartering has been very poor during the week, and "free" tonnage is reported to be extremely scarce on the north-east coast. Tyne to Gothenburg is quoted 190 kr., Cardiff to Bordeaux 34s., and Swansea to Rouen 47s. 3d.

A Bill intended to deal with the matter of compensation for coal mines taken over by the Controller was introduced in the House of Commons last night by Sir Albert Stanley, and will be read a second time on Monday.

The annual conference of the National Union of Scottish Mineworkers will be held in Edinburgh on November 6 and the three following days.

Shipping and Coal Exports.

IN March 1916 the Chamber of Shipping of the United Kingdom and Liverpool Steam Shipowners' Association appointed a committee to advise as to the measures requisite for the maintenance of the British mercantile marine. The report of this committee has now been published in two volumes, containing a wealth of information upon this vital question and its bearing upon the national prosperity. As we can only draw attention here to a few of the subjects discussed in this report, it is necessary to confine ourselves chiefly to that part which concerns the coal industry. One of the fundamental propositions laid down by this committee is the indisputable fact that "the importing power of a nation must, in the main, be dependent on its power to create in its own favour international credits by the export of its manufactures and the raw materials it produces, for when once such credits are created it can pick and choose between the imports it purchases." This economic principle has been recognised by all the great commercial nations of the world, and in the years immediately preceding the war the United Kingdom, the United States and

Germany were all increasing their exports at a rapid rate. In the year 1913 our coal exports showed the following percentage distribution:—About 8 per cent. went to places within the Empire, 44 per cent. to our Allies, 36 per cent. to neutral countries and 12 per cent. to enemy countries. Of our total imports of food and raw materials we obtained about 29 per cent. within the Empire, 13 per cent. from our Allies, 52 per cent. from neutrals and about 6 per cent. from enemy countries. If these figures prove anything, they go to show that the volume of our trade with enemy countries is comparatively negligible, and that there is no truth in the German assumption that we shall be compelled in our own interest to resume commercial relations with that country after the war. As a matter of fact, before the war Germany had been importing from the British Empire yearly about £14,000,000 worth more than her exports to the British, and in 1912 this excess was no less than £28,000,000. Hence Germany has more need of British trade than we have of hers.

The committee has made some striking remarks on the position of our coal exports in regard to our oversea trade. Although the coal we export amounts in value to only about 10 per cent., yet in weight it represents fully three-fourths of our total exports, and it therefore forms the bulk of our outward cargoes. Now freights are based chiefly on weight or bulk, and not on the value of the cargo. The chief question involved in fixing freights in normal times is the power to obtain cargo for the whole voyage, both outward and inward. Hence we arrive at the important result that our foreign trade was founded and is maintained on the fact that we have been able to export a bulky article like coal as against our big imports of food and raw material. Our ships have been filled both ways, and any curtailment in our foreign markets for coal, which diminished the outward cargoes offering, increased both the freights charged on our imports of food and raw material, as well as upon our export of manufactured articles. Thus a restriction of coal exports operates in increasing the cost of production and marketing of our goods, and places us at a disadvantage in competition with other countries. This has been our position in regard to coal exports under conditions obtaining previous to the war. It was fully debated in connection with the coal export tax, and was considered by the Royal Commission on Coal Supplies as a valid reason for the removal of the tax. The question now to be considered is whether the same arguments will hold under the new conditions created by the war.

Notwithstanding the strenuous efforts we are now making to develop natural resources within the Empire, and to increase the home production of food supplies, it is unlikely that we can ever be self-supporting in the sense that the Empire can be wholly independent of the foreign markets in the matter of food and raw material. Our commercial interests will require the maintenance of the greatest freedom of exchange of commodities throughout the world. The wastage caused by the war will have to be repaired in the shortest possible time. That wastage will be very unevenly distributed. In the case of the coal industry, there has fortunately been little if any actual wastage. The falling off in output scarcely comes under the heading of waste so long as the power of production remains unimpaired. But, in one sense, this deficiency has intensified the acuteness of the financial position of Great Britain by diminishing foreign credits.

There are some who still believe that a check should be placed upon the export of coal. It has been suggested that State control over our coaling stations should be maintained after the war so as to ensure that vessels under British and Allied flags should receive preferential treatment in regard to bunkering facilities. The committee, however, reject this view in the belief that such a proceeding would only lead to the establishment of other coaling stations on foreign territory. There is considerable force in the contention that this would constitute a national danger in the event of another war; for these foreign coaling stations would be free from British control, and might be used to our detriment. The argument applies almost exclusively to Germany, which is the country whose mercantile marine is most likely to engage in aggressive competition with our own. The committee is quite emphatic, however, upon the necessity that the British ship owner should

submit to the competition of the world's shipping. The report before us states clearly that any return to the general principle of the old Navigation Laws, or any attempt to exclude foreign shipping from the trade of the world by placing restrictions on our coaling stations, would be against the best interests of our foreign commerce and our mercantile marine. We may be permitted to remark upon this point, however, that a great deal will depend upon the kind of peace that is secured. If we can secure the terms the committee lays down in the report, their attitude towards this question will be readily approved. They regard it as essential that the enemy shall give guarantees for the future peace of the world, and redress for the mischief done, that no colonies shall be returned, that all devastation shall be made good, that adequate indemnities shall be paid, and all the material resources of the enemy drawn upon to the last mark, including, if needed, his resources in plant and machinery to this end, that "ton for ton" shall be exacted for all ships destroyed, and, in fact, that the enemy shall be submitted to a full policy of retribution for his crimes against humanity. Given such a termination to the war, there will be little need to consider further measures of retaliation. But only after justice has been done can generosity be allowed to follow.

Industrial Councils.

THE Ministry of Reconstruction is steadily pursuing its course, and promises before long to be one of the most important departments of the State. Within the last few days a special committee has been established to consider the supplies of raw material that will be available for British industries and for our Allies for the development of trade after the war. Still more important, perhaps, is the fact that the War Cabinet has definitely approved of the report of the Whitley Committee urging the establishment of industrial councils. The task of setting up these councils has been assigned to the Ministry of Labour. Upon a previous occasion we drew attention in these columns to the character of the reception which has been given to the Whitley scheme both by the Employers' Parliamentary Council and by the Trades Union Congress. Although there is no avowed hostility to the proposal, there is a certain amount of shyness, if not suspicion, with regard to such an innovation in our industrial mechanism.

The Ministry of Labour has therefore set itself, in the first instance, to examine certain misapprehensions which appear to exist. It is denied that there is any intention to introduce any new element of State interference with industry. The new councils are to be entirely autonomous in character, and free to determine their own functions in accordance with the requirements of each industry. The effect of the proposal, in fact, will be to give each industry a kind of self-government. There will not necessarily be even a common plan, since it is recognised that no rigid scheme will be equally applicable to all industrial conditions. It will be open to every industry to set up the kind of machinery most suited to its needs. The proposal to form Joint Standing National Industrial Councils, with branch organisations consisting of district councils and works committees, is merely intended to provide a model capable of any degree of modification that may be deemed advisable in each case.

Similar elasticity is to be provided in the representation of existing organisations on these industrial councils. There is no intention to make the scheme in any sense a forerunner of compulsory arbitration, and the fears expressed by the trade unions in regard to this aspect of the proposal are declared to be groundless, as, indeed, we were able to state in our former comments upon it.

The Government is perfectly candid in regard to the reasons which have led it to adopt the Whitley report. It is an outcome of experience brought about by the war. The war has shown, as nothing else could have done, how close is the bond between the nation and its industries. It has also shown how difficult it is under present conditions to get Government departments to get into touch with the people. There have been hitherto three separate departments, viz., the State, as representing the nation, the employers and the workers—without any connecting bond between them. If the problems of reconstruction after the war are to be satisfactorily solved in

of all concerned, it is essential that some method should be devised by which each of these aspects should be adequately considered. There is a feeling that if this country is to recover speedily from the ravages of war. Some machinery must be adopted which will obviate the danger of dissipating the recuperative energies of the nation in internal disputes between employers and employed. The practical unanimity which the common patriotism of all classes of the community has called forth in the critical stages of the war has shown what co-operation can do, and also how wasteful and injurious to industry the absence of mutual goodwill must be. This, of course, is no new economic principle, but its importance in the work of reconstruction has been vastly increased by the excessive drain upon the national resources which the war has caused. In the case of the coal industry, which is the very mainspring of our industrial life, this aspect of the question is especially important. Both to employers and employed the advantage of a consultative body, such as the Whitley report contemplates, is self-evident. Much national wealth has been dissipated in the mighty conflict in which we are engaged, and until that loss has been made good the work of recuperation will not be complete.

It is not our intention now to discuss the details involved in putting the Whitley scheme into operation so far as the coal industry is concerned. That is a complex and difficult matter, especially in regard to the advisability or otherwise of the creation of a works committee in every colliery, and the delimitation of the questions which such a body could profitably discuss. We shall have occasion to return to this phase of the question at a later date. In the meantime, it will be a great gain to the coal industry to possess an organisation which will be recognised by the Government as the official consultative body, the opinion and experience of which will be sought on all questions that may arise. The Government intends that the industrial councils shall play a definite and prominent part in the economic life of the nation. It will afford the best possible means whereby the workers can secure their legitimate aims without detriment to the prosperity of the industry upon which their well-being depends.

THE IRISH COAL TRADE.

THURSDAY, OCTOBER 25.

Dublin.

The recently increased prices at the pit head have resulted in corresponding advances, and this week house coals are 2s. 6d. per ton higher all round. Current quotations are:—Best Orrell, 48s. 6d. per ton; best Arley 47s. 6d.; best Wigan, 46s. 6d.; Pemberton Wigan, 44s. 6d.; best Whitehaven, 46s. 6d.; best kitchen coal, 45s. 6d., all less 1s. per ton discount for cash; Scotch steam coal, 39s. per ton; Welsh steam, 50s.; coke, 46s. 6d. per ton delivered. The demand is fairly good, with a continued scarcity in supplies of best qualities. The total quantity of coal discharged upon the quays from English, Scotch and Welsh pits during the past week was 21,310 tons, as compared with 27,480 tons the week previously. The Coal Committee recently appointed by the Corporation with reference to the fixing of coal prices in Dublin, met on Monday, and are considering whether, in face of present circumstances, they can take steps towards effecting an abatement in present charges.

Belfast.

Last week an advance of 2s. 6d. per ton was made in all qualities of English house coal at this port, and business generally shows a further improvement as a consequence. It is stated that the supplies are now rather more satisfactory of some qualities. Quotations for household coals at present stand as follow:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. The total number of coal-laden vessels arriving in the harbour from September 30 to October 13, was 101 only—a considerable falling off as compared with recent figures for similar periods.

Development of Spanish Mining.—The Spanish Government has issued a Decree authorising the formation of coal field syndicates, consisting of coal owners in each area, and the formation of a council. The object in view is the full and systematic exploitation of mines and transport arrangements. The Government will give financial help if necessary.

Ascertainment of Selling Prices: Workmen's Dissatisfaction.—The dissatisfaction of the workmen employed at collieries in the Federated mining areas of England and North Wales was brought before the meeting of the Coal Conciliation Board held at the Savoy Hotel, London, on Thursday. Mr. F. J. Jones (Yorkshire) was in the chair. Mr. Stephen W. M. P., chairman of the workmen's section, expressed great dissatisfaction through the present method of ascertaining selling prices, and they wished to know that before any further wage reductions were made, the workmen's section of the board was satisfied that the method of ascertaining prices was the correct one, and that Mr. F. J. Jones, for the coal owners' board, promised that full consideration would be given to the matter, and every effort made to remove any dissatisfaction existing among the workmen.

THE COAL AND IRON TRADES.

THURSDAY, OCTOBER 25.

Scotland.—Western District.

COAL.

Little or no improvement is reported in the general situation in the Scotch coal trade. Business in all departments is slow, and collieries are finding difficulty in disposing of their outputs without adding to their stocks. In the west of Scotland district the industrial demand is still steady, and along with household requirements provides a certain amount of regular business, but other avenues of distribution are quiet. Shipments were 125,708 tons against 94,186 in the preceding week and 107,033 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	22/-27/6
Ell	26/6-28/	26/6-28/	27/-28/
Splint.....	28/-30/	28/-30/	25/-35/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

Conditions in the Scotch iron trade continue extremely active. Everything is being diverted for Government necessities, and business consequently moves in well defined lines. The claims of ordinary consumers are receiving meagre attention, and work of this class has been reduced to a minimum. Supplies of ordinary brands of pig iron are becoming still scarcer, while the output of hematite is wholly absorbed by local works. Prices remain firm and unchanged. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. There is nothing fresh at the malleable iron works. Marked bars continue in fair demand for shipment, and a few transactions have been put through at £16 per ton f.o.b. at Glasgow. Red and black painted sheets are still largely used in place of galvanised sheets, which are still prohibitive in price. Exports are completely off, and are not likely to improve with conditions as they are at present.

Scotland.—Eastern District.

COAL.

There is nothing new to report regarding the coal trade in the Lothians, trade remaining dull and depressed. Admiralty orders are somewhat larger at present, but business in all other directions is lagging. Shipments for the week amounted to 17,344 tons against 18,880 in the preceding week and 28,430 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	30/-32/6
Secondary qualities.....	25/6	25/6	29/-31/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-21/6

The Fifeshire coal trade is no better off, and is in much the same condition as in the Lothians. Idle time is very prevalent. Shipments were 29,713 tons against 31,302 in the preceding week and 48,225 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	35/-40/
Unscreened do.....	24/-25/	24/-25/	30/-35/
First-class steam coal.....	28/	28/	34/-35/
Third-class do.	24/	24/	22/-25/
Treble nuts	23/	23/	23/-24/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-22/

The aggregate shipments from Scottish ports during the past week amounted to 172,765 tons, compared with 144,368 in the preceding week and 183,688 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

So far as tonnage supplies are concerned, the market has gone from bad to worse this week. The advance in quotations, by order of the Coal Controller, has had little effect in checking the enquiry from neutral countries, but a severe shortage of tonnage is rendering business well nigh impossible of transaction, and sales are, indeed, few and far between. Steam coal collieries are badly off for want of early tonnage. Requisitioning on official account is not so great as it has been for the last few weeks, and this is adding to the embarrassment attendant on the efforts of collieries to maintain automatic regularity of employment. The gas coal trade is very slow, feeling the pinch of paucity of shipping severely, and Durham collieries are reported to be losing a considerable amount of time. In consequence of the falling off in shipment, gas specials are more plentiful and are cheaper. The bunker market is very slow. The demand for smithies and coking coals on home account is well maintained, as also is that for coke, which latter is moving off as quickly as produced, and is very firm in quotation. No new forward business worthy of mention is reported. The contract to supply the Norwegian State Railways with 18,500 tons of steam coals for December-January loading, tenders of which were due in last Friday, is still under consideration. The quotations which follow are, as was the case last week, the lowest fixed prices for Allied destination to the highest minimum rate for sale to neutrals. The deputation from this district which waited on the Coal Controller last week has reported to the local coal exporters. There was nothing good to report, from

the exporters' point of view. Indeed, the only new point elicited seems to be that the Order applies to those descriptions of coke—foundry and blastfurnace sorts—which were included in the original schedule. Earlier, it was supposed that coke was exempt from the advance.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/-32/6
Do. Tynes (Bowers, &c.) ...	29/6-32/	29/6-32/	32/6-35/
Secondary, Blyths	25/6-28/	25/6-28/	27/6-30/
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	30/
Unscreened	23/6-27/6	23/6-27/6	22/6
Small, Blyths	20/-22/6	20/-22/6	20/-21/
Do. Tynes.....	18/6-21/	18/6-21/	19/-20/
Do. specials.....	20/6-23/	20/6-23/	22/6
Other sorts:—			
Smithies.....	25/-30/6	25/-30/6	22/6-25/
Best gas coals (New Pelton or Holmside) ...	25/-27/6	25/-27/6	30/6-32/6
Secondary gas coals (Pelaw Main or similar) ...	23/6-26/	23/6-26/	23/
Special gas coals	26/6-29/	26/6-32/6	30/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	20/-25/
Do. do.			
Northumbrians	26/6-27/6	26/6-27/6	20/-22/6
Coking coals	24/-27/6	24/-27/6	22/6-25/
Do. smalls	24/-27/6	24/-27/6	20/-21/
House coals	28/6-32/6	28/6-32/6	35/
Coke, foundry	42/6-45/	42/6	38/-45/
Do. blast-furnace	42/6-45/	42/6	36/-40/
Do. gas	32/6-35/	32/6-35/	33/-35/

Sunderland.

COAL.

The coal market has opened very quietly this week, and is still somewhat unsettled pending the official report of the deputation which waited upon the Controller. Neither colliery owners nor merchants appear to like the raising of contract prices by 2s. 6d. per ton, whilst it is pointed out that the exemption of the Allied countries from the advance practically exempts the most important item in present day export business. Further, it is realised that certain collieries will be hard hit by the advance in wages, and estimates which have been taken out are said to be very discouraging. For prompt delivery the position is one of disappointment, chiefly owing to the chronic lack of tonnage, which has resulted in the enforced adoption of short time at many of the pits. Supplies of all classes of coal are abundant, and the tone is quiet, while prices are steady, but nominal; manufacturing fuels are in fair demand, also best gas for shipment and coal for coke making, but many second class brands and bunker coals are very dull. Steam smalls remain a drug on the market and continue to accumulate. Coke is in good request at late values. Prices all round remain nominal at schedule figures plus 2s. 6d. a ton except for shipment to Allied countries. No news has yet been received of the Norwegian railways allotments.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	32/6
Secondary do.	25/-27/6	25/-27/6	27/
House coals:—			
Best house coals	32/6	32/6	35/
Ordinary do.	30/6	30/6	29/
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	32/6
South Hetton do.	31/-32/6	31/-32/6	32/6
Lambton unscreened ...	26/6	26/6	24/
South Hetton do.	26/6	26/6	24/
Do. treble nuts	22/6	22/6	25/
Coking coals unscreened	27/6	27/6	24/
Do. smalls	27/6	27/6	22/
Smithies.....	27/6	27/6	24/
Peas and nuts	27/-28/6	27/-28/6	25/6
Best bunkers.....	27/6	27/6	26/6
Ordinary bunkers.....	26/6	26/6	21/
Coke:—			
Foundry coke	42/6	42/6	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/	28/	28/
Gas coke.....	32/6	31/	32/6

Middlesbrough-on-Tees.

COAL.

For the time being, production of coal is ahead of the means of disposing of it. Enquiry is fairly large, and prices of all grades are steadily maintained. Tonnage is in hand for the better qualities of Durham coal, but much more will be needed almost immediately. Some orders are being placed here and there by neutrals. At the Durham collieries the work is stated to be unevenly divided. Best Durham gas coal is in good request at 27s. 6d., but ordinaries are quiet at 26s, whilst Wear specials are put at 29s. Bunker coal is dull, and only in very moderate demand. Unscreened Durhams are put at 26s. 6d. to 27s. 6d. Good enquiries continue for special manufacturing coal and for washed fuels for home use. Demand for household coal is increasing. Coking coal continues to be well taken up at current rates, and opinions strongly incline to an advance. As yet, for shipment, beehive and patent oven coke both remain at 42s. 6d., and gas house product is actively sought after at from 32s. 6d. to 35s. Local demand for blast-furnace descriptions is unabated, and average kinds readily realise the fixed maximum of 28s. at the ovens, whilst qualities low in phosphorus are bought at 30s. 6d. at the ovens.

IRON.

Business in Cleveland pig iron is only quiet, but quotations are very still. Home customers are heavily bought, and are anxious about deliveries, pressure for supply to Scotland, where foundries are exceptionally busy, being very heavy. Foreign sales are slow, but shipments are going steadily forward to France through official channels, and demand on Italian account is as insistent as ever. For home consumption No. 3 Cleveland pig is 92s. 6d., and that price also rules for No. 4 foundry and for No. 4 forge, whilst No. 1 is 96s. 6d.; and for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. The general position of the east coast hematite branch is regarded as showing some slight improvement, and though conditions are still stringent, considerable relief is looked for in the not distant future by increased production of steel-making

iron, preparations for which are understood to be making satisfactory progress. Transactions are strictly regulated. A moderate home trade is passing, but new export business is very difficult to put through. All essential inland needs are met by running contracts and the business that is passing, but exports are light. Nos. 1, 2 and 3 are 122s. 6d. for home use and 141s. for shipment to the Allies. No new feature of moment is noticeable in the various branches of the finished iron and steel industries. Facilities for the transaction of ordinary commercial business are very limited indeed, as practically the whole of the output is absorbed by the huge needs of the Government and the very heavy demands of the shipyards. Quotations all all round are very stiff.

Cumberland.

Maryport.

COAL.

The Cumberland coal industry has improved considerably since last week, and the situation all over the coal field is now more satisfactory than it has been for some time. Business continues to be very brisk in all departments, and there is a very strong enquiry for all sorts, both for shipping and local purposes. A substantial addition to the output will no doubt be secured as soon as the repairs are completed and work resumed at the Wellington Pit, Whitehaven. The cross-Channel trade is very active, but the stormy weather has interfered considerably with sailings. It is expected that supplies for shipment will be fuller during the next week or two. The imports this week have included a good cargo of timber from Dumfries for the local collieries. Current quotations:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls „	19/2	19/2	16/8
Do. peas „	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	30/
Best works fuel	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	21/6	21/6	19/

IRON.

No change of importance has occurred in the condition of the hematite pig iron trade. Prices are still at the official maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with warrants at cash at 115s. per ton. Special iron is 140s. per ton, and semi-special iron 135s. per ton f.o.t.

South-West Lancashire.

COAL.

There is no new feature to report in the inland household trade. Supplies to the merchants are generally short of their requisitions, and these latter are for actual orders on their books. In most of the towns now retail prices have already been fixed and published, or are reaching completion. There is not much fresh to report with regard to steam coal. Steamers arrive somewhat irregularly, and cause some inconvenience at times as coal brought forward is occasionally held up at the tips. There is not much coal outside contract account on the market. Prices of best Lancashire screened steam coal 30s. 6d. f.o.b. per the Controller's terms. The same position applies also to the coastwise and cross-Channel shipments for household coals. The merchant is always a receiver when coal is available and suitable freight forthcoming. In slacks the consumption is coming to a more equal balance week by week with the supply.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net)	27/ upwds.	27/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/ -20/
Do. (f.o.b. Garston, net)	26/ upwds.	26/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net)	25/	25/ upwds.	24/ upwds
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/ -30/6	23/ -24/
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. The difficulty in getting satisfactory supplies of house coal continues. The question of prices is gradually finding its level. Manufacturing fuel is in good demand, save with regard to slack, which is somewhat freely offered. There is a steady call for shipping coal, mostly on contract account. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/ -23/
Medium	22/ -23/	22/ -23/	19/6-21/
Common	20/6-21/	20/6-21/	18/ -18/6
Furnace coal	20/ -20/6	20/ -20/6	17/ -18/
Bunker (f.o.b. Partington)	—*	—*	25/ -26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

There was a fair attendance on 'Change in Manchester on Tuesday, but nothing special to report in the change of position of affairs in this district. All works are fully employed on deliveries, which are entirely controlled by the Ministry.

Yorkshire and Derbyshire.

Leeds.

COAL.

The demand for all qualities of coal continues to be very strong. The pits are working full time, but it is unfortunately the case that enquiries made over a wide area indicate that the output has suffered since the advance in miners' wages came into operation. With regard to the recent increase of coal-prices and the effect on furnace coke, the Order applies to coking slacks but not to coke. Reports from the depots show that it is almost impossible to carry out the household distribution Order in London, whereby merchants are instructed to reserve 25 per cent. of supplies for stocking purposes, so as to acquire, by the end of November, stocks equal to three weeks' maximum requirements. The coal coming to hand is not sufficient to meet orders that have been on the books for some time as well as provide for stocks. Coastwise shipping is confined to very narrow limits, as boats are so scarce; the few that are available are mostly loaded with contract coal. Conditions are unchanged in the house coal trade in the West Riding, except that maximum retail prices which have been arranged are having to be revised in view of the 2s. 6d. advance. Considerable progress is being made in the fixing of these prices, which average from 9s. to 9s. 6d. per ton above pre-war rates. Several cargoes of gas coal have been shipped this week at Hull for France at limitation figures. The demand for washed furnace coke is very strong, especially from Frodingham and the Midlands.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/ -21/
Wallsend & London best	21/ -21/6	21/ -21/6	19/ -20/
Silkstone best	21/ -21/6	21/ -21/6	19/ -20/
Do. house	20/ -20/6	20/ -20/6	17/ -18/
House nuts	18/6-19/6	18/6-19/6	16/ -17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/ -24/
Silkstone best	24/ -25/	24/ -25/	22/ -23/
Do. house	23/ -24/	23/ -24/	20/ -21/
Other qualities	20/6-22/	20/6-22/	19/ -20/
Gas coal:—			
Prices at pit:			
Screened gas coal	17/6-18/6	17/6-18/6	16/ -17/
Gas nuts	17/ -18/	17/ -18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/ -16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/ -18/
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/ -17/
Small nuts	16/6-17/6	16/6-17/6	15/ -16/
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/ -16/
Best rough slacks	15/6-16/6	15/6-16/6	14/ -15/
Small do.	13/6-14/6	13/6-14/6	12/ -13/
Coking smalls	14/ -15/	13/ -15/	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	25/8	25/8

Barnsley.

COAL.

The position at the collieries remains unchanged, with the demand especially vigorous despite the recent advance in selling prices. Although the general public complains very much with regard to the amount of the increase, they recognise, with the present shortage of supplies, that there is no alternative. The subject of accumulating stocks for supplies of house coal does not appear to be clearly understood; and collieries are practically deluged with enquiries which, in the present state of affairs, have little chance of being complied with. In spite of all efforts to make the distribution of fuel equitable, there is little satisfaction felt anywhere, whilst the position at the collieries is little removed from a state of chaos. Orders are still coming to hand from the Controller, diverting or augmenting deliveries which it is impossible to comply with without passing on the inevitable effect to other consumers. In the absence of practically any free coal, the markets continue to be sparsely attended, and there is little business transacted apart from contract supplies. The demand for large steam coal, both for shipment and on home account, is again of a very heavy description. The supplies to the ports leave little surplus in the hands of merchants, and is largely required for the use of the Allies and the Admiralty. In regard to the home trade, the railway companies are more pressing for delivery, and altogether the consumption is of a huge description. It still seems to be impossible to obtain steam nuts for ordinary purposes with the continued heavy requirements by munition works and other engineering concerns; whilst all descriptions of small steam coal are more largely required. The scarcity of coking slacks continues to be emphasised with the tremendous demand for furnace coke maintained. The position in respect to gas coal remains unaltered. Contract supplies appear to be generally inadequate, whilst delays in

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	22/6-24/6	22/6-24/6	20/ -22/
Best Barnsley softs	21/ -21/6	21/ -21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/ -17/6
Best house nuts	18/6-19/6	18/6-19/6	16/ -17/
Secondary do.	18/ -18/6	18/ -18/6	15/6-16/
Steam coals:—			
Best hard coals	20/ -21/	20/ -21/	17/6-18/6
Secondary do.	19/ -20/	19/ -20/	16/6-17/6
Best washed nuts	18/9-19/	18/9-19/	16/3-16/6
Secondary do.	18/ -18/9	18/ -18/9	15/9-16/3
Best slack	15/ -15/6	15/ -15/6	12/6-13/
Secondary do.	13/ -13/6	13/ -13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/ -19/6	19/ -19/6	16/6-17/6
Unscreened do.	18/ -18/6	18/ -18/6	15/6-16/
Gas nuts	18/6	18/6	16/
Furnace coke	25/8	25/8	25/8

deliveries are also causing trouble, and collieries feel pressure exerted to procure added supplies in various areas. As expected, the demand for house coal from the West Riding and nearer markets is largely increased but it is difficult to provide the extra tonnage required, and scarcity of wagons does not make the position any better. The relaxation of orders in regard to London deliveries does not appear to be by any means abated, and a big tonnage is still going to the south.

Hull.

COAL.

Conditions may not be so stringent as they have been, but they are bad enough to handicap business. A fair quantity is coming along over the railways, and is about sufficient to keep shipping employed in the French trade occupied and to meet local needs. France still takes the great bulk of the exports, and after the Admiralty requirements have been met there is very little left, if any, for neutral destinations, to which, however, only small quantities are being sent. Large steam coal is pretty well all absorbed, and contractors are quoting round 35s. for prompt shipment to neutral ports. Allied prices remain the same as heretofore. Practically nothing is doing in the freight market beyond satisfying France at fixed rates.

Chesterfield.

COAL.

The coal trade of this district presents no new feature. Demand continues on an extensive scale for every class of fuel, but supplies are still below requirements. No free coal is available, and practically all deliveries are on contract account. The large steel works of Sheffield are urgently in need of cobbles and nuts for their gas producers, and it is almost impossible to obtain adequate supplies. There is also an active call for large steam coal. Slack for boiler firing finds a ready sale, and fairly large quantities are going forward daily for the cotton mills of Lancashire. Locomotive coal and gas coal are much wanted. There is nothing doing in the export trade so far as Derbyshire is concerned, as it is impossible to obtain shipping licences. The coke trade continues active, and a good demand is maintained for every quality of coke, the whole output of the ovens going steadily into consumption. As there is now no "free" coal available, it is deemed unnecessary to issue quotations. Values are firm at the present advance.

IRON.

All the plant of the district is employed to its utmost capacity upon the production of every class of iron. Engineering works are extremely busy.

Nottingham.

COAL.

Despite the all-round advance in prices, the demand on local merchants for domestic fuel does not display much change, although business is not quite as brisk as a year ago. This is attributable to heavier midsummer purchasing, which is now giving a little welcome relief. At the same time, merchants can readily dispose of the supplies they are able to secure from the collieries. Owners have plenty of orders in hand, and the output is being distributed according to the scheme for supplying the various areas, apart from their particular district. Under the circumstances, most collieries find it difficult to comply with full contract obligations, and although delays in some cases are unavoidable, matters are proceeding as smoothly as possible, following on extra work thrown on colliery staffs by increased rates of pay and the coming into operation of new price lists. The tone in the steam coal branch continues strong, all classes of this kind of fuel being eagerly purchased after the preferential claims for war work have been attended to. Many contract accounts are in arrear and consequently open market transactions are on a small scale. Slacks generally are in good demand, but a scarcity continues of those grades used in the manufacture of coke.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/ -22/	21/ -22/	18/6-19/6
Good house coals	20/ -21/	20/6-21/	17/ -17/6
Secondary do.	18/6-19/6	19/6-20/	16/ -16/6
Best hard coals	18/9-20/	19/3-20/	17/ -17/6
Secondary do.	17/9-18/6	18/6-19/	16/ -16/6
Slacks (best hards)	14/6-15/	—	12/ -13/
Do. (second)	13/ -13/6	—	10/6-11/6
Do. (soft)	9/6-10/6	—	11/

Leicestershire.

COAL.

Work has been resumed on the settlement of the strike, the members of the Notts and Derbyshire Enginemen's Union having given an undertaking to leave that union and to become members of the National Amalgamated. A full week's output was lost at a number of collieries, and a large percentage at others. The pits were got into working order as speedily as possible, but there has been a very big accumulation of orders, and the most urgent requests for deliveries which are coming to hand indicate how keenly the dislocation of business was felt. Several weeks must elapse before deliveries can again become normal. As far as possible, however, preference will be given in the meantime to those demands which appear to be most urgent, with a preference for munition works and London and district. For the latter there is a very strong request,

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/ -21/6	20/ -21/6	17/ -19/
Second, hand picked	19/ -20/	19/ -20/	15/6-17/
Deep screened cobbles ...	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/ -17/
Bakers' nuts	17/6-18/6	17/6-18/6	15/ -16/
Small nuts	17/ -18/	17/ -18/	14/ -15/
Deep breeze	15/3-16/	15/3-16/	12/ -13/
Peas	14/6-14/9	14/6-14/9	12/ -13/
Small dust	8/6-9/6	8/6-9/6	—
Main nuts for London kitcheners	16/ -17/6	16/ -17/6	14/ -15/
Steams, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Steams, seconds	15/6-17/	15/6-17/	13/6-14/
Main cobbles for kitcheners	16/ -17/6	16/ -17/6	14/ -15/
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

household, main and deep cobbles and nuts, and small nuts for mechanical stokers. There are again very bare of supplies, many collieries having been cleared. The country merchants are very far in arrears, and there is a general increase in the domestic consumption at the great centres of population. There are no reserves of stocks of any kind at the collieries.

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The situation in the coal trade has undergone no change of note during the week. All deliveries are now subject to the advance of 2s. 6d. recently granted to meet the advance in miners' wages. As regards coal other than household, the advance is retrospective to September 17, but a lot of the coal supplied in the same trucks since that date has been used both for house and industrial purposes, and it will be no easy matter to settle the proportions. Some collieries have got over the difficulty by charging the advance on the lot, leaving the merchant to say what proportion ought to be charged at the advanced rate. An announcement with regard to coke prices is awaited with interest. It is understood that application has been made for an advance of 5s. a ton, which on the basis of 12 to 14 cwt. of coke as the yield of one ton of coal is at a slightly higher rate than the advance conceded for coal. In some quarters even 5s. is regarded as insufficient, as it would leave out of account the fact that the wages of the men employed at the coke ovens have gone up with those of the miners. Meanwhile, the scarcity of all descriptions of fuel is pronounced, but establishments engaged on important national work are assured of supplies, which are sent in many cases direct from the collieries on Government instructions. Nuts and slacks are not easily obtainable in adequate quantities. Merchants also find it difficult to meet customers' demands for household coal, and orders are not infrequently cut down.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	24/6	24/6	22/
Do. seconds deep ...	22/6	22/6	20/
Do. best shallow ...	21/6	21/6	19/
Do. seconds do. ...	20/6	20/6	18/
Best hard ...	21/	21/	18/6
Forge coal ...	18/6	18/6	16/
Slack ...	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/
Do. hand-picked			
cobs ...	20/6	20/6	18/
Best hard spires ...	22/6	22/6	20/
Forge (steam) ...	18/6	18/6	16/
D.S. nuts (steam) ...	17/	17/	14/6
Small (do.) ...	17/	17/	14/6

IRON.

In the iron and steel industries there is a vast accumulation of orders on hand. There is plenty of new business offering, which manufacturers are unable to accept owing to their already heavy engagements. The rise in the price of coal and the prospective rise in fuel have created a feeling of unsettlement in regard to prices. A deputation of blast-furnace owners waited on the Ministry of Munitions last week and stated their case for increased maxima. Much will depend upon the amount of the advance in coke. If 5s. a ton is conceded, that will practically mean an additional 7s. 6d. a ton on pig iron, as from 28 to 30 cwt. of coke are required to produce one ton of pig. A decision is expected shortly. The current output of pig iron in all the supply districts is quickly absorbed. One Derbyshire firm was unable to accept an offer to supply 2,000 tons, to be delivered over the next three months, as they could not undertake delivery within the period, the bulk of their prospective production being earmarked. Another basic furnace has been started in Derbyshire, and the requirements of steel are on so huge a scale that the additional supplies will be very welcome. Basic iron and semi-raw steel are allocated by the authorities for war material, and mercantile business must of necessity stand aside. The great activity at the tube drawing works creates an ever-increasing demand for gas strip, the bulk of which is sold at about £15 10s., with perhaps 5s. additional for emergency lots. There is also a heavy call for high-pressure tubes, for which blooms are wanted in greater quantities than are available. Steel strip is in brisk request at £17 15s. to £18, large quantities being utilised for aeroplane work. Even bedstead makers have to go without supplies, except those engaged on the manufacture of hospital beds. No change falls to be recorded in the conditions of the bar iron branches. Demand is beyond the capacity of the mills, despite the enlarged output. Makers are keeping a watchful eye on the situation created by the increased coal prices, but so much hinges on coke that no definite step is likely to be taken till the price of this is settled.

Forest of Dean.

Lydney.

COAL.

Outputs from the house coal pits are going away very freely, all the collieries being pressed for supplies from all quarters. The coal produced is still inadequate to meet the abnormal demand, and merchants have to wait long turns for their supplies. Railborne orders continue to pour in, and good train loads are despatched every day. In the seaborne business stems are now anything from a week to 14 days. The consumption of steam and manufacturing fuel is exceptionally heavy, and all the collieries are inundated with orders.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Do. ...	26/6	26/6	24/
Do. ...	25/6	25/6	23/
Do. ...	25/9	25/9	23/6
Do. ...	24/	24/	21/6
Do. ...	16/	16/	14/
Do. ...	22/6-23/6	22/6-23/6	20/
Do. ...	18/-19/	18/6-19/	17/-17/6

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE WELSH COAL AND IRON TRADES.

THURSDAY, OCTOBER 25.

Monmouthshire, South Wales, &c.

Newport.

COAL.

The arrival of tounage has improved, and cargoes have been despatched with more celerity than for a considerable time past. But there is still a great deal of coal in stock, especially of small, which is a great drug in the market. House coal and gas qualities are still eagerly asked for. Work at the collieries has been very irregular from a variety of causes. The shortage of wagons, consequent upon the slowness in the arrival of tonnage in past weeks, has operated prejudicially, and, according to Mr. Finlay Gibson, the secretary of the Monmouthshire and South Wales Coal Owners' Association, a situation of considerable gravity has been caused by the incidence of the control of coal matters, inasmuch as a number of concerns find that they cannot carry on at a profit, and they are faced with the alternative of closing their pits.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	—	35/-36/
Western-valleys, ordin'y	31/6	32/6	34/-35/
Best Eastern-valleys ...	31/6	31/6	34/-35/
Secondary do. ...	30/6	31/6	30/-32/
Best small coals ...	23/6	30/6	24/-26/
Secondary do. ...	22/6	24/	22/-24/
Inferior do. ...	20/6	22/6	20/-21/
Screenings ...	25/6	25/6	25/-26/
Through coals ...	29/6	29/6	24/-26/
Best washed nuts...	32/6	32/6	29/-30/
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	24/-26/6
Secondary do. do. ...	33/3	33/3	22/-24/
Patent fuel ...	35/	35/	40/-43/6
Furnace coke ...	47/6	47/6	50/-52/6
Foundry coke ...	47/6	47/6	57/6-60/

IRON.

There is no change in the state of the iron and steel market of the neighbourhood. All the works are at full swing, and most of them are fully engaged on Government orders; prices, therefore, are nominal. The tinplate trade is reviving and showing now a quite healthy tone, consequent upon the Government allowing more steel to the makers. Pitwood continues scarce at about 75s.

Cardiff.

COAL.

It is difficult to describe the actual position of the coal trade at the present time. Tonnage is short, wagons are scarce, stocks are excessive, stoppages numerous, and to complicate matters strikes are now taking place in order to compel employers to provide work for men who have been discharged owing to the closing of unremunerative pits. The latter is a serious feature. At Blaina 200 men ceased work at the No. 3 South Cutting Pit, and also at Llan Colliery, the owners asserting that notices had been given for economic reasons. The men, at a mass meeting, discussed the position, and their attitude may be gauged from the fact that all the collieries in the control of these particular owners have been rendered idle pending the reinstatement of the men concerned in other pits. In this district alone over 3,000 men are affected. There is no suggestion of victimisation or anything approaching it, but the miners are becoming more truculent week by week and month by month. Unless strong steps are taken to stem the tide of disaffection there is the probability that many collieries will be stopped in the near future. Many concerns are near the border line of profit. The position is reacting on the market, and salesmen are not materially concerned whether they do business or not. The alleged offer of Messrs. Furness, Withy and Co. to supply France with a million tons per month of South Wales coal, was discussed at a special meeting of the Chamber of Commerce on Wednesday. It

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. allowed by Controller, except in shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals ...	33/	33/	—*
Superior seconds ...	31/6	31/6	—*
Seconds ...	30/9	30/9	35/-36/
Ordinary ...	30/	30/	34/-35/
Steam smalls No. 1 ...	21/6	21/6	25/-26/
Do. 2 ...	21/	21/	—
Do. 3 ...	20/6	20/6	23/-24/6
Do. 4 ...	20/	20/	—
Do. 5 ...	19/6	19/6	21/-22/6
Do. 6 ...	19/	19/	—
Do. 7 ...	18/6	18/6	20/-21/
Do. 8 ...	18/	18/	—
Best dry coals ...	30/	30/	32/-33/
Ordinary dries ...	28/6	28/6	30/-31/
Best washed nuts ...	30/	30/	32/-33/
Seconds ...	28/6	28/6	31/-32/
Best washed peas ...	27/6	27/6	31/-32/
Seconds ...	26/6	26/6	30/-32/
Monmouthshire:—			
Black Veins ...	30/	30/	35/-36/
Western-valleys ...	29/	29/	34/-35/
Eastern-valleys ...	29/	29/	33/-34/
Inferior do. ...	28/	28/	30/-32/6
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large ...	30/9	30/9	35/-36/
Small ...	26/	26/	27/6-30/
No. 2 Rhondda—			
Large ...	27/	27/	30/-32/
Through-and-through ...	22/-23/6	22/-23/6	25/-26/
Small ...	17/-19/	17/-19/	21/-22/
Best patent fuel ...	30/	30/	42/-45/
Seconds ...	30/	30/	40/-42/
Special foundry coke ...	47/6	47/6	60/-65/
Ordinary do. ...	47/6	47/6	55/-60/
Furnace coke ...	47/6	47/6	50/-55/
Pitwood (ex-ship) ...	70/-75/	75/	44/-45/

* Nominal.

was stated that Lord Furness and the local manager of the firm had specifically denied the rumour, which probably arose owing to the fact that the Furness, Withy Co. had established extensive offices in Paris. A resolution was adopted protesting against the alleged offer. It is now definitely laid down that coal exported to British depots abroad will have to pay the increased rate, even when in competition with foreign Allied depots. This is considered a hardship. There is a strong demand for house, gas and other bituminous coals, and supplies are on the short side. Patent fuel and coke are plentiful at limitation rates. Pitwood is still scarce, and recent arrivals command 70s. to 75s. per ton.

IRON.

Production continues at high pressure in the iron and steel trade, and there is no abatement in the Government requirements. The wages dispute at the Dowlais Works has been settled, and the men have returned to work, the point at issue being submitted to arbitration. All the blastfurnaces of the district are producing maximum outputs, and supplies of iron ore continue to be satisfactory. Rail mills are fully employed, light sections being particularly in demand. Exports are considerably lower than a year ago, but this is accounted for by the fact that practically the whole of the output is being requisitioned for Government purposes. Bar mills are working at great pressure in order to supply the extra allocation granted to tin-plate works, and receipts of tin-plates from makers last week showed a substantial increase, the total quantity being 20,917 boxes. Shipments, on the other hand, were much heavier, and totalled 26,429 boxes, leaving 52,737 boxes in stock compared with 58,249 boxes the previous week, and 105,827 boxes a year ago. All business continues to be done on the basis of 30s. per box for standard sizes. The position of the galvanised sheet trade is unchanged, and the few works operating are almost wholly engaged on the production of black plate and painted sheets, for which there is a substantial demand for Army purposes. All prices in every department are under control.

Swansea.

COAL.

The trade of the port showed some improvement during the past week as compared with the preceding period. Shipments of coal and patent fuel amounted to 73,877 tons. On 'Change there was no material alteration to report in the general conditions regarding anthracite. The better qualities of large were in strong demand, and practically nothing was obtainable for prompt shipment. Machine-made sizes were very busy, particularly cobbles and French nuts. Peas were steady, but nothing like so firm as the other qualities. Culm and duff continued slow. Large steam coals were a shade better, but throughs and smalls were easy.

Llanelli.

COAL.

The market during the past week has not been very active, owing to the heavy weather interfering with tonnage conditions. Anthracite large kinds of the better grades have maintained their improved position, but the lower qualities are not very active. The machine-made qualities are very firm, and there is a scarcity in supplies of nuts and beans. Cobbles are also well enquired for, but culm and duff are both very slow. Large steams of the higher qualities are in demand. Throughs and smalls are slow and stocks on the heavy side. Manufacturing coals are in good demand, and house coals are also very strong.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds ...	29/	29/	29/-30/
Thirds ...	27/6	27/6	—
Red Vein large...	25/6	25/6	26/6-27/6
Machine-made cobbles...	42/6	42/6	39/6-42/6
Seconds ...	41/	41/	—
Thirds ...	39/	39/	—
Red Vein cobbles...	36/	36/	—
Machine-made nuts...	42/6	42/6	—
Seconds ...	41/	41/	—
Thirds...	39/	39/	—
Red Vein nuts ...	36/	36/	—
Machine - broken beans (best) ...	35/	35/	30/-31/
Seconds ...	34/	34/	—
Thirds...	33/	33/	—
Red Vein beans ...	31/	31/	—
Peas (all qualities) ...	20/	20/	22/-23/
Rubbly culm...	13/	13/	14/6-15/
Red Vein culm ...	11/	11/	—
Breakers duff ...	8/	8/	—
Billy duff ...	6/6	6/6	6/-6/6
Steam:—			
Best large steam ...	30/	30/	34/6-36/
Seconds ...	27/	27/	—
Cargo through ...	23/6	23/6	—
Seconds ...	22/	22/	—
Bunkers through ...	23/6	23/6	26/-29/
Smalls ...	19/	19/	20/-22/
Second smalls ...	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls...	24/	24/	—
Gas through ...	23/6	23/6	—
Gas smalls ...	21/	21/	—

The prices in list are subject to an increase of 2s. 6d. per ton to meet the war wages increase, except in the case of shipments to France and Italy and coal for the manufacture of patent fuel for shipment thereto.

The position of certifying surgeon under the Factory and Workshops Acts in Lytham (Lancashire) is vacant.

The Camberwell Borough Council has received permission to store 4,000 tons of coal in anticipation of the coming winter.

The Labour Party in Parliament elected Mr. William Adamson as their chairman for the session, in place of Mr. Arthur Henderson, who was released from the position because of the duties devolving upon him in connection with the scheme for the reorganisation of the party. The election was a surprise. Mr. Adamson, who is 57, is a Scot. Educated at a village dame school, he worked as a miner for 27 years. He was assistant secretary of the Fife and Kinross Miners' Association from 1902 to 1908, when he was appointed general secretary.

THE LONDON COAL TRADE.

THURSDAY, OCTOBER 25.

Little actual business has been done on the London Coal Exchange during the past week, for few of the colliery representatives were prepared to accept any new orders, and the buying and selling was largely restricted to the exchange of the few remaining trucks in the hands of contractors and factors who were fortunate enough in having an occasional wagon in hand for re-sale. The demand is as keen as ever, and reports from the depots show that a fair tonnage has arrived, and the delivery trade has been good during the whole of the week. This has to be taken in connection with the limited number of carmen at the disposal of the merchants, and the evident desire to put as much reserve coal on the ground as possible. The allocation of the various qualities of coal to supersede the long-distance coal which formerly arrived in the London area, has given rise to a large number of complaints, as the supply has lately fallen off considerably. A good deal of pressure has been brought to bear upon the original consignees to secure an adequate quantity to compensate for the loss of the regular supplies, and for a time this has yielded very good results to many of the North London depots, but all the South London merchants are calling out eagerly for better supplies. Steam coals are exceedingly scarce, and many of the factories along the Thames side are kept very short. The bulk of this class of coal is absorbed by the provincial works and by the pressing needs of munition stations, so that a very small proportion of the output finds its way to London. The seaborne market has been fairly supplied; 26 cargoes arrived in the River Thames for Monday's market, and 19 for Wednesday. Freights are still firm, and 20s. to 20s. 6d. have been fixed from the Humber ports to London. Official reports as to the stocks of coal within the Metropolitan area show that during the week ending October 13 a fairly satisfactory amount of coal was received, and that the stocks on the ground have been increased. The tonnage in stock on October 6 was 134,433 tons, and on October 13 the amount was 140,619. There were received during the week 101,196 tons, as compared with 93,695 tons the week previous; delivered during the week, 97,933 tons, against 77,874 tons the previous week; in transit, 48,822 tons, compared with 51,557 tons; and orders unexecuted, 193,906 tons, as compared with 233,241 tons the week previous. It is reported that prosecutions have been ordered when it is known that trolley men and dealers have knowingly exceeded the amount per cwt. chargeable under the Price of Coal (Limitation) Act in the poorer neighbourhoods. House coal has been fixed for all trolley men at 2s. per cwt., and 1s. 11d. per cwt. for kitchen coal, for all the North London districts, and 1d. per cwt. more for the South London area.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, OCTOBER 19.—There was no alteration in the seaborne house coal market, no cargoes being on offer. Arrivals, 24.

MONDAY, OCTOBER 22.—The seaborne house coal market was rather quiet, although the enquiry for supplies was fair, but no sales were reported. Cargoes, 26.

WEDNESDAY, OCTOBER 24.—The seaborne house coal market continued quiet, with no cargoes offering for sale. Arrivals, 19.

COASTWISE SHIPMENTS IN SEPTEMBER.

According to the returns issued by the Commissioners of H.M. Customs and Excise the following quantities of coal were shipped coastwise from the United Kingdom during September:—

From	Total cargo.		Total bunker.	
	1916.	1917.	1916.	1917.
	Tons.	Tons.	Tons.	Tons.
Bristol Channel ports	110,763	103,365	7,477	8,806
North-western ports	236,239	177,516	44,477	39,484
North-eastern ports	482,775	459,921	17,952	18,597
Humber ports	68,901	31,247	6,579	3,573
Other ports on east coast	620	8,920	8,157	1,581
Other English ports	6,291	5,138	2,013	1,986
Total from England and Wales	905,589	786,107	86,655	74,027
Ports on east coast of Scotland	45,133	49,869	6,421	5,247
Ports on west coast of Scotland	150,042	201,732	19,391	21,649
Total from Scotland	195,175	251,601	25,812	26,896
Irish ports	—	—	1,317	1,406
Total from United Kingdom	1,100,764	1,037,708	113,784	102,329

The destination of cargo shipments was as follows:—

To ports in	Sept. 1916.	Sept. 1917.
	Tons.	Tons.
England and Wales	657,886	613,626
Scotland	36,151	22,761
Ireland	406,727	401,321

Appeal to Motor Lorry Owners.—The Earl of Cottenham (on behalf of the Motor Transport Volunteers) has sent out an appeal to the owners of motor lorries to assist in conveying soldiers across London at night. Many firms are already helping in this way, and thereby doing a really useful work for the country; but additional vehicles are still needed. The Army authorities supply the petrol, and all the officers and drivers give their services.

The Stanton Iron Works.—On Saturday the Right Hon. George Roberts, M.P., lit up the last remaining idle furnace of the Stanton Works, which has been placed in commission for purposes of making basic pig iron out of local iron ore for purposes of steel makers. The manufacture of basic pig iron out of local ore is a new industry in the Midlands; and not until the shortage of raw materials for steel making purposes had made itself felt were the Midlands called upon to divert their blast furnaces to the manufacture of basic iron. It is of interest to note that under normal conditions these furnaces remain in continuous operation for some 15 years before requiring re-lining. The Stanton Company now have in commission nine furnaces, and supply their own iron ore and coal, etc.

EDWARD MEDALS FOR MINERS.

His Majesty the King has awarded the Edward Medal in silver to George S. Christie, James Erskine, David Baird, Andrew Scott, Edward McCafferty, and John Boyle. On January 20, 1917, while operations were being conducted for the widening of a shaft at the Cowdenbeath Colliery, Fife, a portion of the side of the shaft collapsed, throwing a workman named Newton down the mine to a scaffold about 90 ft. below. Scott, McCafferty, and Baird at once descended in a large bucket or kettle to attempt a rescue. The whole of the shaft below the point at which the fall had occurred was in a highly dangerous condition: stones and rubbish were continually falling, and there was constant danger of a further collapse. Newton was found, alive and conscious, buried beneath about 12 ft. of debris, and pinned by some fallen timber. The men worked continuously from 10.45 a.m. until 7 p.m. They were joined at 11 a.m. by Christie, and at 1.30 p.m. by Erskine, both of whom remained at work with the others until 7 p.m. During the whole of this period all five men were in serious danger.

Edward Medals were awarded to Percy Robert Havercroft, Albert Henry Tomlinson, John Walker, Edward Wingfield, Charles Slack, Daniel Foulds, James Haddon, William Heathcote, James Short, Alfred Smith, William Fish, and Herbert John Golledge.

On August 27, 1915, a descending cage containing 10 men collided about half-way down one of the shafts of the Waleswood Colliery, near Sheffield, with an empty ascending cage. The impact was extremely violent, severely injuring all the men and breaking the winding ropes. Both cages were, however, wedged together in the shaft, so that, fortunately, neither of them fell to the bottom, though there was serious danger that they might do so at any moment. A hoppit manned by Tomlinson, Havercroft, and Walker was at once sent down to effect the rescue of the imprisoned men. All the men were carried from the damaged car along a girder to the hoppit, which made five descents altogether, the rescue occupying about two hours. During the whole of this time Tomlinson, Havercroft, and Walker were exposed to great danger. Wingfield, who was one of the occupants of the descending cage, had both legs fractured, and received a severe wound in the thigh and a wound on the head. He seized hold of another man who had fallen half-way through the bottom of the cage, and held him up until he was rescued. During the whole time he displayed the greatest coolness and bravery.

On November 2, 1916, a fall of roof occurred at the Woodland Colliery, Durham, completely burying a hewer named Richardson. Slack, a deputy overman in the colliery, immediately sent for help, and himself started to remove the stone from Richardson, although the roof was still obviously very dangerous. Almost immediately a further fall occurred, burying Slack except for his legs. He was pulled out by two hewers, and after recovering himself returned to Richardson's assistance. He attempted to prop the falling stone up with his back, and by so doing succeeded in canting it off Richardson's head. Slack undoubtedly risked his life in saving Richardson.

On November 28, 1916, a heavy fall of roof occurred at the Pye Hill Colliery, Nottinghamshire, by which three men were buried. Foulds, Haddon, Heathcote,

Short, and Smith quickly arrived, and attempted to rescue the buried men by digging out the fallen roof and setting props as they progressed. The roof was still extremely dangerous, and stones were constantly falling. They remained at work for seven hours until all three buried men were reached and taken out; unfortunately all were found to be dead. During the entire period the rescuers were in continuous danger.

On January 19, 1917, a heavy fall of roof occurred at the Hartford Mine, Northumberland, at a spot where two men were working, instantly killing one man and injuring and pinning down the other. Fish at once set to work to release the injured man, although there was constant danger of a further fall by which he himself might be killed or injured. After more than half an hour's work he succeeded in his attempt. There can be little doubt that, but for Fish's gallant action, the injured man would have died.

On February 25, 1917, George Weeks, under-manager of the Braysdown Colliery, near Bath, was ascending the shaft when the cage struck a water pipe which had become unfastened and was projecting from the shaft. The pipe pierced the roof of the cage and severely injured Weeks, at the same time preventing the cage from ascending. Golledge was working at a level about half-way down the shaft, which is 608 yds. in depth and about 80 yds. above the point at which

the accident occurred. Hearing Weeks' cries, he at once got into the shaft and climbed down to the level by means of the buntons, or girders, which run horizontally round the shaft. Golledge lowered himself from buntun to buntun, the distance between the buntuns being on an average 5 ft., or in some cases 6 ft. On reaching the cage, Golledge rendered first-aid to Weeks, and remained with him until the cage could be liberated and brought to the surface, a period of about two hours.

THE BY-PRODUCTS TRADE.

Tar Products.—Solvent naphtha is the great feature of the market at present, and a rapid advance has brought the price (approximately) to 3s. 3d. to 3s. 6d. per gall. net and naked at maker's works in London, and 3s. to 3s. 1d. naked north. Supplies are by no means plentiful at these figures. The cause of this sudden demand is not quite clear. Heavy naphthas also have advanced, and the price is now about 2s. per gall. Naphthalenes are in request. Pitch is in good demand, and evidently would be at higher quotations if tonnage arrangements were more facile. The position of sulphate of ammonia is about the same. Average quotations are as follow:—Coal tar, 26s. 3d. to 30s. 3d. Pitch, east coast, 18s. to 20s.; west coast, Manchester, 17s. to 18s. 6d.; Liverpool, 17s. 6d. to 18s. 6d.; Clyde, 18s. to 19s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. to 3s. 1d. Heavy naphtha, north, 1s. 6d. to 1s. 8d. Heavy oils, in bulk, north, 4½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., in bags. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—Buyers are still taking a considerable quantity of sulphate of ammonia. There is an expectation that the increasing output in the United States will affect prices generally. The quotation ruling on this side for October-December delivery is £15 15s. per ton, and for January-May £16 7s. 6d. delivered. The export quotation is £24 to £25 f.o.b. London, Liverpool, Hull, Glasgow, or Leith.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.—October 25.

An Irish Colliery.

LORD HYLTON, replying to the Earl of Mayo, said the Castlecomer Collieries had not been lost sight of by the Government. The question of providing railway facilities for them was before the Board of Trade last August. The matter was carefully reviewed, but it was decided that it was impossible to undertake the work. The railway from Athy to Wolfhill Colliery now under construction was being made at the public expense under the Defence of the Realm Regulations, and with war labour. It had not been constructed in pursuance of statutory authority, but after consultation between the Chief Secretary, the Board of Trade, the Coal Controller, and others.

HOUSE OF COMMONS.—October 22.

Canals and Coal Distribution.

MR. WARDLE, answering Col. YATE, said that it was impossible to state the proportion of coal and other heavy traffic which had been diverted to the canals so as to relieve the congestion on the railways. As the canals did not serve all districts of the country, only part of the heavy traffic carried by railways could in any circumstances be diverted. In the Midland district, in the case of one canal system alone, the amount of coal being transferred from the railways to the canals was equivalent to 150,000 tons per annum. The Canal Control Committee was taking every possible step by increasing the number of boatmen available and by other measures to increase the amount of traffic carried by water.

In answer to other questions, MR. WARDLE stated that a resolution passed by the Houghton-le-Spring Urban District Council had been forwarded to the Controller of Coal Mines. The resolution referred to the unequal distribution of orders for coal. The cost of the war wage per ton necessarily varied considerably in different districts and collieries, and no general statement as to the effect on individual undertakings could be made. The amount added to the pit price by the Board of Trade was not considered to be more than was reasonably necessary, having regard to all the circumstances.

October 23.

Germans and English Minerals.

SIR C. HENRY asked the Minister of Reconstruction if he could state the medium through which Germans had endeavoured to purchase mineral properties in England.

DR. ADDISON replied that the attempt was made about a year ago through neutral agents, and was unsuccessful. It would not be in the public interest to give details.

October 24.

Coal Prices in London.

MR. WARDLE, in answer to MR. GILBERT, said that his attention had been called to the retailing of coal above the official prices in London, and to the extra charge for delivery upstairs to lodgers. If specific instances were given to the Controller of Coal Mines, the offenders would be dealt with. An Order revising the coal prices in London had been published to the trade, and would be published generally as soon as possible.

October 25.

Output of Coal.

In answer to MR. WILL THORNE, MR. WARDLE stated that during 1916 the number of tons of coal turned out of the various collieries in the United Kingdom was 256,348,351. In the nine months of the present year the approximate output was 187,750,000 tons, or 30 per cent. less than in the corresponding period of 1916.

Royalties on Petroleum.

The House went into Committee on the Finance Bill, a provision authorising the payment out of moneys to be provided by Parliament into the Petroleum Royalties Fund constituted under any Act of the present session to make

respect to the searching and boring for and in the United Kingdom of a sum equal to ton of petrol gotten on behalf of his of any other expenses chargeable under

words "into the Petroleum Royalties Fund constituted," and insert the words "of expenses incurred by or on behalf of his Majesty."

Mr. ADAMSON opposed the resolution. The Government's attempt to carry it now was a breach of the common understanding that no contentious legislation should be introduced during the war. He contended that the ownership of any petroleum find in this country should vest in the Crown for the benefit of the State, and that no royalty should be paid to the land owners. Such a course would be no hardship to the land owner, because the existence of petroleum under his land never entered his imagination, and he was to be put to no expense in the borings to find it.

Mr. CURRIE asked for a promise that any royalties paid should be subject to the excessive profits tax, or to a corresponding mineral rights duty.

Mr. LONG said there was nothing behind the Bill; it was not promoted in the interest of any individual or set of individuals. In a great many cases owners of property had entered into agreements to enable borings to take place, and arrangements had been made by which they were to receive certain royalties. The Government by this Bill, which reserved to the State the right to bore and obtain oil, were fixing royalties very much lower than anything which had been offered to those proprietors. In fact, they were hitting these people very hard indeed. If this Bill did not pass, the arrangements referred to would go forward. There was going on in the country a very unhealthy competition to get at these oils. The Bill represented a fair compromise. He would not make himself responsible for a Bill which did not offer royalties to those who were in the position to which he had referred. There was no choice between this Bill and leaving things to go on as they were for the present, but the Government would be ready to accept fair and reasonable amendments.

Mr. HERBERT SAMUEL stated that he and other members were willing that landlords should be paid for any damage done to their property or for loss of amenity. What they opposed was that the Bill should be used as an occasion to establish the statutory right of surface owners to receive royalties for any resources of the soil which were developed by the State or its licensees.

The Government was defeated by 44 votes to 35.

THE AMERICAN COAL TRADE.

The bituminous coal market is in a critical condition (according to the *Coal Age*, September 29), owing to inadequate supplies. Some plants are down to a supply scarcely in excess of 24 hours' requirements, and many consumers of fuel are willing to pay prices much above those established by the Government. The price for coke was recently fixed at 6 dols. per ton. Allowing for the shrinkage in coal used in coke manufacture, and the labour and other expenses entailed, this would represent a price for the coal of approximately 3 dols. per ton at the mine mouth. Such a price, if allowed to the producers of coal, would go far toward relieving the present shortage of bituminous.

Boston reports a complete absence of spot bituminous. Few sales at the Government figure of 2 dols. are made in Philadelphia or elsewhere. A Baltimore correspondent points out that the closing down of many mining operations is giving concrete proof that coal cannot always be produced at 2 dols. or 2-15 dols.

Anthracite movements are fairly regular and continuous. On account of the scarcity of bituminous coal, the steam sizes of anthracite are in strong demand. Prices, however, are held rigidly to circular. Quotations in Philadelphia per gross ton f.o.b. cars at mines for line shipments are as follow: Broken, 4-55 dols.; egg, 4-45 dols.; stove, 4-70 dols.; nut, 4-80 dols.; pea, 4 dols.; buck, 2-90 dols.; rice, 2-40 dols.; boiler, 2-20 dols.; barley, 1-90 dols.

Few steamers for coal have been chartered. Rates to Marseilles and Spanish Atlantic ports are about 42 to 50 dols., and to Spanish Mediterranean destinations about 45 dols.

United States Coal for Canada.—The Fuel Administration, U.S.A., has allotted 2,000,000 tons of bituminous and 700,000 tons of anthracite coal to go to Canada in the next two months.

Escape Openings for Coal Trimmers.—On Tuesday, the Parliamentary Committee of the Scottish Trade Union Congress had an interview with Mr. Wardle at the Board of Trade with reference to resolutions passed by the Congress. One resolution pressed for the provision of escape openings for coal trimmers in the bunkers of all shipping. Mr. Wardle said that the plans of standard ships would be examined with a view to providing escape openings.

Miners' Food Blockade.—Demanding the dismissal of a weigher, miners are on strike at Llandebie, Carmarthenshire, and eight colliery officials have been employed for a fortnight in pumping operations to prevent the flooding of the mine. The strikers, alleging that blackleg labour was also being employed, organised an elaborate system of picketing, and would not allow food to be carried into the colliery unless submitted to scrutiny, to ascertain whether it was intended for others than the pumping officials. It was admitted that only these pumping officials are employed at the colliery, so the picketing was relaxed.

Directory of Colliery Companies in South Wales.—Under the direction of Mr. Finlay A. Gibson (secretary), the statistical department of the Monmouthshire and South Wales Coal Owners' Association has issued a directory of the companies in the South Wales coal field. The directory includes the head office, branch offices, and branch addresses, telegraphic numbers. Similar information is given for the associations, Government departments, and committees connected with the coal trade. The work has been prepared by the members of the association, and to non-members the price is 2s. 6d.

INDIAN AND COLONIAL NOTES.

Australia.

Victoria's Brown Coal.—The last mail from the colony brings news of the progress of experiments in utilising the brown coal of Victoria for electrical generation and the extraction of by-products. Tests so far made show that an ordinary gas making plant, not using an exhaustor, produced from one ton of brown coal, containing 35 per cent. of moisture, about 10,000 cu. ft. of gas with a calorific value of over 300 British thermal units per cubic foot, together with 5 lb. of dehydrated tar and ammonia equal to 9 lb. of sulphate of ammonia. It was hoped to improve these results in further tests. Investigations as to spirits and other chemical products were in progress, but would take some time to complete. Brown coal from Lal Lal, Yarragon, Morwell, and Narracan was sent by the Mines Department to Germany in 1891, and there converted into briquettes. All these briquettes were, according to the opinion of experts, considerably above the average German briquettes in quality.

Coke Industry in Queensland.—An expert, reporting on the prospects of procuring coke for industrial purposes, states that it is safe to assume that the coal from the Ipswich collieries, under proper treatment, should yield 70 per cent. of coke, with not more than 11 per cent. of ash. With the present coke ovens, and the method of charging and discharging them, there is not much possibility of increasing the output or percentage of recovery, because the ovens are practically cold when the first charge is put in, and a considerable quantity of coal is burned to ash in raising the mass to the coking temperature. This explains the low recovery of only 60 per cent., despite the fact that the analyses show that the carbon and ash range from 75.7 to 76.3 per cent., almost all of which could be saved under ideal treatment. Ipswich coal is said to be suitable for treatment in a simple type of oven, which, the expert recommends, should be about 20 ft. long, 6 ft. 6 in. wide, and capable of handling 18 to 24 tons of coal a week. Assuming a suitable site could be obtained, the plant of 30 ovens, with all appliances capable of extension by an additional 10 or 20 tons, could be erected for £17,000.

Canada.

Alberta's Coal Production.—The report of the Dominion Mines Branch for the quarter ended June 30 last, shows the monthly production of the various mining districts in Alberta, and the total sales of the different kinds of coal mined. The report also shows the number of tons of coal imported through the various ports of the Dominion during the first and second quarters, and the value. The total number of tons of coal imported during the first six months of the present year was 1,097,546 tons, as compared with 1,161,164 tons during the first six months of 1916. The total number of tons of lignite, bituminous, and anthracite coal mined in Alberta during the months of April, May, and June was 416,845 tons, and the total number of men employed in the various mines is given at 11,856. The total output of anthracite coal from the Banff district for the second quarter is given at 3,114 tons, which was practically all sold within the province.

Coke for Smelting Works, Vancouver Island.—As a consequence of the establishment of copper smelting works at Anyox, and of arrangements being made to resume smelting at Ladysmith, coke making is again a subsidiary industry to coal mining in Comox district, Vancouver Island. The Canadian Collieries (Dunsmuir) Limited, operating several coal mines in the neighbourhood of Cumberland, is enlarging its coke making capacity by building more coke ovens at Union Bay. Early in August it was announced that the Granby Consolidated Company had arranged to purchase coal lands on Vancouver Island, situated between Ladysmith and Nanaimo, and will proceed to develop the coal measures, primarily for the purpose of ensuring its own supply of coke for its coast smelting works, and probably to later enter into the general coal supply trade. It is stated that coke ovens are to be constructed at Anyox after sufficient development work shall have been done on the coal property, and railway, dock, bunker, and other shipping facilities shall have been provided.

South Africa.

New Coaling Plant at Durban.—The new mechanical coaling plant now in operation at Durban, which was supplied and erected by Messrs. Fraser and Chalmers Limited, is typical of the additions which must be made to the coal loading equipment of Union ports if the bunkering trade continues to increase at its present rate. Revenue from coal traffic has risen out of all proportion to the advance in receipts from other traffic; while the railway earnings under various main heads showed in respect of passengers 25.97 per cent., against 28.34 in 1915, goods and minerals (other than coal) 43.82 per cent., against 46.33 in 1915, and live stock 3.52 per cent., against 4.89 in 1915, coal itself (earning £2,815,244, against £1,776,100) showed a jump from 14.56 per cent. in 1915 to 21.24 last year. The introduction of a war surcharge on bunker coal of 6s. per ton naturally had some influence on the figures (it only took effect on June 5), but the chief contributing cause was the increase in the demand for the mineral for shipment at the ports. Whereas in 1915 some 6,275,828 tons passed over the railways, in 1916 some 7,602,188 tons were carried, and for the current year it would not be surprising to find that figure enormously exceeded. Coal handling plant at Durban is gradually becoming more adequate, and it is now the best equipped of any port in the Southern Hemisphere. Cape Town is, however, very poorly furnished in this respect, and if, on the resumption of normal conditions, Table Bay continues to attract vessels in larger numbers for bunkering purposes, consideration will have to be given to mechanical coaling appliances at that port also. Existing arrangements are primitive and expensive, and need to be graded up to Durban. As it is believed that ocean-going vessels will continue to make use of Table Bay on a gradually increasing scale, it can only be a question of time before the Railways and Harbours Administration is forced into the market for the machinery of which the port so badly stands in need at present. The necessity for more engines and trucks will follow, as a matter of course.

A deputation from Monmouthshire waited on Sir Richard Redmayne at the Coal Mines Department of the Board of Trade on Thursday, on the subject of a dispute at the Elled Colliery concerning the price-list for cutting a certain seam of coal.

A circular on miners' war wages issued to the Miners' Federation by the Coal Controller states that if a pit is stopped owing to the weather the war wage is paid, but it is not paid when the weather prevents the worker from getting to the pit.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Stoppages in Sight—Wage Cost and Production—Result of Forgotten Cartridges—Retail Prices.

Mr. F. A. Gibson, secretary of the Monmouthshire and South Wales Coal Owners' Association, has issued a letter wherein he describes the grave situation which has arisen in the South Wales coal field, and he states that at a number of collieries "the conditions have already become so unremunerative that the owners have been driven to the necessity of making preparations for closing down some of their pits, and it is feared that the number will increase." He points out that it had been stated that in the Avon Valley 2,000 miners were under notice, and that the men in the district are approaching the Controller in order to get a fairer distribution of shipping for Port Talbot. But, states Mr. Gibson, "the causes of stoppages of collieries are not merely those arising from lack of tonnage. The working of some of the pits in the coal field has become impossible under the prevailing conditions of State control. These conditions have been growing increasingly unfavourable since the mines passed from the control of their owners to that of a Government department in London. The coal owners of South Wales, and of the United Kingdom as a whole, have been persistent in their efforts to warn the Government and the workmen of the consequences which were inevitable under a system which, while leading to a constant increase in the cost of production, at the same time checked and discouraged enterprise. The shortage in the supply of ships is certainly a serious factor in the situation, but it is only one of many factors, and it is feared that the position will grow still worse unless the industry receives greater consideration from those in control. It is impossible to pay high wages if the revenue of the industry is not sufficient for the purpose. If the conditions were normal, the coal owners would naturally endeavour to obtain such a price for coal as would enable them to meet the cost of production and secure a fair return on the capital employed; but the circumstances are in the highest degree abnormal, for while prices and profits are subject to arbitrary restriction and regulation by the Government, there has been no check to the rise in the cost of pitwood, stores, and wages; and hence the position of the owners is rapidly becoming impossible. The most injurious blow to the trade is the recent advance in the workmen's wages without an equitably corresponding increase in price. It is true that the Government announced an advance in price of 2s. 6d. per ton, but the advance was given without any consultation with the coal owners, and its incidence is most unfair, as it applies only to a portion of the sales."

Mr. Gibson adds that there is a point at which the wage cost of producing coal destroys production itself, and this point has already been reached at a great many pits; and, in such circumstances, some owners have no option but to stop working.

In the course of an inquest concerning a fatal accident in Nine Mile Colliery, Sirhowy Valley, it was stated that deceased and another man had been ordered to bore a hole in hard rock, and whilst using the drill an explosion occurred, leaving a strong smell of powder. Both the man's arms were blown off, and he was found unconscious under a fall, dying within an hour; and a second man who was with him was so injured that he had to be removed to the hospital. Near the spot where they were at work there had been shot-firing early in September, and there was a depth of 11 in. in the old hole. The manager of the colliery said his theory was that the men were boring a hole in which some cartridges had been left from the shot of previous firing. A verdict of "Accidental death" was returned.

The Mumbles Council, Swansea, has held a meeting with representatives of local dealers; and the prices fixed for retail delivery of coal range from £2 0s. 6d. per ton to £1 17s. 6d. when delivery is in bulk; but if in bags, then 2s. per ton extra may be charged. The retail price for small quantities was fixed at 2s. per cwt. Some of the dealers said they could not sell at that price, but the chairman of the Council stated that they had been treated very fairly, and he hoped they would fall into line.

A special meeting of the Cardiff Chamber of Commerce, called to deal with the reported offer by a firm, or firms, to supply a million tons of coal per month to France during next year, was held on Wednesday. Letters were read which had passed between the Board of Trade and the Central Executive Committee and others, and also a letter in which Lord Furness denied that it was his firm which had made the offer. It will be remembered that the coal exporters held a meeting last week, their discussion centring upon the fact that the offer referred to would prove seriously detrimental to their interests, seeing that it offered supply for reduced percentage, etc.; and it was upon their suggestion that the special meeting of the Chamber of Commerce had been called. During the proceedings on Wednesday the idea was mooted that the proposed supply of coal had reference only to business after the war; but the discussion dealt largely with the endeavours to combine business and the efforts of large capitalists to control interests in such a way that independent operators would be squeezed out—this being regarded as a serious menace. A resolution was passed which stated that the meeting regarded with apprehension any scheme which would place in the hands of one firm, or group of firms, the bulk of export trade in coal to France and Italy, seeing that it would create a monopoly, with serious loss to colliery proprietors, exporters, ship owners, and others.

The position of affairs in regard to colliery working becomes more serious with each passing week, owing to difficulties, some of which are insuperable, while others, if not avoidable, might at least be modified by greater care in Government administration. The letter of Mr. Gibson, secretary of the Coal Owners' Association, indicates very plainly some of the difficulties. Others arise from the circumstances of the trade, more particularly because of the effect upon profits of the compensation scheme arranged by the Controller. As is well known, this scheme provides that the colliery proprietors shall receive a payment equal to an average of profits (not dividends) of a period before the war. Out of the three years preceding the war, they may select the best two, and the average of those two is a "standard" upon which compensation is made. There is an output "standard," with certain special provisions in addition; and this output "standard" has a fixed relation to the profits payable. Certain of the collieries, by reason of shipping difficulties, etc., are not able to maintain their output, and there is therefore a risk of compensation not reaching their needs. In regard to some undertakings, the financial position requires them to obtain accommodation from the bank in order to meet wages and

other demands of current expenses; but the cost of all material has risen so very much that the 1s. 6d. per day given to the men (even when they are idle through circumstances beyond their own control) has increased the financial burden to such an extent that bank accommodation, at the present rates of interest, becomes a questionable resort, even if, as may happen, bankers be willing to finance the undertaking in this way. Consequently, there is a risk of collieries being stopped; and as, already, owing to short time, men are making protest, any stoppages of this character would create a very determined outcry from the men.

The trade of Swansea during last week showed distinct improvement, the shipments of coal and patent fuel rising—coal being returned as 55,880 tons, with patent fuel 17,989 tons.

The metal merchants of Swansea held a meeting at the Exchange on Tuesday, and there was a large attendance, the object being to form a merchants' section of the Metal Exchange. A resolution was passed to form a South Wales Association of Steel and Metal Merchants.

The anthracite district meeting has considered the circumstances of collieries which are closed or on short time within their area; and Mr. J. D. Morgan, the agent, was instructed to bring the matter before the executive of the South Wales Federation, in order that the subject might be brought directly under the notice of the Coal Controller.

Northumberland and Durham.

Flower Day—Endangering Workmen's Lives—Coal Output and Alleged Starvation—Question of Timbering.

The recent "Flower Day" in aid of the funds of the Durham Aged Mine Workers' Homes Association resulted in £1,100 being raised.

Prosecuting Wilfred Porter (20), on a charge of having hewed and filled off the wall side at Houghton Colliery, Mr. Edward Bell informed the Houghton-le-Spring magistrates that it did not seem to be sufficiently well understood by such men that, in committing these offences, they were endangering the lives not only of themselves, but of other workmen using the road. The width at the point in question was between 12 ft. and 13 ft. The roof was bad, and required repairing, and it was highly dangerous to take coal or anything else from the side. The Bench had power to send such men to prison for three months. Defendant had admitted the offence, and Mr. Bell understood that he was cautioned only three months ago for a similar act. Defendant informed the magistrates that it was entirely a case of spite. Men were hewing at the same place on the following day, and were not proceeded against. Mr. Bell replied that the management was liable to a fine of £20 if it did not enforce the rules. Porter was fined 40s., and was warned that he would be sent to prison if he committed another offence of that nature.

When Chester-le-Street Urban District Council discussed the Durham City Council's resolution regarding the county not receiving its fair share of the coal trade of the country, Mr. Craggs said that, at Washington especially, and to a somewhat lesser degree at Usworth, the people were starving owing to the short time worked at the collieries. Mr. Cullen stated that so much time was being lost at Washington especially that the Durham County Education Committee had been asked to put into operation the Act for the feeding of school children, and to set in motion the Prince of Wales's Fund. These requests, however, had been ignored, and it was desired to bring pressure to bear. Various members expressed the opinion that the reason of the trouble was that certain of the coal was not adapted for war purposes. It was decided to support the resolution.

Methods of timbering and "jowling" were much discussed at the inquest, held by Mr. Coroner Cadle, touching the death of John Jos. Quinn (14), who was killed by a fall of stone in the Busty seam of Kelloe Colliery. Mr. J. T. Wilkinson, manager of the pit, stated that the stone came away from a feather edge, right over the edge of a balk of timber. There was a disused way, a road which had been "working," at the right in-by side of the flat, close to where the stone fell. The flat was timbered through with baulks up to that point. The baulks were 4 ft. apart. At the disused way end there was a distance of 5½ yds. to the next baulk. Instead of having baulks across the roof, it was supported at the sides by 6 ft. crown trees. In reply to deceased's father, witness did not recommend that system. Answering the coroner, he stated that the rule said that the maximum distance in a post roof was 20 ft. The fact of the disused way made the stone more liable to fall. The reason the baulks were 4 ft. apart through the flat and then 20 ft. was that they were taking down a top canch, and had not got baulked right through. Mr. Tate, agent, pointed out that the baulks were in accordance with timbering rules. The coroner replied that the mines inspector did not say that the timbering was contrary to rule, but that the distance should be reduced. It was rather like locking the stable door after the steed was stolen, but they had now provided against such an accident by timbering right through. A verdict of "Accidental death" was returned.

The Darlington Coal Control Committee has decided to fix the price per ton at 6s. 6d. per ton above the price for 1913, and has appointed a sub-committee to draw up a list of the prices of the various coals. It was intimated that the agents did not intend to charge at a higher rate per ton for quantities below one ton. The committee resolved to ask the coal owners to give dealers a rebate of 1s. 6d. per ton, so that the coal could be sold at as low a price as possible to small consumers.

The question whether carbon monoxide poisoning in the mine comes within the scope of the Workmen's Compensation Act was argued at Durham County Court on Monday, when Mrs. Brett, widow of a Hamsteels miner, brought an action against the Owners of Hamsteels Collieries for £300 in respect of the death of her husband. It was stated that Brett died from pneumonia as a result, it was contended, of having been poisoned by the inhalation of carbon monoxide in the mine. For the defence, it was submitted that Brett did not inhale the gas during his employment, and that, even if he did, it was not an accident within the meaning of the Act. The judge reserved his decision on the question of whether there was an accident.

North Walbottle miners have sent a proposal to the executive committee of the Northumberland Miners' Association, "that in future we take no part in any peace meetings." The executive has decided to inform the lodge that it has no power to lay down a future policy of the association, as it would do by agreeing to the proposal, and that, when the time comes, the workers ought to have a large part in the peace settlement.

Mr. G. J. Wardle, M.P., has informed Mr. J. W. Taylor, M.P. for Chester-le-Street, that the question of distribution of trade in Durham and Northumberland among the different collieries has, for some time, been

engaging the attention of the Controller of Coal Mines, and that something has already been effected in the way of allocating trade to collieries which had been losing time, so far as such collieries had been capable of supplying the qualities of coal required. The matter is still receiving consideration.

Mr. H. S. Ellis, local representative of the Coal Controller, has addressed a communication to the Mayor of Wallsend, urging upon the residents the great importance of economy in the use of coal, and of getting in a reasonable supply as early as possible. The Controller, he states, desires it to be known that circumstances may arise in the near future which will necessitate a large quantity of coal being sent from this district to the south, so that the mere fact of there being an ample supply in this district does not make it less necessary for economy. The Controller also urges that, wherever practicable, housekeepers should instal gas fires and gas cookers, and that they should use coke or coke breeze, mixed with small coal. By the use of gas fires, the production of by-products, essential for the manufacture of high explosives, is greatly assisted.

Yorkshire.

Yorkshire Miners' Association—Supplies in Sheffield—Absentees Fined and Censured—Overhead Electric Cable System.

Mr. H. Smith presided at a meeting of the council of the Yorkshire Miners' Association at Barnsley. Since the last meeting it was reported 105 more members had been killed whilst serving in the war, making a total of 3,115 since the outbreak of hostilities. Regarding income tax, the council felt aggrieved at the non-success of their effort, and unless something was done speedily they would have to take action in another way. The council strongly protested against an increase of 2s. 6d. per ton on household coal, believing there was no justification whatever for it. In regard to the wages of surface workers generally at collieries, the council instructed the officials to make a general demand at once for an advance in the rate of wages to the South and West Yorkshire Coal Owners' Association. It was reported the district had voted unanimously in favour of notices being tendered at Ossett, Roundwood, West Sharlston, Lofthouse, and Rotherham collieries.

The situation as regards the supply of coal to Sheffield shows an improvement, and the promise of the Coal Controller to accelerate supplies is materialising. It is stated that the cutlery city is a notorious place for extravagance in coal, as so many of its employees work in such high temperatures that they like a similar amount of warmth in their own homes, the fires of which are abnormally large. The difficulty of distribution is just now being keenly felt, so many carters having been taken.

The Corporation of Doncaster, through the special committee appointed for the purpose, have now issued an amended schedule of prices for coal, those quoted last week being cancelled. It was found that the previous prices did not make provision for the recent increase in the price of coal at the pit, viz., 2s. 6d. per ton, or 1½d. per cwt. in the case of small quantities. After consultation with the local coal merchants, the amended prices are: Haigh Moor or best Silkstone, 31s. 6d. per ton; Barnsley best bright, 29s. per ton, or 1s. 6½d. per cwt.; kitchen or Barnsley second bright, 27s. and 1s. 5½d.; nuts, screened, 25s. 6d. and 1s. 4½d.

Sums ranging from £4 10s. to £10 were claimed from each of seven employees of the Maltby Main Colliery summoned at Doncaster on Saturday last for neglecting their work. It was stated by the prosecuting solicitor that some of the men had been before the tribunal dealing with absentees, and that others had been warned. The damages claimed were merely nominal, at the rate of 10s. per day, but in future the full amounts would be claimed. The magistrates declared that it was disgraceful miners should be idling their time away in this period of crisis instead of serving their country by producing coal. They awarded the damages claimed, and ordered the men to pay costs as well.

The Bullcroft and Brodsworth Collieries are to be linked up by means of overhead electric cables, so as to economise power in week-end operations. The new Markham Main Colliery at Cantley is also to be supplied by cable. The directors have in view the provision of a generating station for utilising the waste gases of the colliery works for generating electric current, and distributing the current through overhead cables in an area with about a 20-mile radius. At Bullcroft Colliery there is said to be enough water running to waste or to be had for the pumping to supply all Doncaster and district.

Lancashire and Cheshire.

Miners' Agent Retiring—New Price Scale in Manchester—Protests in Bolton—Military Distinctions.

The Lancashire and Cheshire Miners' Federation decided to accept the resignation, on account of ill-health, of Mr. Jesse Butler, miners' agent, who has been an official for about 30 years.

The new scale of prices arranged by the Manchester Coal Supplies Committee will come into operation on and after Monday next.

The Bolton Electricity Committee, after deciding to increase the price of current to all consumers from the commencement of the present quarter, resolved to protest against the action of the Coal Controller in sanctioning a further advance of 2s. 6d. per ton in the price, and particularly to such advance as regards coal required for industrial purposes being retrospective to September 17.

At a delegate meeting of the Lancashire and Cheshire Miners' Federation, held last Saturday at Bolton, the subjoined resolution was adopted: "That this conference protests against the 2s. 6d. per ton advance for coal for domestic purposes, contending that it is far in excess of the amount needed to cover the advance given to the miners; and recommends that the question be relegated to the Miners' Federation of Great Britain, with a view to getting the Coal Controller to withdraw the 2s. 6d. advance.

The nine V.C.'s announced last week include two miners—one from Wigan, and the other from Leeds. Pte. Thos. Woodcock, the Wigan miner V.C., is 28 years of age. Before enlisting in the Irish Guards, he worked as a collier at the Hindley Green Collieries of Messrs. John Scowcroft and Company, in the Wigan coal field. This makes the third V.C. awarded to colliery workers in the Wigan coal field during the present war.

The Midlands.

The advance in the price of coal at the pithead, as authorised by the Coal Controller, has been well received by colliery owners on Canmoek Chase and the adjoining South Staffordshire fields. It is proclaimed that the increase is not too great, in view of the advance in wages and the remarkable manner in which prices of pit timber

continue to advance. Pit timber has advanced 100 per cent. since the commencement of the war by 100 per cent., and all other classes of colliery material have also advanced to an extent approximating to an increase of 300 to 500 per cent. on pre-war costs. A good deal of local correspondence has just occurred in connection with a statement emanating from the men that the increase in wages of 25 per cent. only means so far as the Canmoek Chase mines are concerned an added expense to the mine owners of 4s. 6d. per day per man. The men base their statement on the declaration that on an average three men in a stall each send out three tons of coal per day, i.e., nine tons per day output for the three men. Reckoning from this proposition, certain of the miners are publicly arguing that the advance in selling prices of 2s. 6d. per ton just authorised by the Coal Controller is excessive.

The Birmingham City Council, owing to the advance in pithead coal prices, have resolved that the retail prices previously authorised by the Council shall be correspondingly raised. The increase is equal to an advance of 1½d. per cwt. on the retail price of coal in the city.

Kent.

At Tilmanstone Colliery last week 2,800 tons of coal were raised, and the output of the Snowdown Colliery was about the same amount.

Scotland.

Fines Concerning Explosives—A Winding Rope Case—Fines Follow Accident.

Alexander Twaddle, colliery fireman, New Stevenston; and Samuel Rankin, brusher, Motherwell, appeared before Sheriff Shennan at Hamilton Sheriff Court on charges relating to the storage of explosives in No. 12 pit, Holytown Colliery. Twaddle admitted that he had failed to keep 58 detonators issued to him in a securely locked case until they were about to be used; while Rankin's offence was that he had the detonators in his possession, contrary to the provisions of the Order. It was explained by the Procurator-Fiscal that many of these explosives were finding their way to Ireland, and an attempt was now being made to enforce the Order more strictly. A fine of £2, or eight days' imprisonment, was imposed on each accused.

In Hamilton Sheriff Court, Herbert Hall, Milton Cottage, Motherwell; and Joseph Edwin Robert McIntosh, colliery manager, Wishaw, were charged with contraventions of the Coal Mines Act. The complaint bore that Hall (the agent) and McIntosh (the manager) of the Shields Colliery, Motherwell, occupied by the Glasgow Iron and Steel Company Limited, had on various dates between March 14 and June 28 of this year, made use of winding ropes for raising and lowering men which had been in use for more than 3½ years, and that they had failed to re-cap winding ropes which had been continuously in use within a period of six months. Respondents admitted the offence. Mr. G. A. Anderson, who appeared with the respondents, pointed out that the Home Office had issued no particular notice with regard to the use of winding ropes. While that was no excuse for the offence, such a circular would have directed attention to the matter, and the need for the prosecution might not have arisen. In one case there was a new winding rope ready to be put on, but, unfortunately, that was not done; while in another case a new rope had been ordered on March 7, 1916, but it did not arrive until July 1917. The Government had practically commandeered all the galvanising material used in connection with such ropes. Sheriff Shennan said he was bound to regard this as a very serious offence. It was the duty of people having the management of mines to make themselves perfectly familiar with the conditions under which those mines were to be worked. The penalty on each accused would be £10, with the alternative of 20 days' imprisonment.

Evidence has been led before Sheriff Shennan at Hamilton in three prosecutions which arose out of an accident occurring on June 5 last at Swinhill Colliery, Shawburn, occupied by the Darnagill Coal Company Limited, whereby one man was killed and three injured. The accused were Alexander Gray, manager, Larkhall; John Law, underground manager; and Thomas Porteous, engineer at the colliery. Gray was charged with having, in respect of a winding apparatus at No. 5 pit shaft of the colliery, failed to have such apparatus efficiently constructed and maintained and provided with a locking device or brake sufficient in itself to hold the load in the shaft at any point. The evidence showed that when a number of men were being lowered in the shaft for dismantling work, the platform shot away, one of the men being killed. On Gray's behalf, evidence was led to show that the brakes provided were suitable for the purpose, the accident being really due to a latent defect in the spur wheel. Sheriff Shennan convicted, and, looking to the results which had followed on what he regarded as a serious neglect of duty, imposed a fine of £10, or 20 days' imprisonment. Law was afterwards found guilty of failing to enforce the Regulations in connection with the apparatus, and was fined £2 or five days' imprisonment. The charge against Porteous was that of having negligently lowered the scaffold down the shaft in a manner likely to endanger the lives of the men. Sheriff Shennan dismissed this complaint.

Mr. Malcolm Leckie, manager of No. 3 pit, Blackridge Colliery, has been appointed manager at Leicester, England.

Gas undertakings in the north-eastern district of Scotland have already found that they are greatly handicapped by the Coal Controller's Order restricting the supply of coal for gas works in the area to Fifeshire coal only. Many of the coals from the Fife pits are entirely unsuitable for gas making purposes, and at a conference in Dundee on Friday of last week it was resolved to demand that a substantial proportion of the requirements should be met from Lanarkshire and the Lothians.

At Burntisland, the coal exported for the past week totalled 6,890 tons, compared with 16,080 tons in the preceding week, and 21,700 tons in the corresponding week of last year. The whole quantity went coastwise. At Methil, the shipments show a substantial increase. The export was 22,676 tons, as against 14,536 tons the previous week.

The extensive works of the Frodingham Iron and Steel Company, North Lincolnshire, have been purchased by well-known Sheffield firms—Messrs. Steel, Tozer Limited, of the Phoenix Special Steel Works, and Messrs. Samuel Fox and Company Limited, so that the works will be owned chiefly by the members of the Coal Industry of Leeds. All the directors, except Mr. Magnusson, who has acted as managing director, are to retire, and their places will be taken by directors appointed by the purchasers.

After the usual resolutions re-appointing the retiring directors and auditors, the meeting then terminated with a hearty vote of thanks to the chairman.

DIVIDENDS.

Babcock and Wilcox Limited.—The directors announce an interim dividend of 6 per cent., the same as a year ago.

Baldwins Limited.—In issuing their report for year to June 30 last, the directors regret that it is not accompanied by the usual balance-sheet and statement of accounts, the position of the company in relation to various claims having not yet been definitely ascertained. The directors are satisfied that there are profits available for the payment of the usual dividends, and they have declared the following interim dividends: A further dividend of 7½ per cent. (making 10 per cent. for year) and a bonus of 2½ per cent., all free of tax, on the old ordinary shares, and a proportionate distribution on the newly issued ordinary shares. It is not anticipated that any further dividend will be paid for the year to June 30, 1917.

Niddrie and Benhar Coal Company Limited.—Interim dividend of 5 per cent. per annum, free of tax.

Nobel's Explosives Company Limited.—The directors announce an interim dividend at the rate of 5 per cent., free of tax, on the ordinary shares in respect of the year.

Vulcan Foundry Company Limited.—The report for year to June 30 shows a credit to revenue reserve account, after writing £37,795 off for repairs, renewals, and depreciations, and including £119,685 brought in, of £238,931. After transferring £37,086 to capital account in respect to bonus shares issued, a dividend of 15 per cent. was declared on ordinary, the same as for the previous year.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The colliery proprietors having conditionally recognised the South Wales Association of Colliery Examiners, the first joint meeting took place at Cardiff. Mr. T. Griffiths presided over the owners' side, and Mr. W. Frowen over the representatives of the examiners. Different matters in dispute which at one time had threatened to assume a serious nature were discussed, but no decision was reached, and the members of the Examiners' Association returned to their constituents to submit certain terms. After consideration by the executive of the Examiners' Association, it was decided to refer the matter to a conference which will be called at an early date.

The representatives of the association also met Forest of Dean colliery owners and asked for a new wage rate; but the employers intimated that they cannot increase the wages of steam coal firemen, though they would advance those of house coal firemen by 6d. per day, if approved by the Controller. Certain concessions were made regarding conditions of employment and sickness absence.

Because so large a number of workmen in the anthracite district are under notice terminating contracts, the South Wales Federation has decided to ask that a special meeting of the Miners' Federation of Great Britain committee be summoned, in order that the Coal Control Board may be approached.

The workmen at Clydach Valley who had tendered notices because of a dispute concerning night repairs, have been desired by the Federation executive to withdraw their notices, so that the secretaries of the Conciliation Board may appoint representatives to deal with the matter in dispute.

A joint meeting between representatives of the Engine-men and Craftsmen's Association and the employers' representatives took place in Cardiff on Friday, Mr. T. H. Deakin in the chair, and Mr. W. Hopkins presiding over the workmen. A question was raised as to the non-payment of the war wage to craftsmen when working on a Sunday; and it was agreed that men who worked a full shift on Sunday were entitled to payment for that day, so long as the total number of war-wage payments for one week did not exceed seven.

Another question was as to payment of the 1s. 6d. war-wage to craftsmen who lost a quarter in the day, the men claiming that this should be paid nevertheless, and the owners making an offer that where the loss of time was voluntary, although the man, they considered, was not entitled to the war-wage, they would pay if he made up the lost time at the end of the shift by arrangement with the management; but any man in this position could not claim the right to work the overtime. This offer of the owners was not accepted by the workmen; and they held a separate meeting later in the day, and decided to ascertain the occurrence of cases of this character, special instructions being sent out to branch secretaries. The intention is to bring before the Controller's notice any cases of deduction from the full 1s. 6d. a day.

The miners' executive met in Cardiff on Friday, Mr. J. Winstone in the chair; and with regard to the proposed "down tools" policy, they decided to issue a manifesto urging resistance. The manifesto states that the ballot to be taken on November 1 and 2 is fraught with many serious issues. The executive points out first that the resolution to strike would be "for the purpose of resisting the completion of combing-out workmen who have obtained employment in the mines since the outbreak of war"; and in the second place, it will be a strike against any workman being taken from the mines under the scheme formulated and adopted by the Miners' Federation of Great Britain, which provided that if further men are required after the 1914 comb-out there shall be a selection made by ballot from unmarried men of Class A in all grades between the ages of 18 and 41. The manifesto shows also the position of the South Wales Federation in its relations with the central organisation (the Miners' Federation of Great Britain), and states that, on account of the overwhelming response from the South Wales collieries at the outbreak of the war, the Government, finding the output of coal rapidly diminishing, had to prohibit any further recruiting of men from the mines. The council strongly recommend the workmen to vote against the down tools policy.

A conference took place in Cardiff on Saturday, the colliery examiners having met to receive a report of the deputation which waited upon the coal owners in reference to matters in dispute. The terms upon which the employers were prepared to grant recognition to the trade association were discussed, and the delegates will report to their lodges—a further conference to take place afterwards.

The coal trimmers of Cardiff and Barry met on Sunday to consider a matter which has caused much dissension, there being many complaints as to unfair distribution of the work. After discussion, it was decided that the men should be balloted in regard to the scheme, and the ballot is now being taken.

Another point which came before the meeting was as to payment for waiting time, complaint being made that from time to time men are called out to meet a vessel which does not arrive or which is not put under the tip; and the men

seek to be paid for going to the docks and waiting. They passed a resolution deciding that after October 29 they will charge 5s. for any time up to three hours, and 1s. 6d. for each additional hour.

The Avon Valley miners, near Port Talbot, had before them at their monthly meeting on Saturday a report that 2,000 men in the different collieries of the district were under notice because of shortage of shipping, and it was decided to request the secretary of the Miners' Federation of Great Britain to take steps for getting a fairer share of tonnage for that district. It was stated that in every case the owners would give preference of work on the principle of seniority. The agent reported that the war-wage award would apply not only to men who were idle because of "stop trucks," but also on account of falls, inrush of water, machinery breakage, etc.

Between 2,000 and 3,000 men, who have been on strike at Messrs. Guest, Keen & Works, Dowlais, resumed work this week, the decision at their meeting on Sunday afternoon being that return to work was conditional upon an arbitrator being sent down by the Board of Trade before Thursday.

A large number of disputes were reported upon by Mr. W. L. Cook, J.P., deputy agent, at a meeting of the Monmouthshire Eastern Valley miners' district, at Pontypool, on Monday. Dealing with the price-list dispute at the Elled Colliery, Pontnewynydd, where the men, after a three months strike had returned to work for one month pending a settlement, Mr. Cook reported that owing to a breakdown in the health of Sir Richard Redmayne, negotiations were suspended for fully a fortnight. The men, however, continued working, and he was in possession of a fresh offer from the employers.

The dispute which has been for so long in existence at the Tytrist washery has been settled; and the men at the washery of Pochin Colliery have been accorded similar terms, which operate as from September 17.

A singular strike has taken place at Blaina—no fewer than 3,000 men being idle on Wednesday. A number of men at the No. 3 South Cutting Pit ceased work on Tuesday, their notices having expired; and there are also about 200 men idle in the district through the closing down of a small colliery because it was unremunerative. At a mass meeting held in Blaina on Wednesday these matters were discussed, and a decision was reached that work should not be resumed until employment had been found for the men who had been rendered idle in the two cases mentioned.

North of England.

The half-yearly meeting of the members of the Northumberland Colliery Mechanics' Association, held last Saturday, decided to approach the county coal owners for an eight-hour day. The committee was authorised to take a ballot, under the Trade Union Act, 1913, with a view to the insertion of "political objects" as one of the objects of the association and so to link up with the Miners' Federation of Great Britain.

The dispute at Netherton Colliery, as a result of which the Howard Pit was idle from September 17, was settled last week-end and the men resumed work on Monday of this week. The question at issue was whether men working at the Hall Pit had a right to tender for bargains at the Howard Pit, even although the two pits were under the same ownership.

Federated Area.

At a meeting of the Lancashire and Cheshire Coal Wages Board, held in Manchester on Monday, it was decided, after discussion, to appoint committees at different collieries in Lancashire and Cheshire with a view to maintaining and accelerating the output of coal at collieries, and for the purpose of adjusting any grievance that may arise at the pits. A sub-committee was appointed forthwith to arrange details in connection with the scheme. It was mentioned that the Coal Wages Board had already dealt with many grievances in a manner eminently satisfactory to both sides. The present cordial relationships of the employers and men were favourably commented upon.

The Leicestershire collieries dispute has been settled, and the men resume work next Monday.

At a meeting of Lancashire and Cheshire Miners' Federation executive council, it was reported that the employers had refused to pay the advance sanctioned by the Coal Controller for September 17, and a great deal of dissatisfaction had been caused by their action. It was further reported that the Coal Controller had undertaken to send to the employers a full statement of the whole of the agreement with the Miners' Federation of Great Britain representatives.

The Bentley, Bullcroft and Brodsworth branches of the Yorkshire Miners' Association have been successful in obtaining for the surface workers and manipulators of coal another advance in wages, and the arrears are to be paid for the three months. The advance ranges from 2d. to 1s. per shift.

Scotland.

The ballot at Dewhill Colliery, Salsburgh, regarding the formation of a new branch has been completed, the men having decided to form a distinct branch at these pits, and thus do away with the friction which previously existed between Harthill and Salsburgh miners.

At Coursington Colliery, Motherwell, trouble has arisen regarding the allowance paid to men who are working deficient places and those engaged on shift work. It seems that the manager refused to pay a higher rate than 10s. per shift. The whole question has been remitted to the executive of the National Union of Mine Workers.

At Standhill Colliery, West Lothian, there is some dissatisfaction with the system of contracting in the machine sections, and steps have been taken to improve the conditions.

At a meeting of the miners employed in the Herbertshire Collieries, Stirlingshire, the agent submitted a report on the wages earned by the miners, based on a statement prepared by the company. It was agreed that no action should be taken meanwhile.

A settlement has been reached in the Bellshill collieries, Lanarkshire, of the Wilsons and Clyde Coal Company, whereby 800 men were idle. The friction at East Parkhead and Douglas Park collieries was in regard to working conditions. The question at issue has, by mutual arrangement, been remitted to an arbitrator. At Milnwood Colliery there was trouble over the employment of a contractor. The management, in order to obviate further friction, agreed to request the contractor not to resume.

Reports which have been received by the Lothians Miners' Union show that in East and Mid Lothian, 60 per cent of the men are securing steady employment and earning good wages. The remainder are being employed from two to three days each week.

A strike is threatened at Pencaitland branch, East Lothian, where it is alleged the manager has refused to make any advance on the howing rate. Failing a settle-

ment the executive of the Lothian Miners' Union have been empowered to bring the colliery on strike.

At Knowton Colliery, Shotts, Lanarkshire, the 300 men and men have failed to agree on the terms of reference to be submitted to the arbitrator in connection with the dispute which is pending. The Coal Controller has now been appealed to to take a hand in the negotiations.

Representatives from the union have interviewed the general manager at Clyde Tollcross relative to low wages paid in some of the sections. A rate of 2s. 9d. per ton has been offered in one section and an increase of 6d. per ton in another. It has been agreed to recommend acceptance of these terms by the men affected.

Iron, Steel and Engineering Trades.

The war wage grant to Cleveland ironstone miners and Weardale quarrymen under the Controller's award (1s. 6d. extra per shift for adults, and 9d. for boys), takes effect from September 17 last.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ABERDEEN, OCTOBER 30.—Coal to the City District Board of Control. Forms from the clerk and treasurer, 20, Union-terrace.

DOWNPATRICK, OCTOBER 31.—60 tons best household coal and some steam coal for County Court. Tenders to the secretary, Court House, Downpatrick.

DUBLIN, OCTOBER 31.—800 tons best Scotch or second Wigan coal in bags of 10 st., and 130 tons best Wigan coal. Tenders to the clerk, South Dublin Union Offices, 1, James's-street, Dublin.

STOWMARKET, OCTOBER 31.—100 tons of coal for the Guardians. Forms from the clerk.

THURLASTON (RUGBY), NOVEMBER 1.—50 tons best coal or cobbles, without slack, for the Poor Plot Charity. Tenders to W. D. Barnwell, Dunchurch.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

DUBLIN, NOVEMBER 1.—*Stores.*—Axles, tyres, bolts, nuts, metals, wire, castings, forgings, wagon hinges, electrical fittings, lamps, boiler plates, signalling materials, etc. (six or 12 months), for the Great Northern Railway Company. Forms (1s.) from the secretary, Amiens Street Terminus, Dublin.

BELFAST, OCTOBER 30.—*Stores.*—Castings, firebricks, packing, rivets, bolts, etc. (12 months), for the Harbour Commissioners. Forms from the Harbour Office.

THE FREIGHT MARKET.

The volume of outward chartering possible in British markets has shown a sad falling-off during the past week, even when compared with the attenuated volumes of business reported in recent weeks. At the north-east coast, the amount of "free" tonnage on offer has been exceptionally small, and only a very few fixtures have been possible of arrangement. These include two to Gothenburg at from 190 kr. to 195 kr., three to Stockholm at from 205 kr. to 207½ kr., one to Gibraltar at the even 100s., one to London at 20s. 6d., and a couple to French Atlantic ports. For other directions, nothing has been done, despite the fact that the enquiry for suitable vessels shows no diminution. Thus, the Spanish Mediterranean is very firm, at 220s. to Barcelona from the Tyne, whilst probably much more than the 165s. quoted nominally for Port Said could be obtained. Portuguese ports are still quoted at 90s. to Lisbon, and 105s. to Oporto. For the Spanish Atlantic, the recently-paid rate of 160s. to Bilbao could be repeated, either for that port or for Santander. At South Wales, only a comparatively few charters have been arranged, and the overwhelming majority of these are for French Atlantic ports at fixed figures, the only exception, indeed, being that a 3,000-ton sailing vessel has been taken up for Monte Video at 90s. At the Clyde, Gibraltar has been done at 100s., the River Plate at 85s. for a sailing vessel, and Barcelona at 250s. for a 3,500-tonner.

Homewards, the River Plate is dull, but steady, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. At the United States, coal freights are still based on 125s. from Virginia to the River Plate, with 33 dols. for Rio discharge. Net charter tonnage is easier, at 200s. from Northern Range to the United Kingdom, but steady at 250s. for Northern French discharge, and 350s. for West Italy. For heavy grain cargoes, the Northern Range is quoted at 30s. to the United Kingdom or French Atlantic—a weaker rate than that of a week ago—and 32s. 6d. to West Italy. From the Gulf to these destinations the rate is 2s. 6d. more in each instance. Tonnage is in strong demand at the Far East, but despite the fact that rates are fully upheld, little business is being done. Madras Coast to Marseilles with kernels is very firm, at 500s. Haiphong-Saigon to French Atlantic destinations with rice is strong, at that same rate. Bombay to United Kingdom on d.w. basis is quoted at 250s., with 400s. for West Italian discharge. Kurrachee to United Kingdom is maintained at 250s. Mediterranean ore tonnage easily commands late rates.

Tyne to Gothenburg, 1,850, 190 kr.; 1,700, 195 kr.; Gibraltar, 6,000, 100s.; Honfleur, 1,200, 62s. 6d., pitch; London, 650, 20s. 6d.; Rouen, 900, 67s. 6d., pitch; and Stockholm, 2,400, 207½ kr.; and 2,500, 205 kr.

Cardiff to Bordeaux, 2,000 and 1,800, 34s.; Cherbourg, 1,000 and 1,600, 47s. 3d., neutral; 1,700, 47s. 3d. coal. 72s. 6d. coke, neutral; Caen, 700, 48s., neutral; Havre, 2,000 and 1,100, 45s. 9d., neutral; Monte Video, 3,000, 90s., sail; Rouen, 1,300 and 1,500, 48s. 9d., neutral; and Trouville, 500 and 700, 48s., neutral.

Swansea to Rouen, 3,000, 47s. 3d., neutral; Caen, 1,000, 1,100, and 1,200, 46s. 6d., neutral; and Trouville, 700, 48s., neutral.

Glasgow to Gibraltar, 100s.; River Plate, 2,950, 85s., sail; and Barcelona, 3,000, 250s.

Blyth or Methil to Stockholm, 2,500, 205 kr.

LATER.—The following additional fixtures have been arranged:—

Tyne to Barcelona, 3,100, 250s.; Gothenburg, 2,000, 183½ kr.; and 1,800, 187½ kr.

Cardiff to Brest, 1,500, 45s., neutral; L'Orient, 1,400, 29s.; and Rouen, 1,300, 74s. 3d., neutral.

Swansea to Honfleur, 400, 48s., neutral.

Newport to St. Nazaire, 1,600, 61s. 6d., neutral.

THE COLLIERY GUARDIAN

Monthly List of Recent Coal Literature.

I.—General.

- Cost of Coal. O. Smith and C. E. Leshner. "Economic Geology," Jan. 1917, p. 42.
- Fuel Economy. "Eng.," Oct. 19, p. 418.
- Cost Accounting for Mine Engineers. H. H. Stock. "Coal Age," Sept. 8, p. 402.
- The Utilisation of Pyrites Occurring in Illinois Bituminous Coal. E. A. Holbrook. "Univ. Ill. Bull.," Circ. No. 5; 14 fig.
- Fatigue and Its Elimination. "Cassier's Eng. Mthly.," Oct., p. 219.
- Some Aspects of Industrial Fatigue. H. J. Spooner. "Cassier's Eng. Mthly.," Oct., p. 223.
- Industrial Fatigue. "Cassier's Eng. Mthly.," Oct., p. 236.
- Development of Mining in Greater Japan (Gross-Japans bergwirtschaftliche Entwicklung). — Dyes. "Metall. Erz.," Aug. 22, p. 309.
- A Reliable Method of Economising Coal (Erprobter Weg zur Kohlenersparnis). A. Thomas. "St. u. E.," Aug. 16, p. 753.
- French Views on the Future of Iron and Coal (Eisen und Kohle in Frankreichs Zukunftabsichten). F. Moos. "St. u. E.," Aug. 9, p. 729.
- The Coal Problem. "Engin.," Oct. 19, p. 330.
- Coal Gas for Motor Traction. W. M. Barrett. "Contractors' Record," Oct. 17, p. 635. (Paper read before the Mchestr., Lpool. and Counties Commercl. Motor Users' Asscn.)
- Fuel Economy. "Eng. Rev.," Oct. 15, p. 106; 2 fig.
- Coal Fields and Coal Industry of Eastern Canada. F. W. Gray. "Colliery Guard.," Sept. 28, p. 591. (From report by Dept. of Mines, Ottawa.)
- The Flow of Water in Siphons. M. Halliday. "Colliery Guard.," Oct. 19, p. 749; 2 fig. (Paper read before N. of Engld. Inst. of Min. and Mech. Engin.)

III.—Geology.

- Insects from the British Coal Measures. H. Bolton. "Quart. J. Geol. Soc.," May 8, p. 43.
- The Economic Geology of the Central Coal Field of Scotland (Area II.). L. W. Hinxman, C. B. Crampton, E. M. Anderson, and M. Macgregor. 92 pp.; 4 fig. and 9 pl. 1917. H.M. Stationery Office. 4s. 6d. net.
- Text-Book of Geology and Mineralogy for Higher-Grade Schools (Lehrbuch der Geologie und Mineralogie für höhere Schulen). Prof. P. Wagner. 6th edition. 228 pp.; 322 illus. and 4 pl. Leipzig: B. G. Teubner. 3 mk.
- Note on the Carboniferous Formation of Guadalcanal, Seville (Nota sobre el Carbonifero de Guadalcanal, Sevilla). A. Carbonell y Trillo-Figueroa. "Rev. Min.," Sept. 8, p. 443.
- Fossil Coals of Bosnia and Herzegovina (Die fossilen Kohlen Bosniens und der Hercegovina). — Katzer. "Bergb. u. Hütte," Aug. 15, p. 283; illus.
- Geological Problems of Brown Coal Deposits (Geologische Probleme der Braunkohlenlager. — Walther. "Braunk.," Aug. 24, p. 173; Sept. 7, p. 189.
- Co-relation of Seams in West and South Yorkshire. P. F. Kendall. "Colliery Guard.," Oct. 5, p. 643. (Paper read before Middl. Inst. of Min. Civ. and Mech. Engin.)
- Area of Deposition of the Coal Fields of Western Europe. G. Blake Walker. "Colliery Guard.," Oct. 5, p. 639; 1 fig. (Paper read before Middl. Inst. of Min. Civ. and Mech. Engin.)

VI.—Working of Minerals.

- Turbine Coal Cutters. A. Y. Hoy. "Mine and Quarry," Aug., p. 983; 5 fig.
- Mining Anthracite Coal with Hammer Drills. A. E. Blackwood. "Mine and Quarry," Aug., p. 1003; 2 fig.
- Methods of Mining in Crow's Nest Pass District, Alberta. R. Green. "Bull. Can. Min. Inst.," Sept., p. 784; 5 fig.
- Report of the Departmental Committee on Underground Mining Contracts (Witwatersrand Mines). Govt. Printing Office, Pretoria. 2s.
- The Coal Industry of Illinois. C. M. Young. "Bull. Amer. Inst. Min. Engin.," Sept., p. 1369.
- Steam Shovel Mining of Bituminous Coal. H. H. Stock. "Bull. Amer. Inst. Min. Engin.," Sept., p. 1385; 23 fig.
- The Thin Mine Problem. H. O. Dixon. "Colliery Guard.," Oct. 12, p. 700. (Paper read before Mchestr. Geol. and Min. Socy.)

VII.—Boring, Shaft Sinking, and Tunnelling.

- Drill Bits and Drill Steel. G. H. Gilman. "Mine and Quarry," Aug., p. 988; 15 fig.
- Geology and Shaft Sinking. (Geologie und Schachtbau). — Landgraber. "Techn. Bl.," Aug. 18, p. 121.
- The Cover Rock of the Coal and Salt Deposits on the Lower Rhine, and the Methods to be Applied in Shaft Sinking (Das Deckgebirge der Salz- und Kohlenlager am unteren Niederrhein und die darin anwendbaren Schachtbauverfahren). — Landgraber. "Bergb.," Aug. 16, p. 509; Sept. 6, p. 553.
- Employment of Divers in Shaft Sinking (Ueber Taucherei im Bergwerksbetriebe). H. Grahn. "Glückauf," Sept. 22, p. 705; 4 fig.
- The Case for Trial Boreholes. "Colliery Guard.," Oct. 5, p. 648.

VIII.—Explosives, Blasting.

- A Short Account of Explosives. A. Marshall. 100 pp. J. and A. Churchill. 5s. net.
- Coal Mining Investigations. "Coal Age," Sept. 1, p. 364; 4 fig. (Testing explosives at U.S. Bureau of Mines Experimental Station.)

IX.—Timbering, Packing, etc.

- Coal Face. "Iron Coal Tr. Rev.," Oct. 5, p. 379; 2 fig.
- Underground Workings in the Ferreira Deep. — Cazalet. "Jl. S. Afr. Instn.," Aug., p. 9; 16 fig.

- Notes on Tests of Timber Pig Styes. H. C. Hilton. "Jl. S. Afr. Instn. Engin.," Aug., p. 37; 8 fig.
- Wood Preserving Opportunities in the Anthracite Field. K. C. Barth. "Coal Age," Sept. 22, p. 492; 4 fig.
- The Preservation of Wood. A. J. Wallis-Taylor. 344 pp.; 119 fig. 1917. Rider. 10s. 6d. net.
- The Preservation of Timber (Die Konservierung von Holz). — Simmersbach. "Ann. Glaser," Aug. 25, p. 49; Sept. 1, p. 62.
- Ferro-Concrete Pit Props. W. Marriott. "Colliery Guard.," Oct. 12, p. 692; 2 fig. (Paper read before Middl. Counties Inst. Engin.)

X.—Surface Arrangements.

- Electrical Equipment at Winding Gulf, W. Va. C. H. Elson. "Coal Age," Sept. 15, p. 462; 7 fig.
- Plant of the Lundale Coal Company, Lundale, W. Va. W. W. Beddow. "Coal Age," Sept. 22, p. 482; 5 fig.

XI.—Winding and Haulage.

- Electric Winder at Staindrop Pit. "Iron Coal Tr. Rev.," Oct. 5, p. 379; 2 fig.
- Effective Indicating Derailer. F. Hoskinson. "Coal Age," Sept. 22, p. 480; 2 fig.
- Notes on Shaft Winding (Betrachtungen über die Schachtförderung). — Macka. "Bergb. u. Hütte," Aug. 1, p. 269; illus.
- Electric Winding for Mines. W. R. Evans. "Min. Mag.," Oct., p. 160; 5 fig.
- Mechanics. Brychan. "Sci. Art. Min.," Oct. 20, p. 104; 1 fig. (Rope pull of pit tubs; transmission by gearing.)
- Interesting Electric System of Haulage at a Coal Mine. F. Hoskinson. "Coal Age," Sept. 1, p. 354; Sept. 8, p. 408; 11 fig.
- Electric Winding for Mines. W. R. Evans. "Min. Mag.," Sept., p. 111; 3 fig.
- Location and Construction of Mine Tracks. J. McCrystle. "Coal Age," Sept. 1, p. 359; Sept. 8, p. 405; Sept. 15, p. 465; 7 fig.
- A New Electric Mine Hoist at Butte, Montana. R. S. Sage. "Electrician.," Oct. 19, p. 74; 4 fig.
- Electric Haulage at Delagua Collieries. F. Hoskinson. "Colliery Guard.," Oct. 5, p. 642; 9 fig. (From "Coal Age.")

XII.—Signalling.

- The A. T. M. Visual and Audible Indicator. "Iron Coal Tr. Rev.," Oct. 5, p. 383; 5 fig.
- Shaft Signalling Regulations, with Special Reference to the Pearce-Hall Signal Indicator. R. W. Hall. "Iron Coal Tr. Rev.," Sept. 28, p. 354; 8 fig. (Paper read before N. Engld. brch. Natl. Asscn. Colly. Mgrs.)

XVIII.—Mine Fires.

- The Problem of Spontaneous Combustion. "Colliery Guard.," Sept. 28, p. 597.

XX.—Drainage, Pumping, etc.

- Observations on Sinking Pumps. J. F. K. Brown. "Coal Age," Sept. 15, p. 448; 3 fig.
- Siphoning Mine Water. J. L. Ball. "Coal Age," Sept. 22, p. 481; 2 fig.
- Centrifugal Pumps for Mine Service. H. Oxford. "Coal Age," Sept. 22, p. 485.

XXI.—Preparation.

- Observations on Modern Coal Washing. G. H. Elmore. "Colliery Guard.," Sept. 28, p. 590; 2 fig. (From "Coal Age.")

XXII.—Briquettes.

- Briquetting Slack and Coke Breeze. "Gas Wld.," Oct. 6, p. 15 (coking sectn.). (From "Iron Trade Rev.")
- Patent Fuel Manufacture. "Chem. Trade J.," Oct. 6, p. 282; Oct. 13, p. 302.
- Artificial Fuel. "Building News," Sept. 12, p. 203.
- Coal Briquetting, with Special Reference to Anthracite Coal. J. A. Yeadon. "Colliery Guard.," Sept. 28, p. 594. (Paper read before S. Wales Inst. of Engin.)

XXIII.—Coke Ovens and By-Products.

- New Coke Ovens and By-Product Plant at Bearpark Brancepeth Colliery, Durham. "Iron Coal Tr. Rev.," Oct. 12, p. 401; 7 fig.
- Nitrogen and Nitrates from Bituminous Coal. C. G. Atwater. "Chem. News," Oct. 5, p. 165.
- Direct Recovery of Ammonia. "Times Eng. Suppl.," Sept. 28, p. 188.
- Suction Gas Production from S. African Bituminous Coals. F. C. Sturrock and E. J. Way. "Jl. S. Afr. Instn. Engin.," Aug., p. 28; 4 fig.
- Black Cores. J. W. Mellor. "Brit. Clay Worker," Sept., p. 89; 3 fig.
- A Study of the Microstructure of Some Clays in Relation to their Period of Firing. H. Ries and Y. Oinouye. "Bull. Amer. Inst. Min. Engin.," Sept., p. 1421; 10 fig.
- By-Product Coking. "Colliery Guard.," Oct. 5, p. 647.
- Testing Refractory Materials. J. W. Mellor. "Colliery Guard.," Oct. 5, p. 654. (Paper read before Refractory Matls. Sectn. of the Ceramic Soc.)
- Fireclays and Ganisters of the South of Scotland. L. W. Hinxman and M. MacGregor. "Colliery Guard.," Oct. 5, p. 652. (Paper read before Refractory Matls. Sectn. of the Ceramic Soc.)
- Recovering Sulphur from Coal. A. Sander. "Colliery Guard.," Oct. 12, p. 690; 1 fig. (From "Chem. Z.")

XXIV.—Fuels, Testing, etc.

- The Utilisation of Undeveloped Fuels in Pulverised Form. V. Z. Caracristi. "El. Rev.," Oct. 12, p. 342; 4 fig. (From "Genl. Electric Rev.")
- The Use of Culm and Other Waste Fuels. J. B. C. Kershaw. "Engin.," Oct. 12, p. 307.
- Combination Coal and Gas Firing. A. Morgan. "Electrician.," Sept. 21, p. 967; 3 fig.
- Notes on Peat. "Ind. Eng.," Aug. 18, p. 95; Aug. 25, p. 109.
- Alcohol for Fuel. "Times Eng. Suppl.," Sept. 28, p. 189. (From "Bull. No. 8" of the Sth. Australian Dept. of Chemistry.)
- Screen Scale for Coal Testing Work. E. A. Holbrook. "Coal Age," Sept. 8, p. 398; 3 fig.

- Suction Gas from South African Coals. F. C. Sturrock and E. J. Way. "Colliery Guard.," Oct. 12, p. 687; 1 fig. (From "Jl. S. Afr. Instn. Engin.")
- Report of the Fuel Research Board. "Colliery Guard.," Oct. 19, p. 738.

XXV.—Steam Engines and Boilers: Gas Engines.

- Boiler Design for Gas Fuel Economy. "Iron Age," Sept. 6, p. 534.
- The Transmission of Heat in Tubes (Die Wärmeübergang im Rohr). — Nusselt. "Z. d. Ing.," Aug. 18, p. 685; illus.
- The Utilisation of Waste Steam in Mining (Die Verwertung des Abdampfes in Bergwerksbetrieben). — Schapira. "Z. Bergb. Betr. L.," Aug. 1, p. 177; illus.
- Devices for Returning Condensed Water (Kondenswasser-Rückbeförderungsanlage). — Lier. "Z. Bayer. Rev. V.," Aug. 15, p. 122; illus.
- Are Our Boiler Grates Too Large? "Brit. Clay Worker," Oct., p. 103.
- Formation of Scale in Boilers. Wenlock. "Sc. and Art Min.," Oct. 20, p. 106.
- Experiments in Firing Inferior Klinkery Small Coals on Travelling Grates (Versuche zur Verfeuerung minderwertiger, schlackenreicher Feinkohle auf Wanderrosten). — Loschge. "Z. d. Ing.," Sept. 1, p. 721; illus.
- Oil Economy in Steam Engines (Oelersparnis bei Dampfmaschinen). — Trott. "Braunk.," Aug. 24, p. 174.
- Fuel Economy on Locomotives. "Eng. Rev.," Sept. 15, p. 84. (Suggestions by the Internatl. Railway Fuel Asscn. of America.)
- Boiler Efficiency (Heat Transfer Through Plate). "Times Eng. Suppl.," Sept. 28, p. 184.
- Boiler House Design. H. E. Birch. "Ind. Man.," Sept., p. 827; 6 fig. (Coal bunkers.)
- Some Notes on the Design of Coking Stokers. "Cassier's Eng. Mthly.," Oct., p. 271; 2 fig.
- The Piston of the Uniflow Steam Engine (Der Kolben der Gleichstrom-Dampfmaschine). — Graf. "Z. Bayer. Rev. V.," Aug. 31, p. 129; illus.

XXVI.—Compressed Air.

- Economy in Air Compressor Drive. R. D. Willets. "Mine and Quarry," Aug., p. 982; 1 fig.

XXVII.—Electricity.

- Notes on the Suggested Safety Rules for Installing and Using Electrical Plant in American Coal Mines. L. Fokes. "Iron Coal Tr. Rev.," Oct. 5, p. 373.
- Central Station Service. T. R. Hay. "Ind. Man.," Sept., p. 850.
- Application of Electricity in Mining (Le Applicazioni dell'elettricità nelle miniere). "Ind. Chim. Min. Met.," Aug. 10, p. 257.

XXVIII.—Surface Transport and Storage.

- Coaling Plant Delivers Coal to Self-Unloading Barge. "Engin. News-Record," Sept. 13, p. 511.
- The Advantages of Overhead Bunkers for the Main Coal Stock. G. F. Zimmer. "Gas Wld.," Oct. 6, p. 235; 3 fig.
- 32-ton Electric Travelling Coaling Crane. "Eng.," Sept. 28, p. 326; 2 fig.
- Installation, Working Conditions, and Economy of Electric Runways (Einrichtung, Betriebsverhältnisse und Wirtschaftlichkeit von Elektrohängebahnen). — Blau. "Bergb. u. Hütte," Aug. 1, p. 264.
- The Virginian Railway. "Engin.," Oct. 12, p. 312; 12 fig. (New line from W. Virginia coal fields to coast.)
- High-Power Cranes for Heavy Loads. H. Hubert. "Eng. Rev.," Sept. 15, p. 73; Oct. 15, p. 108; 7 fig.
- Push-Button Coal and Ash Hoists. "Engin.," Sept. 21, p. 254; 2 fig.
- American Plant for Coaling Locomotives (Amerikanische Anlagen zur maschinellen Bekohlung von Lokomotiven). — Hermanns. "Z. Dampfkr. Betr.," Aug. 31, p. 273; illus.
- Storing Coal (Lagerung der Kohlen). — Kuckuck. "Jl. Gasbel.," Aug. 25, p. 433; illus.
- Coal and Shipping—XXII.: Stacking and Re-Handling Coal. F. J. Warden-Stevens. "Colliery Guard.," Oct. 19, p. 735; 5 fig.

XXIX.—Sanitation, Diseases, etc.

- An Ideal Washhouse. F. M. Heidelberg. "Coal Age," Sept. 1, p. 378; 2 fig. (From "Eng. Min. J.")
- Miners' Housing in Scotland. "Colliery Guard.," Oct. 12, p. 692; Oct. 19, p. 741. (From report of Royal Commission on the Housing of the Industrial Populn. of Scotld.)

XXX.—Mining Laws, Royalties.

- Mine Taxation in Alsace-Lorraine (Die Bergwerksbesteuerung in Elsass-Lothringen). F. F. Meier. "Glückauf," Sept. 15, p. 696; Sept. 22, p. 709.
- Notes on the Austrian Law on Damage by Mine Subsidence (Beiträge zum österreichischen Bergschadenersatzrechte). — Herbetschek. "Bergb. u. Hütte," Aug. 15, p. 289.

GOVERNMENT PUBLICATIONS.

* * Any of the following publications may be obtained on application at this office at the price named **post free**.

- First-Aid (Form 923), Treatment of Minor Injuries. (London: H.M. Stationery Office). Price 1½d.
- Dominions Royal Commission: Royal Commission on the Natural Resources, Trade, and Legislation of Certain Portions of H.M. Dominions: Minutes of Evidence Taken in the Central and Western Province of Canada in 1916, Part II. (Cd. 8459). Price 4s. 7d.
- Colonial Reports (Annual): (No. 932), Bahamas, Report for 1916-17; dated October 1917. Price 3d.
- Statutory Rules and Orders, 1917: (No. 1060), Coal, Price of Coal—The Coal (Pit's Mouth) Prices Order, 1917. Dated October 12, 1917. Made by the Board of Trade. Price 1½d.



The Silent Conveyor

(Spence's Patent).

A Fair Example of Results.

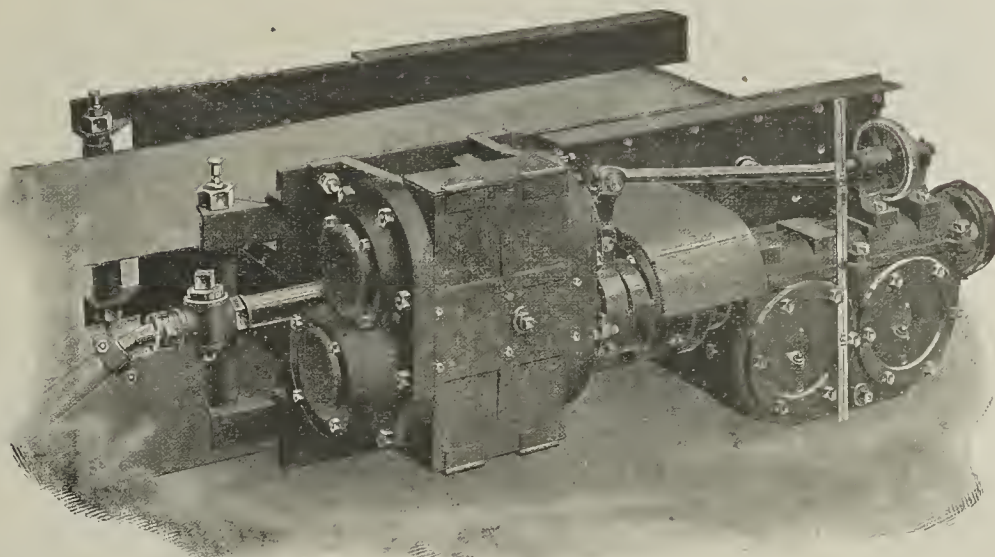
Length of Face - - 80 yards

Height of Seam - - 2 ft. 9 in.

Average Gradient
against load 1 in 12

Average discharge
(5 men) - 60 tons per shift

Average load (input) - 4 B.H.P.



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SHEFFIELD.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

Improvements in Centrifugal Compressors. The Patent Office, London. E.C.—The present invention relates to centrifugal compressors, and has for its object to provide an improved structure for a compressor, particularly a multistage machine. In the drawings, fig. 1 is a longitudinal sectional view of a multistage compressor embodying the invention; fig. 5 is a sectional view of a fragment of the casing taken at a point angularly removed from the section of fig. 1; and fig. 6 is a view illustrating how the invention may be used for a single stage machine. Referring to the drawing, 10 indicates a shaft having mounted thereon the impellers 11, each comprising the usual web member 12, with vanes 13 on opposite sides thereof, the vanes having curved entrance edges 13a. The casing comprises an admission end section 14, a discharge end section 15, and an intermediate section 16. The admission end section 14 is made in two parts, being divided horizontally in an axial plane. It has an outer end wall 17 and an inner wall 18, the two being fixed in spaced relation to each other by webs, thus forming an admission chamber 21. 22 indicates a shaft packing arranged in an opening 23 at the centre of the end wall. The webs 19, of which there are two, extend down close to the packing member 22, so as to prevent the air or other gas being pumped from circulating around the shaft on its way into the impeller. The end wall 17 has formed integral therewith a curved flange 24, and the inner wall 18 has a curved flange 25, spaced from the flange 24, and joined to it by webs. This forms a continuous circumferential passage 27, except that it is divided by webs which communicate with the admission chamber 21. 28 indicates the admission conduit of the compressor, it being formed as a part of the end section 14. The discharge end section 15 comprises an outer end wall 29, an intermediate wall 30, and an inner wall 31. The intermediate wall 30 is spaced from the outer wall 29 to form a discharge chamber 32. It is connected to the outer wall 29 at the central portion, as indicated at 33, and also by means of suitable webs 34. There is an opening 35 at the centre to receive the shaft packing 36. Formed integral with the end wall 29 is a curved flange, and the intermediate wall 30 is provided with a flange 38 connected to the flange 37 by webs 39. This forms a continuous circumferential passage 40, except that it is divided by webs. Formed integral with the intermediate wall 30, and concentric with the flange 38, is a second flange 41, to which the circumferential edge of the inner wall 31 is fixed. The intermediate wall 30 and inner wall 31 are spaced apart by webs 42 and 43. The webs 42 extend down to the packing 36, while the webs 43 terminate short thereof. The annular space between the flanges 38 and 41 is crossed by a series of partition walls 44 forming radial passages 45, which connect the space between the intermediate wall 30 and inner wall 31 with the annular passage 40. Between the walls 44 forming the passages 45 are left axial passages 46 extending to the discharge chamber 32. 47 indicates the discharge conduit which communicates with the discharge chamber 32. 48 indicates a bearing for the shaft 10. In operation, the fluid (as air or gas) being compressed or pumped, enters the chamber 21 through inlet conduit 28, and circulates entirely around the shaft. The lower web 19 located centrally in the inlet conduit subdivides the incoming fluid into two separate streams. From chamber 21 part of the fluid is fed to the right hand side of the impeller around

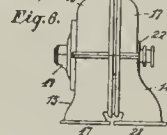
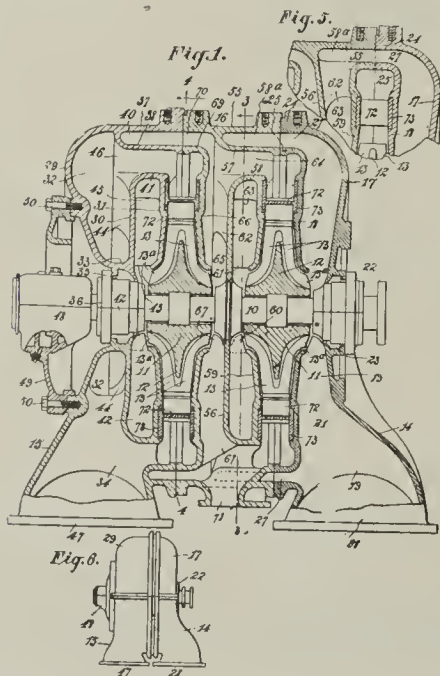
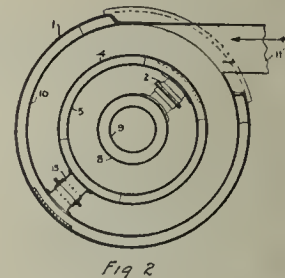
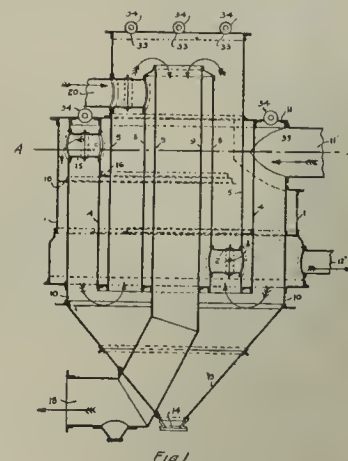
On the other hand, if the impeller is to be made wider, then the patterns can be built up by means of filling strips to add the necessary width to the casing parts, this being a comparatively simple and inexpensive matter. (Four claims.)

108771. Improvements in Pumps. E. Dodson, 24, Queen-street, Deal, Kent.—This invention relates to pumps of the type comprising a tubular chamber, such as a Bourdon gauge tube, supplied with liquid through a non-return valve, and subjected to a bending or distorting action, which causes a contraction of volume that discharges a corresponding amount of liquid through the outlet. The chief object of the invention is so to enable such pump to pump small accurately measured quantities of liquid under high pressure, such, for example, as are required in supplying liquid fuel to internal combustion engines or for lubricating under pressure. The pump may, however, be employed for other purposes, as, for instance, the injection of water in small quantities into the cylinders of internal combustion engines. Fig. 1 is an elevation partly in section of a pump of Bourdon tube formation embodying the invention; fig. 2 is a detail view of an adjustment device. A is the tubular chamber or Bourdon tube provided with a junction piece a at its open end, to which is connected by a tube the pump body B. C is the spring controlled inlet valve placed in the inlet passage b of the body B, and D the delivery valve in the outlet passage b' of the body. E is the air trap placed above the end of the branch passage b' leading to the tube A. F is a cam, and F' an eccentric employed alternatively in the two modifications illustrated to effect the delivery stroke through suitable lever connections to the closed end a' of the tube A. G indicates diagrammatically a pressure reservoir, from which the liquid is supplied to the inlet of the pump under substantially constant pressure. The quantity of liquid delivered is controlled by limiting the expansion or suction stroke by means of an adjustable stop. This may be effected by the cam-operated lever H attached to the pump tube A, and connected through a slotted connecting rod h to a pin or stop j on a control lever J, the position of which is angularly adjustable so as to alter the point at which the connecting rod is checked when the lever is released by the cam F. The amount of expansion allowed to the pump tube at the end of the delivery stroke, and consequently the amount of liquid drawn into the pump tube, are therefore limited by the position of the control lever or stop J, and the delivery is thus measured by the adjustment of the control lever. In the case of a number of pumps operated under a common control, the control levers of the engine pumps may be made separately adjustable, so as to allow for inequalities in the pumps themselves, as it is difficult to make a series of pumps exactly similar in their operation, although set to the same zero position. The general operation of the pump is as follows:—The cam F is engine driven, and is shown at the end of the delivery stroke when the bending of the tube A is at its maximum, and the charge of liquid has just been forced out of the pump through the valve D and the outlet d', passing, in the case of a fuel pump, to a spraying nozzle in the engine cylinder. As the end of the cam F passes the roller h' on the lever H, the spring a' connected to the closed end of the tube A, together with the resiliency of the tube, causes the latter to spring back, turning the lever H around its fulcrum h', through the medium of the connecting rod h', in the direction shown by the arrows. The expansion of the tube A, which also involves an expansion of its volume, continues until the end of the slot h' in the rod h' meets the stop pin j. During this expansion the liquid has been entering the tube A under the pressure in the reservoir G, passing from the reservoir through the valve C and passages b and b'. Any air which may enter with the liquid tends to rise into the air trap E during the suction or expansion stroke, the air collecting under the valve c, and immediately the pressure below this valve rises above that in the trap E, together with the pressure of the weak spring c', the air escapes past the valve into the trap. The amount of air entering is, of course, extremely small under normal conditions, but it is important that it should not accumulate in a part of the pump where it is subjected to the changes of pressure in the pump itself, as the variable amount of compressible air would change the effective volume of the pump, and render delivery of the exact amount desired impossible. In the trap E the air gradually accumulating during the working of the pump is cut off from the pump tube A by the non-return valve c, and is subjected only to the almost constant pressure of delivery, which is determined by the pressure of the spring d' of the delivery valve D. When the cam F again meets the roller h', the delivery stroke begins with the contraction of the pump volume, due to the bending of the tube A, but the actual delivery begins only when the internal pressure exceeds that of the valve D, a stage reached almost immediately the pull on the rod h' starts. The delivery pressure usually remains nearly constant, and only slightly in excess of that of the valve D, which valve closes as soon as the cam F reaches the position shown in the drawing. A pump tube of the Bourdon type is liable to vibrate, and thus to cause some disturbance in the delivery of fuel, especially if working at high speed. A damping device is provided, which may be in the form of a strip K of wood or other suitable material bound upon the tube. Any tendency of the tube to vibrate will be checked by this attachment, and, since the bending of the tube is at a maximum about the middle, the strip, if suitably shaped, also serves to relieve the tube of excessive strain at this point, as it distributes the stresses along the length of the tube. (Ten claims.)

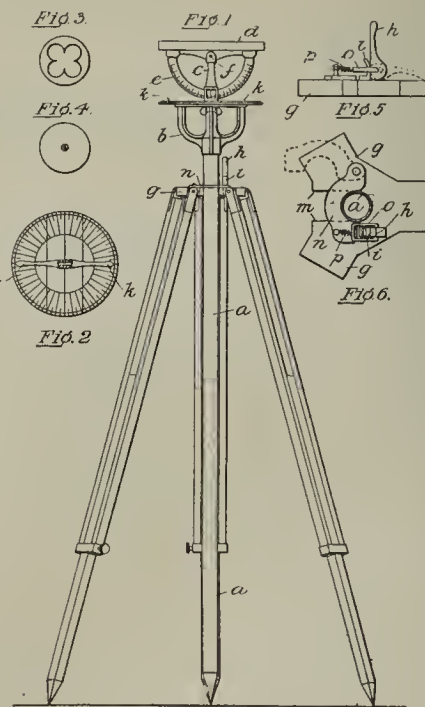
108710. Improvements in Regenerators for Use with Gas Producer Plants. A. H. Lynn, Sanctuary House, Tothill-street, Westminster, S.W.; L. A. Riley, Vanderbilt Concourse Building, 52, Vanderbilt-avenue, New York; and N. E. Rambush, Sanctuary House, Tothill-street, Westminster, S.W.—This invention relates to improvements in regenerators or heat interchangers for use with gas producer plants. Fig. 1 is a central, vertical, longitudinal section; fig. 2 is a section thereof along the line A—A. Each apparatus comprises an outer, preferably cylindrical, shell or casing 10, the upper end of which is covered by a head 11. Arranged at the upper end of the shell 10 is a connection 11' mounted tangentially to the periphery of the shell 10, to impart rotation to the heating medium admitted to the heating chambers. To the lower end of the shell 10 is attached a conical dust collector 13. The lower end of the same is covered by a cover 14. So far, the construction of

all the embodiments is identical. Referring now to figs. 1 and 2, the superheater of this construction, as shown, consists of three vertical cylinders 10, 5, 9, concentrically arranged and intended for the heating medium. Intermediate with and surrounding said cylinders, three cylinders 1, 4, 8, are provided for the medium to be heated. As will be seen from the drawings, five annular and one cylindrical spaces are thus provided. One set of spaces serves as a passage for the medium to be heated, and the other set of spaces serve as passage for the heating medium. The heating medium enters the top of the apparatus at the inlet 11' arranged tangentially and leading to the second annular space. Owing to the tangential direction a cyclonic movement is imparted to the heating medium, thus facilitating dust removal if necessary. The heating medium passes downwards in the cylindrical annular space between cylinders 10 and 4, and passes below the closed edge of the annular space between cylinders 4 and 5 into the annular space between cylinders 5 and 8, which it ascends. At the top it passes over the closed annular space between the cylinders 8 and 9, and again changes its direction, and descends through the central heating cylinder 9, and from there to the outlet 18. The medium to be heated passes in a direction opposite to that of the heating medium. It enters at the inlet 20, passes downwards through the annular space between cylinders 8 and 9, and by way of one or more lateral tubular connections 2, into the annular space between cylinders 5 and 4, and leaves said space through one or more lateral tubular connections 15 into the annular space between cylinders 1 and 10, through which it descends, and leaves the apparatus by the pipe 12'. The outside of the cylinder 1 is preferably covered by a heat insulating material. The tubular connections 2 between the annular spaces between cylinders 8, 9 and 5, 4, and the tubular connections 15 between the annular spaces between cylinders 4, 5 and 1, 10, may be flanged and bolted together in order to allow of easy detachment and removal of the internal parts for cleaning or repair without total dismantling of the apparatus. In order to ensure a uniform distribution of the medium to be heated within the annular spaces, baffle plates or the like 16 may be provided. Similar baffling or distributing arrangements may also be provided for the heating medium. (Seven claims.)

108816. Surveying Instrument for Vertical and Horizontal Angles. C. Bald, Tukvar, Darjeeling, India.—This invention relates to an improved surveying staff or instrument for general land surveying which is so constructed as to accommodate within the ordinary tripod or stand a central staff that can be secured in its correct position without recourse to the aid of spirit levels or any of the relative adjustments which form essential parts of a theodolite. For this purpose the head of the tripod is provided with a gap or gate for the reception of the said central staff, which can be retained loosely in position so as to permit of being rotatably adjusted or securely fixed in the desired position by means of a clamping device also



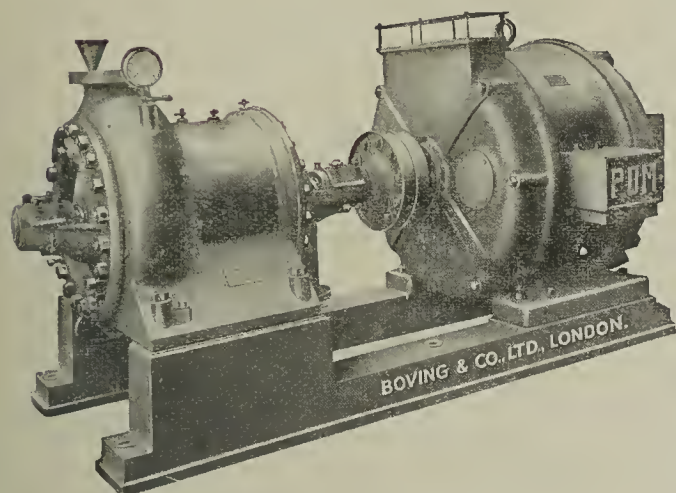
its entire periphery. Another part of the fluid flows by way of passages 27, 58a, and 63 into the chamber formed between the walls 56 and 59, from which chamber it is fed to the left hand side of the impeller. This chamber extends entirely around the shaft, so that this side of the impeller also receives fluid around its entire periphery. The fluid discharged from this impeller, after passing through the discharge vanes 72, flows through passages into the chamber 65, from which it is fed to the right hand side of the second stage impeller. Fluid also flows through passages 70, 40, and 45 to the chamber between walls 30 and 31, from which it is fed to the left hand side of the impeller, the impeller having complete peripheral admission on both sides, as in the case of the impeller of the first stage. The fluid discharged from the second stage impeller flows by way of passage 46 to the discharge chamber 32, from which it passes to discharge conduit 47. When so arranged as will be clear from an inspection of fig. 1, the chamber for the impeller will be formed between the two walls 18 and 31, and circumferential passage 27 of the admission end section of the casing will communicate directly with circumferential passage 40 of the discharge end section of the casing. For a two-stage machine (as shown in fig. 1) the two end sections and one intermediate section is required; for a three-stage machine, the two end sections and two intermediate sections are required; and for a machine of more stages it is simply a matter of adding more of the same set of patterns for each additional stage, which greatly reduces the cost of construction. The structure also has the advantage of being easily made to accommodate any number of stages. If the impeller is to be made wider, then the patterns can be built up by means of filling strips to add the necessary width to the casing parts, this being a comparatively simple and inexpensive matter. (Four claims.)



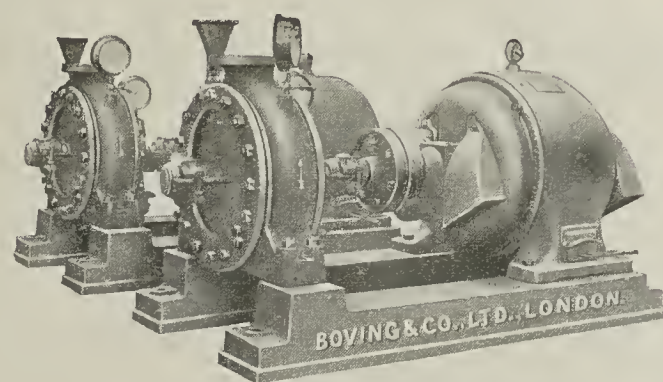
mounted on the head of the tripod. In the accompanying drawings, fig. 1 is an elevation of the surveying instrument with the improvements applied thereto; fig. 2 is a plan view of the plate or circular dial applied to the central staff; figs. 3 and 4 show to an enlarged scale to that of fig. 1 the field and eye-piece ends respectively of the telescope; and figs. 5 and 6, elevation and plan respectively of an example of a clamping device to fulfil the functions already referred to, and hereinafter more fully described. The method of using the instrument is as follows:—The tripod is placed directly over the point on the ground from which a survey is to be made. It is so placed that the centre piece is approximately level, not necessarily quite horizontal. The centre piece may be placed at any convenient height from the ground. The aid of a plumb bob is necessary in order to adjust the vertical position of the tripod. With the plumb bob is a round plug of wood or metal of the same diameter as that of the staff a. The plug has a small hole pierced through its centre the size of the cord, which is passed through the plug. The plug is inserted within the circular gap in the centre of the centre-piece of the tripod, with the plumb

BOVING TURBINE PUMPS.

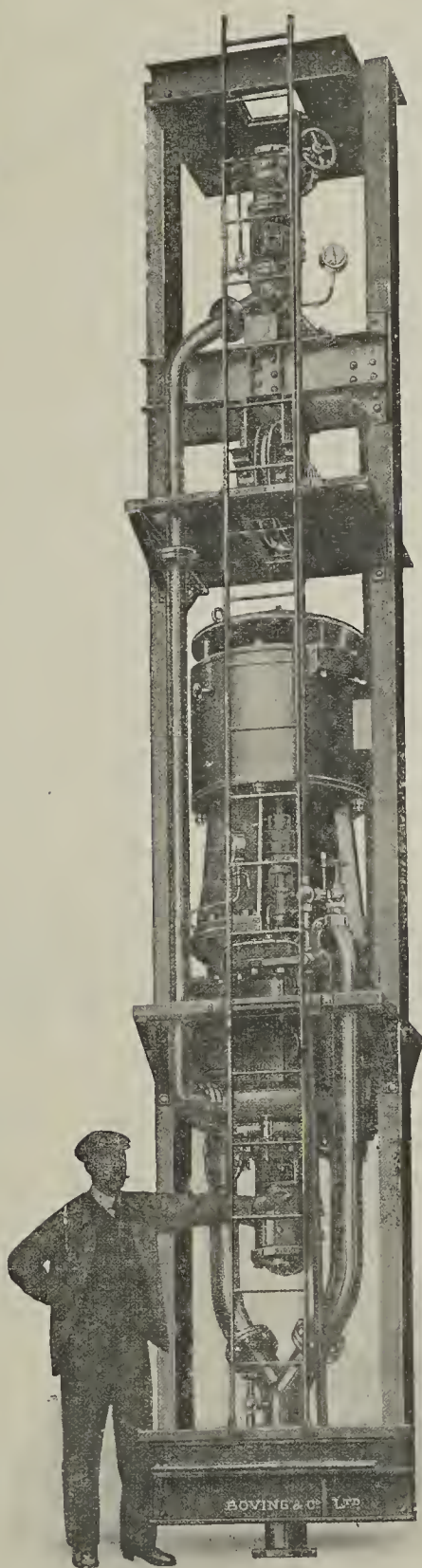
THE MOST RELIABLE AND EFFICIENT
BRITISH MADE PUMP.



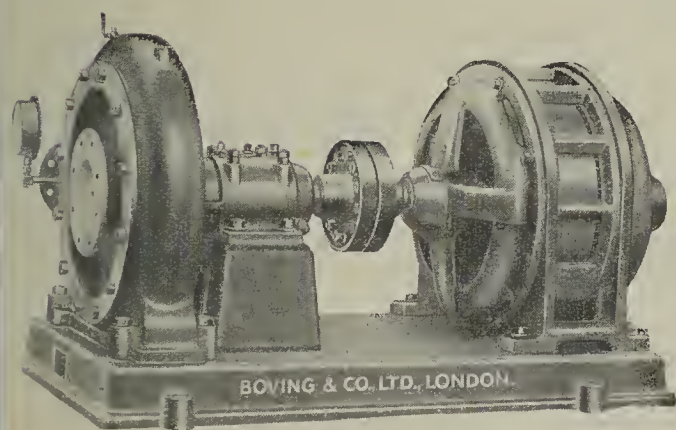
LARGE MINING PUMP
(6 Repeat Orders).
860 g.p.m.
755 feet.
1,450 r.p.m.



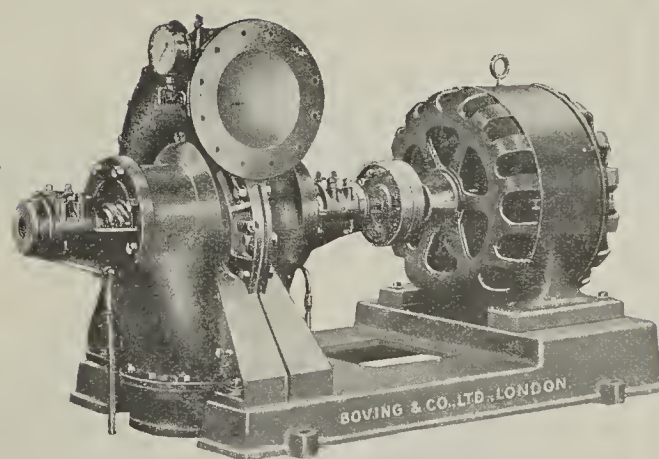
2 SMALL MINING PUMPS.
220 g.p.m.
328 feet.
2,900 r.p.m.



2 SINKING PUMPS
as shown (Repeat Order).
333 g.p.m.
475 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Medium Pressure.
800 g.p.m.
125 feet.
1,450 r.p.m.



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3,000 g.p.m.
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...ding from it. The position of the tripod is then adjusted, so that the point of the plumb bob is in the point of the ground. The plumb bob is then moved, and the gate *n* of the tripod is opened, so that the plumb line is in the dotted lines, fig. 6. The lower point of the tripod is then placed upon the point on the ground, the tripod is then directed into the tripod, the gate *n* of which is then closed and clamped loosely, as shown in the drawing. The staff is now perpendicular, and in consequence the engraved dial is level, without recourse to the aid of spirit levels or any of the relative adjustments which form essential parts of a theodolite. A rectangular compass is now laid upon the engraved dial in position with one of the parallel lines, and the whole staff is turned round upon its own axis until the compass indicates the meridian. The staff is then clamped tightly to the tripod by turning down the thumb piece *h*, as shown in dotted lines, fig. 5. The standard *c* is then made to turn upon its own axis in unison with the telescope *d*, and the necessary observations can be made, when the double pointed hand *k* will indicate upon the dial the angle of observation in relation to the meridian. As an adjunct to the instrument, a ranging rod is necessary having a short crossbar fixed to it. This bar is fixed to the rod at the same distance from its lower point as that of the point of the staff to the centre line of telescope. (Five claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

Akt.-Ges. Brown, Boveri et Cie. Apparatus for governing centrifugal compressors. (14977)
Atkinson, E., and Haythorn, J. Compression reduction valve mechanism of uniflow steam engines. (15114)
Balfour, A. Steel. (15224)
Balsillie, A. Travelling and lifting trolley. (15234)
Barnett, S. Internal combustion engines. (15175)
Beckwith, N. G. Pumps. (15075)
Beckwith, N. G. Rotary pumps. (15081)
Booth, J. T. Internal combustion engines. (15095)
Bradley, A. Continuous conveyor retort for distillation, carbonisation, roasting, etc., of coal, etc. (15134)
Brayshaw, E. R. and S. N. Furnaces. (14963)
Butterworth, T. S. Gas storage tanks or cylinders. (15007)
Campbell, D. St. C., (Carmichael, I. N.), and Couper, S. S. Motive power engines of the multi-cylinder reciprocating type. (14880)
Candlot, C. Conveyors. (15160)
Challis, P. Internal combustion engines. (14923)
Chopin, A. L. Percussion drills. (14996)
Cochrane, A. M. Self-driving motor. (15091)
Collis, A. Elevating truck, transporter, etc. (15065)
Cox, K. R. W. Blowing engines and compressors. (15011)
Davey, H. Fuel economy of multiple effect steam engine and steam turbine plants. (15195)
Fasey, W. R. Rotary engines. (14987)
Foster, W. J. Blast furnaces. (15008)
Harger, J., and Helps, G. Manufacturing fuel gases. (15237)

Honeywood, D. Machinery for crushing or grinding ore, rock, cement, etc. (15248)
James, D. Rotary pumps. (15223)
Kane, W. H. Internal combustion engines. (14959)
Kesseling, F. Continuous current dynamos. (14981)
Lamplough, F. Coal distilling apparatus. (14997)
Letrillart, E. V. Rotary motor. (14994)
McClements, T. Internal combustion engines. (14959)
MacGregor, P. Steel. (15224)
Marelli and Company, E. High-speed rotary compressors. (15083)
New Rotoplunge Pump Company. Pumps. (15075)
New Rotoplunge Pump Company. Rotary pumps. (15081)
Oil Extractors Limited. Coal distilling apparatus. (14997)
Pears, H. W. K. Solid compound for burning and heating, etc. (14871)
Rainsbury, B. T. Fire lighters. (15202)
Rhodes, C. T. Internal combustion engines. (15019)
Smith, C. Lakin. Pumps. (15075)
Smith, C. Lakin. Rotary pumps. (15081)
Smith, D. J. Suction gas-plants. (15089)
Spence, J. Internal combustion engines. (14882)
Sütterlin, G. Hollow grates for boiler furnaces. (15080)
Sutton, G. W. Internal combustion engines. (15017)
Tacchi, P. G. Internal combustion engines. (15074)
Watson, G. Furnace grates. (14970)
Wild, M. B. Winches. (15136)
Willey, S. J. Furnace tubes. (15244)
Yates, H. J. Furnaces. (14963)

Complete Specifications Accepted.

(To be published on November 8.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
8567. Heyes, W. A., Heyes, L. O., and Heyes, A. V. Signalling apparatus for mine signalling and like purposes. (110172)
9633. Gibbs, W. E. Apparatus for breathing in bad or toxic air. (100888)
11018. Lironi, V. G. Internal combustion engines. (110173)
11136. Rasmussen, C. O. Production of gas from peat, lignite, or wood. (101152)
14349. Blanchard, C., and Wood, H. N. Coal and like cutting machines. (110185)
14427. Wilson, E. C., and Wilson, W. W. Under-reamers. (110189)
14811. Binche, G., Dupuis, C., and Prignol, H. Two-stroke cycle explosion motors. (103470)
14956. Green, F. W., and Tennant, G. E. Fuel economisers or exhaust steam heaters and the like for steam boilers. (110210)
15166. Morris Limited, H., Lennox, J. G., and Bailes, T. F. Operating gear for the points or switches of runways. (110213)
15450. Thomas, W. Process and apparatus for distilling coal, wood, peat, or lignite. (110217)
16795. Bingham, H. C. Means applicable for the removal of dust from furnace gases. (110235)
16989. Kynoch Arklow Limited and Pirmez, L. H. Explosives. (110237)
18095. British Thomson-Houston Company (General Electric Company). Electric motor control systems. (110246)

18336. Griscom-Russell Company. Combined evaporator and boiler feed water heating apparatus for power plant. (103644)

1917.

1545. Leary, J. I. Apparatus for generating and burning hydrocarbon vapours. (107755)
1764. Mossay, P. A. H. Dynamo electric machines. (110269)
2669. Babcock and Wilcox, and Meiklereid, D. G. Air and the like cleaning devices. (110275)
4660. Noel, S. A. H. Reversible steam turbine. (110297)
4854. Siemens-Schuckertwerke. Winding, hoisting, or like machinery. (105341)
6309. Igranic Electric Company (Cutler-Hammer Manufacturing Company). Electric motor control systems. (110311)
7663. Minorikawa, N. Grate bottoms of furnaces for steam boilers and the like. (110317)
7801. Truscott, E. F. High-speed engine. (110319)
9267. Crabb, V. Dynamo electric generators. (110329)
10635. Soc. Anon. des Ateliers de Construction Mécaniques Escher, Wyss et Cie. Steam turbine plants. (109251)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
14252. Hansen, E. A. Water level indicators for steam boilers. (110358)
14369. Tanner, H. L. Electric motors. (110359)
14541. Tissier, L. E. Process and apparatus for calcining and roasting certain ores. (110360)
14620. Reiser Ges., H. Producing means for softening water. (110363)

PUBLICATIONS RECEIVED.

"The Journal of State Medicine" (Vol. 25, No. 10), October 1917, price 2s. net; "Central Association of Miners' Permanent Relief Societies—1917 Conference" (Barnsley: Berry and Steele, printers, Regent-street South); "New Zealand Mines Statement for the year 1916," by the Hon. W. D. S. MacDonald (dated 1917), (Wellington: By Authority; Marcus F. Marks, Government printer); "Institution of Engineers and Shipbuilders (Incorporated)—Report of the Council for Session 1916-17"; "The Monmouthshire and South Wales Coal Owners' Association—A Directory of Colliery Companies in the South Wales Coal Field, showing Addresses, Telegraphic Addresses, Telephone Numbers, etc." (dated October 1917), Finlay A. Gibson, secretary, price 2s. 6d.; "The Mining Institute of Scotland—List of Members, 1916-17 (on the Roll at August 1917)"; "Transactions of the Mining Institute of Scotland—General meeting at Glasgow, August 11, 1917" (Vol. 40, Part 1).

Petroleum Research.—Sir Boverton Redwood, Director of Petroleum Research, who has been adviser on petroleum to the various departments of the Government for many years, has been appointed Director of Technical Investigations in the recently created Petroleum Executive.

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THE COLLIERY GUARDIAN

AND

JOURNAL OF THE COAL AND IRON TRADES.

VOL. CXIV.

FRIDAY, NOVEMBER 2, 1917.

No. 2966.

Coal Mines Control Agreement.

The following is the text of the Compensation Bill introduced in the House of Commons on October 25, together with the Agreement to which the Bill is to give effect :—

Whereas provision is made by Regulation 9G of the Defence of the Realm Regulations for the control of coal mines to which that regulation is applied by order of the Board of Trade : And whereas by virtue of orders of the Board of Trade dated respectively the twentieth day of November nineteen hundred and sixteen and the twenty-second day of February nineteen hundred and seventeen, the said regulation has been applied to all coal mines in the United Kingdom : And whereas the Board of Trade have appointed a Controller of Coal Mines to control mines of which possession has been taken under the said regulation : And whereas questions have arisen as to the compensation to be paid to the owners of the several mines so controlled in respect of control and with respect to other matters arising out of such control : And whereas for the purpose of settling such questions an agreement dated the twentieth day of July nineteen hundred and seventeen, which agreement is set out in the Schedule to this Act, has been made, and it is expedient that the said agreement should be confirmed by Parliament and made binding on all persons whom the said agreement affects or purports to affect : Be it therefore enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :—

1.—(1) The above-recited agreement of the twentieth day of July nineteen hundred and seventeen, together with all rights and powers conferred and all duties and obligations imposed thereby on the Controller of Coal Mines, the Commissioners of Inland Revenue, the Board of Referees, or any other persons, are hereby confirmed, and the said agreement shall have effect as if enacted in this Act, and shall be binding on the owners (including trustees) of any undertaking consisting of or comprising any coal mine to which the said Regulation 9G is for the time being applied, and upon all persons whom the agreement affects or purports to affect.

(2) If any person without reasonable cause fails as and when so required to give a return or to furnish any information or to produce or give facilities for the inspection of any books, plans, or documents which, under the said agreement, he may be liable to give, furnish, or produce, or gives any information which is false in any material particular, or discloses or makes use of, for any purpose other than for such purpose as is authorised by the said agreement, any information acquired by him under the said agreement, he shall, on summary conviction, be liable to a fine not exceeding one hundred pounds, and in the case of a continuing offence to a further fine of fifty pounds for each day during which the default continues, and if the default is wilful shall also be liable to imprisonment with or without hard labour for a term not exceeding six months.

If any person pays any dividend or repays any loan in contravention of the provisions of the said agreement, he shall be liable on summary conviction to a fine not exceeding fifty pounds, and to forfeit to His Majesty the amount of any dividend so paid or loan so repaid.

Where any such offence as aforesaid is committed by a company every director and manager of the company who knowingly authorises or permits the default, shall be liable to the same penalties as the company.

(3) Nothing in this Act or in the agreement confirmed thereby shall, except as otherwise expressly provided by the agreement, affect the general powers of the Board of Trade or the Controller of Coal Mines under the said regulation.

(4) References in the said agreement to the Controller of Coal Mines shall be deemed to include any person for the time being appointed to hold that office.

2. If the Controller of Coal Mines determines the said agreement, the agreement shall have effect in respect of any part of an accounting period which may have elapsed at the time of the determination thereof, and if a new agreement in substitution therefor is made, such new agreement shall, as soon as may be, be laid before Parliament, and unless within thirty days from the time when such new agreement is laid before Parliament either House of Parliament presents an address to His Majesty against the confirmation thereof, the new agreement shall be confirmed and this Act shall have effect as if such new agreement was set forth in the Schedule to this Act in lieu of the original agreement.

3. This Act may be cited as the Coal Mines Control Agreement (Confirmation) Act, 1917.

SCHEDULE.

COAL MINES CONTROL AGREEMENT.

1. For the purposes of this Agreement—"The Act" means the provisions of the Finance (No. 2) Act, 1915, relating to Excess Profits Duty, as amended or explained by any subsequent enactment, and any reference to any particular provision of the Act means that provision as

so amended or explained; "Controller" means the person appointed by the Board of Trade to control coal mines of which possession has been taken under Regulation 9G of the Defence of the Realm Regulations; "Undertaking" means the whole of the undertaking of the owner of a coal mine which is for the time being under control of the Controller, except such parts of the undertaking as are controlled establishments within the meaning of the Munitions of War Acts, 1915 and 1916, or are under the control of the Controller of Shipping, and such other parts (if any) as the Controller may exclude from the operation of this Agreement; "Mine" means one or more pits or workings with a common system of ventilation or any part of a system of ventilation in common; "Profits standard" means the profits standard determined in accordance with the Act, and the percentage standard shall in no case be taken to be the standard for the purposes of this Agreement; "Output" means the tonnage of saleable coal raised and weighed at the pit head; "Standard output" means the annual average output of coal during the standard period; but if the accounting period is less than a year the amount of the standard output shall be proportionately reduced; "Standard period" means the years which have been chosen or may be chosen for the determination of the profits standard under the Act; "Accounting period" in relation to any undertaking means an accounting period under the Act.

2. Subject to the right of the Controller at any time to take over in whole or in part the management either of all undertakings generally or of the undertakings in any particular district or of individual undertakings, the several undertakings shall continue under their existing management, and nothing in this Agreement shall be construed as affecting the right of the Controller to discontinue the control of any undertaking, or any part thereof; except that he shall not discontinue the control of a mine which or any part of which has been closed by his direction.

3. The owner of an undertaking shall be entitled to retain the profits thereof, except that if in any accounting period the profits exceed the profits standard by more than the amount mentioned in section thirty-eight (1) of the Act, the owner shall be entitled to retain only so much of those profits as is equal to the amount of the profits standard plus the amount so mentioned, with the addition thereto of an amount equal to one-fourth part of such excess remaining after the deduction therefrom of a percentage equal to the rate of excess profits duty for the time being in force, and the balance of the profits, less the amount paid or payable for excess profits duty in respect of the accounting period in question, without deduction therefrom of any set-off in respect of any other period, shall be paid by the owner to the Commissioners of Inland Revenue as hereinafter provided, and the sums so payable by the owner are in this Agreement referred to as "coal mines excess payments":

Provided that—(a) if the owner of the undertaking proves that the special standard hereinafter mentioned has been ascertained, and that the payment of the coal mines excess payment or any part thereof would reduce or has reduced the profits retained by him below the special standard, the payment of the coal mines excess payment or such part thereof, where the proof is before the date when the coal mines excess payment becomes payable, shall be remitted, and, where the proof is after that date, if paid, shall be refunded; and (b) subject as aforesaid, in no case shall the total amount of profits retained under this clause exceed six-fifths of the profits standard plus the amount mentioned in section thirty-eight (1) of the Act; and (c) where an undertaking forms part only of a trade or business assessed or assessable to excess profits duty the foregoing provisions of this clause shall apply, subject to the following modifications :—(i) the profits standard for the undertaking shall be a standard determined in accordance with the Act based on so much of the profits or losses taken into account in determining the profits standard of the trade or business as may be properly attributable to the undertaking; (ii) the profits of the undertaking for the accounting period shall be so much of the profits or losses of the trade or business for the accounting period as may be properly attributable to the undertaking; (iii) for the reference to the amount payable for excess profits duty there shall be substituted a reference to the amount which would have been payable for excess profits duty if the undertaking had been separately assessable to that duty with the profits standard referred to in (i). (iv) The apportionments under sub-paragraph (c) of this proviso shall be made by the Commissioners of Inland Revenue, subject to the like appeal as in the case of questions arising under the Act.

4. Where as respects any accounting period the profits of any undertaking retained by the owner are less than the guaranteed standard as hereinafter defined, or if there is a loss or the loss is greater than the guaranteed standard, when that standard is a negative quantity, such sum as may be required to make up the guaranteed standard, shall, subject to the provisions of clause 13, be paid to the owner by the Controller.

5. For the purposes of sub-paragraph (a) of the proviso to clause 3, and of clause 4, profits retained, and for the purposes of clause 4, loss, shall be profits or loss after taking into account any refund of excess profits duty on account of the deficiencies in the accounting period attributable to the undertaking and any refund of coal mines excess payment.

6. If the stock of coal at the end of the period of control of any undertaking is in excess of that at its commencement, the profit or loss on such excess when sold, as compared with the valuation in the balance sheet at the end of the period of control, shall for the purpose of determining the amount to be paid to make up the guaranteed standard in respect of the last accounting period be brought to account as though the realisation had taken place in that period.

7. The expression "The Guaranteed Standard" means—(a) when the output of the undertaking in any accounting period is not less than the standard output, the profits standard; or (b) where the output of the undertaking in any accounting period is less than the standard output, but amounts to at least 65 per cent. thereof, the profits standard reduced by a percentage thereof equal to three-fourths of the percentage of the reduction of output; or (c) where the output of the undertaking in any accounting period is less than 65 per cent. of the standard output, the profits standard subject to such reduction as may be fixed under clause 10.

8. (1) If at any time, in the case of any undertaking, it appears to the Controller, either on his own motion or on the motion of the owner, that there is no profits standard or that the profits standard as ascertained under the Act cannot fairly be applied, the Controller shall fix, for the purpose of ascertaining the guaranteed standard, or the special standard, as a substitute for the profits standard, a sum equal to the average annual profits which might have been actually earned during the standard period—(a) had the undertaking been worked during the standard period under similar conditions in all respects excluding conditions due to the war to those under which the undertaking is worked in the accounting period; and (b) in the case of an undertaking which or part of which in the standard period was in course of development had the undertaking or such part thereof been as fully developed in that period as in the accounting period; and, if it appears that the undertaking would have been run at a loss, the sum so fixed may be a negative quantity.

(2) In any case of hardship where a fair substitute for the profits standard cannot be fixed in accordance with the provisions of the foregoing sub-clause, the owner may apply to the Controller to fix a substitute without regard to those provisions, and if the Controller grants the application he shall fix such substitute for the profits standard as he thinks fair in the circumstances, and the amount so fixed shall be subject to appeal as provided by clause 11 hereof, but if the Controller refuses the application his decision shall be final.

9. The expression "The Special Standard" means the sum fixed as a substitute for the profits standard under clauses 8 or 11 hereof, with the addition thereto of the amount mentioned in section thirty-eight (i) of the Act, and of an amount equal to one-fourth part of the excess of the profits of the undertaking over such substitute (plus such addition) remaining after deducting from such excess a percentage equal to the rate of excess profits duty for the time being in force.

10. If the output of the undertaking in any accounting period is less than 65 per cent. of the standard output, the guaranteed standard shall be the profits standard, subject to such reduction as the Controller may fix, and may be a sum varying according to the output: provided that—(a) so far as the decrease in output is due to action by the Controller not common to the whole of the coal industry under his control, the guaranteed standard shall be calculated at a rate per ton of output, regard being had only to the tonnage which would have been raised and the comparative cost of raising it had there been no such action by the Controller, and shall be greater than that which would be fixed if the rule for ascertaining the guaranteed standard in the case of an undertaking where the reduction of output was 35 per cent. or less applied, so however that the guaranteed standard shall in no such case exceed the amount which would have been the guaranteed standard if the reduction of output had been 35 per cent.; and (b) so far as the decrease in output is due to any other cause, the guaranteed standard shall be less than would have been fixed if the said rule applied, and shall be calculated at a rate per ton of output, regard being had only to the tonnage raised and what it would have cost to raise such tonnage in the standard period; (c) in either case, if a mine is closed, the guaranteed standard shall not include any sum in respect of the cost of maintaining the mine in a state of repair or of reopening it or any rent, royalties, wayleaves, management or other similar charges, in respect of the mine.

11. If the owner of any undertaking feels aggrieved at the refusal of the Controller to fix a substitute for the profits standard under sub-clause (1) of clause 8, or at the amount fixed by him under either sub-clause (1) or (2) of clause 8, or under clause 10, he may appeal to the Board of Referees appointed under the Act, who shall determine their procedure in hearing and disposing of any such appeal, and that Board may either con-

the decision of the Controller, or, where has been fixed by the Controller, may vary, way of increase or decrease, the amount however that in making such variation the be subject to the limitations imposed by ment on the Controller in fixing the amount, and the decision of the Board shall be final.

12. Where an undertaking is subject to control during part only of an accounting period the profits standard or the special standard, as the case may require, and the guaranteed standard and any other sums brought into account in calculating the sums retainable under clause 3 or payable under clause 4 shall, for the purposes of applying this agreement to such part of such accounting period, be proportionately reduced, and the profits for that period shall be apportioned between the parts of the period before and after the date of the commencement of the control in proportion to the number of months or fractions of months in those parts respectively.

13. Any profit retained by the owner under clause 3 of this agreement in any accounting period in excess of the guaranteed standard, except in so far as such profits may be made up by a refund of excess profits duty on account of deficiencies in that period, shall be set off against any amount to be paid to the owner under clause 4 of this Agreement to make up the guaranteed standard in respect of any subsequent accounting period, and any sum paid under clause 4 to the owner to make up the guaranteed standard in respect of any accounting period shall be made good out of any excess over the guaranteed standard which the owner is entitled under clause 3 to retain in respect of any subsequent accounting period.

14. If the owner of a mine intends to close or abandon the mine or any part thereof he shall give to the Controller not less than sixty days notice of his intention, and if before the expiration of the notice the Controller directs that the mine or such part thereof shall not be closed or abandoned, the mine shall continue to be carried on in accordance with the direction of the Controller, and thereupon the guaranteed standard applicable to the particular undertaking shall forthwith by agreement between the Controller and the owner, or failing such agreement, then by the Board of Referees appointed under the Act be revised and fixed at such an amount (positive or negative) as will under the operation of clause 4, indemnify the owner against any loss caused to him by continuing to carry on the mine or such part thereof which he would not have suffered if he had been permitted to close or abandon the mine or such part thereof.

If no such directions are given by the Controller, the mine or such part thereof as aforesaid, shall, unless otherwise agreed between the Controller and owner, be closed at the expiration of the notice, or abandoned at the earliest date at which the owner shall have power to abandon it under the conditions of his tenure, and in such case if the mine or part thereof closed or abandoned does not constitute the whole undertaking, then such revision shall be made in the amount of the guaranteed standard of the remainder of the undertaking as may be agreed between the Controller and the owner, or settled, in default of such agreement, by the said Board of Referees.

15. Except as otherwise provided in this Agreement, and so far as not repugnant thereto, profits shall be the amount of the profits as determined or determinable under the Act and excess of profits over the profits standard for the purposes of this Agreement shall be computed and coal mines excess payments shall be assessed and collected by the Commissioners of Inland Revenue in like manner as the excess of profits over the profits standard for the purposes of excess profits duty is computed and payments of that duty are assessed and collected, and the provisions of the Act (including those relating to appeals) shall apply accordingly.

Provided that no excess profits duty paid in respect of a period prior to the time when the control of the undertaking in question commenced shall be repayable by reason of any deficiency created by coal mines excess payments in respect of any period whilst the undertaking was subject to control, nor shall any coal mines excess payment be applied to make good deficiencies or losses for which excess profits duty would be repayable.

16. Nothing in this Agreement shall prevent coal mines excess payments or any repayments thereof being treated for purposes of income tax as payments and repayments of excess profits duty are treated under section thirty-five of the Act, nor shall this Agreement—(a) confer any right to have the profits retained under clause 3 together with any further sums received under clause 4 to make up the guaranteed standard treated for the purpose of income tax, super-tax, or excess profits duty otherwise than as the profits of carrying on the trade or business; or (b) be deemed to constitute any claim for an amendment of an assessment under section one hundred and thirty-three or section one hundred and thirty-four of the Income Tax Act, 1842, nor to affect any such claim which, but for this Agreement, the owner would have been entitled to make under either of those sections.

17. The owner of every undertaking shall keep and furnish to the Controller at such times and in such form as the Controller may determine such cost accounts, trading accounts and balance sheets and other accounts as the Controller may require, audited and verified in such manner as he may direct, and if part only of the undertaking is under the control of the Controller, entirely separate accounts of the portion of the undertaking under such control shall be kept, and the price charged on departmental transactions between the controlled portion of the undertaking and any other part shall be on a commercial basis, and the time to time be approved by the

or any person appointed by him shall require the owner of any undertaking, director, manager, or officer of the to furnish any information which may be required by the Controller for the purposes of the agreement, and may inspect and take copies of

any books, plans, and documents relating to the undertaking, and every such owner, director, manager, and officer shall furnish to the Controller or any person appointed by him all such information as aforesaid, and shall produce all such books, plans, and documents as may be in his possession or under his control, and shall afford to such person all reasonable facilities for inspecting the same.

19. No objection shall be taken to the Commissioners of Inland Revenue making available to the Controller any information acquired by them for the purposes of income tax or excess profits duty which may be desired by the Controller for the purposes of this Agreement.

20. Any information obtained under clauses 17, 18 or 19 shall be treated as strictly confidential, and shall be used only for the purposes of His Majesty's Government or any department thereof, and no person who obtains any such information shall disclose or make use of any such information for any other purpose.

21. For the purpose of providing for the expenses of maintaining (including any rent, royalties, wayleaves, management, or other similar charges in respect thereof), and of reinstating, when reopened, any mine in any district or group of districts hereinafter referred to which may be closed by direction of the Controller, so far as such expenses remain unprovided for after all refunds of Excess Profits Duty arising through such expenses of maintenance and reinstatement have been exhausted, the Controller shall from time to time, on the application of any association of colliery owners in any district or of any group of such associations in several districts, cause a levy to be made on the owners of all undertakings under his control in such district or districts at such rate per ton on the output as may be specified in such application, and every such owner shall pay the amount due by him under such levy.

The proceeds of such levy shall be paid into a fund under the control of the Controller who shall thereout pay to the association or associations on whose application the levy shall have been made, such sums as may be from time to time certified by such association or group of associations to be required for the purposes aforesaid.

The output on which any particular levy under this clause is to be payable shall be the output in the last completed calendar year before the levy is made, but at the end of the period of control the Controller shall make such adjustments as may be necessary to make the total amount paid by the several owners such as would have been payable had each levy been made on the average annual output during the period of control.

The owner of any mine which is closed whilst the mine is under control shall, if the mine is situated elsewhere than in a district in respect of which an application has been made under this clause, not be entitled to any compensation in respect of such expenses as aforesaid.

If the total net amount paid as coal mines excess payments under clause 3 during the whole period of control is certified by the Controller on the termination of control to exceed the total amount paid by him under clause 4, together with his administrative expenses, the surplus shall be applied by him in reimbursing the fund created under this clause to the extent of forty per cent. of the amounts paid thereout under the provisions of this clause.

The balance, if any, standing to the credit of any association or group of associations in the fund, including the sums paid by way of reimbursement as aforesaid, after defraying all such expenses as aforesaid, shall be the property of and paid over to the association or group of associations.

The Controller shall invest any sums which may from time to time be standing to the credit of any association or group of associations in the fund as are not immediately required for such purposes as aforesaid in such Government securities as the Controller may think fit, and may vary such investments from time to time.

If at the end of the period of control the purposes for which the said fund is created have not been fully satisfied the administration of the fund and the powers of the Controller under this clause shall be transferred to such person as the Board of Trade may appoint for the purpose. The amount payable in respect of a levy under this clause shall not be treated for the purposes of this Agreement as part of the expenses of carrying on an undertaking.

22. No dividends shall be paid and no loans repaid in respect of any undertaking without the consent of the Controller.

23. If any dispute arises under this Agreement between the Controller and the owner with respect to which the decision of the Controller is not expressly made final, and no other method for the settlement thereof is provided under this Agreement, the dispute shall be referred to the arbitration of a single arbitrator appointed in England by the Lord Chief Justice of England, or in Scotland by the Lord President of the Court of Session of Scotland, or in Ireland by the Lord Chief Justice of Ireland.

24. The terms of this Agreement shall be taken to be in full satisfaction of all claims for compensation arising in the period of the operation of this Agreement in respect of the Orders of the Board of Trade dated the 29th day of November 1916, and the 22nd of February 1917, or anything done thereunder.

25. This Agreement shall be deemed to have come into operation,—(a) in the case of mines controlled under the order of the Board of Trade dated the 29th November 1916, as from the 1st day of December 1916; and (b) in the case of mines controlled under the order of the Board of Trade dated the 22nd February 1917, as from the 1st day of March 1917; and may be determined by the Controller on or at any time after the first day of October nineteen hundred and seventeen.

Resolved as follows on the twenty-first day of June, nineteen hundred and seventeen, by the Executive Council of the Mining Association of Great Britain:—“That this meeting records its view that the terms of the Agreement with the Controller of Coal Mines should be further modified, but leaves to the Consultative

Committee full power to make a definite settlement on the best possible obtainable terms.”

Subsequently, between the said twenty-first day of June and the twentieth day of July, nineteen hundred and seventeen, a definite settlement in the terms of the foregoing agreement was arrived at between the Controller of Coal Mines and the said Consultative Committee.

(Signed) GUY CALTHROP,
Controller of Coal Mines

(Signed) ADAM NIMMO,
President of the Mining Association
of Great Britain

(Signed) REGINALD GUTHRIE,
Secretary of the Consultative
Committee.

The twentieth day of July 1917.

COAL CONCRETED FROM DUST OR ASHES.

In a paper read before the Institute of Clayworkers on October 31, Mr. R. Goulburn Lovell dealt with his method of concreting fuel from dust or ashes, with special reference to the clayworking industry. Fireclay workers are frequently well situated, their grey clay being interstratified with seams of coal. These “clunches,” or underclays, are believed to be the soil that produced the vegetation from which the coal was formed; in some cases the coal seam is only a few inches or a few feet thick, and it is generally thrown away as the clay is “got,” because of its friability. This coal merely falls through the grate bars of the kilns and furnaces; its calorific value, however, is generally sufficiently high to justify the time required to concrete it into decent fuel.

All clayworkers have cinders, which mostly consist of unconsumed carbon, and either alone, or with a proportion of coal slack, it would pay them to turn these into a decent fuel.

Another grave difficulty which many clayworkers have to face is that of clinkering; in some cases it is so serious that the fires have to be drawn and restarted so that the mass of clinkers may be removed. The danger and risk to the contents of the kiln is well known. This difficulty is obviated by using a concreted fuel, and if this fuel be used in conjunction with coal the clinkering nuisance is greatly diminished.

In many cases the calorific value of cinders, or bar ashes, will be 7,000-8,000 B.T.U. If an amalgam fuel be made of half bar ashes and half coal dust, the resultant fuel will produce about 10,000 B.T.U.

From the personal standpoint, all clayworkers will find it to their advantage to utilise their unemployed plant in the production of artificial coal, the making of artificial coal being far easier than the making of bricks. The operations are simply grinding, mixing and drying. If required for their own consumption, clayworkers will probably find the following method the most expeditious. The aggregates (slack, smudge, cinders, etc.) require to be used from a fine dust to $\frac{1}{4}$ in. If necessary to grind, this may be done in the process of mixing with the matrices or binders. The whole should be semi-plastic; any old pug-mill will do the work. From this it can be ladled out into a truck and tipped on to a drying floor, or anywhere under cover where it will dry hard. The time required depends upon many conditions, but principally upon the amount of sun or artificial heat. On an ordinary drying floor, in a day or two, the fuel can be broken up and stacked ready for use. Once it is hard it weathers perfectly well.

If the fuel has to be transported, and is required for domestic or industrial use, the finishing and drying process has to be somewhat amplified. Either a stiff-plastic process or a plastic process can be employed. In the first, the fuel takes the form of bricks; in the second, it can either be wire-cut into various shaped blocks, or passed through a die in a plastic band, breaking with irregular ends as it falls.

These large blocks or small nuggets of fuel are dried, either by simple exposure, with protection from the weather, by drying floors, or by drying chambers or tunnels. In the tunnel process the drying requires only about as many minutes as the bricks require hours. In some districts these artificial coal blocks, the same size as ordinary house bricks, are sold at £3 per 1,000, the heating value is equivalent to three tons of ordinary coal, and already the supply is not equal to the demand.

Detachable Power Installations.—The success obtained in applying detachable power units to canal barges for the transport of coal and other cargoes, at the instance of Messrs. Coggins and Arthur, coal factors and colliery agents, New-street, Birmingham, has led to the formation of a new company entitled Watercraft Detachable Power Units, with registered offices at Central House, New-street, Birmingham.

Worm Gearing.—At a meeting of the Manchester Association of Engineers on Saturday evening, Mr. Francis J. Bostock, of Huddersfield, read a paper on worm gearing. Until recent years, he said, the theory of worm gear, let alone its manufacture, was very little understood, the gears previously in use being generally for the purpose of transmitting “motion” from one member to another. It usually consisted of a worm of large diameter and low lead angle meshing with a cast wheel, the teeth of which had not been machined. The natural result was that low efficiencies were obtained; hence their use was discontinued by engineers. All that had now changed; its construction of late years had become a science, and its manufacture a precision accomplishment. Worm reducing gear units were now, with great advantage, coupled direct to electric motors, and represented a simple, sound, and economical proposition. For shop drives, machine tools, boiler feed pump, blower, and other work they had proved themselves to be invaluable. On account of their ability to withstand considerable overload for short periods, they lend themselves admirably for intermittent work, because, for the work they were called upon to do, they could be made relatively small. They were therefore of great use in crane work, and for starting purposes of electric motors, steam, gas, and oil engines.

EMPLOYMENT OF DIVERS IN SHAFT SINKING.*

H. GRAHN.

Of late years the employment of divers in shaft sinking has proved very useful for a number of purposes, in the Bochum district, including the fitting and removal of pump strainers, the examination and freeing of sinking shoes, overhauling shaft pumps, replacing cables disturbed by the influx of water, etc.

At one pit in the Witten district, when the shaft had been carried down to about 25 yds., a feeder discharging some 250 gals. of water per minute was tapped at about 125 yds. by a 12 in. borehole in the shaft bottom, this hole being kept open by a wire rope which could be raised or lowered from bank or from the shaft bottom. The casing inserted in the borehole in its upper portion, which passed through loose rock, was closed by a fluted, taper wooden plug, a certain amount of the water being allowed to escape through the grooves in the plug and perforations near the top of the casing. When the lower portion of the shaft was being lined with concrete, a pile of rough stones was made round the projecting end of the casing; and, to facilitate the setting of the concrete and maintain a counter pressure in the interior of the shaft, the water was allowed to rise nearly to the level of the staging. Owing to some of the concrete having run down into the pile of stones, the wooden plug was found to have jammed, and could not be pulled out; and the water rose to within about 16 ft. of the bank, the shaft being completely flooded.

A diver was sent down for several days to recover the skips and other articles on the shaft bottom, and more particularly to break up the cemented stone pile round the casing, so as to free the plug and the mouth of the borehole. The plug being nearly 5 ft. long, and extending for over 3 ft. into the casing, it was decided to bore it out. To provide proper guidance for the boring bar, 65 ft. in length, a 2½ in. pipe was let down, the lower edge being provided with sharp teeth so as to get a good grip into the top of the plug, the diver holding it in position until the boring tool was deep enough into the plug. Through the 1½ in. hole thus formed, the water was allowed to run for several days, at the end of which time, however, another stoppage of the borehole occurred and necessitated the aid of the diver in boring through the plug again. The borehole was then flushed out thoroughly, and a rod, composed of railway rails, lashed together, was lowered into it and suspended from an iron girder on the shaft bottom, so that, as sinking progressed, the girder and rod descended automatically by their own weight and pre-

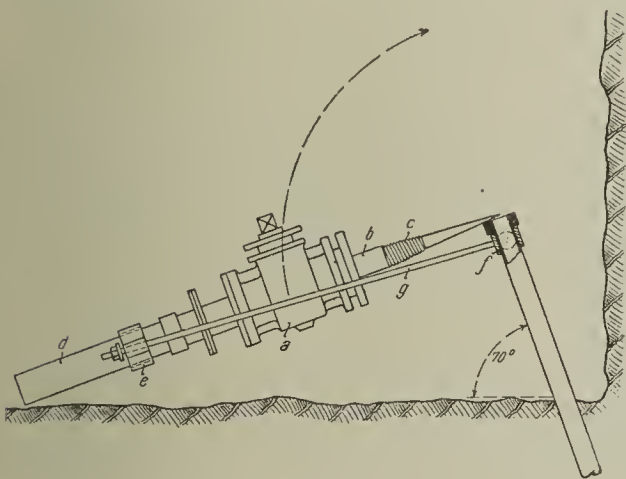


FIG. 1.—TAP AND PLUG READY FOR SWINGING.

vented the hole from choking up again. This done, sinking was continued without any further water troubles.

During the difficult operation of unwatering the State colliery at Waltrop, divers were frequently employed. At first an attempt was made to cope with the extensive inrush of water—amounting to nearly 4,000 gals. per minute—by means of Tomson water barrels. In carrying out this plan, much trouble was experienced with the flat winding ropes used, these being severely strained by the great weight of the ropes themselves and the full barrels, and jamming in the winding bobbins. Moreover, when little progress could be made in lowering the water level, the repeated splashing of the saline mine water every time a water barrel was lowered acted on the pitch-pine guides and softened the timber, which then easily broke. This entailed repairing the guides under water, the divers having to work at a depth of about 70 ft. Eventually, however, the work of unwatering with barrels had to be given up, owing to the above-mentioned rope troubles, and carried out by means of mammoth pumps, arranged in series.

Considerable practical importance attached to the work done by divers in sinking two shafts by the cementation process, one of them being driven through the fissured white marl of the Recklinghausen district. When this shaft had got down to a little over 500 yds., and was only some 150 yds. from the coal measures, one of the advanced boreholes struck a powerful feeder. As there was no stuffing box on the standpipe of the borehole casing, and as the rods, forced up by the rush of water, jammed against the staging near the shaft bottom, it was impossible to cap the pipe, and the shaft soon became flooded to a depth of about 45 yds. The diver sent down to investigate reported that the force of water issuing from the pipe was too great to allow the latter to be capped; and it was therefore decided to rearrange the unwatering appliances in order to obtain a much greater output than before. Within a few weeks the water level was lowered to about 30 ft. above the shaft bottom, this head being left to oppose the stream from the borehole and facilitate the work of the diver.

To plug the standpipe, the arrangement shown in figs. 1 and 2 was designed, consisting of a tap *a* into which was screwed a tube *b*, tapering at its lower end

and provided with threads *c*, intended to cut a thread in the standpipe. The conical portion was continued to a point by means of three pieces of T-section (section A—B, fig. 2). A pipe *d* was secured to the upper end of the tap, to serve as a guide for the winged strap *e*, in which it could move freely until the strap made contact with a fixed collar on the pipe.

The strap *e* was connected to the top of the standpipe by means of 1 in. screw bolts *g* pivoting on a strap mounted on the standpipe, the bolts being long enough (fig. 2) to allow the tap to be swung. The parts were assembled at bank and taken down by the diver, who, after placing the device in the position shown in fig. 1, tightened up the strap *f* on the standpipe and swung the tap through an angle of 90 degs., thus bringing the

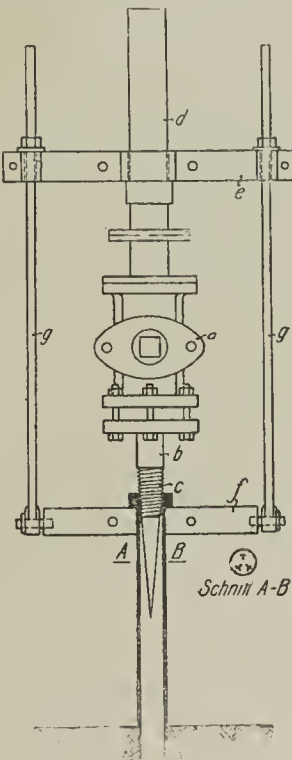


FIG. 2.—TAP SCREWED INTO STANDPIPE AND SECURED.

point of the apparatus into the mouth of the standpipe and centring the pipe *b*. On then rotating the whole tap, the taper thread cut its way into the standpipe. To prevent the tap being forced out bodily—the water issuing at the rate of nearly 700 gals. per minute, and under a pressure of about 30 atmospheres—the nuts on the rods *g* were tightened up so as to brace the two straps *e* and *f* together, and the tap was then shut (fig. 2). In this way the sinking and cementing of the shaft could be resumed, after a stoppage of 13 months, although the rock was extensively fissured with small feeders and several large fissures which had to be stopped with many tons of cement.

A similar case arose in sinking a shaft at the Asse potash mine, through bunter sandstone, by the cementation process. On striking a big feeder, the tap of the standpipe was turned off, but water escaped through a split in the pipe and flooded the shaft. When the pumps had lowered the water to within about 50 ft. of the shaft bottom, a diver was sent down to remove the tap and plug the pipe. The first attempt at plugging, with a couple of steel tubes and rubber washers, failed because the water forced the device out of the pipe, in spite of the free passage left by the tubes. Better results, however, were obtained by the use of a wedge-shaped plug of soft wood, which the diver inserted into the standpipe by the aid of a steel pin 10 in. long, stuck in the point of the wedge, the latter then being driven home by a weight attached to the rope, operated from the surface. This plug proved staunch, and the shaft was pumped dry. By forcing cement down the other standpipes, the other holes, including the one substituted for the first named, were plugged as soon as the feeder was reached in boring; and the sinking progressed to completion without further trouble.

In sinking a shaft, on the left bank of the Rhine, through tertiary rock, with an iron sinking shaft and Priestman grab, the rope broke at about 30 yds., leaving the grab on the bottom. As the grab excavated mainly at the centre, so as to allow the sides to cave and furnish loose soil, the diver sent down had some trouble in locating the grab, and clearing away round it so as to allow a strong cable to be attached. The work was rendered particularly arduous on account of low visibility,

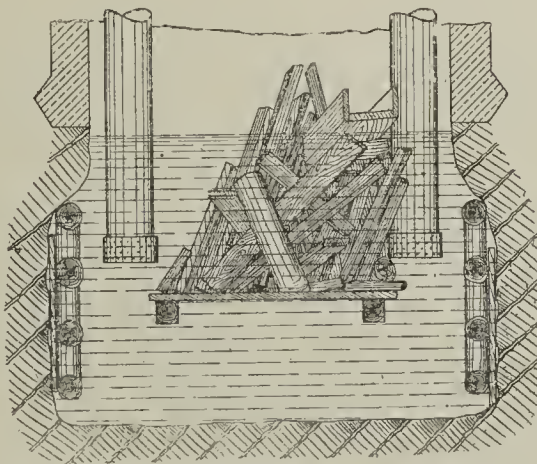


FIG. 3.—PIT BOTTOM BEFORE CLEARING BY DIVER.

the water being laden with fine tertiary sand and loam, and quite opaque at the shaft bottom. Almost similar work had recently to be performed in an iron sinking shaft in a mine in Upper Silesia, the sunken grab having first to be dredged clear in between 80 and 90 ft. of water. A heavy cable was attached to the grab, and was lifted by means of a steam winch and pulley tackle alternately, the strain pulling a 2½ in. wrought iron hook (about 3 ft. long) out straight. Eventually, the grab was recovered by exerting a gradual pull on the rope.

In sinking the Adolf shaft of the Eschweiler Company, it was found impossible to force the sinking shoe down below about 20 ft. above the coal measures, even after boring out the shaft completely; and on this account, a concrete plug was prepared on the shaft bottom and then bored through. In the course of this work several leaks were made, and a diver had to be sent down to locate them, and plug them with concrete. The expectation that the insertion of a couple of connecting rings would enable the sinking to be carried down to the coal measures without further trouble was not

realised, a further leak in the concrete plug necessitated the flooding of the shaft to prevent the caving of the rock. The diver widened the breach to a width of 7 ft. height 1 ft., and depth 20 in., packed sandbags in front of the opening, and quickly kneaded in the cement poured in with buckets. In a few days the cement had set hard enough to allow the shaft to be unwatered, and sinking continued to completion.

In putting down a new shaft at the Dutch State Colliery, Emma, the upcast pipe of the shaft pump broke, a length of over 200 yards of pipe falling down the shaft, and burying itself and the sinking pumps in the shaft bottom. A diver was sent down for several days in succession to ascertain the best places for progressively lowering the new sinking pumps, and eventually the shaft was cleared. Another instance of the utility of divers' work was afforded in a pit at Herne, Westphalia, where a shaft was being unwatered by means of water barrels, which operation was retarded by a bar connecting the on-setting device at the pit eye. This bar had to be partly unbolted and partly cut through by the diver, who also repaired and renewed the guides, and set up wire netting, 10 ft. in height, on both sides of the pit eye to prevent the water from floating anything down from the roads into the shaft.

In putting in a new winding rope at the De Wendel pit, the old rope, which was attached to the new one, broke and dragged the latter down the shaft, and at the same time completely destroying the tail rope. The whole of them fell into sump and stopped the pump at work there and the diver was engaged for nearly three weeks in clearing up the damage. Again, while the No. 11 shaft at the Ewald-Fortsetzung pit was in

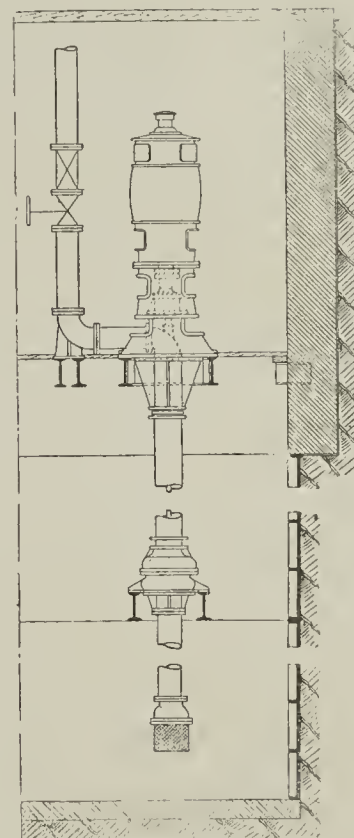


FIG. 4.—SUBMERGED ELECTRIC PUMP, WITH SHAFT MOUNTED IN STANDPIPE.

course of sinking, a sudden rush of water flooded the pump meter, and it was decided to instal a centrifugal pump to work in 30 ft. of water so that no suction would be required even if the water level were lowered, the motor being mounted just below bank in order to guard against flooding in the future. With this object a diver was sent down to put up a pair of 10½ in. iron girders across the 18 ft. shaft and bolt them to the flanges of the tubbing (fig. 4). Two iron plates to carry the pump were secured to the girders, the suction pipe of the pump being led up between them. The vertical shaft of the pump was led up about 65 ft., inside the upcast pipe and guided by wooden bearings mounted between the pipe flanges. The upcast pipe was bent horizontally just below the motor, and was provided at the bend with a stuffing-box for the passage of the pump

shaft. The pump was constructed to raise 660 gals. per minute against a head of 190 ft.

In the foregoing operations, wherever compressed air was available, the supply of air to the diver was taken direct from the air mains, thus dispensing with the troublesome work of pumping air. In several cases, mine officials who had studied diving operations during their mining-school course, rendered effective assistance to the diver; and it is therefore recommended that, in the case of pits where water troubles are frequent, some of the officials, overmen in particular, should occasionally practise working in diver's dress (on the same lines as the members of rescue corps exercise with breathing appliances) at some mining school where such instruction is given.

First-Aid.—The Home Secretary's Order relative to first-aid arrangements in blast furnaces, copper mills, iron mills, foundries, and metal works, has been published as a penny leaflet, which may be obtained from Messrs. Wyman and Sons Limited, 29, Breams Buildings, Fetter-lane, London, E.C. The leaflet is No. 1067 of the Statutory Rules and Orders (1917). The requirements are first-aid boxes or cupboards, each containing a copy of the first-aid leaflet, dressings, etc. The arrangements regarding ambulances are also detailed.

Requisitions for Household Coal.—The Controller of Coal Mines calls attention to the fact that after November 1 no coal or coke for household or domestic purposes can be supplied or delivered unless an appropriate requisition for the consumer's allowance has been dealt with under the provisions of the Household Coal Distribution Order, 1917. An exception to the rule requiring requisitions to be made before coal can be delivered will be allowed in favour of public authorities in respect of schools, hospitals, infirmaries, workhouses, homes, and asylums, so long as the necessary requisition is received not later than November 19 next. These public institutions may continue to receive their normal or regular supplies during the month of November. In order to avoid any interruption of supply, when a consumer requires a special assessment on Form No. M. D. 11, supplies of coal or coke may be delivered to such consumer for 14 days from the date upon which the requisition is submitted for approval. A special assessment must, in this case, be made by the consumer or merchant to make the supply. In the case of premises, where more than 10 per cent. of the coal or coke required is used for domestic purposes (heating or cooking), a requisition must be made for the whole supply, stating separately the quantity required for each purpose.

* Glückauf.

COAL MINING IN INDIA IN 1916.

The recently issued annual report of Mr. G. F. Chief Inspector of Mines in India, we quote the following particulars relative to mining work in 1916:—

Persons Employed.

During the year 1916 the average number of persons working in and about the mines regulated by the Indian Mines Act was 197,919, of whom 127,289 worked underground and 70,630 on the surface; 124,770 were adult males, 66,855 were adult females, and 6,294 were children under 12 years of age. This is a decrease of 17,831 workers, or 9.90 per cent. Those employed in coal mines numbered 143,459, which is a decrease of 2,078 as compared with those employed in 1915. The labour supply in the coal fields of Bengal and of Bihar and Orissa was normal during the first nine months of the year. The labour supply to the Assam coal mines was affected by the stoppage of Arkattie recruiting, but in view of the fact that 1916 was the first complete year for Sardarie recruiting, the result was fairly satisfactory.

Output of Coal.

There was again a small increase in the output, which was 16,419,082 tons. This is an increase of 66,002 tons, or 0.41 per cent. over the output of 1915.

As might have been expected during such disturbed times, there were increases and decreases. The chief

Provinces, 13.71 per cent., and North-West Frontier Province (output negligible), 25 per cent.; and the decreases were in Assam, 7.71 per cent.; in Baluchistan, 3.31 per cent.; in Burma (output negligible), 100 per cent.; and in the Panjab, 18.07 per cent.

The output per person employed during the year was (a) below ground 178 tons, and (b) above and below ground 114 tons. The figures for the five years preceding were (a) 177 and (b) 114. Taking each group of coal fields separately, these figures were as follow:—Bengal and Bihar, (a) 183 and 181, (b) 117 and 116; Assam, (a) 155 and 184, (b) 103 and 120; Baluchistan, (a) 61 and 73, (b) 38 and 47; the Central Provinces, (a) 122 and 122, (b) 81 and 85; and the Panjab and North-West Frontier Province, (a) 68 and 62, (b) 45 and 40.

Accidents.

During the year 1916, at mines regulated by the Indian Mines Act, 1901, there were 140 fatal accidents, being a decrease of 23 as compared with the number in 1915, and a decrease of 4 as compared with the average number of the last five years. There would have been a still further decrease if the accidents in wolfram mines had not increased considerably. These accidents involved the loss of 206 lives, which is the largest number since 1913. As in that year, certain accidents occasioned loss of life on a large scale; 24 lives were lost by a sudden subsidence

of which may extend to 50 years, it is worth consideration whether economy, as well as safety, will not be the result of bricking the sides of such shafts, either entirely or for considerable lengths, and saving several thousands of hours taken up in weekly examinations.

The death rate per 1,000 employed was 1.04, while that of the preceding five years was 1.10. At coal mines only, these figures were 1.18 and 1.24, and at mines other than coal, 0.68 and 0.70. The death rate per million tons raised at coal mines only was 10.29, while that of the preceding five years was 10.87. Of the 206 persons killed, 168 were males, and 38 were females; 14 persons lost their lives by explosion of firedamp, 46 by falls of roof, 35 by falls of side, 29 in shafts, 4 by explosives, 3 by irruption of water, 12 by haulage, 7 by other accidents underground, and 56 on the surface.

Health and Sanitation.

There were eight cases of cholera and three deaths at Ballarpur Colliery. At the Pench Valley collieries and Kutchi Dhana manganese mines there were 69 cases and 36 deaths. Two deaths occurred from plague at these collieries.

The rainfall in the Jharia coal field was 57.79 in., in the Giridih coal field it was 77.50 in., and in the Raniganj coal field it was 54.11 in. These figures for 1915 were 38.83 in., 38.68 in., and 39.43 in. respectively.

Mining Education.

Lectures in the coal fields were again given at five centres during the session 1915-16. The average number of attendances was 24.06, which was a distinct advance on that in the previous session.

For some years lectures were given by various colliery managers at the different centres, but for the session 1915-16, Mr. H. C. Read, who had previously been officiating as Professor of Mining at Sibpur College, was appointed lecturer for all the centres.

Mining Boards in Bengal and Bihar.

The Bengal Mining Board held two meetings during the year, when the following subjects were considered:—

(1) Amendment of rules issued under section 11 of Bengal Mining Settlements Act (Act II. of 1912). (2) Rules regarding allocation of the expenses of the Mines Board of Health between mine owners and royalty receivers. (3) A proposal to make rules to ensure adequate acquaintance on the part of mine officials with the number of persons working in a mine at any given time. (4) New draft forms for submitting annual returns under the Indian Mines Act.

The Bihar and Orissa Mining Board held three meetings during the year, when the following subjects were considered:—

(1) Alteration of Rule 19, Notification No. 864-28-20, dated March 10, 1904, made under section 20 of the Indian Mines Act. (2) Conversion of three inspection circles into two. (3) Draft rules under Bengal Mining Settlements Act (Act II. of 1912). (4) A proposal to make rules to ensure adequate acquaintance on the part of mine officials with the number of persons working in a mine at any given time. (5) Enquiries into the housing of casual labour on the coal fields of Bihar and Orissa. (6) Legal advice available for the Chief Inspector of Mines in India. (7) Temporary additional provisions to Rules 32 and 33 of the rules regarding coal mine managers and their certificates. (8) Necessity or otherwise of more comprehensive rules under the Indian Mines Act for goafing in coal mines to minimise risk of subsidence. (9) Steps to be taken to ensure more economical working of coal mines in respect of the methods of extraction adopted, and the manufacture of coke. (10) A proposal to make rules under the Indian Mines Act to regulate labour in mines.

Mining and Geological Institute of India.

The total membership at the end of the year, including subscribers, was 262. The Government prize for the best paper during the year was awarded to Mr. F. L. G. Simpson for his paper on "A description of the Methods of Working Out the Pillars at the Mohpani Mines by Means of Packing, and a Comparison of the Dry and Wet Systems of Packing." The institute medals were awarded as follow:—The gold medal to Mr. F. L. G. Simpson, for his above-mentioned paper; the silver medal to Mr. Glen George, for his paper, "Development of Deep Coal Areas in Bengal"; and the bronze medal to Mr. E. H. Robertson, for his paper on "The Cementation Process of Shaft Making."

Association of Colliery Managers in India.

The hon. secretary reports that the membership of the association increased during 1916 from 168 to 184. The association has given its special attention to the questions of the better control of labour, housing of the workers, and similar matters.

Official Duties in 1916.

During the year, the Government of India was pleased to direct that the three circles into which the whole of British India has, since 1906, been divided for the purposes of mines inspection, should be re-arranged as two circles, with an inspector of mines in charge of each, assisted by junior inspectors.

The Government of India was also pleased to direct that the junior inspectors should be appointed in all provinces, so that each could be sent on tour to any part of British India. This has added considerably to the efficiency of the department.

The Government of India was also pleased to appoint the Chief Inspector of Mines as an electric inspector, and to direct that he shall exercise the powers and perform the functions of an electric inspector under the said Act in all mines, as defined in the Indian Mines Act, 1901, situated within the Presidency of Bengal and the Province of Bihar and Orissa.

Mr. A. H. Thwaite, Northwood, Bowden Close, Durham, has undertaken the secretarial work of the Coke Oven Managers' Association (northern branch), in succession to Mr. Phillipson, who resigned.

NUMBER OF MINES REGULATED BY THE INDIAN MINES ACT, 1901, NUMBER OF WORKERS AND OUTPUT OF MINERALS, DURING THE YEAR 1916.

Province, district and mineral field.	Number of mines under the scope of the Act.	Worked by mechanical power.	Total output.	Average number of persons employed daily in and about the mines.		
				Below ground.	Above ground.	Total.
Assam—			Tons.			
Lakhipur	7	4	233,830	1,805	86	2,611
Naga Hills	1	—	3,135	52	131	183
Total	8	4	236,965	1,857	937	2,794
Baluchistan—						
Kalat	5	—	2,763	55	41	96
Loralai	1	—	87	12	8	20
Quetta-Pishin	9	—	6,318	86	41	127
Sibi-Khost	7	2	32,995	141	327	868
Total	22	2	42,163	691	417	1,111
Bengal—						
Bankura, Raniganj	2	—	6,965	63	41	104
Birbhum	1	—	2,055	17	12	29
Burdwan	166	140	4,983,356	27,775	15,132	42,907
Total	169	140	4,992,376	27,855	15,185	43,040
Bihar and Orissa—						
Hazaribagh—						
Bokaro-Ramgarh	7	1	192,365	1,579	479	2,058
Giridih	9	4	866,055	7,007	2,969	9,976
Jharia	5	3	32,988	239	158	397
Manbhum—						
Jharia	249	156	8,917,330	44,862	23,713	71,575
Raniganj	67	9	541,404	3,434	2,255	5,689
Palamau, Daltonganj	1	1	76,298	445	367	812
Sambalpur Hingir-Rampur	1	1	59,737	524	230	754
Sonthal Parganas—						
Jainty	1	1	74,518	301	274	575
Raniganj	4	—	1,527	34	30	64
Total	344	176	10,762,222	58,425	33,475	91,900
Central Provinces—						
Chanda, Ballarpur	3	2	84,889	556	334	890
Chhindwara, Pench Valley	7	7	154,548	1,033	394	1,477
Narsinghpur, Mohpani	1	1	48,395	721	467	1,188
Yeotmal	1	—	—	1	2	3
Total	12	10	287,832	2,361	1,197	3,558
North-West Frontier Province—						
Hazara	1	—	75	7	—	7
Panjab—						
Jhelum	6	—	44,944	636	337	943
Mianwali	1	—	817	8	7	15
Shalpur	2	—	1,688	43	48	91
Total	9	—	47,449	687	362	1,049
Grand total (coal) for 1916	563	332	16,419,082	91,886	51,573	143,459
Grand total of preceding year	583	334	16,352,480	95,513	50,024	145,537
Difference	-18	-2	+66,602	-3,627	+1,549	-2,078

decreases were in Jharia, where the decrease was not far short of 200,000 tons, in Assam, and in the Panjab. In the Raniganj field, there was an increase of slightly over 50,000 tons, and there were also increases in the Sonthal Parganas and in the Central Provinces. The chief increase, however, comes from the comparatively new coal field of Bokaro-Ramgarh, which practically balanced the decrease in Jharia. If this new field had not come on during the year as it did, there would have been a setback in the total output.

The coal trade passed through many vicissitudes during 1916, and many circumstances which could operate against the well-being of a trade had to be contended with. Until March, there was considerable wagon shortage, and the early hot weather brought in cholera. In the latter part of the year, an outbreak of malaria affected the output severely. It had the effect of increasing the demand for the Central Provinces product, the market for which was poor for the first eight months in the year. The late rains, however, which extended to this province, and exceptionally heavy crops, acted adversely on the labour supply, and curtailed raisings.

The opening stocks were 1,872,321 tons, and the closing stocks were 695,863 tons. The despatches amounted to 15,103,241 tons, and the colliery consumption to 1,625,255 tons (9.89 per cent. of the output). The total of coal delivered to coking was 1,937,992 tons, of which 193,792 tons of hard coke and 1,744,200 tons of soft coke were made. Analyses of the coal given in the full report. Of the output, 15,545,598 tons, or 95.95 per cent., were of the best quality, and Bihar and Orissa, the percentage of the best quality being 95.76. In the Central Provinces, the increases were in the Central

of the surface, owing to the collapse of underground workings, 14 by an explosion of firedamp, nine by the bursting of a dam in a river, six by the collapse of a winding rope attachment, and four by a fall of roof. One of these occurred at a wolfram mine, and the remainder at coal mines. The great majority of accidents, as in other parts of the world, continue to be caused by falls of roof and sides. In the year under report, they numbered 70, being a decrease of 15 as compared with the previous year. Next to falls of roofs and sides, the most numerous accidents occur in shafts, by haulage, and on the surface. During the year under report there was a small increase in accidents in shafts from various causes. Haulage accidents showed a gratifying diminution, being only 12 in number. This is the smallest number for many years. Surface accidents showed a small decrease, but the figure is still high.

The increased use of electrical power at mines is bringing in its train its specific accidents. There were four such fatal accidents, resulting in five deaths, in the year under report. The sinking of deep shafts is introducing a new danger from falls of material from the sides of the shaft. It has not been the custom in India to brick or line shafts, and at shallow depths this does not appear to have been much needed. As far, however, as a limited experience of shafts over 800 ft. has proved, the increased pressure due to depth is exerting its effect, and the liability to falls of stone from the sides of such shafts is greater. There is another aspect to this question. Under the rules, the sides of all shafts must be examined weekly. Even with shafts 400 to 600 ft. in depth, when they are unlined, this is a lengthy process, if it is done properly. In the case of shafts double this depth, the life

THE STEAM COLLIER "ELWICK."

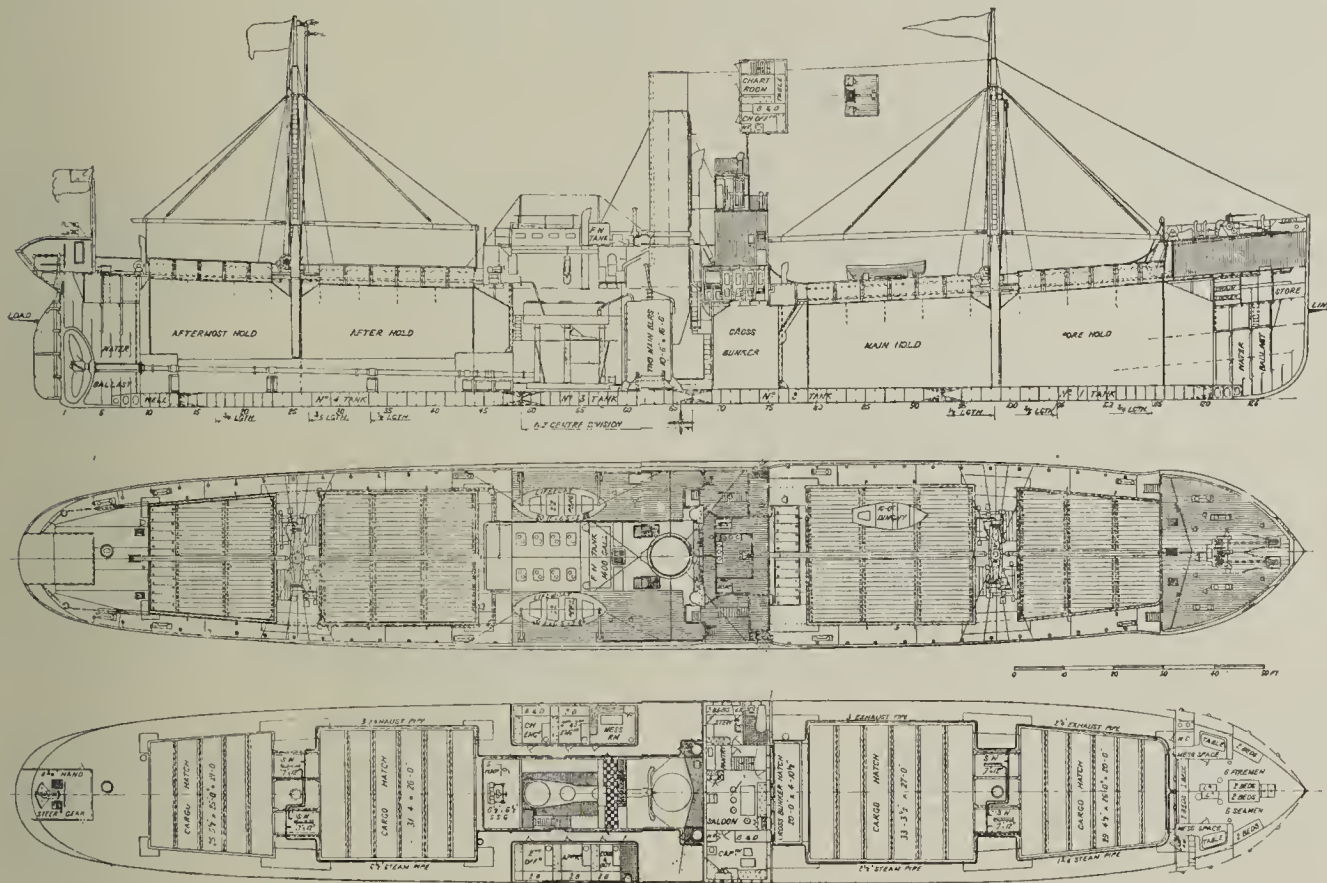
The single-screw collier "Elwick," built for the Sharp Steamship Company Ltd., Newcastle-on-Tyne, by the Blyth Shipbuilding and Dry Docks Company Ltd., Blyth, has the following principal dimensions:—Length overall, 265 ft.; extreme breadth, 38 ft. 3 in.; breadth moulded, 38 ft. 1 in.; depth, 19 ft. 6 in.; load draught, 17 ft. 11 in.; load deadweight, 2,520 tons; load displacement, 3,787 tons; gross tonnage, 1,717; net tonnage, 892; I.H.P., about 1,600.

The general arrangement of the "Elwick" is shown in the illustration. The machinery is placed amidships. There are four cargo holds, two forward and two aft, holding respectively (with their hatchways) 564 tons, 670 tons, 691 tons, and 406 tons, whilst the cross bunker has a capacity for 189 tons of coal. The hatchways are large, to obviate trimming and provide additional space, the dimensions being as follow:—The foremost and aftermost measuring 25 ft. 5½ in. by 25 ft. to 21 ft., and the two main holds 31 ft. 4 in. by 26 ft.

Provision for water ballast is made in the cellular double bottom, and by tanks in the peaks, the total capacity being 562 tons, of which 386 tons are contained in the double bottom and 176 tons in the peak tanks.

The deck erections include a raised quarter deck 131 ft. 9½ in. long, extending from the forward boiler-room bulkhead to the stern. These secure a more equal capacity of the forward and after holds.

The frames consist of single bulb angles unsupported by side stringers, the shell plating being suitably increased to compensate for the omission. This arrangement facilitates the stowage and trimming of the coal, there being no ledges for accumulating coal, or screening empty space beneath them and thus losing useful capacity. There are no hold pillars other than the two masts, the decks being supported by brackets. On the masts and bulkheads are large brackets, 4 ft. 6 in.



GENERAL ARRANGEMENT OF THE STEAM COLLIER "ELWICK."

deep, and in the hatchways the strength is maintained by transverse webs, about 5 ft. apart, with no fore and afters, the hatch covers (single planks) being laid on at right angles to the webs. With this arrangement loading and discharging can usually be effected without removing the webs.

The cargo-working arrangements are as follow:—Each mast carries two derricks, one for working at each cargo hatch, and these derricks are worked over each side of the ship from derrick tables and crossbeams, the tables being placed about 11 ft. above the deck. For working the derricks two 7 in. by 12 in. horizontal steam cargo winches, placed alternately on each side of the centre-line, are provided at each mast.

The propelling machinery consists of a set of MacColl and Pollock direct-acting triple-expansion reciprocating engines driving a single screw. The engines have cylinders 22, 36 and 60 in. in diameter by 39 in. stroke, and are capable of developing about 1,600 I.H.P. Steam is supplied by two single-ended cylindrical boilers by the same firm as the engines each 16 ft. 6 in. in diameter by 10 ft. 6 in. long, and designed for a working pressure of 180 lb. per sq. in. under natural draught. The boilers have a total heating surface of 5,460 sq. ft., and a grate surface of 148.5 sq. ft.

The engine-room auxiliaries include a pair of double-acting Nichols feed pumps, 7½ in. by 5 in. by 15 in.; a Davie and Horne feed heater and feed filter; and a Dawson and Downie duplex vertical ballast pump, 8 in. by 10 in. by 10 in., capacity of 150 tons per hour. The vessel is provided with electric lighting throughout.

National Association of Colliery Under-Managers.—A special meeting of the Lancashire and Cheshire branch was held on Saturday at Bull's Head Hotel, Wigan. The meeting, which was largely attended, discussed measures to be taken by the committee for securing improved salaries for under-managers. It was unanimously decided to emphasise strongly the need for every colliery under-manager becoming a member of the association, and the meeting inclined to the view that in the near future it may be necessary for associated members to refuse to work at collieries where non-associated members are included in the staff.

GEOLOGICAL STRUCTURE OF THE FOREST OF DEAN.*

By T. FRANKLIN SIBLY, D.Sc., F.G.S.

In 1894, Dr. R. Kidston correlated the coal measures of the Forest of Dean with the true upper coal measures.† In 1910, Dr. T. T. Groom, reasoning from this correlation, pointed out that

unless the measures that have not been detected [the true lower and middle coal measures] are exceedingly thin, or are represented by the upper part of the millstone grit, there must be an unconformity at the base of the coal measures.‡

The late Dr. A. Vaughan had proved the lower carboniferous age of the lowest beds of the millstone grit near Mitcheldean.§ In 1912, Dr. E. A. Newell Arber, whose detailed study of the fossil plants in the local coal measures confirmed Dr. Kidston's correlation, wrote:—

Reviewing the present evidence, I am inclined to think that it will eventually prove that an unconformity exists a short distance below the Lower Trenchard coal, perhaps a little above the sandstone vein of iron ore. . . . True millstone grits, lower, middle, and transition coal measures appear to be absent in the Forest of Dean, so that the unconformity in question is of considerable importance.||

The present author's independent investigations led him, in 1912, to the conclusion that an unconformity at the base of the coal measures is an important structural feature in the Forest of Dean. In a short paper¶ on the carboniferous succession, he described the lower carboniferous sequence near Mitcheldean, proposed the name Drybrook sandstone for the millstone grit of the district, and demonstrated the reality of the intra-carboniferous unconformity by describing the persistent overstep of the coal measures across the

Thick bands of limestone appear in the Drybrook sandstone on the south-western margin of the coal field. Near Milkwall, limestones in the lower part of the formation have yielded *Seminula fiondes*, *Cyrtina carbonaria*, and other fossils of the main *Seminula* zone. *Cyrtina carbonaria* has also been observed in corresponding beds of limestone in the Parkhill adit (Fryer's Level). It follows that the lower portion of the Drybrook sandstone is equivalent to part of the carboniferous limestone exposed in the gorge of the Wye at Chepstow and the Avon Gorge at Bristol. Unquestionably, a series of sandstones and quartz conglomerates, the Drybrook sandstone, passes laterally into limestones as we proceed from the north-eastern margin of the Forest of Dean southwards to Chepstow and Bristol.

Concurrently with the development of limestones, the arenaceous beds, which compose the bulk of the Drybrook sandstone even on the south-western margin of the coal field, become finer in grain when followed south-westwards. For example, seams of quartz conglomerate are conspicuous in the Drybrook sandstone of the Mitcheldean district, but these have dwindled to insignificance in the neighbourhood of Bream. Bands of shale and fine-grained sandstone, containing shreds of coal, are found in the upper part of the Drybrook sandstone in the Parkhill adit.

Owing to overstep by the unconformable coal measures, the Drybrook sandstone is wholly concealed both on the south-west between Lydney Park and Staple Edge Wood, where the carboniferous limestone also is concealed, and on the north between Drybrook and the Lydbrook Valley. From the same cause, the apparent thickness of the Drybrook sandstone varies greatly, and in no regular manner, along its outcrop. The thickness is at least 650 ft. in the Soudley Valley between the Shakemantle Pit and Staple Edge Halt, where the upper beds are well exposed on the railway.

The coal measures of the Forest of Dean lie unconformably, and sometimes with great discordance of dip, upon an eroded floor formed by the Drybrook sandstone, the carboniferous limestone, and, on the south-eastern margin of the coal field, the old red sandstone.

This important unconformity is due to an intra-carboniferous episode of crust movement, folding, and denudation, which followed the deposition of the Drybrook sandstone, but preceded the formation of the existing coal measures of the Forest. The latter were deposited on the denuded edges of the older strata. An altogether later movement involved the coal measures, gave them their present basin-like arrangement, and served also to accentuate the folding previously imposed upon the older rocks.

The intra-carboniferous disturbance responsible for the unconformity necessarily involved the silurian and the old red sandstone, together with the lower carboniferous strata. It produced the main uplift of the May Hill anticline, lying immediately east of the Forest of Dean. North-and-south folding predominated, but was accompanied by some east-and-west folding. The result was a basin, markedly unsymmetrical in structure, on the site of the present coal field. Along what is now the eastern edge of the coal field, the lower carboniferous strata were involved in the western limb of the May Hill anticline, and acquired a steep dip westwards, the larger part of the very steep dip that they possess to-day. Westwards across the site of the present coal field, away from the May Hill axis, the intensity of folding diminished very rapidly, and on the western side of the basin the inward dip of the strata was very slight.

Consequently, the beds of the coal measures are nearly, but not exactly, accordant with the underlying strata on the western side of the present coal basin, but markedly discordant with them on the eastern side. But, slight though the discordance may be on the western side, the behaviour of the outcrops supplies convincing evidence of unconformity all around the coal field. The base of the coal measures pays no regard to the strike of the lower carboniferous beds, but everywhere passes to and fro, slowly or rapidly, across their outcrops.

Two interesting and significant features are: (1) the development of conglomerates at the base of the coal measures, and (2) the concealment of the Trenchard coal and the measures beneath it, by the overlap of the overlying measures, on the south-eastern border of the coal field. These may be described in connection with the unconformable overstep of the coal measures.

The lowest beds of the coal measures, those underlying the Trenchard coal (upper Trenchard coal in some parts of the coal field), were termed Trenchard measures by the late H. D. Hoskold.* The Trenchard measures, although variable in character, usually consist largely of yellow grits, in part fine-grained, compact, and well-bedded, in part coarse-grained, friable, and imperfectly stratified. The intercalated clays are sometimes mottled in purple and yellow. A characteristic feature of these grits, particularly in the coarse-grained and conglomerate varieties, is the abundance of an indurated white or yellow clay cementing the grains. On the northern and north-eastern borders of the coal field, these grits of the Trenchard measures often become very coarse-grained and pebbly at their base, and bands packed with quartz pebbles or quartzite pebbles constitute well-defined basal coal measure conglomerates.

On the northern edge of the coal field, between Drybrook and the Lydbrook Valley, the base of the coal measures transgresses the older strata rather sharply, the Drybrook sandstone and the upper beds of the carboniferous limestone are concealed, and the grits of the Trenchard measures rest directly upon the carboniferous limestone. A quarry 1,100 yds. east of the deane Church shows masses of coarse, pebbly Trenchard measures lying upon, and in places "piped" down into, the grits of the carboniferous limestone. The former extension of coal measures northwards and westwards

* A paper read before the Forest of Dean branch of the National Association of Colliery Managers, on October 25, 1917.

† *Proc. Roy. Phys. Soc. Edinb.*, vol. xii., 1894, p. 222.

‡ "Geology in the Field." "Jubilee" Volume of the Geologists' Association, 1910, p. 731.

§ *Quar. Jour. Geol. Soc.*, vol. lxi., 1905, p. 252.

|| *Phil. Trans. Roy. Soc.*, vol. ccii., B, 1912, pp. 270, 277.

¶ *Geol. Mag.*, N.S., dec. v., vol. ix., 1912, pp. 417-22.

* "Geological Notice Upon the Forest of Dean." *Proc. Cotteswold Nat. F.C.*, vol. x., 1892, pp. 123-77.

exposed edges of the underlying strata is an outlier of Trenchard measures. In the Howle Hill, represented as millstone G. Geological Survey map (sheets 43 S.W. and 44 S.W. Old Series), Trenchard measures rest directly upon the lower limestone shales. A smaller outlier on Courthill Hill, Welsh Bicknor (not shown on the Survey map), rests upon the lower limestone shales and the base of the main limestone.

The railway cutting immediately north of Drybrook Halt gives a fine section of Trenchard measures resting upon massive sandstones, which lie in the lower part of the Drybrook sandstone. The basal bed of the coal measures is here a remarkable pebble bed, with large, well-rounded pebbles of grey quartzite. This pebble bed has been traced some distance north of Drybrook, and has been recognised in the Howle Hill outlier.

On the eastern edge of the coal field, from Wigpool Common as far south as the Soudley Valley, the Trenchard measures rest upon Drybrook sandstone. In the Soudley Valley the railway cutting south of Staple Edge Halt exposes the unconformable contact of the two formations. Conglomerates forming the base of the Trenchard measures, and containing fragments of a fine-grained white sandstone, which can be matched in the Drybrook sandstone of the same cutting, rest upon the Drybrook sandstone with discordance of dip. The average dip of the Drybrook sandstone in the cutting is 50 degs. west-north-west. The conglomerates dip slightly north of west at about 25 degs.

South of the Soudley Valley, overstep carries the base of the coal measures southwards, and then eastwards, across fully 650 ft. of Drybrook sandstone and the whole of the carboniferous limestone, in the distance of barely two miles to the southern side of the Blackpool Valley. The lower carboniferous strata maintain a steep north-westerly dip, rising to 65 degs. in places, as their strike swings gently from south-south-west to south-west. The coal measures maintain a moderate dip a little north of west. The Drybrook sandstone and the upper beds of the carboniferous limestone are transgressed gradually in Staple Edge Wood. The bulk of the carboniferous limestone is transgressed very sharply in the Blackpool Valley. On the south side of that valley, the base of the coal measures continues its rapid overstep eastwards, until, just north of Danby Lodge, it crosses the quartz conglomerates which lie some 400 ft. down in the old red sandstone.

In consequence of this sharp overstep, the carboniferous limestone and the upper series of the old red sandstone remain wholly concealed from Danby Lodge to the western side of the Cannop Valley, above Lydney. In the near Stonebury Wood, north of Lydney Park, the quartz conglomerates of the old red and the beds of the carboniferous limestone, dipping very steeply westward, reappear from underneath the cover of unconformable coal measures. The sharp swing of the coal measure base here carries it back rapidly from the old red sandstone on to the Drybrook sandstone in Old Park Wood.

The unconformable *overstep* of the coal measures is attended, on the south-eastern margin of the coal field, by conformable *overlap*. The Trenchard coal and the underlying Trenchard measures are overlapped by the Pennant sandstone above them. As a result, the Pennant comes to rest directly and unconformably upon the older, steeply-inclined strata, and the Trenchard measures fail to crop over a considerable part of the distance between Staple Edge Wood and the Cannop Valley. This is abundantly clear at Danby Lodge, where the Pennant sandstone containing the Coleford High Delf coal transgresses the quartz conglomerates of the old red. It is confirmed by the section in an old quarry on the northern side of the Blackpool Valley, which shows the unconformable junction of Pennant sandstone and carboniferous limestone. The sandstones in this quarry dip gently westwards. They show lentils of clay and a streak of very coarse grit or quartz conglomerate at their base, and repose upon the worn hummocky edges of dolomite beds which dip north-westwards at about 60 degs.

To sum up, an unconformity at the base of the coal measures is a dominant feature in the geological structure of the Forest of Dean. It is evidenced (1) by the overstep of the coal measures across the Drybrook sandstone, the carboniferous limestone, and the old red sandstone (2) by a great difference between the prevailing dip of the older strata and that of the coal measures along the eastern margin of the coal field; and (3) by visible discordance of dip at exposed junctions of the coal measures with Drybrook sandstone and carboniferous limestone respectively.

It is attended by (1) the development of basal conglomerates in the coal measures, particularly well seen on the northern border of the coal field; and (2) local overlap of the Trenchard measures by the Pennant sandstone, whereby the former are concealed along part of the south-eastern edge of the coal field.

The Explosives Combine.—Publication of the details of the scheme for combining the various explosives companies in England and Scotland, which was expected to be disclosed this week, has been postponed for two months owing to the great amount of detail involved. As is known, the chief partners in the combine are Nobel's Explosives Company, Curtis's and Harvey, Kynochs, National Explosives, and Eley Brothers.

American Tin-plate Exports.—Exports of tin-plates, valued at 1,000,000 lbs. of tin, from the United States for the year ended March 31, 1917, total of 521,861,390 lbs., valued at £1,000,000. The increase in 1917 over 1916, and 105,899,762 lbs., valued at £2,117,997. While the increase in 1917 over 1916, the increase in value was £1,117,997. American tin-plate is exported to 75 countries in all parts of the world.

THEORETICAL AND ACTUAL AIR DELIVERY OF COMPRESSORS.*

By R. S. LEWIS.

Air compressors are rated by their manufacturers on the basis of piston displacement, or volume swept through by the piston, expressed in cubic feet of free air (air as it may be under the local atmospheric conditions of pressure and temperature) per minute. If compressors delivered this quantity of free air as compressed air, such a rating would be correct; but various factors modify the intake capacity of a compressor, so that it may be much less than the piston displacement. The ratio of the free air taken into the compressor, stroke after stroke, to the piston displacement is called the volumetric efficiency of the machine, and may be expressed as an equation:—

$$(1) Ev = \frac{\text{cubic feet of free air taken into cylinder}}{\text{piston displacement in cubic feet.}}$$

The important factors which modify volumetric efficiency are clearance, volume of piston rod, heating of the air before compression, leakage of air past the piston and also leakage of intake and discharge valves, too small area of valves, and mis-timed operation of mechanically controlled valves.

The space between the piston when at the end of its stroke and the cylinder head is filled with compressed air which cannot be expelled. During the return stroke, this air must expand until it is at atmospheric pressure again before any free air can enter the cylinder. If this clearance space is large, the free air intake capacity of the cylinders is materially reduced. In well-designed single stage compressors, the clearance (expressed as a percentage of the displacement per stroke) may be as low as 1 per cent. for the large sizes and 2 per cent. or more in other cases. This means that for a low clearance value, the distance between piston and cylinder head at the end of the stroke may be only $\frac{1}{16}$ in. or even $\frac{1}{32}$ in. The effect of this clearance increases as the ratio of compression (final absolute pressure to initial absolute pressure) increases.

For large clearance ratios the piston must travel a considerable part of its stroke, while the air is re-expanding, before any free air can enter the cylinder. If it were possible to compress to 5,000 lb. per sq. in. in a single cylinder of ordinary design, no air at all would be taken in during the return stroke, the air in the clearance space expanding to entirely fill the cylinder.

Assuming here, for convenience, that this clearance air expands isothermally, which may be nearly as correct as to consider that it expands adiabatically, the effect of clearance may be calculated as follows:—

Let Ec = volumetric efficiency depending upon clearance.

C = clearance expressed as a decimal.

r = ratio of compression = $\frac{P}{Pa}$, P being final absolute pressure in lb. per sq. in., and Pa being the initial absolute pressure. (Absolute pressure is gauge pressure plus atmospheric pressure.)

$$(2) \text{ Then } Ec = 1 + C(1-r).$$

Thus, when compressing from an atmospheric pressure of 14.7 lb. to 100 lb. gauge with a clearance of 2 per cent., we have:—

$$r = \frac{100 + 14.7}{14.7} = 7.3,$$

and $Ec = 1 + 0.02(-6.8) = 0.864$, or 86.4 per cent.

In case the clearance of a compressor is not known, it may often be determined, as is done with steam cylinders, by measuring the volume of water required to fill the clearance space.

The effect of clearance upon volumetric efficiency is lessened by using two-stage compression. Since the air is not compressed to the final pressure in a single cylinder, the percentage of the volume of the low-pressure cylinder occupied by the expanded clearance air is reduced. The piston rod occupies space on one side of the piston, consequently the displacement per revolution, or double stroke, corrected for clearance, less the volume of the piston rod, will give the free air intake capacity of the compressor per revolution.

Under constant pressure, the volume of a given weight or quantity of air is proportional to its absolute temperature (460 degs. Fahr. + thermometer reading). At 60 degs. Fahr. a given volume of air will expand $\frac{1}{520}$ th of its volume at this temperature for each degree (Fahrenheit) of rise in temperature. If 1 cu. ft. of air at 60 degs. is heated to 100 degs. as it enters the compressor, its volume will be increased $\frac{40}{520}$ ths, or approximately 8 per cent. In other words, 1 cu. ft. of air at 100 degs. is equivalent to 92 per cent. of 1 cu. ft. of air at 60 degs. The power required for compressing 1 cu. ft. of air, once it is in the cylinder, is independent of the temperature of the air. This means that the colder the air is when taken into the cylinder, the less will be the number of cubic feet required to give a desired result. For this reason care should be taken to get the air into the cylinder at as low a temperature as possible.

The intake conduit for the compressor should be made of non-conducting material, such as wood, brick, or concrete, and should draw air from the coolest place available; never from the compressor room itself. The cross sectional area of the conduit should be equal to at least one-half the area of the piston, in order that the air may flow with perfect freedom. In hot and dusty localities it has been found beneficial to draw air from the interior of a framework covered with burlap or sacking, which is continuously drenched by spray of water. This arrangement not only cools the air, but removes the dust at the same time.

If a compressor has poorly designed intake passages, the air as it enters the cylinder may be at a tempera-

ture several degrees above that of the atmosphere. The metal of the cylinder becomes quite hot after a compressor has been running for an hour or more, and, after travelling through long and narrow intake passages, the air may be heated to 100 degs. Fahr. or above.

Let T_c = absolute temperature of the air after entering the cylinder, and T_a = atmospheric absolute temperature, then

$$(3) Ev = Ec \frac{T_a}{T_c}$$

This is the expression for volumetric efficiency, modified by clearance and heating of the intake air.

Leakage past valves and piston will further reduce the intake capacity of a compressor. If the area of the intake valves is too small, the cylinder will not be filled with air at full atmospheric pressure; and, if the area of the discharge valves is too small, all the air compressed will not be discharged. Poppet valves depend upon a difference in pressure on the two sides of from 3 to 5 oz. for their action, and may reduce volumetric efficiency by as much as 2 to 4 per cent. Mechanically operated valves of the Corliss type are very satisfactory, but they must be maintained in correct adjustment.

Though the effect of clearance and of heating the air before compressing can be calculated by the formulæ, it is well to bear in mind that the results so found may not always agree with the actual conditions of operation. The leakage of air past valves and piston, the choking of air passages, and bad valve action, are variables that cannot be determined by formulæ. Volumetric efficiency is most accurately determined by measuring the air delivered, and comparing it with the displacement of the compressor. Such a method includes all factors affecting the performance of the machine.

When the ratio of compression is large, the final temperature of the air in the cylinder may be very high. The relation of temperature to volume and pressure is given in the following equation:—

$$(4) T_2 = T_1 \left(\frac{V_1}{V_2} \right)^{n-1}$$

$$(5) T_2 = T_1 \left(\frac{P_2}{P_1} \right)^{\frac{n-1}{n}}$$

The subscripts 1 and 2 indicate initial and final conditions respectively. P and T are in terms of absolute pressure and temperature. Volumes V are in cubic feet. The value of n for perfect adiabatic compression is 1.406. For an initial temperature of 60 degs. Fahr., a final gauge pressure of 100 lb., and atmospheric pressure of 14.7 lb., the final temperature of the air would be:

$$T = (460 + 60) \left[\frac{14.7 + 100}{14.7} \right]^{0.29} = 520 (7.8)^{0.29} = 931^\circ \text{ abs.} = 471^\circ \text{ F.}$$

Should some of the hot compressed air leak back into the cylinder, or should the ratio of compression be increased by throttling of the intake air through sticking of the valves, the temperature may be even higher than the above theoretical value. That such high temperatures are reached in practice is shown by the explosions that occasionally take place in compressors and receivers.

An air cylinder, unlike a steam cylinder, requires only a small quantity of oil—a drop once in four or five minutes should ordinarily be sufficient. The use of too much oil causes an accumulation of carbon that may choke the valves and passages. Kerosene, often employed for cleaning valves, has a flash point of 150 degs. Fahr. or less, and ordinary lubricating oils have flash points varying from 330 to 425 degs. Fahr. In view of the high temperatures that may be reached in the cylinder, such oils are obviously a source of danger. Only a thin air cylinder oil, with a flash point of 600 to 630 degs. Fahr., should be used. For cleaning valves, a mixture of soft soap and water should be fed through the lubricating cups once or twice a week. As a safety measure, it is advisable to place a thermometer or fusible plug in the discharge pipe, and as near the compressor as possible.

For pressures up to 60 lb. per sq. in., single-stage compression is satisfactory, but for pressures from 60 to 150 lb., which are commonly used in mining work, two-stage compression is preferable. The ratio of compression in a cylinder of a two-stage compressor is equal to the square root of the ratio of compression in a single-stage compressor delivering air at the same final pressure; consequently losses in capacity due to clearance and leakage are materially lessened. The inter-cooler of a two-stage compressor will reduce the temperature of the heated air from the low-pressure cylinder nearly to that of the atmosphere before it enters the high-pressure cylinder; therefore the final temperature of the air is lower than for single-stage compression, and lubrication is facilitated. However, the sticking of valves, or the choking of passages, may cause such a high temperature to be reached in the high-pressure cylinder that an explosion will occur even in a compound compressor.

Distillation of Oils from Coal.—Mr. Justice Eve, in the Chancery Division of the High Court last week, heard a motion for the appointment of a receiver and manager to protect assets in the case of Morden and Small against Heyle and others, the action being one for specific performance of an agreement. Mr. Gore Browne, K.C., for plaintiffs, said Mr. Heyle had a process of distilling oils from coal which he had developed to a very considerable extent, and which was likely to be a most remunerative invention. A company was formed, nominal capital £1,000,000, and in the meantime Mr. Heyle obtained an advance of £30,000 for business purposes from the plaintiffs, and also entered into an agreement with the company, but (according to counsel) refused to go on with the agreement. Defendants now gave an undertaking regarding assets, and the case was adjourned pending the trial.

* Compressed Air Magazine.

MINERS' HOUSING IN SCOTLAND.

(Continued from page 791.)

Rentals.

The Commissioners give certain examples of the rents charged, first quoting figures furnished by the Ayrshire miners regarding bad and old houses in their county: Single apartments, 1s. 5d. per week, 1s. per week, 6s. 6d. per month, 7s. 11d. per month, 1s. 6d. per week, 1s. per week, 1s. 3d. per week; two apartments (one very small), 2s. 1d. per week; two apartments, 2s. per week, 9s. 6d. per month, 8s. 7d. per month, 1s. 3d. per week. The range of rents in this county was stated by the Coal Owners' Association as from 1s. to 2s. 1d. for one-apartment houses, from 1s. 5d. to 3s. 4d. for two-apartment houses, from 2s. 6d. to 5s. 9d. for three-apartment houses, and from 1s. 8d. to 6s. 1d. for more than three-apartment houses, the average rent per week being: Single-apartment, 1s. 4-5d.; two-apartment, 2s. 2-19d.; three-apartment, 3s. 0-9-4d.; more than three, 3s. 6-32d.

It has to be kept in view that in some mining centres the standard of habitability is so low (a house so called consisting of very little else than four walls and a roof—no scullery, no water-closet, no coal accommodation, no presses, water to be carried from a distance) that "rent" in its ordinary significance does not enter the minds of either colliery owner or the miner tenant. The houses, such as they are, are simply looked on as part of the colliery plant—and that the least expensive—for producing as large and as remunerative an output as possible. The great majority of witnesses stated that miners would generally be found willing to pay a higher rent if improved houses were provided.

Houses Owned by Colliery Companies.

One has to distinguish between cases in which the tradition of "free houses" still largely determines rent, and others in which the colliery company charge a rent for modern houses which gives a moderate return on the capital involved. To judge by certain comprehensive statements submitted by coal owners in the West of Scotland, the former is more the usual position. Elaborate figures were given regarding the return on 976 workmen's houses built in Lanarkshire by Messrs. William Baird and Company since 1874. These houses cost £128,593, and yield an annual gross rental of £7,167, or 5-57 per cent. of the capital. The total annual burdens amount to £3,640, or 2-83 per cent. of the capital. In the burdens are included 0-57 per cent. for scavenging, factor, etc.; 0-29 per cent. for land (this only represents a portion of the cost of the land, it being nearer 0-75 per cent.); 1-15 per cent. for rates and taxes; and 0-82 per cent. for repairs and materials. If depreciation were allowed for, the return would be reduced to 1-65 per cent.; nor does this figure take account of the proportion of rental expended in some years upon improvements.

There is no doubt that, in mining districts, especially in the West of Scotland, the movement from one and two rooms to three rooms as the standard family house, has been slower than among other sections of the population. But in this connection it must be kept in view that until recently few (practically no) three-room houses have been built in mining villages.

A frequent cause of overcrowding is the custom of sub-letting a portion of a house to another family, and the constant difficulty regarding the accommodation of lodgers. On the whole, the weight of evidence was in favour of placing on the local authority the duty of checking sub-letting; but it is clear that if this is to be done effectively, the co-operation of the colliery company or other house owner is essential, in addition to the provision of new and larger houses. With or without such co-operation, if the local authorities rigidly enforce their powers in this matter, colliery owners will be compelled to build more houses where required, and, at the same time, overcrowding will diminish and eventually disappear.

Proportion of Houses Owned by Employers.

It is of importance to give some idea of the number of miners who are housed in dwellings belonging to the companies who employ them. The figures supplied to the Commissioners were incomplete, except in the case of Lanarkshire, but they give certain typical examples. In the Upper Ward of Lanarkshire, out of 2,329 houses occupied by miners, 921 were owned or leased by the mine owners; in the Middle Ward, the number was 7,026 out of 17,364; and in the Lower Ward, 294 out of 1,564—giving a proportion over the landward areas of 38-7 per cent. It must, of course, be remembered that of the miners who live in burghs a larger proportion lease their own houses. In Stirlingshire and Dumbartonshire, out of 12,276 miners employed in 1908, 4,555 lived in houses belonging to mining firms in the landward areas. In Mid-Lothian and West Lothian the proportion was much higher, amounting to 7,247 out of 9,621. In Ayrshire it was roughly estimated that about 30,000 miners lived in rows belonging to the companies, while 10,000 resided elsewhere. In Fife it was estimated that at least 90 per cent. of the miners resided in houses owned by the coal masters. This, however, hardly squares with the figures supplied by the Fife Coal Company, which employed before the war about 12,700 workers, as they owned 2,952 houses, accommodating on an average about 1½ workers apiece; or with the figures given by the manager of the Wemyss Coal Company, who only house 34½ per cent. of the workers.

The estimate of the average number of workers per house in dwellings owned by the Wemyss Coal Company, the Fife Coal Company, and the landward parts of Stirlingshire and Dumbartonshire vary only slightly—being respectively 1-6, 1-75, and 1-65. This is an important point in its bearing on the question as to the proportion of their income which miners commonly spend in house rent.

Several witnesses dealt with the general attitude of miners to the system of the "tied house," by which the miner occupies the dual position of employee and tenant of the company. Certain witnesses emphasised

the advantages of the system, the chief being that the miner is supplied with a house near his work at a cheaper rent than he would have to pay elsewhere. On this account, one colliery manager stated that the men desired to come into his company's houses, adding that the payment of the rent in small fortnightly instalments was an additional attraction.

In addition to the evidence from the representatives of mine owners and miners on this subject, Dr. Dewar, of the Local Government Board, described at some length administrative difficulties which he had found to occur in the case of "tied houses" which had fallen into disrepair. He stated that, in certain villages, whether in Fife or Lanarkshire, "one is adjured in every second house, 'no to say that I was complaining,' or is told brusquely on entering that 'the house is all right,' when a further inspection shows that its defects are many and serious." The general opinion of the miners' unions is without doubt in favour of housing by a public authority rather than by the employer. On the whole, the provision of houses by the employers is regarded on both sides as the second best course.

Termination of Leases.

Apart from any possible hardship to the companies on account of termination of lease, an undoubted administrative difficulty is raised when, owing to the termination of the colliery lease, the houses have become the property of some party other than the company from whom the company rent them for the use of their workers. The company may accordingly be held responsible for the condition of the houses so long as they are so rented by them, although the houses do not actually belong to them. There appear to be two possible solutions of these difficulties. The best (and the one the Commissioners recommend) is that the colliery company should obtain the land required for building houses as a feu independent of the mineral lease. This is the policy now followed by Messrs. Wm. Baird and Company; and even in the event of the colliery having to be abandoned, the company would be in a stronger position regarding its houses, as they would not revert to the superior. The other alternative, which appears less desirable, but would still be an improvement on the present system, is that there should be a definite valuation of the houses at the termination of the lease. If this were carried out by a representative of the local authority, there would be a guarantee that the state of the houses and the degree of wear and tear which they had suffered would be taken into account in the price awarded. Dr. Dewar made the further suggestion that, in cases which are not complicated by the question of the transference of the houses, where the prospective exhaustion of a coal mine is advanced as a reason for avoiding necessary expenditure on houses, a short time limit should be fixed, at the end of which measures would be taken "to secure that the houses in question be either renovated or closed and demolished." The principle of the time limit is open to the objection that during its currency nothing will be done for the upkeep of the houses.

It was considered that the recommendations made (1) that mine owners should be entitled in future to obtain ground for their houses under feu-charter, and (2) that where they presently own houses built under leasehold tenure but do not desire to convert them into a feu, such houses should, at the termination of a lease—if the superior is re-letting the minerals to a new tenant—be taken over by the superior at a valuation, should go a long way to remove the evils which presently exist by reason of the dual ownership of the colliery site for houses.

The Commissioners recommend that until it is proved in the case of a new mine that it is carried on at a profit, and likely to be permanent, or, at all events, that it will have many years of life, the local authority should have power—where permanent houses are not otherwise available—to allow the mine owner to erect temporary housing, which would probably take the form of huts constructed of wood and iron.

Occupying Ownership.

In the West of Scotland the building of houses by miners for their own occupation has been, in the main, confined to two districts. In the Middle Ward of Lanarkshire, out of 574 houses owned by miners, 299, or more than half, are in the parish of Dalserf, which includes Larkhall. The other district comprises Leadhills, and the adjoining village of Wanlockhead, in Dumfriesshire, which together form a very interesting community. On the whole, the experience of the few mining districts where the principle of occupying ownership has taken root suggests that, in view of the good wages commonly earned by miners, it is capable of being adopted more widely.

Summary of Subjects.

There are many matters in respect of which improvement is urgently called for. Most of these, however, are not peculiar to mining communities, but obtain generally in housing conditions through Scotland, though perhaps not always in the same acute degree. These subjects are:—

- (1) The responsibility for providing houses in mining areas.
- (2) The maintenance of houses and the control of sub-letting.
- (3) The conditions on which defective houses will be allowed to continue to be occupied in cases where the "life" of the mine is, or is alleged to be, very limited.
- (4) Increased control over the planning of new villages, including approval of sites of houses, lay-out of streets, number of houses per acre, provision of garden and recreation ground, etc.
- (5) Provision of proper water and drainage schemes, and introduction of water into houses.
- (6) Provision of suitable and adequate sanitary conveniences and of baths, sculleries, coal stores, etc.
- (7) Increased powers to obviate difficulties associated with the adoption by landward local authorities of the Burghs Gas Supply (Scotland) Act, 1876.

Subsidence.

The hardship caused by damage to houses, especially through subsidence due to mineral workings, was prominently brought forward by various witnesses from Fife and Lanarkshire. The emphasis laid on it seemed indeed somewhat out of proportion to the areas actually affected, but where damage on a considerable scale has occurred, it is felt as, and in the Commission's opinion is, a very definite grievance that the house owner has to bear the whole loss.

Suggestions for a remedy fall under two heads: prevention, and compensation for damage caused. It was suggested by more than one witness that the damage is in some cases due to the unsuitable design or defective construction of houses, and that if attention was paid to the proper drainage of sites and provision of substantial foundations, it might be much reduced. The restriction of houses to a single storey, and the avoidance of long continuous rows, is possible and desirable in some districts, but so far as the practicability of building single-storey houses is concerned, hardly affords a solution for the congested urban areas of Mid-Lanark. At the same time, this is an additional reason why new developments in mining districts should be on "garden city" lines; and with modern improvements of transit, it may become possible to remove many of the houses from the actual mining area. Another form of prevention consists in the working of the coal in such a way as to avoid a sudden or irregular lowering of the surface. There is a possibility that the main seams of coal under dwelling houses or public buildings or works should be left unworked, in order to support the surface; but no witness seriously suggested this course. There was general agreement that the coal must be taken out, the only questions being how to do so with least chance of damage; and, in the event of damage, by whom it should be made good.

The third argument in the defence of the present system is that full information regarding the thickness and depths of seams and plans for working them is commonly placed at the disposal of feuars before the contract is completed. It appears to the Commission that the protection given to intending feuars in the form of information, in many cases verbal only, as to the prospective removal of underlying minerals is seriously inadequate.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—October 29.

Price of Coal at Pit Mouth.

MR. FRENCH asked whether the President of the Board of Trade had seen a communication to the effect that, according to the Coal Controller, the price of coal at the pit should not exceed pre-war prices more than 7s. or 8s. per ton, whereas the people in Wexford had to pay 30s. per ton more. Could anything be done to ease the prices to the poor?

SIR A. STANLEY replied that the price of coal at the pit's mouth should be 6s. 6d. per ton above the pre-war price (or 9s. per ton in the case of coal from collieries in South Wales and Monmouth and the Forest of Dean, from which a considerable portion of supplies of coal for the South of Ireland was drawn), but increases in freights were largely responsible for increased prices of seaboard coal. The Controller of Coal Mines hoped to be in a position very shortly to issue instructions to local authorities in Ireland to enable them to fix retail coal prices under the Retail Coal Prices Order, and it was understood that the question of freights on coastwise traffic was receiving the attention of the Shipping Controller. In the meantime, enquiry was being made into the position at Wexford.

Wagon Weighmen's Wages.

MR. T. WILSON asked the President of the Board of Trade whether wagon weighmen at collieries were entitled to the increase of wage recently awarded to workmen at collieries by the Coal Controller, and whether the award applied to all colliery employees.

SIR A. STANLEY said the war wage did not apply to the clerical staffs of collieries, in which category wagon weighmen were for this purpose included, and their remuneration remained a matter for the discretion of the colliery owner. The scope of the application of the war wage was defined in circular instructions.

October 31.

Mineral Resources Committee.

SIR W. EVANS, in answer to questions, stated that the Mineral Resources Development Branch of the Ministry of Munitions had not reported concerning oil production. The power to make the necessary borings and explorations depended upon the Bill now before the House.

MR. PRETYMAN, in answer to other questions, said that such preliminary steps as appeared possible were taken by the Government pending the passing of the Petroleum (Production) Bill. It was not a question of royalties.

November 1.

The Petroleum Bill.

MR. BONAR LAW, in answer to MR. KING, intimated that the intentions of the Government with regard to the Petroleum (Production) Bill had not yet been decided; but he hoped to be able to make a statement before the end of next week.

Peat Fuel.

MR. ROWLANDS asked when a supply of peat fuel would be obtained from the factory in France, and what were the conditions entered into between the Government and the company.

MR. MACPHERSON said the difficulties of supply of material, machinery, and labour rendered it doubtful whether the erection of the proposed peat fuel factory in France could be undertaken at the present time. The Government had entered into reserved the right to the Government to abandon the project at any time, but should the factory be erected, the Government had the obligation of the output at a fixed rate representing about 10 per cent. of the price at present paid for charcoal for peat fuel, and out of the price fixed a rebate to the Government was allowed towards the repayment of any advances which might be made by the Government towards the expense of erecting the factory.

CONTENTS.

ARTICLES:—	PAGE
"Fen Rights" in Mining Areas.....	843
Min Royalties	843
Mines Control Agreement	835
Coal Concreted from Dust or Ashes	836
Employment of Divers in Shaft Sinking	837
Coal Mining in India in 1916	838
The Steam Collier "Elwick"	839
Geological Structure of the Forest of Dean	839
Theoretical and Actual Air Delivery of Compressors	840
Miners' Housing in Scotland	841
South Wales Colliery Examiners and Firemen	844
South Wales Mining Timber Trade	847
South Wales Miners and Re-ruiting	847
Factory and Workshop Welfare	848
New Electrolyte for Miners' Electric Safety Lamps	848
Practical Wood Preservation	848
Electrolysis Underground in Mines	849
Miners' War Wage	849
Comparative Values of Hammer Drills	850
The American Coal Trade	850
Labour and Wages	852
Obituary	853
Open Contracts	853
The Freight Market	853
Abstracts of Patent Specifications Recently Accepted	854
New Patents Connected with the Coal and Iron Trades	856
Publications Received	856
Government Publications	856
LETTERS TO THE EDITORS:—	
Rope Haulage in Mines	850
THE COAL AND IRON TRADES	844-847
The London Coal Trade	846
The By-Products Trade	847
The Tin-plate Trade	847
PARLIAMENTARY INTELLIGENCE	841
INDIAN AND COLONIAL NOTES	848
NOTES FROM THE COAL FIELDS	850
COAL, IRON AND ENGINEERING COMPANIES	853
MISCELLANEA:—	
Detachable Power Installations—Worm Gearing	836
First-Aid—Requisitions for Household Coal	837
National Association of Colliery Under-Managers	839
The Explosives Combine—American Tin-plate Exports—Distillation of Oils from Coal	840
Miners and the Price of Coal	844
Fuel Economy	846
Saskatchewan Coal Fields	847
Researches on Tin and Tungsten	850
Dutch Iron and Steel Scheme	851
Housing Difficulties in Colliery Districts—Bunker Coal at Panama—Tar Oils	853
Institution of Civil Engineers—Lantern Slides for Lectures	856

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LONDON, FRIDAY, NOVEMBER 2, 1917.

The London coal market shows very little change. The pressure for all kinds of screened coal is intense, and the inability to put stock on the ground is causing grave concern. Hard steam coals are exceedingly short. Gas coals by sea are arriving fairly regularly.

Prices in Northumberland and Durham are steady, and steam coals are moving off briskly on home and foreign account. Smalls are so plentiful that a Sunderland correspondent says they are hopeless. Generally speaking the position is unchanged. Except for tonnage irregularities, due to gales, no fresh feature appears in the reports from Lancashire. The Leeds market has a better tone. One of the great hindrances is the delay in returning empties. In South Wales numerous stoppages are reported, and excessive stocks still affect the outlook. Practically no new business is being done. All transactions are on the basis of the scheduled list, plus 2s. 6d., except to France and Italy. The market in Scotland is unsettled and dull. It is difficult to dispose of output, with the result that idle time is frequent.

All the shipping returns show that vessels are exceedingly scarce at Humber, Tyne and South Wales ports. From the Humber to London 20s. is the recognised freight. Rates in all directions are strongly maintained. The neutral and Allied pressure for coal tonnage is unabated, but the supply is far below requirements.

The Coal Controller and men's representatives have signed an agreement in settlement of the war-wage question as affecting colliery workers, other than miners. All colliery artisans and semi-skilled men will receive the full 9s. war-wage and arrears.

The executive council of the South Wales Miners' Federation at Cardiff resolved, in the interests of the Federation, to proceed with a ballot on the comb-out question, but reaffirmed their former decision urging the workmen to vote against a down-tools policy.

A meeting of 200 representatives of the principal colliery owners resolved that the Coal Mines Control Agreement (Confirmation) Bill in its present form is inequitable and unjust to the coal trade. A committee was formed to watch the measure.

The Institution of Mining and Metallurgy announces, provisionally, that the first meeting of the session will be held on November 15, commencing at 7.30 p.m., in the room of the Geological Society, Burlington House, Piccadilly, London.

A meeting of the Midland Institute of Mining, Civil and Mechanical Engineers will be held at the Danum Hotel, Doncaster, to-morrow (Saturday), commencing at 3 p.m. A paper "On the Splitting of Coal Seams by Dirt Partings," by Prof. P. F. Kendall, will be read. Papers on "The Higher Education of Colliery Managers," by Mr. G. R. Kerr, and "Areas of Deposition of the Coal Fields of North-Western Europe," by Mr. G. Blake Walker, will be open for discussion.

Mr. C. H. Werdingham, president, will deliver the inaugural address at the opening of the 1917-18 session of the Institution of Electrical Engineers, Great George-street, Westminster, on November 8. Mr. T. M. Hunter will read a paper on "Gas Firing Boilers" on November 22. The meetings commence at 6 p.m.

Early returns of the miners' ballot in South Wales are said to indicate an overwhelming majority against a down-tools policy.

Scottish "Feu Rights" in Mining Areas.

THE Report of the Royal Commission on Housing in Scotland, to which we directed attention last week, deals at considerable length with the question of compensation for subsidence in mining areas. The crux of the situation appears to lie in the contracting-out clause in building leases, whereby the lessor excludes any claim on account of damage arising from disturbance of the surface from mining operations. The question is one of long standing, and has been the subject of considerable controversy. In 1894, a majority of the Select Committee on Feus and Building Leases reported in favour of an alteration in the law so as to reinstate the common law claim to damages for surface subsidence—without, however, requiring that support should be left for the surface upon which such buildings stand. Attempts have been made to introduce a Bill into Parliament to render the contracting-out clause in building leases null and void, but without success. The matter has the appearance of being serious in certain districts, especially in Lanarkshire, where the town of Motherwell may be taken as a typical example. The grievance, it should be noted, is not because of the subsidence, but because in the titles to the building sites the estate owner contracts out of any liability whatsoever. These titles are not leasehold, or temporary, but permanent titles, called in Scotland "feu rights." They are usually granted by the estate owner to the house owner for a perpetual yearly ground rent. The house owner takes the view that, owing to the limited amount of land available, and the absolute necessity of obtaining building sites in mining districts, he is entirely in the hands of the estate owner, and there is no true freedom of contract. The answer to this contention is that the risk of damage by subsidence is already taken into account in the moderate terms of payment, which are admitted to be lower than a rack rent, and that the difference is enough to provide a premium for insurance to cover the risk. This fact may, of course, be disputed, although there is definite proof in its support; and, if it is admitted, it is clear that the house owner cannot have it both ways.

Without, however, entering further into the merits of this contention, there is one grave objection to any alteration of the law which would necessitate the submission to arbitration of claims for damage

by subsidence. Such a system would be open to serious abuse. Apart from the encouragement it would give to exaggerated claims, it would tend to anticipation in advance of facts, and in any case the procedure would be costly. An example was afforded by the evidence given before the Commission by the town clerk of Motherwell, who quoted an instance from his own experience, in which certain damage which cost only £10 to restore, would almost certainly have been assessed at £200 in an arbitration claim.

The Commissioners first consider the possibility of the prevention of subsidence, and they deal with this subject under several heads. Different methods of house construction, with more attention to the provision of strong concrete foundations, might diminish the risk of injury. The difficulty, however, of laying out mining towns on "garden city" lines is obvious in such congested industrial districts as those in Lanarkshire. It might perhaps be possible to alter the system of working the coal seams so as to prevent any sudden or irregular lowering of the surface. This is so highly technical a matter that it is difficult to form any opinion upon its feasibility as a practical proposition. To leave main seams of coal unworked beneath buildings was not suggested by any witness, since the capital value of the coal required to be left would be many times greater than that of the surface for ordinary building purposes; to say nothing of the loss of wages that would ensue. Where pillars have been left under important buildings experience has shown that the damage by subsidence in surrounding areas is likely to be far greater than would be the case where the whole area is let down. The Commissioners were struck by the possibilities of hydraulic stowage, as practised in the north of France and in Germany, and it is of interest to recall that this method has been adopted with success in a mine near Bothwell, on the Dalzell estate, where subsidence would have given rise to the danger of an inrush of water from the River Clyde. Although some witnesses favoured this procedure, the majority were of opinion that the expense would be greater than that of providing compensation for surface damage. The Town Council of Hamilton have had prepared a special report upon hydraulic stowage, and it is estimated that in the Hamilton area it would add 1s. 6d. per ton to the cost of working, and that this cost would exceed the average colliery profit.

In regard to the question of compensation, the Commissioners are unanimous in the view that in all future grants of titles for building, the contracting-out clause should be abolished. This would make the estate owner liable to the house owner subject to any relief he might obtain from the mineral tenant. As to leases already in existence, the Commissioners are divided, although the majority would annul the contracting-out clause so far as future damage is concerned. The minority are inclined to uphold the sanctity of existing contracts.

Certain special cases also call for consideration. Where the surface owner is not also the mineral owner, it is suggested that for any sum the former is called upon to pay in compensation for damage by subsidence he should be entitled to indemnity from the royalty owner. It is not easy to see where the justice of this proposal lies. When the two estates were split, the price that was fixed must be assumed to have been based upon an understanding that the mineral owner was entitled to work out all the coal without any liability. He purchased his royalty by payment of a lump sum, and can scarcely in fairness be asked to pay a second time. The sanctity of contracts seems to preclude such a proposition completely.

A second special case arises where there is an existing lease of the minerals at the date of the hypothetical change in the law, and the house owner obtains compensation despite his contract to the contrary. In such a case it is proposed that the house owner should be left to bear one-third of the loss without any remedy, but the remaining two-thirds should be recoverable from the royalty owner, if he is also the estate owner, or one-third from each if they are different persons. It is suggested that an official assessor should be appointed to secure the benefits of experience, uniformity and economy in regard to claims.

On the whole, while any interference with existing contracts cannot be commended upon any grounds whatever, the scheme proposed by the Commissioners

appears to be defective on account of the one-sidedness of cases where contracts have been made for a lump sum instead of an annual payment. If it is deemed desirable to review the conditions of mineral leases in the interest of the house owner it is difficult to see why this revision should not be carried further in the interest of the mineral tenant also.

Petroleum Royalties.

THE discussion in the House of Commons on the Petroleum (Production) Bill led to a somewhat curious position upon the question of payments and expenses, which are provided for by the establishment of the Petroleum Royalties Fund upon the basis of 9d. per ton, intended to be set aside partly for expenses and partly for distribution amongst the owners of land beneath which petroleum may be found. In a thin House, and by what may be described as a snatch vote, the Government were defeated upon this particular clause, although not one of the dissentients was opposed to the general principle of the Bill.

The whole matter looks very much like a quarrel over the division of the skin before the bear has been killed. For the existence of any workable quantity of mineral oil in British strata is highly problematical, much as that contingency may be desired at the present time. It is a remarkable fact that the whole British Empire has hitherto furnished less than 5 per cent. of the available known petroleum supplies of the world, and there would be a great satisfaction in the discovery of resources which would lead to a home petroleum industry. Let us grasp the significance of the fact, stated by Mr. LONG, that oil, to-day, is the greatest motive power. Its importance is increasing by leaps and bounds, and mineral owners have already for some time turned their thoughts to its discovery in this country. This very fact has been partly responsible for the situation that has arisen. Mr. LONG acknowledged that there are a good many cases in which owners of land are under the impression that there is oil on their property, and under this conviction they have entered into provisional agreements with regard to boring rights, upon the understanding that certain royalties will be paid to them if oil is found.

It is upon this question of the right to royalties that the House was divided. There are, of course, many who object to all royalties in principle, and there are others who are opposed to the creation of new royalties on a substance such as petroleum, which is essentially a migratory body, rather of the nature of water than a mineral substance as legally defined. There is certainly something to be said in favour of this contention. Oil does not remain where it is formed, but flows in accordance with hydrostatic laws. If oil were tapped in a deep boring, there would be some difficulty in determining whence it came. The mere fact that a productive boring is on a certain owner's property is not in itself a proof that the oil belongs to him any more than to other surface owners in the vicinity. This peculiarity of oil as a mineral property has led to much competitive boring abroad, and to a wasteful method of production. There is proof that from 25 to 85 per cent. of the oil in certain American oilfields has been lost by this means, and the only way to stop this waste is by a unified system of control such as this Bill provides.

As regards the subject of royalties in general, Mr. PRICE made the interesting statement that in Scotland it was only by a majority of one judge in a decision of the Court of Session that coal itself was not considered as belonging to the Crown, a circumstance which, if true, has been highly satisfactory from the point of view of the development of the coal industry. For if it had been decided otherwise it is difficult to conceive how the State could have incurred the many risks of mining which private individuals have taken under the stimulus of prospective royalties.

The argument from coal, however, is beside the question, for no one assumes that oil is on a similar footing. A writer in *The Times* has recently quoted the trouble of examining the legal position of oil as mineral property in this country. He quotes the late Lord ALVERSTONE in the action *Salt Union v. Brunner, Mond and Co.* (1903, 2 K.B., 822) who states that the pumping of brine from a borehole does not necessarily become illegal because it is derived from rock salt in another man's property.

The very satisfactory output of Cleveland foundry pig iron has just been further increased by the blowing in of an extra furnace and thus bringing the total number of furnaces in operation in this district up to 76, of which 34 are making Cleveland pig, 28 are turning out hæmatite

and 14 are producing special kinds of iron. The November allocations of Cleveland foundry iron to consumers in the north of England and in Scotland are already on a most liberal scale, and pressure for demand is so insistent that several makers have sold as much iron of certain brands as they can supply. Thus next month's home deliveries promise to be on a very heavy scale. Sales of forge quality are now few, consumers being well covered up to the end of the year. Foreign transactions are very limited. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge are all quoted 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Conditions continue stringent in the east coast hæmatite department, but preparation for relieving the pressure by putting in more furnaces on basic iron are proceeding very satisfactorily, and the position is likely to be much improved in the near future. Minimum home needs are regularly met, but there is little iron to spare for export. Mixed numbers are 122s. 6d. for home use, and 141s. for shipment to the Allies. Deliveries of foreign ore are a little better, but the new business passing is quite of a hand-to-mouth character and is put through as opportunity occurs. Continuous demand of material for Government requirements and for the shipyards keep manufacturers of finished iron and steel so fully employed that they take little notice of ordinary commercial enquiries. Prices all round are very stiff, but the only actual change since our last report is a further rise of 10s. in iron ship rivets, making them £19 10s. net.

Cumberland.

Maryport.

COAL.

The Cumberland coal industry continues remarkably firm and brisk. All the pits in the county are now more regularly employed, and with a full resumption of operations at Wellington Pit, Whitehaven, production is probably larger than it has been since the spring. There is a heavy demand for all varieties of fuel for both export and local consumption. The demand for slacks, smalls and all kinds of fuel for industrial purposes is very keen. Engine fuels are in steady request, and gas coal for local consumers is in very strong demand. There is a growing call for both household and works fuel for the Irish market. Quite a number of vessels which arrived over a week ago are still windbound, and therefore the tonnage from all the Cumberland ports is much below normal this week. The coke industry is intensely busy. Prices are firm, but unchanged. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls „	19/2	19/2	16/8
Do. peas „	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	25/
Best works fuel	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	21/6	21/6	19/

IRON.

The Cumberland and North Lancashire hæmatite pig iron trade continues very strong. Prices are unchanged at the Government maximum, and Bessemer mixed numbers are again quoted at 127s. 6d. per ton, f.o.t., with warrants at cash at 115s per ton. Special iron is 140s. per ton, and semi-special iron is quoted at 135s. per ton f.o.t. The steel trade is exceedingly brisk, and all the mills at both Workington and Barrow are working at their fullest capacity. Steel rails, heavy sections, are quoted at from £10 17s. 6d. to £11 per ton, with light rails at from £14 to £14 10s. per ton. Heavy tram rails are quoted at £14 per ton, ship plates £11 10s. per ton, and boiler plates are £12 10s. per ton. Billets are in firm demand at £10 17s. 6d. per ton.

South-West Lancashire.

COAL.

In the inland household trade merchants are busy delivering such supplies as come to hand, and in many cases they are still faced with a long list of arrears. There is little or no change in regard to shipping. Owing to irregular arrival of steamers, requirements of steam coal for bunkering and export fluctuate somewhat, but taken as a whole they are well maintained, and there is very little free coal about. Prices are according to full schedule rates, plus, of course, the 2s. 6d. per ton. An average weekly tonnage is going forward of household coal through the ports for the coastwise and cross-Channel trade. In slacks, where there is a little to spare it is usually of common quality or small in size.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net)	27/ upwds.	27/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/-20/
Do. (f.o.b. Garston, net)	26/ upwds.	26/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net)	24/-25/	25/	24/
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	23/-24/
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. There is still a difficulty in obtaining adequate supplies of house coal. Furnace coal is in good demand, as well as shipping coal, which is principally on contract account. The better qualities of slack are not quite so freely offered, but this does not apply to the small or fine slacks.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

Yorkshire and Derbyshire.

Leeds.

COAL.

The general situation remains unchanged, which means that there is a full demand for all the coal produced in the West Yorkshire district, and that a strong pressure is maintained on the collieries for supplies. A better tone pervaded the market on Tuesday, and although dissatisfaction and grumbling are not eliminated, they are, at all events, less conspicuous. There is so little free coal that very little business can be done on the market nowadays. Except that in some cases a slight drop in the output coincided with the increase in the miners' wages, the production of the pits is well maintained and is cleared daily. The wagon supply is rather better. With regard to London house coal trade the demand is keen, if not quite so urgent as it was, except for deliveries south of the Thames, which are keenly pressed for. Collieries are not being required to divert supplies from other districts in order to supply London to the extent that they were a few weeks ago, and are consequently able to better satisfy their regular customers in the West Riding and the provinces generally. Coastwise shipments to the Thames and the south coast are still very restricted, and export of coal generally from the Humber ports is checked somewhat through less tonnage being available on account of the stormy weather. Locally merchants are getting rather better supplies. There seems to be a doubt whether the instruction emanating from the Coal Controller's office, forbidding deliveries to consumers already holding a month's stock or more, applies to the provinces. Deliveries of gas coal are generally below the requirements of the works, and stocks are being used up so rapidly that a serious problem is threatening to arise. As to manufacturing fuel, all qualities are firm, small steam slacks being far less plentiful, while nuts and best rough slacks are very scarce. There is no slackening in the demand for washed furnace coke, and a greater output would sell readily if sufficient coking material could be secured. As a result of the advance of 2s. 6d. per ton in the price of coking smalls, the price of washed furnace coke has been revised this week, the result being an increase from 25s. 8d. to 32s. per ton at the ovens.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallsend & London best	21/-21/6	21/-21/6	19/-20/
Silkstone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkstone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/	20/6-22/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	17/6-18/6	17/6-18/6	16/-17/
Gas nuts	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/-18/
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	32/	25/8	25/8

Barnsley.

COAL.

Practically no change has occurred. From almost every quarter collieries are heavily pressed for larger supplies of fuel. Absenteeism on the part of miners is again becoming so serious as to cause a decrease in the daily output in cases, varying from 400 to 200 tons per day. Delays in transit are also adding to the difficulties, whilst the policy continues of asking collieries to supply special or extra lots of coal for essential needs. It will be realised that under these conditions collieries are placed in a very difficult position. A renewed effort appears to have been recently made to maintain the abnormal tonnage of several grades of coal to London and the south. This is particularly the case in respect to house coal, and added to this there is a more vigorous demand from the normal districts. The question of gas coal supplies is causing still greater anxiety, but with the present production it appears to be absolutely impossible to provide such a tonnage as is frequently demanded in order to accumulate stocks to provide for delays in deliveries. The efforts of the district coal sub-committees are very marked in this respect. A similar state of things prevails in regard to slacks, which are urgently required for the manufacture of coke. Owing to decreased outputs, most collieries are having to purchase slacks to feed their own plants, but supplies are difficult to obtain and it is hardly possible to keep the ovens fully at work. The pig iron districts, especially North Lincolnshire, are

complaining very seriously of the insufficient supply, and strong efforts have been made by the makers to increase the supply. The question of increased output for furnace coke has been settled; an increase of 6s. 4d. per ton being permitted, which is rather a surprise, as general opinion indicated that a smaller amount would have been allowed. The increase is to date back to September 17, but in order that pig iron makers may have opportunity to provide for the extra cost by increasing their selling prices, coke manufacturers have been requested not to tender supplemental accounts until November 5. The demand for all classes of steam coal continues to be exceptionally brisk. A big bulk of the output is still going for shipment, largely on account of the Allies and for the needs of the Admiralty. On the other hand, the tonnage required for home purposes continues to be exceptionally heavy, and again railway companies are showing great concern in regard to their stocks. All descriptions of smaller coal are also rather scarce, with the demand daily becoming stronger. The following list of increased quotations applies to contract deliveries on home account:—

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	22/6-24/6	22/6-24/6	20/-22/
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/
Secondary do.	18/-18/6	18/-18/6	15/6-16/
Steam coals:—			
Best hard coals	20/-21/	20/-21/	17/6-18/6
Secondary do.	19/-20/	19/-20/	16/6-17/6
Best washed nuts	18/9-19/	18/9-19/	16/3-16/6
Secondary do.	18/-18/9	18/-18/9	15/9-16/3
Best slack	15/-15/6	15/-15/6	12/6-13/
Secondary do.	13/-13/6	13/-13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/
Gas nuts	18/9	18/6	16/
Furnace coke	32/	25/8	25/8

Hull.

COAL.

There has been a continuance of the less stringent conditions affecting trade from the Humber, and more supplies seem available. Were there a better supply of steamers, it is probable that much more could be dealt with, especially for France, the needs of whose importers are as pressing as ever, West Yorkshire Hartleys, in particular, being in strong demand at limitation prices. Large steam coal is still being taken up in considerable quantities on Admiralty and official account, but more is offering in the open market to meet the demand for odd lots for prompt shipment. Under the present commercial conditions ruling in Northern Europe, neutral business is only of a minor degree, up to 35s. being paid for South Yorkshire hards for handy lots. Industrial fuels are absorbed chiefly for home purposes, and very little is available for export.

Chesterfield.

COAL.

The condition of the coal trade of this district is unchanged. Demand is stronger than ever. Supplies are much below the needs of the market, but this state of things is unavoidable under existing circumstances. The predominant cry is for cobbles and nuts, especially the kinds that are suitable for gas-producers. Much difficulty is experienced in obtaining these qualities in adequate quantities. Hard steam coal is also in great request, but consumers' requirements cannot be satisfied. Steam-raising slack is in good demand. Gas coal is also much enquired for, and locomotive coal is in active request. There is no change in the condition of the export trade, and no licences are now obtainable for Derbyshire coal, shipment of which has practically ceased for the present. The coke market is active, all qualities finding a ready sale. Prices of coal and coke remain firm. There are no spot-lots of coal available.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best house coals	17/	17/	17/
Secondary do.	16/6	16/6	16/6
Cobbles	16/	16/	16/
Nuts	15/	15/	15/
Slack	12/6	12/6	12/6

IRON.

Every branch of the iron trade of the district is actively employed, chiefly on Government work. The production of pig iron will be increased as soon as some furnaces now in course of reconstruction are ready to be blown in.

Nottingham.

COAL.

Notwithstanding the recent advance in prices, the demand for household coal continues to be active. With the advance coming concurrently with the advent of colder weather, it has not so far given much indication of a steady influence, but undoubtedly the higher rate will tend to make some householders more economical. Supplies from the collieries are being fairly evenly distributed to the different areas, and everything is being done to prevent any undue hardship. Merchants readily accept all classes of fuel in view of their limited stocks, and the same may be said of customers at the landsale depots, who are only too eager to receive whatever fuel they can, taking into consideration the present pressure upon the collieries. Steams of almost every description are having a ready sale, after the preferential claims in regard to war work have been met, but there is little opportunity of doing business in the open market in consequence of the tonnage required on contract account. Slacks generally are in good request, business in best qualities being particularly brisk.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/	21/-22/	19/-20/
Good house coals	20/-21/	20/-21/	18/6-19/
Secondary do.	19/6-20/	18/6-19/6	17/-18/
Best hard coals	18/6-19/6	18/9-20/	17/-18/
Secondary do	17/9-18/3	17/9-18/6	16/-17/
Slacks (best hards)	14/6-15/	14/6-15/	12/-13/
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	—	9/6-10/6	11/

Leicestershire.

COAL.

strike, the ordinary course of business is maintained. The colliery sidings are filled to overflowing with wagons, and merchants are being kept waiting no more till the accumulation—one of the results of the work's stoppage—has been cleared. The demands for supplies have become so very urgent that many complaints have been forwarded to the Coal Controller, who, in turn, has declared that deliveries must be maintained or something serious will happen. There is an enormous demand for all classes of household for London and district, and great efforts are being made to restore the maximum deliveries of deep and main cobbles and nuts, as well as bakers' nuts and small nuts for mechanical stokers. Country deliveries are very greatly in arrears, and it will be impossible to reduce the accumulation of arrears for two or three months at least.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/
Second, hand picked	19/-20/	19/-20/	15/6-17/
Deep screened cobbles ..	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/
Small nuts	17/-18/	17/-18/	14/6-15/6
Deep breeze	15/3-16/	15/3-16/	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/
Main nuts for London kitcheners	16/-17/6	16/-17/6	14/-15/
Stearns, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Stearns, seconds	15/6-17/	15/6-17/	13/6-15/
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The coal trade continues very active, with increasing stringency in the matter of supplies. The public have settled down to the increased price philosophically, being much more concerned about their winter stocks. Some anxiety is shown regarding supplies to people who are not able to buy in sufficient quantities to meet their requirements for the winter, and the local Coal Supply Committee are requesting the Coal Controller to allocate a further quantity of coal to the city to increase the stocks of dealers who do this class of business. Coal which in many instances is used for special purposes, is being diverted from the district, and representations are also being made to the Controller on this point. Merchants also find their wagons used for other purposes than the transit of coal by the railway companies, and there is a shortage accordingly, though there does not seem to be any lack on the part of the collieries. With the prevailing scarcity there is no chance of accumulating stocks. All the output of industrial fuels disappears rapidly for essential Government work, and the market is kept very bare. Nuts and better class slacks fall short of demand. All descriptions of smalls are in active request. No official announcement has yet been made regarding the addition to be granted to coke. Some furnace owners declared that the amount was to be 6s. 4d., but this was received with a certain amount of scepticism. But a decision is awaited with considerable interest.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	24/6	24/6	22/
Do. seconds deep	22/6	22/6	20/
Do. best shallow	21/6	21/6	19/
Do. seconds do.	20/6	20/6	18/
Best hard	21/	21/	18/6
Forge coal	18/6	18/6	16/
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/
Do. hand-picked cobs	20/6	20/6	18/
Best hard spires	22/6	22/6	20/
Forge (steam)	18/6	18/6	16/
D.S. nuts (steam)	17/	17/	14/6
Small (do.)	17/	17/	14/6

IRON.

Pending an authoritative decision on the question of prices, a certain amount of unsettlement pervades the iron and steel industries. It is obvious, however, the price revision is a matter that must take some time, and if any advance is made retrospective, as is anticipated, no insurmountable inconvenience will be caused. The maxima for steel have not been interfered with since the restrictions were first applied, and it is felt that they are now out of touch with conditions, and that any changes should extend to steel as well as iron. Fairly good supplies of basic iron are being forwarded to the local steel works, but forge and foundry pig are difficult to procure, the higher grades especially. There is very little galvanised material on the market, this being substituted by ordinary sheets painted, for which operation an extra charge is made over the controlled price of £17 a ton. The demands made upon bar makers are very heavy. Best bars are wanted in large quantities to meet the enormous demands for cable iron. The wagon building and general engineering establishments are also big customers, so that the mills have little to spare after essential needs are met. The basis price of £15 10s., less 2½ per cent., applies, but, of course, it is expected that finished iron will participate in any advance that is conceded—to what extent will depend on pig iron. Merchant bars command the full controlled rate of £13 15s. net at makers' works, nut and bolt iron £14 5s. to £14 10s., and small rounds £11 10s. (three-eighths sizes) iron, and practically no change in semi-steel up to about £18 minimum, and for other than Government boiler plates. Scotland, in view of the shortage of supply for this district, demands prevent the wants being adequately met. The basis price for trucks at makers' works.

Lydney.

Forest of Dean.

COAL.

The general demand for the house coals of this coalfield is steadily maintained. All the collieries are working full time, but the output is totally inadequate to cope with the abnormal demand. The list of arrear orders is a heavy one with all the collieries. A very large proportion of the steam and manufacturing fuel is being reserved for firms engaged in Government work, the general position remaining much the same as last week.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/
Forest	25/6	25/6	23/
Rubble	25/9	25/9	23/6
Nuts	24/	24/	21/6
Rough slack	16/	16/	13/
Steam coal:—			
Large	22/6-23/6	22/6-23/6	20/
Small	18/-18/6	18/-19/	17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE LONDON COAL TRADE.

THURSDAY, NOVEMBER 1.

Trade shows very little change from the market conditions of the past few weeks. The demand for all kinds of household fuel is equally strong, and for hard steam coal the shortage is growingly manifest. The quantities coming forward to London, although equal to the limited strength of the loaders and carmen for delivery purposes, does not enable the merchant to put any stock on the ground. Colliery representatives are constantly refusing orders, and reports show that a very large number of them are still on hand unexecuted. Contract orders entirely absorb all the output, consequently very little free coal can be obtained in any direction. Slacks have become more plentiful, but the principal demand is for screened coal. Empties returning to the colliery has become a serious problem again, as the delays are in many cases very severe, but the railway companies allege that the transport has been most difficult. Loaded wagons run up to the Metropolitan in fairly good time, but the trouble is in getting the empties back again. At this season of the year also the farm produce is calling for a large number of goods wagons, and the power of the railway companies to provide empties for coal transport is seriously crippled. Of contract cargoes 27 arrived in the River Thames for Monday's market and only four for Wednesday. The pressure on the railways has been emphasised during the past week by the statement regarding locomotives sent to the front and many others awaiting repairs. The difficulties under which the British railway companies are working are more pronounced than at the beginning of the year, and the train service may again be reduced. The secretary of the London Coal Committee exhibited a notice on the Exchange Committee room door on Monday last, that all anthracite and steam coals used for domestic purposes would advance 2s. 6d. per ton as and from October 15 instead of September 17 as originally stated in the Coal Controller's circular. This opens up the question as to how much of the steam coal has been used for house or domestic purposes, and what constitutes house purposes in large institutions, hospitals, hotels, etc. Many of the merchants also who supply bakers and restaurants are waiting for a pronouncement as to what constitutes a dwelling-house and a factory, as so many bakers live on their premises.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, OCTOBER 26.—The demand for seaborne house coal continues good, and the short supplies available slightly relieves the amount of enquiry, but no *bonâ fide* sales, however, were reported. Cargoes, 15.

MONDAY, OCTOBER 29.—The colder weather caused a good enquiry for seaborne house coal, but the supply being limited, only a little business was done. Cargoes, 27.

WEDNESDAY, OCTOBER 31.—The seaborne house coal market was quiet to-day, no cargoes being on offer; no sales were reported. Cargoes, 4.

THE IRISH COAL TRADE.

THURSDAY, NOVEMBER 1.

Dublin.

Business continues fairly active generally, but the position with regard to supplies remains much the same, the scarcity of best qualities of house coal being more severely felt as the season advances. The coal merchants state that the recent increase in prices is entirely due to cost of production, and the outlook for the winter months affords no indication which would enable the consumer to hope for better conditions, unless freights should be any lower. Current quotations stand as follow: Best Orrell, 48s. 6d. per ton; best Arley 47s. 6d.; best Wigan, 46s. 6d.; Pemberton Wigan, 44s. 6d.; best Whitehaven, 46s. 6d.; best kitchen coal, 45s. 6d., all less 1s. per ton discount for cash; Scotch steam coal, 39s. per ton; Welsh steam, 50s.; coke, 46s. 6d. per ton delivered. At the Castlecomer Collieries, co. Kilkenny, the price of best large coal is 28s. 4d. per ton at the pithead. The total quantity of coal discharged upon the Dublin quays from English, Scotch and Welsh ports during the past week was 21,537 tons, as compared with 21,310 tons the week previously.

Belfast.

The trade is now very active in the port, the household demand showing a considerable improvement owing to severe weather and recently advanced prices. The cross-Channel trade has suffered during the past week in consequence of heavy gales, and supplies are below the normal. Quotations for household coals are as follow:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s.

The Right Hon. William Abraham, M.P., is lying critically ill in Cardiff.

Fuel Economy.—The National War Savings Committee, Salisbury-square, London, E.C., in connection with the Food Economy Campaign, has issued a leaflet entitled "Hints on Fuel Economy." Attention is directed to the desirability of using gas in preference to coal as far as possible, on account of the industrial advantages thereby gained. Gas coke also is recommended in preference to coal, and briquettes are commended. Many other domestic economies in heating are detailed.

THE WELSH COAL AND IRON TRADES.

THURSDAY, NOVEMBER 1.

Monmouthshire, South Wales, &c.

Newport.

COAL.

There is very little change in the market since the last report. Trade is restricted by a variety of causes, and there is considerable uncertainty about changes which may be necessary in the somewhat near future. There has been a fair arrival of tonnage, but stocks of coal are still very heavy, especially of smalls, which do not seem to diminish at all and leave a great deal of stock on the market. Work at the collieries has been intermittent. It is satisfactory to know, however, that a re-start has taken place at several of the pits in the western valleys of Monmouthshire, where, in the neighbourhood of Blaenau, about 4,000 men had been idle for more than a week.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	32/6	34/-35/
Western-valleys, ordin'y	31/6	31/6	33/-34/
Best Eastern-valleys ...	31/6	31/6	32/-33/
Secondary do.	30/6	30/6	30/-32/
Best small coals	23/6	23/6	23/-25/
Secondary do.	22/6	22/6	21/-23/
Inferior do.	20/6	20/6	20/-21/
Screenings	25/6	25/6	24/-25/
Through coals	29/6	29/6	24/-25/
Best washed nuts.....	32/6	32/6	28/-30/
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	24/-26/6
Secondary do. do. ...	33/3	33/3	22/-24/
Patent fuel	32/6	35/	40/-43/6
Furnace coke.....	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	57/6-60/

IRON.

There is a steady output from all the works in the district, without much alteration in the general scope of business, as most of the concerns are engaged on Government account. Prices, therefore, are nominal. The tinplate trade, though very much controlled, is gradually improving, and there are hopes that it may ultimately revive completely. Pitwood has arrived in only moderate quantities, and the price has been strongly maintained at 75s. for best French fir.

Cardiff.

COAL.

Reports from the collieries show that stoppages are still numerous throughout the coal field, and in many districts it is becoming quite a custom to have an idle day at the commencement of the week, pending the collection of sufficient wagons to keep the pits going during the following days. This applies in many localities, and especially in Monmouthshire, but at some collieries different arrangements are being made with the object of securing greater regularity of working, for the officials agree that it is better to have a smaller number of men employed continuously than to have a larger number working spasmodically and irregularly. Stocks are still very excessive, especially of the ordinary and lower grade coals, and there is a glut of smalls, which it is almost impossible to dispose of. At some collieries in the Rhondda Valleys, banking of small coal is being resorted to in order to release wagons and convey the better descriptions to the coast, but in the miles of railway and colliery sidings there are thousands of wagons held up owing to lack of tonnage. The stormy weather has delayed the arrival of vessels, and even this week the work of loading and discharging at the docks has been seriously delayed through similar causes. Business is almost exclusively confined to the execution of

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. allowed by Controller, except in shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	33/-34/
Ordinary	30/	30/	30/-32/
Steam smalls No. 1	21/6	21/6	24/-25/
Do. 2	21/	21/	23/-24/
Do. 3	20/6	20/6	19/-22/
Do. 4	20/	20/	19/-20/
Do. 5	19/6	19/6	18/
Do. 6	19/	19/	18/
Do. 7	18/6	18/6	18/
Do. 8	18/	18/	18/
Best dry coals	30/	30/	32/-33/
Ordinary dries	28/6	28/6	30/-32/
Best washed nuts	30/	30/	31/-33/
Seconds	28/6	28/6	30/-32/
Best washed peas.....	27/6	27/6	30/-32/
Seconds	23/6	26/6	30/-31/
Monmouthshire—			
Black Veins	30/	30/	33/-35/
Western-valleys	29/	29/	32/-33/
Eastern-valleys	29/	29/	30/-32/
Inferior do.	28/	28/	30/-31/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	34/-35/
Small	26/	26/	27/6-30/
No. 2 Rhondda—			
Large	27/	27/	29/-31/
Through-and-through	22/-23/6	22/-23/6	24/-25/
Small	17/-19/	17/-19/	20/-21/
Best patent fuel	30/	30/	42/-43/6
Seconds	30/	30/	40/-42/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	57/6-62/6
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	70/-75/	70/-75/	43/-44/

* Nominal.

orders for the British and Allied Governments, and there seems little prospect of any improvement for some time to come. Chartering last week was only moderate, the amount of tonnage taken up being less than 17,000 tons, compared with only 10,700 tons in the preceding six days. The publication of the Bill for the compensation of collieries has had no effect on the market, as the details were practically known some time ago. Many of the coal owners, however, hold the opinion that the industry is not being fairly dealt with, compared with other trades under Government control, and an influential committee has been appointed to watch the progress of the Bill through Parliament, and to take such steps as may be deemed necessary to protect owners' interests. Nothing further has transpired with regard to the publication of the general classification list, and in the meantime all business is being transacted on the controlled schedule, plus the 2s. 6d. per ton, to cover the recent wages increase, France and Italy, of course, as previously stated, being exempted. The patent fuel industry is quiet, for, although the demand is good, the trade is suffering from lack of transport facilities. For household and gas coals there is a strong enquiry and a scarcity of supplies. The same remarks apply to coke.

IRON.

The principal item of interest in this department has been the restarting of the blastfurnaces at the Cyfarthfa Works at Dowlais, which have been idle for a period of about 10 years. Since the outbreak of war the works have been undergoing a process of remodelling, and when the necessary extensions have been completed the output will be very considerable. All rail and bar mills are hard pressed to supply the demands for their outputs, and war requirements show no signs of easing off. Ordinary commercial business is practically at a standstill, and when peace is again restored it is anticipated that the iron and steel trades will have a long run of prosperity in order to make up the arrears which have been accumulating during the past three years. Manufacturers are experiencing a considerable increase in their working costs owing to the 2s. 6d. increase in the price of coal allowed by the Coal Controller, and where there is a limitation of prices, the Munitions Ministry will probably be asked to amend the schedule rate not only for raw material, but for finished steel. In the tin-plate trade there is practically no change to report. Orders are plentiful, and most makers are well booked ahead. The stock of wasters is increasing week by week, and it is felt that permission should be granted for less restricted trading in this description of plates. Shipments are taking place to South Africa and other colonies as well as to France and Italy, but practically the whole of these are on Government account, or for purposes connected with the war. Prices continue to be on the basis of 30s. per box for standard sizes. In the galvanised sheet trade conditions remain practically unaltered, and, with the exception of black sheets and trench plates, for which there is an active demand, outputs are limited. Spelter works are busy, and makers are reaping the advantage of the great extensions which have taken place. Prices in all departments are nominal. Supplies of iron ore continue satisfactory. In scrap metals there is a strong demand at maximum prices, but supplies are short.

Swansea.

COAL.

There is nothing to report this week. The anthracite coal market remains unchanged.

Llanelli.

COAL.

There is no change to report in the state of the local market. The inclement weather is interfering with tonnage arrivals, and collieries are suffering owing to the holding up of wagons. Play days are reported from a number of the collieries, and this is causing a shortage in supplies of many qualities. The larger sorts of machine-made anthracite coals are firm, and buyers unable to get all the supplies of beans and nuts they require. Large kinds of the better grades are also in good demand, but the cheaper qualities are offering fairly freely. Culm and duff are both easy, and peas are also not very active. Steam coals are generally slow, and buyers have no difficulty in covering their requirements. The lower grades of throughs and smalls are moving very slowly, and stocks are very heavy. Manufacturing coals are strong, and house coals are also in active demand.

Prices f.o.b.

	Current prices.	Last week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-42/6
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine-broken beans (best).....	35/	35/	30/-31/
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/-22/
Rubby culm.....	13/	13/	14/-14/6
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	32/6-34/
Seconds	27/	27/	—
Cargo through	23/6	23/6	—
Seconds	22/	22/	—
Bunkers through	23/6	23/6	26/-29/6
Smalls	19/	19/	20/-22/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	24/
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

The prices in list are subject to an increase of 2s. 6d. per ton to meet the war wages increase, except in the case of shipments to France and Italy and coal for the manufacture of patent fuel for shipment thereto.

THE BY-PRODUCTS TRADE.

Tar Products.—Scarcely any change of importance has occurred in the market position since the last report. Pitch is sought for home and foreign use, but the scarcity of shipping is a factor which has to be taken into account. Producers expect better quotations, and consequently are firm in the matter of sales. The strong demand for solvent naphtha continues, not with the urgency of the previous week or two, but still sufficiently pressing to show the healthiness of the demand. Sellers anticipate higher values in the near future. Even now it is rather difficult to fix a current figure, for some transactions are said to have been effected considerably above the market quotation. Average quotations are appended:—Coal tar, 26s. 8d. to 30s. 3d. Pitch, east coast, 20s. to 25s.; west coast, Manchester, 17s. 6d. to 18s. 6d.; Liverpool, 17s. 6d. to 18s. 6d.; Clyde, 18s. to 19s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. to 3s. 1d. Heavy naphtha, north, 1s. 6d. to 1s. 8d. Heavy oils, in bulk, north, 4½d. to 4½d. Creosote, in bulk, north, 3½d. to 4d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., in bags. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The authorities are not favourable to export licences at present, for the home requirements have to be taken into account. The supply for agricultural purposes remains at the official figure, and the year's output is likely to show a very substantial increase. Yet very little of this is likely to be sent abroad, so that any gain in that direction will be insufficient to remove the complaint of producers regarding inadequate returns.

SOUTH WALES MINING TIMBER TRADE.

Imports of foreign pitwood into South Wales ports have been upon a much heavier scale. These supplies were urgently needed, and went quickly into consumption. Collieries are running upon short stocks, and are depending to a greater extent than ever upon home-grown timber. The deliveries of home-grown wood keep up well, but there is the drawback that a prolonged rainfall will be followed by such a sharp curtailment that collieries will be faced with a shortage of wood. For the week ending October 26, the total quantity of foreign timber imported amounted to 17,405 loads, which came wholly from the French ports, and out of this the Pitwood Committee for the supply of the collieries on the Admiralty list received 11,592 loads, while the balance of 5,669 loads was taken by the ordinary importers who are qualified to receive supplies under the scheme of the Controller of Import Restrictions. The total imports are heavier than has been shown for some weeks, the difficulty in procuring vessels being very acute. The outlook in this respect is not bright, and the prospects are that collieries will be forced more and more to depend upon home-grown supplies. The quantity imported during October will no doubt prove to be below that allowed by the Controller. The actual imports for the week ending October 26 were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Oct. 20	Morgan and Cadogan	120
" 20	Budd and Company Limited ...	72
" 20	W. H. Williams	600
" 22	Lysberg Limited	1,140
" 22	Lysberg Limited	4,440
" 23	Lysberg Limited	192
" 23	Lysberg Limited	1,800
" 23	Lysberg Limited	2,280
" 23	Lysberg Limited	840
" 23	W. H. Williams	150
" 23	W. H. Williams	155
" 23	Morgan and Cadogan.....	120
" 23	Morgan and Cadogan.....	84
" 23	Grant Hayward	42
" 23	Grant Hayward	144
" 23	Grant Hayward	102
" 23	Grant Hayward	144
" 23	Grant Hayward	180
" 23	E. Marcesche and Company ...	132
" 23	Budd and Company.....	960
" 23	A. Bromage	984
" 23	A. Bromage	1,440
" 24	E. Marcesche and Company ...	36
" 24	E. Marcesche and Company ...	204
" 26	Lysberg Limited	900
Total.....		17,261

Newport:—

Oct. 22 Morgan and Cadogan..... 144

Swansea and Port Talbot: Nil.

Prices Strongly Held.

Apparently importers were making strenuous efforts to import their allowances before the month closed, which accounts for the heavier supplies received. The larger quantities imported in no wise influenced market prices. Quotations were strongly maintained at 75s. per ton, which is a very serious item of expenditure for collieries. Supplies went quickly into consumption, and collieries are running upon low stocks. The tendency is for values to go higher, although an effort is being made to keep prices within a reasonable margin. There is a probability that representations will be made to the Controller with the object of securing French pitwood at fixed prices, for the coals shipped to our Allies are sold at sacrificial prices, and do not take the 2s. 6d. per ton extra. Our Allies receiving such extraordinary concessions, it is thought that the French Government should give reciprocal treatment with respect to pitwood.

Home-Grown Timber.

Supplies of home-grown timber by sea and rail have been upon a good scale, and, as in the case of foreign wood, a quick sale was shown, a number of collieries being urgently in need of wood. Quotations varied according to the quality and straightness of the timber, but the range was from 70s. to 75s. per ton, or round about the same level as foreign prices—a striking commentary upon our transport facilities, seeing that the freight rate upon French timber is about 22s. per ton. The quantity of foreign mining timber allowed to be imported into South Wales during October amounts to 40,000 tons, of which 25,000 tons is for the use of the agents supplying the Admiralty collieries, while the balance of 15,000 tons is for division amongst importers who are qualified to receive supplies under the scheme of the Controller. As the supply of

available vessels is likely to be a more difficult one next month, in all probability the total quantity of timber to be imported will not be taken up, and collieries will be forced to rely to a larger extent upon home-grown supplies. As the winter and rainy season is approaching, the deliveries of home-grown wood will tend to decrease, so that it is imperative that a larger amount of labour should be attracted to the woods if the Welsh collieries are to be adequately supplied. Provision must of necessity be made for periods when it will be almost impossible for cutting to proceed.

SOUTH WALES MINERS AND RECRUITING.

(FROM OUR LABOUR CORRESPONDENT.)

This week the 200,000 men employed in and about the South Wales mines balloted as to whether or not they are in favour of a down-tools policy in the event of the Government proceeding with their combing-out scheme from the mines for military service. For two years a pacifist agitation has been carried on through the coal-field by the Independent Labour Party, the Union of Democratic Control and other organisations, for the obvious purpose of influencing the workers in this great coal field against the war. The outcome of this movement is the present agitation for a general strike.

A fortnight ago the *Colliery Guardian* pointed out the danger to the British cause in allowing the pacifist agitation to go on unchecked and unanswered, and urged upon the Government the duty of seeing that the case of the war was put plainly to the men working in this great coal field. It is satisfactory to note that the suggestion put forward in these columns has at last been acted upon, and this week a number of meetings have been held in various parts of the coal field, and addressed by General Smuts, Mr. William Brace (Under Secretary of the Home Office and President of the South Wales Miners' Federation), and Dr. Macnamara (Financial Secretary of the Treasury).

At Tonypandy, on Monday night, General Smuts and Mr. W. Brace addressed the men. Mr. Brace reminded the men that they had great responsibilities, and this nonsense about downing tools should cease. If they stopped work the men they were going to hurt were their own flesh and blood. Shame on men living at home who were cavilling everlastingly about producing what these men must have if they were going to have a fighting chance for their lives and come back to them.

On Tuesday, at Cardiff, Mr. Tom Richards, M.P., secretary of the South Wales Miners' Federation, put the issue in the "down tools" policy plainly before the workmen. In his circular to the men, Mr. Richards says:—"The Council are desirous that every workman shall clearly understand that if he votes in favour of a strike it will in the first instance be his resolution to strike for the purpose of resisting the completion of the combing-out of the workmen who have obtained employment at the mines since the outbreak of war in 1914, under the scheme formulated and adopted by the Miners' Federation of Great Britain, and recommended by the South Wales executive council to the conference on October 8, 1917. And in the second instance it will be his resolution to strike against any workmen being taken from the mines under the scheme which provides that in the event of further men being required after the 1914 comb-out has been completed, a selection shall be made by ballot from the unmarried men of Class A of all grades of employment between the ages of 18 and 41." The executive council, at a meeting held on Friday, October 19, 1917, decided to recommend all workmen to vote against the down tools policy by putting their X in the square opposite "No" on the ballot paper.

There were strong expectations of a considerable minority supporting the extreme policy, in defiance of the recommendation of their own executive. Some 40,000 or 50,000 other men have come into the pits to take the place of miners who have enlisted and it is not an unreasonable assumption that many thousands of these men are working in the pits to-day because the occupation was a refuge against military service, while others have been attracted by the prevailing high wages. The votes of these men will be given against military service; while the votes of the 50,000 men who are away on service will not be registered.

In the course of an interview Mr. Richards said he would be very much astonished as well as grieved if a substantial majority of the South Wales workmen voted against the down-tools policy. He was satisfied there would be a number of votes the other way, but equally certain that they would not be cast for a down-tools policy as a consequence of certain other industrial disturbances prevalent in some districts of the coal field. He was not without strong and sanguine hopes that the men being right at heart would vote right in the ballot.

THE TIN-PLATE TRADE.

Liverpool.

There is no change in the position. The Government continues to buy on Allied account, but merchants here are doing very little, although no doubt a lot of business is being held up through want of licences. Works are firm in the quotations, the official maximum of 30s. basis net f.o.t. at works for cokes being adhered to. The tin makers, however, want orders, and are prepared to cut the price to secure a line. There is very little trade obtainable in this class of plate just now, though. Coke wasters are accumulating, owing to difficulty in obtaining permits; it is hard to see why certain sizes, at least, cannot be placed in the list for free sale.

Saskatchewan Coal Fields.—Large quantities of coal have been shipped to Manitoba during the last few months, and firms in Winnipeg report that this Saskatchewan lignite coal is proving less expensive and more satisfactory as soft coal received from the United States. The coal does not create a smoke, and can be utilised with good results. A briquetting plant will be erected in the near future at Estevan, and it is expected to be able to turn out a superior quantity of fuel.

PRACTICAL WOOD PRESERVATION.*

By W. E. HOYT.

Interest in wood preservation at the present time has a greater interest to the coal operator than ever before, because of the scarcity and high cost of steel and concrete. Where rapid construction is required, timber is being used in large quantities, and it is gratifying to note that most of the larger mining companies, as well as a great number of independent operators, are finding it worth while to preserve all their permanent wood construction against decay.

Various time-tested methods that have been found capable of at least doubling the life of timber at a low cost are being utilised, thereby not only eliminating repair bills that are directly traceable to rotting timber, but also conserving our forests for years to come.

The method of preventing decay is well established. All investigations have shown that this disease may be forestalled by the permanent disinfection of the wood with an insoluble, non-volatile antiseptic. The injection of creosote oil under pressure has been the usual means employed to preserve ties and wood blocks used in railroad track and street paving where wear and tear are severe and deep penetration is necessary.

For most mining work, however, timber treated by the pressure-creosoting method has not been found practical on account of the delays in getting deliveries of treated timber, the initial high cost, and the fact that the inflammability of freshly creosoted timber is too great. After careful investigation of this subject by many authorities, it was shown upon analysis that the only part of the creosote oil remaining in pressure-treated timber after several years' exposure shows no volatile matter under 275 degs. Cent. After being treated with creosote under pressure, borings taken from timber that has stood in the weather for a period of 10 years show that practically none of the creosote distilling under 275 degs. Cent. remains in the wood.

In treating mining timber, therefore, the solution of the problem is to use only that part of the creosote oil that is taken off above the temperature of 275 degs. Cent., and to simplify the method of application so that the timbers can be treated at the mines without delay and at a minimum cost.

The method of applying the preservative to the wood should be selected only after considering such factors as to quantity of timber to be treated, the kind of wood, the size and seasoning, and the estimated life of the coal mine where the timber is to be used.

The open-tank method, which consists in immersing the timber, after framing, in a bath of the preservative kept heated to above the boiling point of water, is capable, when properly carried out, of lengthening the life of timber to the point where it fails through wear and tear. The duration of the immersion should be increased in proportion to the dimensions of the timber. Roughly speaking, this is about 10 minutes for timbers up to 2 in. in thickness, and increases five minutes for each inch in thickness greater than that.

Timber that is only partially seasoned should be immersed longer in order to allow the preservative to displace part of the moisture. It is not impossible to treat partially seasoned timber by open-tank immersion if the proper preservative is used. Since the oil most suitable contains no tarry matter to seal the pores, complete seasoning may take place after treatment the same as in untreated timber. It is well known, however, that to imprison sap in green timber by a film of tarry matter or paint will hasten dry rot.

By framing the timbers before treating, good penetration is gained where it is most needed—that is, at the ends and at the cuts—thus protecting most thoroughly the parts that rot first. Timber for long-lived developments should be treated in an open tank, especially where it is to be used for tipples, main track ties, and similar purposes.

The equipment necessary for open-tank treating is so simple and easy of operation that many companies have portable tanks for this purpose, shifting them from place to place, and treating ties, tippie lumber, and timber for various constructions as required.

The usual form of portable tank consists of a rough wooden box or trough, into which a tin lining is fitted, the joints being soldered to retain the oil. This tank is of a length sufficient to accommodate the longest timbers treated, is wide enough to receive about three timbers side by side, and is approximately 18 in. deep. A drain board is fitted up to slope into one side of this tank, and upon this the timbers are lifted after immersion, thus allowing the excess oil to drain back into the tank. The drain board serves a double purpose, as it makes a good roof for the tank when it is not in use.

A heat sufficient to maintain the temperature of the bath at 212 degs. Fahr. in summer or winter is obtained by means of live steam that passes through a system of pipes placed in the bottom of the tank. If a small derrick, with a crab for lifting, is added to the equipment, it will be found of great use. By the method just described, three or four men can easily treat from 5,000 to 10,000 board feet of timber per day.

The treatment of structures already erected or in process of erection is often accomplished by brush-coating the timbers with the preservative, which should preferably be heated in cold or damp weather. The joints are coated thoroughly before the timbers are erected, and when built the whole structure is given a thorough painting with the preservative.

Power spraying machines will be found advantageous on exterior work, since they save labour and give a more uniform coating. Operators who have employed this method have found that the life of the timber has thereby been greatly increased. It may be expected of timber that has been brush-treated with a high-grade

* Coal Age.

NEW ELECTROLYTE FOR MINERS' ELECTRIC SAFETY LAMPS.

[SPECIALLY CONTRIBUTED.]

The principal trouble met with in the use of electric lamps of the accumulator type, for underground work, is that brought about by the creeping or spilling of the acid forming the electrolyte. This acid may be sulphuric or hydrochloric, but in each case the behaviour is somewhat similar. The trouble presents itself in many ways and places. In the lamp room it is met with in filling, charging, and adjusting the accumulators. Should acid fall on the skin or clothing, they are burnt thereby. While on the charging board the acid creeping or spilling corrodes the metal work of the terminals and standards in time. Underground, the lamps are in many cases subjected to very rough and improper handling (probably due to the fact that they will burn in any position) and, as a result, the acid is spilled. If on the case, the acid in time renders it useless, and if on the terminals, the lamp emits a flickering light due to improper contact being made. The loss of acid also reduces the output hours of the accumulator. Other troubles are caused by disintegration and short-circuiting, when acid is used in liquid form.

Disintegration is brought about by the material being loosened or separated from the plates as a result of various causes, but principally sulphating and rough usage. Sulphating forms scales or blisters that are likely to fall off, thus reducing the amount of active material and the capacity of the cell. If the cell receives a hard knock, such as caused by a lamp falling on the pavement, the material on the plates falls off in a similar manner. Buckling also tends to disintegrate the plates. Contraction and expansion of the active material take place in normal working and are increased by excessive rates or limits of charging and discharging. Short-circuiting in a cell may be caused by conditions previously stated, and also by the collection of sediment at the bottom of the containing cell. Unless pure water is used to dilute the acid, the disintegration may also be assisted by impurities in the water, such as iron, etc. The "Ceag" Miners' Supply Company have devised many things to overcome these evils, such as a special flanged lid, a triple chamber gassing tube, and a screwed stopper was introduced, and all rubber plugs done away with, etc.—all these improvements being a decided advantage to the lamp. To further overcome, or rather to entirely eliminate these evils, the company has now introduced a dry accumulator, which will not only do away with spilling, but will also to great extent prevent disintegration. The new electrolyte used can be emptied into the cell, without removing the cell lid, in a liquid state, and after a period of about five hours it assumes a plastic form. The paste when put in remains in use without further addition for a period of about four months. Being soluble, at the end of the four months it can be easily washed out and renewed. Examination of the plates at the time when the paste is being renewed shows the plates to be in as good a condition as when first put in. One good feature of this cell is that the standard make of accumulator is in no way altered, saving that a solid substance is now used as the electrolyte. So much so is this the case that all that is required to alter acid to dry accumulators is to introduce the new electrolyte instead of the acid. The cell has now been in use for some time, and may be said to be out of the experimental stage. It has been found that, owing to the elastic nature of the new electrolyte, the positive and negative electrodes are in a much better condition at the end of six months than where acid is used.

FACTORY AND WORKSHOP WELFARE.

The following Order, to come into force on December 1, has been made by the Secretary of State in regard to ambulance and "first aid" arrangements at blast-furnaces, copper mills, iron mills, foundries and metal works:—

First Aid.

1. In every factory to which this Order applies, and in which the total number of persons employed is 25 or more, the occupier shall provide, in readily accessible positions, "first aid" boxes or cupboards in the proportion of at least one to every 150 persons.

The number of "first aid" boxes or cupboards required under this provision shall be calculated on the largest number of persons employed at any one time, and any odd number of persons less than 150 shall be reckoned as 150.

Provided—(1) that an ambulance room maintained in conformity with paragraphs 6, 7 and 8 of this Order may be counted as one of the "First Aid" boxes or cupboards required by this Order; (2) that the requirement of "First Aid" boxes or cupboards shall not apply to a blastfurnace if an ambulance room is provided and maintained as aforesaid.

2. Each "first aid" box or cupboard shall contain at least:—(i) A copy of the first aid leaflet issued by the Factory Department of the Home Office; (ii) Three dozen small size sterilised dressings for injured fingers; (iii) one dozen medium size sterilised dressings for injured hands or feet; (iv) one dozen large size sterilised dressings for other injured parts; (v) one bottle of eye-drops; and (vi) sterilised cotton wool.

Each "first aid" box or cupboard shall be distinctively marked, and if newly provided after the date of this Order shall be marked plainly with a white cross on a red ground.

3. Nothing except appliances or requisites for first aid shall be kept in a "first aid" box or cupboard.

4. Each "first aid" box or cupboard shall be kept stocked and in good order, and shall be placed under the charge of a responsible person, who shall always be readily available during working hours.

A notice or notices shall be affixed in every workroom stating the name of the person in charge of the "first aid" box or cupboard provided in respect of that room.

Ambulance Room.

5. In every factory to which this Order applies and in which the total number of persons employed is 500 or more, the occupier shall provide and maintain in good order an ambulance room.

6. The ambulance room shall be a separate room used only for the purpose of treatment and rest. It shall have a floor space of not less than 100 sq. ft., and smooth, hard and impervious walls and floor, and shall be provided with ample means of natural and artificial lighting. It shall contain at least—(i) A glazed sink with hot and cold water always available; (ii) a table with a smooth top; (iii) means for sterilising instruments; (iv) a supply of suitable dressings, bandages and splints; (v) a couch; (vi) a stretcher.

7. Where persons of both sexes are employed, arrangements shall be made at the ambulance room for their separate treatment.

8. The ambulance room shall be placed under the charge of a qualified nurse or other person, trained in first aid, who shall always be readily available during working hours, and shall keep a record of all cases of accident and sickness treated at the room.

Ambulance Carriage.

9. At every factory to which this Order applies and in which the total number of persons employed is 500 or more, the occupier shall, for the purpose of the removal of serious cases of accident or sickness, provide on the premises and maintain in good condition a suitably constructed ambulance carriage, unless he has made arrangements for obtaining such a carriage when required from a hospital or other place in telephonic communication with the factory.

INDIAN AND COLONIAL NOTES.**Australia.**

About £15,000 has been spent on preparation work on the State coal mine at Lithgow, but operations have been suspended in accordance with the policy of the State Government to cut out all works that are not absolutely essential at the present time.

The absurd nature of some of the stoppage of work at New South Wales collieries was recently demonstrated at South Bulli, in the Illawarra district, where the mine was thrown idle for two days owing to the men, whilst on their way to the pit, turning back on hearing that the wheelers were not going to work. It was a false report; but to make matters even, the wheelers, who felt aggrieved at this action on the part of the miners, did not put in an appearance on the following day.

With regard to high wages in Australia, it might be mentioned that at Fremantle (W.A.) coal lumpers coaled one vessel on a Sunday for which a rate of 5s. 3d. per hour was paid. The award rate from midnight on Saturday to midnight on Sunday is 5s. for cargo and 5s. 3d. for coal. From midnight on Sunday to 8 a.m. on Monday, the award rate is 3s. 6d. The vessel was held up owing to the lumpers demanding 4s. per hour for this period.

New South Wales Stoppages Considered.—In consequence of the numerous stoppages of work that have occurred in the coal mines of New South Wales, a specially convened meeting of the Federal Coal Board has been held in Sydney. The parties concerned were called together to discuss the stoppages in detail. The chairman stated that if such stoppages continued the existence of the Coal Board would become unnecessary and useless. The quantity of coal which is being received in various parts of the Commonwealth is not sufficient for necessary purposes, and the members of the Employees' Federation were asked to lay aside all consideration but that, providing work is entered upon on terms that were fair to them. The employers' representatives furnished a long list of stoppages. Many were occasioned by trivial disputes, one being caused by a man requiring a different horse to the one he had used the day before, and although his request was granted, the men would not resume work until the next morning. The representative of the Southern Colliery Owners' Association stated that from December to April 14 there had been 58 stoppages, and from April 14 to June 14, 47 stoppages. During July there had been 29 stoppages. In one case a mine was laid idle because a wheeler was dismissed for using abusive language to a mine official. A representative of the Employees' Federation said that any dispute between proprietors and men must be referred to the executive before action was taken, and should lodge take action on their own responsibility, the Federation proposed not to give them financial or moral support. If such a course is effectively pursued, it will mean that the majority of these vexatious stoppages will cease to exist.

Trinidad and Tobago.

Mining in 1916.—According to a Colonial Office report on the trade of Trinidad and Tobago, there were at the close of last year 10 companies engaged in the production of oil in Trinidad. Drilling to the extent of 58,390 ft. was carried out during the year, of which 27,555 ft. were in private lands and 30,835 ft. in Crown lands. Out of 47 wells drilled in 1916, oil was struck in 34. The total number of wells drilled in the colony up to December 31 last was 325, of which 161 have been sunk in Crown lands. The total output of oil during 1916 was 32,475,695 imperial gals., as compared with 31,666,396 imperial gals. in 1915. The amount of royalty paid by operating companies on oil won from Crown lands during the year was £7,865. The number of persons employed throughout the year in the oil mining and quarrying industries averaged 2,853. The amount of oil shipped for the use of the Admiralty during 1916 was 47,114 tons, of which 33,417 tons was fuel oil and 13,697 tons was crude oil. The crude oil only was shipped to the United Kingdom. Several refineries have been engaged in the manufacture of petrol, for which there is a large demand locally, as well as in some of the neighbouring islands. Kerosene has also been manufactured for local consumption. The large refinery mentioned in last year's report has continued the production of oil fuel, and another important company is now completing a refinery which will be capable of producing oil fuel to Admiralty specification, in addition to other by-products. The two companies engaged in mining for manjak (asphaltum) suspended operations during 1916.

Sir Richard Vassar Smith, chairman of Lloyds Bank, has been elected president of the Federation of British Industries for the forthcoming year, in succession to Mr. F. Dudley Docker, C.B.

ELECTROLYSIS UNDERGROUND IN MINES.

[SPECIALLY CONTRIBUTED.]

Every now and then attention is called by gas and water engineers to the fact that their pipes are subject to a slow, but very sure, process of deterioration, owing to the action of very small currents of electricity wandering about in the ground in which the pipes are laid. The effect of the currents is to eat away the substance of the pipes by degrees, the result being leakage of gas or water at these points, and the renewal of the pipes at a very much earlier period than would otherwise be necessary. It seems advisable to call attention to the fact that the same trouble may be looked for in mines where electrical apparatus is employed, and particularly underground. The corrosive action on gas and water mains is due to the fact that the return currents from tramway services flow out in all directions on both sides of the rails, and on meeting a metal pipe, or any metal buried in the ground, flow along it, until the electrical conditions are such that they leave it for some other conductor, or to find another path back to the generating station. It is where they leave the pipe that electrolysis takes place: a small portion of the iron of which the pipe is composed combining with the oxygen in the moisture present in the ground. The action is exactly similar to that which takes place in the case of the zinc rod in a Leclanché cell. Just as the zinc is slowly dissolved away in producing the battery current, so the iron pipe is slowly corroded by these small stray currents. As an instance of what goes on in the ground, it may be mentioned that the armour of cables carrying electric light and power currents in towns, and the iron pipes in which they are enclosed, where this system is employed, are subject to electrolytic action under certain conditions.

A point of very great importance in connection with the matter is, the pressure and current available to produce electrolytic action need only be very small indeed. Instances have arisen where differences of pressure amounting to only a small fraction of a volt, and currents amounting to only a small fraction of an ampere, have produced electrolytic action in connection with metals buried in the ground. The quantity of metal affected in a given time is very small indeed, but the continuous action often produces serious effects.

An Actual Case Underground.

An actual case that came under the writer's notice in the early days of the application of electricity to the lighting of mines will be of interest. At that time, old wire ropes were being used as conductors in a few mines, with very satisfactory results: the electrical pressures were very low, in the neighbourhood of 60 volts, so that the leakage currents did not seriously affect the lighting. In the particular case under notice, two old iron wire ropes were suspended on glazed earthenware insulators, on opposite sides of a main intake road, the insulators being supported by iron brackets, made by the colliery blacksmith, which were driven into the props. Very large ropes had been chosen, in proportion to the current they had to carry, and the lights worked all right, and the service at the end of the wire ropes was practically as good as at the pit bottom. After a time, however, it was noticed that the spiked iron brackets on one side of the road were gradually being eaten away; and these had to be replaced from time to time. The explanation of this was the existence of a small leakage current at each insulator, over the surface of the insulator, to the iron bracket, and thence to the wooden prop. This leakage current acted upon the iron brackets exactly in the same manner as the current passing through a Leclanché cell acts upon the zinc rods, and as the stray currents in the neighbourhood of tram lines act upon gas and water pipes.

Underground Electric Power Services.

A method of distributing electricity underground in mines that has been largely and successfully employed in Scotland will further illustrate the matter. In these services, the outer conductor of a concentric system forms the return, the conductivity of the iron armour being sufficiently increased to reduce its resistance to that of the copper conductor that would have been employed with the usual insulated concentric system. The arrangement is a very good one, inasmuch as it attains the ideal of the Home Office rules: it completely encloses all the live conductors within a metallic screen that is permanently connected to earth, by means of a conductor that must be continuous or the service cannot go on. The outer conductor is, of course, connected to earth on the surface, according to the Home Office rules. It will be seen at once, however, that this system is exactly similar to that of the town tramway service, but that the difference of electrical pressure between the farthest end of the distribution system and the earth system on the surface, is usually very much greater than is allowed in tramway services. Taking the case of a 500-volt service, and allowing a 10 per cent. drop between the generator and the farthest end of the distribution service, the difference of pressure between the farthest end of the outer conductor and the earth may be as much as 25 volts. The outer conductor in this case is encouraged to make all the earthing it can, quite apart from its earth connection at the surface; or, at any rate, no care is taken to prevent its making earth; and it follows that the outer conductor will touch various objects in its course—pit props, and other objects that are in more or less conductive connection with the rails of the haulage road and with other metals, the haulage rope, etc. Whenever there are two such connections made between two objects on the road, such as two props and the outer conductor of the cable, a current will pass out from the point farthest in-by, where the cable is in contact, to the object with which it is in contact, usually from that to the rails, and from the rails, through the second

object, back to the outer conductor. And where the current leaves the outer conductor, a certain amount of electrolytic action will take place, the armouring, etc., being oxidised in proportion to the current passing; and where the current returns to the outer conductor, as it leaves the rails, etc., it may have been flowing through, electrolytic action will again take place at the surface of the metal it leaves, once more in proportion to the current flowing. Furthermore, since the current flowing through the rails meets a resistance at each rail joint, a certain amount of electrolytic action will be set up at the out-by end of each pair of rails, and possibly at the sleepers where steel sleepers are used. In a large distribution system there may easily be many of these branch circuits, and many anodes, and consequently a good deal of electrolytic action at various parts of the system. The existence of electrolytic action will, of course, depend upon the presence of moisture in the atmosphere of the mine, in the pit props, in the coal dust in which the rails lie, etc., but a film of moisture lying on the conductor will probably be sufficient for a certain amount of action to be set up.

Ordinary Continuous Current Power Service.

The ordinary continuous current method of distribution, in which both conductors are insulated, differs considerably in this respect from the system with uninsulated outer. The ordinary continuous current service may have its cables arranged in three ways: on the concentric system, the outer conductor being insulated, and the cable armoured over all; the two conductors may be separately insulated and arranged on the lines of the twin cable, the two cables being insulated outside of all, and then armoured over all; or the two conductors may be separately insulated and separately armoured. It may be noted, *en passant*, that the feeling in coal mine management is very strongly in favour of armoured cables everywhere, except for trailing cables for coal cutting machines or dip pumps; the idea is the same as mentioned above: the completely enclosing of all live conductors within a metallic screen, which is connected to earth. The Home Office show a decided preference for the use of the armour of cables for making the earth connection all through the system, and they have laid down very stringent rules about the conductivity of the armour, and for its maintenance. With either of the continuous current systems, in which armour is employed, and is connected to the earth system on the surface, there will be a certain amount of current always passing through the armour, due to leakage. Even under the very best conditions of working, leakage currents always pass through the insulating envelopes of lighting or power cables; and these currents will naturally find their way through the armour to the earth system on the surface, to which, according to the Home Office Regulations, the armour is connected. This means, again, that there is a fall of pressure between the in-by end of the distribution service and the earth system on the surface, though it will usually not be as great as with the uninsulated outer. In addition to the ordinary leakage that is present under the best conditions, colliery cables, as is well known, are particularly liable to leakage due to partial faults, failures of the insulating envelope; and these leakage currents will also find their way back, to a certain extent, at any rate, through the armour to the earth system, and will increase the difference of pressure between the in-by and out-by ends of the armour. As with the uninsulated outer system, if the armour touches any two objects, current will pass out from the armour through these objects, through the rails, etc., back to the armour; and both with the uninsulated outer and the ordinary continuous current system, if the armour only touches one object, such as a prop, through which a leakage current can find its way to the rails, electrolytic action will be set up at different points in the rails, and at points in other metallic objects through which this leakage current flows on its way to the earth system.

Three-Phase Distribution Systems.

In large modern collieries three-phase extra high tension services have become practically the rule, 3,000 volts being the usual pressure, the currents being delivered at that pressure to long distances in-by. At first sight it would appear as if the use of alternating currents would eliminate the possibility of troubles from electrolysis, but a little consideration will show that this, unfortunately, is not so. The behaviour of three-phase alternating current, when flowing through three-cored armoured cables, is very complicated indeed. The three currents are supposed to be so arranged that the algebraical sum of their pressures at any instant is nil; but, in practice, this is very rarely realised. A little extra resistance, or little extra induction in one phase, will upset the balance, and these extras are very liable to occur in mining work. In addition to this, it frequently happens in mining work that one phase is inoperative, owing to the failure of one conductor, the currents in the other two phases doing the work. Moreover, each cable forms a condenser between itself and the armour, and between itself and each of the other conductors, these condensers being charged and discharged during every period. Another point is that the ideal sine curve is very rarely obtained in the three phases of a three-phase service; and when there are not three perfect sine curves, harmonics supervene, which again tend to upset the balance. The net result is that, as has been shown by actual measurement, there is nearly always a resultant continuous current flowing through the armour, and, of course, finding its way to the earth system. Where the neutral point of a star-wound three-phase system is earthed, the tendency for a resultant continuous current to flow through the armour will be increased. This current would be more variable, and the direction of its flow will be sometimes out-by, and sometimes in-by; but it will tend to set up the same electrolytic action as in the other cases, when the armour comes in contact with metallic or other objects.

Remedial Measures.

It may be thought at first that this electrolytic action does not exist. The same idea prevailed in connection with tramway services, and it was only when the matter was traced right home that the trouble was appreciated. Questions of this kind are always obscured by the fact that the results are not seen for a long time, except by very observant eyes, and then it is usually very difficult to follow the connection between cause and effect.

There is one, and only one, method of meeting the trouble; but in applying it, the colliery electrical engineer is, to a certain extent, in a better position than either the tramway engineer or the gas or water engineer, in that he has the whole thing under his hands. The writer suggests that the trouble will be met by the aid of a low-reading voltmeter and some pieces of stout copper wire for bonding. Careful measurements should be taken between every part of the armour of the colliery distribution system and every part of the rails, and any other conductors in the neighbourhood; tests should also be made between different points in the rails, and particularly on the two sides of sleepers. These observations should be recorded, and should be repeated periodically, just as insulation tests are now; and where there is an appreciable difference of pressure between any two metallic surfaces, they should be bonded together as carefully as possible by stout copper wire. Careful observation should also be maintained upon the metal surfaces between which difference of pressure exists; and at the first sign of electrolytic action, bonding should be carried out, if it has not been done before. If, after bonding, electrolytic action is still seen, though possibly lessened, the bonding should be improved.

In considering the whole matter, it should be remembered that electric currents do not follow the paths provided for them in the copper or iron conductors alone; they will flow through any path that is open, and will strictly obey Ohm's law, and the laws of induction where they apply. Wherever a difference of pressure exists between two metal surfaces, and there is a path between them, a current will flow through that path, and will set up chemical action when the conditions are favourable, as they nearly always are in a mine.

MINERS' WAR WAGE.

The Coal Controller, whose amended offer of 1s. 6d. a day for colliery workers over 16 years old and 9d. a day for workers under that age was accepted by the Miners' Federation of Great Britain on September 27, in settlement of their demand for a 25 per cent. all-round increase of wages, has now arranged with the executive of the Federation the conditions which are to govern the payment of the increase. The terms of the agreement are as follow:—

The war wage is to be paid as from September 17 last.

A worker who has received on or since March 1, 1917, any war advance to meet the increased cost of living in excess of an aggregate of war advances amounting to 12s. a week, is only entitled to the war wage of 1s. 6d. (or 9d.) after merging therein any such excess granted on or since March 1, 1917.

A worker who is prevented from doing his ordinary work by some accident or difficulty occurring in his place, or by the absence of another worker without whom he cannot work (such as the case of a collier with his drawer, trammer, haulier, or other helper, or the reverse case), and is offered other suitable work during the day in the pit in which he is employed, together with payment customary in the district for such substituted work, but refuses it, is not entitled to the war wage for that day.

If a worker through his own fault is voluntarily absent from his work during any part of his shift, he is not entitled to the war wage or any proportion of it for that day unless, with the permission of the management, and within the limits of the law regulating coal mines, he makes up the time so lost in the same week.

The war wage is intended only to meet the increased cost of living, and is not therefore payable for overtime, except in so far as it is otherwise provided in the circular of October 3, or in this circular. Where, however, a worker has been called upon, owing to a breakdown or other emergency to work such overtime that he is not reasonably able to work on the following day, his absence shall not disqualify him from receiving the war wage for that day or for the customary full week's work if he would otherwise have qualified for receiving it. If a man work on seven days in any one week he will receive his war wage for seven days.

To qualify for the war wage as for six days where the customary number of days worked at any colliery or by any class of workers at a colliery in the week is less than six days, it is necessary that the worker should have been ready and able to work all the customary days, and for the whole of each customary day, otherwise he will lose the war wage for the sixth day as well as for the day on which he is absent.

Where the work of the pit or any part of it is stopped owing to weather conditions making it impossible to carry on normal operations, the war wage is due to such workers as are thereby prevented from working. This does not apply to cases in which weather conditions may prevent the arrival of a worker at the colliery premises.

On any day on which a colliery is temporarily idle on account of a breakdown of machinery or other accident, or in order to effect repairs, all workers otherwise entitled to it must be paid the war wage of 1s. 6d. (or 9d.) for each day on which the pit is idle.

When the colliery is stopped from causes other than strikes, attendance at the colliery on the day of the stoppage is not necessary to entitle a worker to the war wage in cases where he may be otherwise entitled to it. But when a worker is voluntarily absent both on the day before and the day after a stoppage of one

days occurring otherwise than through a strike, the war wage in respect of one (but not more than one) of the days of such stoppage. It is to be proved that he was ready and able to work on one of the days of such stoppage. In any day the customary shift is less than a full day, attendance for that shift entitles a worker to the full day's war wage of 1s. 6d. (or 9d.).

The war wage is not to be taken into consideration in determining whether a workman has earned the minimum wage or not under the Coal Mines (Minimum Wage) Act.

Where the price of house coal to workmen varies with the rate of wages paid, the war wage is not to be regarded as a rise in wages for that purpose.

When the colliery is idle men who obtain paid employment elsewhere are not entitled to the war wage for the days on which employment is so obtained.

The war wage does not apply to managers, under-managers, overmen, back overmen, or enginewrights. Instructions have already been issued to colliery owners as to deputies, firemen and examiners, and clerical staffs.

Workers at colliery brickworks, manufacturing bricks from material mined at the colliery, are colliery workers within the meaning of the circular of October 3, and entitled to the war wage.

Persons employed by collieries on agricultural work or other industries not directly connected with colliery operations are not entitled to the war wage. Colliery carters and motor lorry drivers employed by the colliery in hauling timber and other colliery material or in delivering house coal direct from the colliery to colliery workmen or others are included in the scope of the war wage, but not other workers engaged in the delivery of coal.

Bona fide colliery workers temporarily employed by a colliery at other than colliery work, for instance, on farms or in felling and cutting timber, do not lose the war wage as the result of such temporary employment.

Men in receipt of compensation and doing light work are entitled to the full war wage when earned.

Colliery washery men are included in the scope of the war wage, but coke oven washery men must be dealt with in accordance with the instructions of the Ministry of Munitions.

COMPARATIVE VALUES OF HAMMER DRILLS.*

In the selection of a hammer drill, the essential points to be considered are its drilling performance and its resistance to wear and tear. With regard to the former, it is a mistake to attach undue importance to the consumption of air alone, which, in itself, signifies nothing. It is not unusual to hear of cases where, with a compressor of 20 cu. m. capacity, preference is given to a hammer drill which consumes 1 cu. m. per unit over one consuming 1½ cu. m., because the former is considered more in accordance with the capacity of the compressor.

On the other hand, to judge solely by the drilling speed is another error to be avoided, even if that speed be proportionate to the consumption of air. For instance, a hammer X has a drilling speed of 20 cm. per minute, and another hammer Y will drill at the rate of 27 cm. for the same time. The conclusion generally drawn will be that Y is the better tool, because, to get a performance equal to that of X, it would suffice at first to drill at the rate of 25 cm. per minute; therefore at 27 cm. it is superior, and each cubic metre will give a performance 8 per cent. higher with Y than X.

This reasoning, though broader than the preceding, does not take into account all the factors that go to determine the actual comparative value of the hammers. Admitted that this speed may be maintained for the first three minutes, will it continue for the three following? Will not the respective positions of the two hammers be reversed? And how will they stand with regard to their respective working returns at the end of the first hour, day or shift? It may naturally be asked how such an irregularity in movement and performance can exist where the conditions are perfectly equal. The answer is simple—namely, that the daily performance depends on the weight of the hammer and on the extent to which the vibrations and shock produced by the hammer affect the operator.

In drilling vertical (downward) holes the weight of the hammer is of no consequence, a heavy tool being an advantage, if anything; but in drilling on the level or at a certain angle, in which the weight of the hammer has to be supported wholly or partially by the miner, every additional pound is a handicap and spells a diminution in the worker's output.

Easy handling, in other words, the more or less complete freedom from vibration, is therefore of primary consideration, the reaction of the hammer being very tiring to a workman, even though he has been long accustomed to the use of such tools.

As a further illustration, take the case of three hammers, X, Y, Z: X, as already stated, drilling at the rate of 20 cm. a minute, weighs, say, 30 lb., and sets up fairly strong vibrations; whilst Y, doing 27 cm., will turn the scale at 32 lb. and produce very heavy vibrations. Z, which is a light hammer, weighing 26 lb., does only 25 cm. per minute at the start, and consumes, perhaps, 1½ cubic metres of air. It would therefore appear to be inferior to the other two; but throughout the day its initial rate of 25 cm. will not fall below 20 cm., whereas that of Y will be reduced to an average of 12 cm., and that of X to an average of 13 cm. at the most. Which hammer of the three is the most efficient? Assuming 7 h.p. per cubic metre, X will have cost, say, 7 fr. for drilling 78 metres, which is equal to 105 fr. per metre. With Y, the cost will be 8.75 fr. for 105 metres. With Z, 10.50 fr. for 105 metres.

* *Echo des Mines.*

In comparing X and Z, where the difference in cost is scarcely appreciable, it must not be forgotten that the linear drilling power of Z will be 50 per cent. higher than those of X. And, besides the ¼ c. per metre represents on 120 metres, a saving of 30 per cent. per day to be added to the saving in wages, which amounts to 34 per cent., as the operator will be able to do one-third more work. Putting the wages at 6 fr. per day, then the saving will amount to 2.30 fr. per day—or, say, 60 fr. per month; so that with ten hammer drills there would be an advantage of 600 fr. per month, or over 7,000 fr. (£280) per annum.

Another important factor in deciding the economic value of a hammer is the yearly cost of repairs and the length of time it is out of use for that purpose. In this respect the figures will vary with the make of hammer. Suppose, for instance, X or Y each cost 100 fr. a year, and Z, of superior manufacture, only 20 fr. for the first year's use. This difference of 80 fr. is far from representing the total saving effected by the use of Z in preference to the others, for X or Y will also have had to lie idle for about five days, if not more, for repairs and new parts every month. If we assume that, following the same proportion as in the cost of repair, Z will be in hospital only one day per month, it will have done four days' extra work on that time. Now, at 7 fr. per day, X will have lost 35 fr. per month in idle time as against 10.50 fr. in the case of Z: a difference of about 25 fr. per month, or 300 fr. per year, in favour of the latter. Thus, taking all the items into account, the use of Z would save 380 fr. per year in comparison with X, and still more as compared with Y.

THE AMERICAN COAL TRADE.

The movement of bituminous coal still continues to be almost entirely a matter of contract obligations entered into before the Government fixed the price at 2 dols. Since the fixing of the coke price at 6 dols., it has been anticipated that prices of bituminous coal would shortly be changed in an upward direction. It is still thought that prices must shortly be established sufficiently high to stimulate production to its maximum (says the *Coal Age*, October 6). It is rumoured in certain quarters that it is the deliberate intention of the Government to compel certain industries to shut down, thus, in a measure, relieving the fuel situation. It is thought also that the embargo on shipments to Canada will have a certain effect in loosening up the present stringency. The railways are unable to handle a larger tonnage of coal.

Pocahontas and New River at Hampton Roads are substantially unchanged. It is next to impossible to buy spot coal.

All the coal companies with headquarters in Baltimore report troubles among miners. There has been talk of the Government allowing a revision upward of the soft coal prices at the mines, and then endeavouring to get the operators to agree to certain wage increases. Coal men predict that such action would do little toward stimulating production.

The adjustment of the price of anthracite pea coal downward, and the fixing of margins allowed to dealers, have exerted a decidedly disquieting influence. Many retailers complain that the margins allowed are not sufficiently large to permit them to do business.

Philadelphia reports state that steam sizes have gained in demand and price. Pea sizes are in accordance with the Government Order—3 dols. 40c. per gross ton f.o.b. cars at the mines.

The commandeering of boats is not confined to steamers; it is operative with sea-going tugs as well, and therefore seriously affects the movement of barges.

LETTERS TO THE EDITORS.

The Editors are not responsible either for the statements made, or the opinions expressed by correspondents.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

As replies to questions are only given by way of published answers to correspondents, and not by letter, stamped addressed envelopes are not required to be sent.

ROPE HAULAGE IN MINES.

SIRS,—We have a road dipping 1 in 3, about 670 yds. long, with several sharp turns in it. Do you think that it is possible to work an endless rope haulage to advantage?

October 29, 1917.

UNDER-MANAGER.

[We have received from Our Engineer the following reply to the above query:—There is no practical difficulty in operating an endless rope haulage on a road dipping 1 in 3 and with several sharp curves, but we question very much whether it would not be cheaper both to instal and operate either a main-and-tail or single-rope system and run the tubs in sets. The advantages for and against the two systems should be very carefully considered. ED. C.G.]

The position of certifying surgeon under the Factory and Workshop Acts at Bangor, Down, is vacant.

Messrs. William Firth Limited, iron and steel and machinery merchants, Leeds, have purchased the goodwill of the business of machinery and plant merchant conducted by the late Mr. John Conway at the Royal Exchange Chambers, Leeds, with a view to amalgamating the same with their own machinery department.

Researches on Tin and Tungsten.—The Ministry of Munitions has arranged a conference at the Hotel Metropole, Whitehall-place, S.W. 1, on Wednesday next, at 2.30 p.m., to consider proposals for the establishment of a Research Association for improving the processes of extracting tin and tungsten. It is suggested that owners of tin and tungsten mines should contribute to a central research fund, supplemented if necessary by a grant from the Committee of the Privy Council. The Department has issued invitations to all the chief producers of tin and to a number of other gentlemen interested in the matter.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Shortage of Doctors—Compensation for Owners—Value of "Tramp" Steamers—New War Wage—Colliery Assessments.

At Pontypridd Police Court, a collier made a claim in respect of loss of work due to bad ventilation at the colliery, and he was represented by the Federation solicitor. The man stated that he had been unable to follow his employment on four days; and Mr. May, mines examiner, said that when he visited the colliery on July 19, and (after inspection) called for the book to enter his report, he was told by the proprietor, who acted as his own manager, that he did not have the particular book asked for. The ventilation was very unsatisfactory. In defence, it was alleged that the condition of things was due to men absenting themselves from work so frequently; and that on the particular day the examiner visited the colliery a fall had interfered with the ventilation. Judgment was given for plaintiff; and a similar decision was recorded in two other cases.

The same defendant was sued by a haulier, who had first been engaged at the pithead and afterwards sent underground. As he refused to return to work on the surface, he had not been allowed to work underground for three days, and he claimed damages for those three days. In this case, judgment was given for the employer.

The South Wales Siemens Steel Association has appointed Mr. Lewis Jones, of Ammanford, to be their secretary.

The conditions of the coal trade, which has been brought so prominently into public notice by the introduction of the Bill for compensation to coal owners, form the subject of very keen discussion on 'Change. Not only have those in the trade the restriction of prices, but there is also the varied operation as regards different markets in the case of the 2s. 6d. advance; then there is the successive advance of wages which the Controller has granted without regard to market prices—these grants foreshadowing the probability of practical subsidy to the trade. Again, the coal owner has to face the complicated conditions of securing a profit where his output is restricted by lack of tonnage or similar circumstances; and even when he is fortunate enough to work the undertaking at a profit, he is allowed only 5 per cent. of any excess above the pre-war standard, whereas in other industries the operator is allowed 20 per cent. The decrease in exports has a very serious effect upon the money market, directly affecting the rate of exchange to an extent which scarcely any other industry experiences. These are only one or two of the more serious points that have to come under discussion.

As further evidence of the huge value attaching to "tramp" steamers engaged in the coal trade, attention should be drawn to the transfer of the Hain vessels, which are being purchased by the Peninsular and Oriental and British Steam Navigation companies on the basis of £80 for each £10 share, and this notwithstanding the fact that those shares were dealt with so recently as last week at a price of £34. The capital involved will be close upon four millions sterling; and, in addition to the £80 per share, the purchasing companies will make compensation to directors and managers. The Hain Steamship Company owned at the outbreak of war nearly 40 steamers, and since have lost or sold 20, but have acquired one new boat and also the control of three Danish steamers. All of them are of a large size, and the total carrying power exceeds 150,000 tons. The company has paid recent dividends of 35 per cent., as well as added very largely to its reserves. It should be mentioned, in regard to the price paid, that the purchasers will acquire about £1,750,000 accumulated funds of the Hain Company, besides other large sums in cash, as well as the steamers.

On behalf of the coal owners, a statement has been issued by Mr. Gibson, secretary, in answer to Mr. Vernon Hartshorn, who condemned a circular issued by the Coal Owners' Association to its members concerning payment of the new war wage. Mr. Gibson points out that they were not consulted by the Controller with regard to concession of the recent advance of 1s. 6d. per day, the negotiations having been carried on exclusively between Mr. Calthrop and the Miners' Federation, and when the decision of the Controller was communicated to the Coal Owners' Association, "it was with such vague directions as to its application that there was hardly a colliery company in the coal field which knew exactly where it stood under the decision." The increased wage, although determined on October 3, was made retrospective from September 17—a circumstance, which accentuated the necessity for immediate instruction on doubtful points. Within a few days over 200 letters were received at the office of the association asking for instructions; and, in the absence of a statement of interpretation from the Controller, the issue of the circular referred to became urgently imperative. Answers given in that circular to questions asked by colliery managers were necessarily subject to confirmation or otherwise by the Controller, and its provisional character in this sense was clearly understood by every colliery manager. It provided a temporary *modus operandi* for payment of the war wage advance, and doubtless facilitated arrangements where otherwise there might have been confusion and friction. The companies, Mr. Gibson emphasises, were requested to pay the advance on Friday; and he states that if instructions had not been issued, the confusion would have been a hundredfold greater than that due to any possible misinterpretations. The directions of the Controller were received at the offices of the association only on October 25, and, in the majority of cases, they confirmed those previously given in the coal owners' circular. Mr. Gibson asks: "Does Mr. Hartshorn question the right of the association to advise its members?" He states that the association has no knowledge of the existence of "bitter resentment" and "serious unrest" alleged by Mr. Hartshorn; for in not a single case has an official complaint been communicated to the Conciliation Board, and, under similar circumstances in the future, "the coal owners could follow no other course than that which they have adopted on the present occasion."

Mr. Gibson deals with another matter which has been raised by Mr. Hartshorn, who, he says, challenges the right of the coal owners to give notices terminating the contracts of workmen owing to the closing of a particular district or districts of a colliery; and he states: "There is no coal owner who would avoidably dispense with the services of any workmen necessary to the production of coal; but when trade is bad, and revenue correspondingly reduced, where does Mr. Hartshorn suggest that the money is to come from to pay wages? The coal owners owe it no less to the State than to themselves to work the collieries as economically as possible, and they are simply pursuing that course when they are managing the collieries according to the prevailing conditions of trade."

The old Cyfarthfa Steel Works at Merthyr have had the blast furnaces re-started after an idleness of over 10 years. This is a matter of considerable rejoicing in the district, as already about 100 additional men have been taken on.

The question of colliery assessments, as to which the miners are taking very active steps, was raised at a meeting of the Newport Board of Guardians on Friday of last week by one of the Labour representatives, who is a colliery checkweigher. The subject came up at the close of the meeting, when "any other business" was the item of agenda which had been reached. He stated that he had applied to the Assessment Committee for a copy of their agreement with colliery companies; and after a second application, had been informed by the clerk that they would consider it a breach of confidence to supply him with the information. He, however, considered that, as a member of the Board, he was entitled to be informed. The chairman of the Board, in reply, said that the Assessment Committee was a statutory body, to which the Board had delegated all their powers; and that, in his opinion, the information could not be given. The applicant, however, retorted that in other unions such information had been supplied, and that the assessments of collieries were causing considerable discontent. He knew the output, and wanted to know what was the amount per ton paid; and that if the information were not supplied him, he would raise the matter with the Local Government Board.

It is anticipated that further colliery developments will take place in the district of Llansamlet, near Swansea, a good taking having been secured by a strong local syndicate in the neighbourhood of Bonymaen.

The Glamorgan Insurance Committee has had before it a statement as to the serious condition of affairs which exists on account of the calling up of doctors in the mining area; and they are urged to take such steps as were practicable in order to ensure that the medical men should not be taken away until substitutes had been provided. A letter to the committee, at their monthly meeting, stated that their action was invited in order "to avoid the necessity of the workmen taking definite and drastic steps." The chairman of the committee pointed out that this was a matter for the doctors' tribunal. It was stated that in the Pontardulais district only two doctors had been left for a population of 12,000, and one of those was likely to be called up.

On Swansea Exchange this week, a proposal has been discussed as to pooling profits, and at a meeting on Tuesday the subject was dealt with by the coal exporters concerned, about 100 being affected. Under the present system of grouping orders and allocating shipping, there has been distinct loss to a section of the exporters, while individuals may have profited; and the idea is that by some system of "pooling" there shall be an equality of sacrifice and something approaching a fairer division of profits, the basis of distribution being similar to that which the Controller has established with regard to the collieries, namely—a pre-war standard of business. No operative decision has yet been arrived at, but the idea seems to be generally favoured.

Mr. Ivor Parry, of Pontypridd, has been appointed legal adviser in the Coal Controller's Department, he having an intimate knowledge of conditions which prevail in the South Wales coal field by reason of professional experience in that district, where he has been engaged in important cases. His appointment is honorary, although so responsible. It is understood that he will give special attention to the "standard" of coal owners' profits, and that part of his duty will be to represent the Controller when appeals go to the Board of Referees under the Agreement.

Cardiff coal exporters on Wednesday agreed to a "pooling" scheme regarding coal exports to Italy during the war. Draft rules were submitted and adopted, the chief points being that six of the largest exporters were appointed to carry out the business on a fittage of 1½d. per ton. The sums received into the pool, it was agreed, would be divided quarterly in proportion to the firm's percentages of exports, actual shipments, from January 1913 to October 1916.

Swansea shipments of coal and patent fuel last week were not at all satisfactory, the total being just over 56,000 tons, of which less than 43,000 tons were coal. Taking the whole of the port, and including tin-plate and other business, there was a falling-off of 13,000 tons as compared with the preceding week, and 24,000 tons in comparison with the corresponding week last year.

Northumberland and Durham.

Carbon Monoxide Poisoning—Darlington Prices—Housing Problem—Allocating Business to Collieries.

The Newcastle Food Vigilance Committee—an organisation consisting of representatives of trades unions and other Labour and Socialist bodies which has been formed to "keep an eye" on the Food Control Committee, so as to safeguard consumers' interests—has had the coal supply question under its consideration, and suggests that the Food Control Committee should obtain power from Newcastle Corporation to establish municipal coal depots in the neighbourhood of the various tram termini, and, if considered desirable, at other points on the tramway routes, and that the tramway system should be used to carry the coal to these depots. It is suggested, further, that the local co-operative societies having branches in the city should utilise any spare space at their shops to store coal in sacks, so that members running short of fuel may tide over the emergency by fetching a sack for themselves from the nearest branch. Further, the Vigilance Committee suggests that the local Control Committee shall fix maximum prices for the various grades of coal at once.

The question whether carbon monoxide poisoning in the mine comes within the scope of the Workmen's compensation Act, was argued at Durham County Court on Monday, when Mrs. Brett, widow of a Hamsteels miner, brought an action against the Owners of Hamsteels Collieries for £300 in respect of the death of her husband. It was stated that Brett died from pneumonia as a result, it was contended, of having been poisoned by the inhalation of carbon monoxide in the mine. For the defence, it was submitted that Brett did not inhale the gas during his employment, and that, even if he did, it was not an accident within the meaning of the Act. The judge reserved his decision on the question of whether there was an accident.

The Darlington Coal Control Committee has decided to fix the price per ton at 6s. 6d. per ton above the price for 1913, and has appointed a sub-committee to draw up a list of the prices of the various coals. It was intimated that the agents did not intend to charge at a higher rate per ton for quantities below one ton. The committee resolved to ask the coal owners to give dealers a rebate of 1s. 6d. per ton so that the coal could be sold at as low a price as possible to small consumers.

The housing problem in colliery districts of Durham county is being much discussed, with a view to remedial action after the war. At a meeting of the Chester-le-Street Urban District Council, it was stated that 430 additional houses were required in the district. If the colliery companies at Pelton Fell and Chester Moor provided for the requirements of their own villages, the number of houses required to be provided by the Council would be 217. A report embodying these facts was directed to be forwarded to the Local Government Board. At Lanchester Rural District Council, it was reported that 200 houses were needed at Craghead, 50 at Esh, 50 at Ushaw Moor, 150 at Langley Park, 30 at Hamsteels, and 100 at Burnhope—a total of 580. If reasonable financial facilities were given by the Local Government Board, the Council was willing to undertake the erection of 330 workmen's houses. The types of dwellings needed were houses of four and five rooms and two-roomed houses for small families.

Whilst Ralph Young (38), was assisting in operating an electrically-driven coal cutting machine in Eldon Colliery, he was caught by the picks and dragged round the jib. His left arm and foot were torn off, and his other leg badly damaged. The accident happened, according to Wm. Pincher, who gave evidence at the inquest following Young's death, owing to the engine "kicking" back. That always happened, and explained the reason for Young holding the stay as he was doing at the time. Up till then, the stay had always kept the engine in its place. Young could not get into any other position than that in which he was to hold the stay, although it was a very dangerous position to be in. Three men worked the machine. Young had worked at it for a considerable time. Witness had a contract at so much per ton of coal, and deceased was acting as his partner at the time of the fatality. The only safe way of operating the machine was first to make a cut into the face of the coal with a pick, and not with the machine. A verdict of "Accidental death" was returned.

The executive committee of the Northumberland Miners' Association recommends the lodges to sanction a donation of £50 in support of the project of the Woodhorn miners to erect a memorial to the 13 workmen who lost their lives through the explosion at Woodhorn Colliery in August last year.

Mr. G. J. Wardle, M.P., has informed Mr. J. W. Taylor, M.P. for Chester-le-Street, that the question of distribution of trade in Durham and Northumberland among the different collieries has, for some time, been engaging the attention of the Controller of Coal Mines, and that something has already been effected in the way of allocating trade to collieries which have been losing time, so far as such collieries have been capable of supplying the qualities of coal required. The matter is still receiving consideration.

According to a local paper, the poor pressure of gas from which Alnwick residents have suffered recently is due to the Gas Company being obliged by the Government control to use Northumberland coal, which does not yield the same quantity of gas as the Durham coal which the company has hitherto used. Efforts, says the newspaper, are being made to induce the Controller to relax the Order.

Cumberland.

A development is taking place on a portion of the old Dearham royalty. Two drifts, which were closed some years ago, are being re-opened, and a new company, called the Birkby Coal Company Limited, has been formed and registered, with a capital of £5,000 fully subscribed, to carry out the scheme. The new pit is in close proximity to Dearham Bridge Station, and connected with the main line of the Maryport and Carlisle Railway. One of the drifts has already been opened out, and an excellent seam of coal about 2 ft. 6 in. has been reached, and at present between 80 and 100 tons of coal per day is being raised. Up-to-date plant is being erected, and more will shortly be installed, and it is believed that the output will be very considerably increased before the end of the year. The second drift will also be opened out as soon as possible. Mr. Richford, late of the Camerton Colliery, has been appointed manager of the new pit. It is a matter for surprise that so little attention has lately been given to the Dearham royalty. In the 70's Dearham was one of the most important mining villages in the county. Apart from Whitehaven, the Dearham royalty is probably one of the best in Cumberland, and a very large area on the north-east side extending down to the River Ellen at Birkby Mill remains undeveloped. The Lonsdale pit at Dearham, which gave employment to over 250 hewers, was closed in 1894, and since then the bulk of the miners in Dearham have had to secure employment at other pits several miles away. An attempt to resuscitate the industry in the village was made in 1895 and 1896 by a local co-operative society, but the project eventually failed owing to lack of capital. The news has created the liveliest satisfaction in the village, and it is hoped that the new venture will be successful. Already a number of men have secured good employment, and as soon as both drifts have been opened out, places will be found for a good many more.

Yorkshire.

Unpatriotic Absentees—Goole Shipping—Yorkshire Mining Electrical Engineers.

Strong comment was made upon the unpatriotic conduct of certain Yorkshire miners, when, at the Barnsley Police Court last week, the Wharfedale Silkstone Colliery Company claimed damages from seven men for neglecting their work. The sums ranged from £8 up to £23, but in each case were reduced to £10 to bring the men within the jurisdiction of the court. The men had been absent from nine to 15 days. Defendants were ordered to pay the amounts claimed.

The Goole Chamber of Commerce and Shipping is perturbed over the decline in prosperity of the town. At a meeting last week to consider the better utilisation of the coaling port, and its industrial development, the great advantages which the adjoining coal fields offer to Goole was demonstrated. It was reported there had been considerable correspondence with all the collieries serving the town, both by rail and water, and with all the coal exporters using the port. In three years the population had fallen from 22,000 to 16,250, and trade values, which were £20,419,000 in 1915, had fallen to £7,450,529 in 1916. Sir Joseph Compton Rickett, M.P., pointed out that Goole is particularly favoured by the development of coal fields in its immediate neighbourhood, which coal, apart from export, could be used for manufacturing work. The present position, he thought, was only temporary, and he suggested efforts should be made to secure new industries. It was pointed out in the discussion that ships came from France to Goole and then went to other ports to load coal, which could just as easily have been shipped at Goole.

Mr. Arthur Bromley, manager of the Batley Corporation gas undertaking, has been appointed local coal control executive officer.

A meeting of the Yorkshire branch of the Association of Mining Electrical Engineers was held at Wakefield on Saturday. Mr. R. Holiday, in his presidential address, expressed his satisfaction at the good work the association and that branch were still accomplishing, in spite of the increasing difficulties of the time. The value of such associations would become greater as time went on, for it was already clear that scientific knowledge would play a very important part in after-war reconstruction and developments. Members of such associations, in studying the problems affecting such reconstruction, would not only be doing their employers and themselves a service, but would have the satisfaction of knowing they were also rendering an invaluable national service. The immediate urgent necessity was to effect economy in every possible direction. By economy he meant not only the actual avoidance of waste—vital as that was—but every man connected with collieries should not hesitate to point out to those concerned where greater efficiency and economy could be secured, even if it meant the scrapping of existing material or plant. In the use of materials it should be remembered that these represented the labour of some man or woman, and, therefore, any waste was in effect the wastage of life-blood. By attention to such details, members of such an association might increase enormously their usefulness, even if they were not individually called upon—as some of them had been—to give the Government the advantage of their technical knowledge, skill, and experience. A paper on "The Installation and Maintenance of Underground Plant" was then read and discussed.

Lancashire and Cheshire.

It was announced at the beginning of this week that the maximum prices fixed by the Salford Coal Supplies Committee are from ½d. to 1d. per cwt. less than for the corresponding classes in Manchester.

Notts and Derbyshire.

At the half-yearly meeting of the Mansfield Railway Company last week, it was stated that the work in connection with the Rufford Colliery branch was nearly finished, but the company was unable to obtain the necessary material for their portion of the work, and it was not likely there would be any mineral traffic over it for some time. The bulk of the work on the western curve was also completed. This would be of great benefit to the Welbeck Colliery.

At Mansfield last week, Charles Hy. Heathcote, manager of the Sherwood Colliery, was summoned for contravening Regulation 92 of the Coal Mines Act regarding signals when persons were about to ascend or descend. It was alleged the proper signals, a double set of three, were not given on June 28 when men were ascending and descending, only a single set of three being given. Men approaching the cage were told by the onsetter to hurry up, and in attempting to get on, two of them were thrown into the sump, and one lost his life. The defence was that the code used was a single set of three, which was sufficient, and that the manager's construction of the Regulations was right. The Bench imposed a fine of 21s.

The Midlands.

At Dudley Police Court on Monday, four young colliery horse drivers were each ordered to pay £1 damages and the costs for neglecting their work at the Sampson Colliery, belonging to the Stourbridge Glaze Brick Company. It was stated that the men stayed away a whole day, the output as a result being decreased 27 tons. The magistrates instructed the police to bring the facts before the military authorities. They could not, the chairman said, permit young men to play those tricks in these times, and they must be sent into the Army to fight.

Kent.

About 5,500 tons of coal were raised from the Tilmanstone and Snowdown collieries last week. The Chislet Colliery has been obliged to stop sinking for the time being, owing to the action of the authorities.

Scotland.

Burntisland Shipments—Trains for Miners—Aliens as Military Absentees—Miners and Military Service.

Mr. Robt. Fisher, of Arncliffe Coal Company Limited, Gorebridge, has been appointed secretary to Messrs. Archibald Russell Limited, coal masters, Glasgow.

At Burntisland, the week's shipment was again small in quantity, only 6,170 tons being sent out, a decrease of 720 tons on the previous week, and 11,290 tons on the same week in 1916. The export from Methil shows an upward tendency, 23,846 tons, as against 22,676 tons in the previous week.

At a meeting of the executive board of the Fife Miners' Association, held at Dunfermline on Saturday, it was reported that representatives of the Ministry of Labour had visited Dunfermline with a view to arranging for trains to convey miners in the East of Fife to Valleyfield and Blairhall collieries, where accommodation had been found for 150 men. A remit was made to arrange with the colliery owners for the purpose of discussing the conditions under which men at Lochore occupy houses belonging to the owners. These conditions were reported to be intolerable, and the men threatened a "down tools" policy if matters were not remedied.

It appears from enquiries made at the headquarters of the Lanarkshire Miners' Union that no fewer than 500 Lithuanians or Poles resident in various parts of the county of Lanark are now regarded by the authorities as absentees from the British Army.

Mr. John Robertson, of the Lanarkshire Union's agency staff, has been successful in establishing the immunity from military service of miners who may be temporarily incapacitated for work underground. The test case which was taken to decide the point was that of Hugh Mills, a colliery fireman, residing in the Shettleston district. Mills, in the course of his employment, contracted heat knee, and went for six weeks to work in a foundry. While there he was called to the Army and posted to a unit. A long correspondence ensued, the result of which has now been the receipt of a letter to the effect that the authorities recognise that Mills is not liable to enlistment.

Dr. John Edward Marr, F.R.S., Fellow of St. John's College since 1881, University Lecturer in Geology at Cambridge, has been elected to the Woodwardian Professorship of Geology, in succession to the late Prof. J. H. Murchison. He was formerly president of the Geological Society, and member of the council of the British Association.

Dutch Iron and Steel Scheme.—A Rotterdam report states that a Dutch iron and steel company is being formed with a view to making Holland less dependent on imported material for her requirements. The new undertaking is to have a capital of £2,000,000. Two coal companies have been formed in connection with it.

LABOUR AND WAGES.

South Wales and Monmouthshire.

There has been desired to intervene because of the Federation to obtain transfer of the Engineers' Association, notwithstanding the fact that Sir George Askwith that during the war one union should not be allowed to take members from the other. The Federation are insisting that engineers newly employed, although members of the Engineers' Association, should join the Federation, and against this the engineers protest and seek the assistance of the authorities in prevention.

The blockade of Llandebie Colliery has come to an end, the men deciding not to picket the colliery any further, and there was consequently reduction in the police officers put upon duty. There were eight colliery officials who, during the strike of about 300 men, kept the pumps in operation to prevent flooding. The strikers demanded dismissal of a weigher, which the company refused, although offering to refer the question to the Conciliation Board or to an arbitrator; and the men alleged that non-union labour was being employed. They therefore picketed the colliery in shifts of about 50 men in order to prevent food being taken to the colliery; but, on learning that only the officials were at work, the picket was relaxed, and afterwards the siege was abandoned.

The surface officials in South Wales are indicating dissatisfaction with their position seeing that the colliers are getting 1s. 6d. per day more wage; and it is pointed out on their behalf that whenever a strike occurs at a colliery the mechanics, clerks, electricians, etc., are expected to fire the boilers, work the pumps, attend the stables, etc.; and the complaint is that they are now being ignored.

The Central Trimming Board met at Cardiff on Friday, Mr. T. Evans (Ocean Co.) being in the chair. The meeting had been called to deal with the request of the men for an increase of 37½ per cent. on the war bonus; and, after their case had been submitted, the employers' representatives consulted separately and decided to make an offer of 22½ per cent. which would make a total war bonus of 60 per cent.; but this offer was conditional upon the men withdrawing a demand for payment when they are called out to vessels not in dock, or (if in dock) not immediately available for work. The men's representatives considered this offer, and accepted it upon the condition that the demand for waiting time should be considered by each local Board. The bonus will be paid upon gross tariff charges, and operates as from November 1.

The conditions upon which colliery proprietors were willing to recognise the Examiners' Association included the following terms:—(1) That overmen who were members of the Examiners' Association should not come within the terms of recognition; also that the employers should not agree to any joint board dealing with the terms and conditions of their employment. (2) That the Examiners' Association must not be affiliated to the Federation or to any trades or labour organisation. That no coercion should be used to compel persons to join or remain in membership with the association, the employers on their part not to prevent any person from joining the association if he wished to do so. That any dispute should be dealt with in the first instance in the colliery concerned without the intervention of a third party; and, failing agreement, should be referred to the joint board; and, finally, that the members of the association should pledge themselves to give local assistance to the management at all times, including the times of trade dispute or stoppages at the collieries.—These conditions were, as previously stated, rejected by the conference of the Examiners' Association, and the suspension of the notices terminating contracts was put an end to.

Mr. Finlay A. Gibson has published a statement with regard to the action of the colliery examiners whose notices terminated on October 31. He points out that when these notices were originally served, the Government intervened, and that the notices were suspended in order to give time for negotiation, and that a joint committee had met and arranged terms. He states that the representatives of the Examiners' Association accepted the terms; but that at a meeting of delegates subsequently held "the undertaking of the negotiating representatives was repudiated and the agreement unanimously rejected"—the coalowners having been informed of this decision. Mr. Gibson declares that, if stoppage of work takes place, the responsibility will rest entirely with the examiners. He states that the coalowners have done all they can be reasonably expected to do in order to avoid a strike; and they ask with confidence "What use is it to show a conciliatory spirit when agreement with appointed representatives is summarily rejected at a moment when it was never more essential that concord should prevail?"

The Elled Colliery workmen, Pontnewynydd, held a special meeting at Pontypool on Saturday evening, to receive a report from the agent, Mr. James Winstone, on recent negotiations relative to the price-list dispute. According to an official report, Mr. Winstone dealt with the new list suggested by the Coal Controller, and it was decided after discussion to accept that list subject to the inclusion of a few items which were left in Mr. Winstone's hands to decide. The men affected—about 240 in number—will continue working pending an interview between their representative and the Coal Controller.

The miners' executive met at Cardiff on Monday, and dealt with the question of taking a ballot. There had been some doubt as to whether, in view of the expression of antagonistic opinion to the down tools policy, there was any need to take a ballot; but, on the other hand, it was urged that perseverance in this course would lead to a discovery of the real strength of the pacifists, and that, therefore, it was advisable to carry out the original suggestion. The executive received statements as to resolutions from districts and lodges—some desiring that the ballot should be postponed until after a further conference, and others requesting that the instructions to take the ballot should be cancelled. A unanimous resolution was passed, however, that in the general interest of the Federation the ballot should be taken, and that the executive should reaffirm its former decision, and urge upon the workmen to vote against down tools. As certain districts had made known a resolution that they would not participate in the ballot, the executive passed a resolution urging them to join with the rest and

of the Rhymney Valley miners, who are at nearly all the collieries in his district, at the down tools meetings there was a strong feeling that the ballot should be stopped; but the majority would not take part in it; but it was decided to vote if the ballot were taken. A number of meetings have been held at which these

two views have been expressed, in some cases the resolution being against down tools policy, and in others against the question of the comb-out being put to a ballot. One meeting, where there was about 800 men, held at Trehafod, in the Rhondda, passed a resolution that the men should vote in favour of down tools; and it is also stated on the same side that an unofficial representative committee is being established in the Rhymney Valley to defend the interests of the pacifists.

There had been some fear that the tippers at the Cardiff docks would stop work on Monday morning—a threat to that effect having been issued; but at a meeting held on Sunday the men's secretary gave report of an interview which Mr. J. H. Thomas, M.P. (of the Railwaymen's Union) had had with Mr. Prosser, the general manager of the Cardiff Company. The points at issue were the war bonus and a demand for a minimum wage for women, the claim of the latter being that they should be paid at the same rate as men. As to the war bonus conversion, it was stated that the tippers would be granted the same conditions as the general body of railwaymen—Mr. Prosser being in negotiation with the Railway Executive on this point; and as to the women's wages an offer of 3s. per week increase has been accepted. These terms were regarded as satisfactory, and the strike threat therefore was withdrawn.

The National Transport Workers' Federation has been very active, and the particular interest is that so many of its members are engaged in the local docks which deal chiefly with the shipments of coal.

At Barry protest was made in the meeting on Sunday against the employment of foreigners whilst British wage-earners were without work; and at Newport on Sunday the men were urged to work heartily for "disciplined trade unionism" as being absolutely necessary.

The miners' executive on Monday had before it an appeal from two Ammanford collieries that they would allow strike pay for stoppage of workmen who had refused to fill Gwaun-cae-gurwen trucks while the Gwaun-cae-gurwen men were on strike. The executive decided to pay these men for the ten days they were idle, but that they could not undertake responsibility for workmen who had been rendered idle in consequence of the stoppage of pumpmen and craftsmen.

The executive resolved to take legal action against the owners of collieries and to claim damages for stoppage caused through alleged defective safety lamps.

Mr. W. Frowen, chairman of the examiners' side of the joint committee, writes in reply to Mr. Gibson, who expressed surprise that after the men's representatives accepted terms they had not power to deal finally with the question at issue. Mr. Frowen states that the deputation did not accept the terms, "but promised to recommend the acceptance of them to the conference of our members, and this has been honourably done—so much so, in fact, that the conference was on the point of passing a vote of censure for so doing." Mr. Frowen states that the men's representatives opposed the terms "believing them to be so unreasonable as to be silly." He indicates that non-associated officials are being paid a larger war wage than associated; and asks also "Why have colliery managers during the last week put their examiners to ballot whether they should remain members of the Association or not? Why have meetings been convened for the examiners at different pits and promise extracted that they would stand by the companies?" He states that the desire for recognition of the Examiners' Association has been before the coal owners for at least 12 years.

Another reply to Mr. Gibson's letter states that so far from the representatives at the joint meeting having accepted the terms offered by the employers, they, in fact, objected to all the clauses. In order, however, to make it clear to the employers that, not their executive alone, but the whole body of their constituents, were pressing the claims, they "agreed with the owners to recommend them. They did so to the best of their ability, and will not forget the trouncing they had from the delegates for recommending such unreasonable terms." It is added that the representatives were not empowered to accept terms except upon lines previously defined; and that the question is not one which has arisen during the war, seeing that they have been for years striving to obtain recognition and to improve their condition.

The miners at Bryncoch Colliery have held a meeting and passed a resolution of protest against the action of colliery owners in tendering notices to a number of workmen throughout the coalfield. It called upon the executive to arrange a conference to deal with the matter.

The anthracite delegates who met at Swansea on Saturday decided to support the Llandebie workmen who desired to obtain the removal of the company's checkweigher and went on strike.

The Blaina miners, who, to the extent of about 3,000, were on strike owing to the closing of one small pit and a portion of the workings of another, met on Monday and decided that no further advantage could be gained by persevering in the strike. Work was therefore partly resumed on Tuesday, and other men returned later, although so recently as Friday a joint committee, representing the collieries affected, had decided to call out the engineers, hostlers, and craftsmen. The deputation who submitted the case of the men to the Coal Controller and the Home Office, consisted of Mr. Manning, the agent, with three representatives from Blaina—Mr. W. Beynon, A. Jones, and J. Minton; one from Brynmawr, J. Downing; one from Ebbw Vale, E. Davies; and one from Abertillery, T. Mytton.

The adjourned special meeting representing the anthracite miners took place at Swansea on Saturday, Mr. T. Davies in the chair, and the two agents, Mr. J. D. Morgan and Mr. J. James, being present. A satisfactory settlement of the through coal difficulty at Rhos and Werns collieries was reported, and with regard to the reduction in number of workmen in the Dulais Valley and other places it was announced that the Federation executive had asked the Miners' Federation of Great Britain to bring the matter before the Coal Controller, and that a meeting of the Advisory Committee had been summoned to deal with the matter.

The miners' ballot on the question of down tools now in progress will be completed by the end of the week, and the results forwarded to the Federation office for final counting on Monday. The question at issue is whether the South Wales men will carry out the arrangements which the Miners' Federation of Great Britain made with the Government as to the combing-out of men from the mines for military service. A delegate conference of South Wales miners, held in Cardiff, passed a resolution adverse to the agreement; but it was arranged that a ballot of the whole of the men should take place on the question, and this is now in progress. The South Wales executive of the Federation has issued a manifesto urging the men to vote

against "down tools," which the extremists advocate as a means of defeating the comb-out. There has been some difference of opinion as to the wisdom of taking a ballot, some districts having passed resolutions urging that it should be abandoned; but the executive council decided to carry through the original decision.

An arbitration enquiry took place in Cardiff on Wednesday. Mr. T. Tomlinson, K.C., sitting to deal with the application for 2s. per shift increase, which is sought by men in the mechanical departments at Cardiff-Dowlais works of Guest, Keen and Company. On behalf of the workmen, representatives of two labourers' unions were present. It is expected that the award will be issued within a few days.

The Tirpentwys Colliery, Pontypool, was again idle on Saturday and Monday last owing to a shortage of clearing. There have been recently frequent stoppages at the Blaenavon Collieries, also from the same cause.

North of England.

Fifteen Easington ex-miners have gained distinctions in the war, the decorations which have come their way being D.S.M. (Jutland battle), D.C.M. and Russian Order of Merit, D.C.M. and 12 Military Medals. The members of the local miners' lodge and other residents have raised a fund of £428, from which it is proposed to present to each of the gallant 15 a gold watch, gold curb chain and gold medal, valued at ten guineas.

Work at Leasingthorne Colliery, which had been laid idle owing to a dispute, was resumed last week.

The members of the Washington F. Pit miners' lodge have passed a resolution protesting against the inaction of the agents and executive committee of the Durham Miners' Association in not pressing for a settlement of the minimum wage matters now before the owners, requesting the agents and executive to demand a meeting with the owners at once, and advocating that, if the owners fail to comply with the request for a substantial increase in the minimum wage, the miners should be asked to down tools to enforce their demands.

In his monthly circular to the members of the Durham Miners' Association, Mr. T. H. Cann emphasises the importance of reporting all accidents, however trivial in character, so that, in future, claims for compensation cannot be refused on this ground. The recent legislation providing for an increase of 25 per cent. in the compensation rates is, he says, a long-overdue measure of meagre justice, but, when the Bill came into operation, the astonishing fact was revealed that it only applied to those who had been injured since the passing of the 1906 Act, with the result that thousands who were maimed for life prior to that date have to continue eking out an existence on the miserable pittance that happened to be apportioned as their lot at the time of the accident. It is not unreasonable to suppose that the chief, if not sole, factor in inducing the Government to make the concession was the increased cost of living and, if it be understood that these derelicts of our industrial system still possess the right to exist, surely anything granted on the cost of living ought to apply to them equally with those injured since 1906. He trusts that steps will be speedily taken to make it clear that this was either an oversight or a misconstruction of the Act.

Forty-seven lodges sent a total of about 80 delegates to a conference of Durham miners convened at South Shields last Saturday by the Marsden Lodge of the Durham Miners' Association, for the purpose of ventilating grievances against the county executive committee. Mr. Jas. Lowther, president of the convening lodge, said the conference was called to let the executive committee and the agents understand that "this Prussian rot" which they were responsible for setting up in the county must be abolished. Mr. John Thompson, secretary of the lodge, moved: "That, should the executive committee keep any motions off the council programme for November 24 that Standing Orders 20, 21 and 22 do not give them power to do, this conference pledges itself to do its utmost to pass such resolutions and send them out to the county as resolutions passed by the council meeting. Should the agents and officials refuse to take reports of the proceedings of such meeting, the council chamber and offices be taken possession of, if necessary, by force, and persons be selected from the delegates to take reports of the proceedings and send such out to the county." Mr. Thompson admitted the drastic character of the motion, but said it was justified by the experience of the last 19 or 20 years. He gave several instances of efforts made by the Marsden Lodge to get matters dealt with by the council, but without success, owing to the action of the executive. To-day they were sending motions to be placed on the council programme, which were simply put into the waste-paper basket. It was a disgrace to the democratic character of the Durham Miners' Association that 61 motions should be kept off the last council programme by the executive committee. The first vote resulted in a tie, 19 voting each way. The vote was put again, and resulted in the original motion being carried by 20 votes to 18. When asked what steps were to be taken to give effect to the resolution, the chairman said that, if satisfaction was not given at the next council meeting, he would guarantee that another conference would be called. Nine other motions on the agenda, dealing with questions of wages, hours and working conditions, were put *en bloc* and agreed to. One of these demanded an increase of 50 per cent. in all basis wages.

Satisfaction is expressed that the strike at the Wrenthorpe Colliery, Wakefield, which arose owing to the demand of the by-workers to be supplied with coal at the same price as the miners, is now at an end—the management having acceded to the by-workers request that they shall only pay 6s. per load of coal like the miners, and not 8s. as heretofore. The number of men and boys affected is about 1,800, and as the strike has been on for seven weeks it is felt it has lasted sufficiently long. It was expected work would be resumed this week. It is computed the loss in wages to the workpeople through the strike will be between £35,000 and 40,000, and the loss in output has been heavy.

Scotland.

Indirectly, as the result of the Coal Controller's award to the coal miners, the wages of the Scottish oilworkers have been advanced by 1s. per day, and women over 18 by 2s. 6d. per week. As the award was given to meet the increased cost of living, the concession has not been considered satisfactory by the Scottish Oilworkers' Association. Their agent has lodged a claim for the Controller's full award to be applied to the ironworkers, which would mean an additional 6d. a day to the men and 7d. per day extra to the women.

The officials of the Leven Labour Exchange, Fifeshire, announce to the miners of Fifeshire, who have been experiencing a rather trying time of it through irregular employment, that they are in a position to find work for a large number of men. It is announced further that free

transit will be provided between the West Fife jobs and Kirkcaldy, and that the wages will run to £2 5s. per week.

The dispute at Ifascockrigg Colliery, Harthill, Lanarkshire, is still unsettled. Negotiations are, however, still proceeding.

From the Ponfeigh district of Lanarkshire there are complaints from the miners regarding inequalities in wages and conditions. The complaints have been referred to the executive committee of the Lanarkshire Miners' Union.

The Coal Controller has submitted his views in reference to the proposed arbitration at Knowton Colliery, Shotts. There was a hitch in regard to the terms of the reference.

A crop of grievances has been discussed by representatives of the masters and men in connection with Messrs. Wm. Baird and Company's pits in the Kilsyth district. The majority of the points raised were amicably adjusted, but a claim by the bottomers for an advance in wages was held over.

In the Plean district of Stirlingshire, the miners employed at Plean Colliery have decided to revert to the working policy of eleven days per fortnight. The miners also resolved to discontinue the practice of filling coal on Sundays.

Certain grades of oncost workers employed at No. 5 Woodend Pit, West Lothian, have formulated a demand for an increase of rates. The claim has been laid before the management for consideration.

At Woodhall Colliery, Mid Lothian, the men in one of the sections represented that they could not earn fair wages at the tonnage rate fixed. The manager, to whom the matter was referred, has agreed to make good the shortage, and has arranged to pay the recognised wage in future, or, at all events, until such time as an improvement can be effected in the drawing.

A protest has been lodged in Fife against the increase in price of miners' household coal, and a movement is on foot to have the "14 days notice" as applied to the Fife coal field abolished.

The question of the 1s. 6d. increase per day not applying to overtime work was discussed at a meeting of artisans employed at Bowhill collieries. It was agreed to give notice to the management that overtime would not be worked except at a breakdown of plant or in the event of the pits being worked six days a week, and it is impossible to have the machinery repaired while the pit was at work.

The colliery smiths of Lanarkshire have given notice to the Coal Controller of their intention to strike unless their demand for an increase of wages is conceded.

At a meeting of the Shale Miners' Association, held in Edinburgh on Saturday, it was agreed to ask the Coal and Petroleum Controllers to use their influence in securing to the workers the same terms as the coal trade. It was further agreed to refuse arbitration on this subject. It is understood that the executives showed a determined attitude, and they are prepared to advise a stoppage of work to enforce their demands in the event of the Controllers' award not being made applicable to the shale trade in its entirety. The oil companies recently declined to be bound by the award to the coal trade, and offered a bonus of 1s. 6d. to the shale miners and 1s. to oncost men, while 2s. 6d. per week was offered to female workers.

OBITUARY.

Mr. G. T. Holloway, who died on the 24th ult., at the age of 54, was a well-known metallurgist, and was chairman of the recent Ontario Nickel Commission. After graduating at the Royal School of Mines in 1886, he established a practice in London as a consulting metallurgist and assayer, and acquired a high reputation, being regarded in his profession as one of the leading authorities on tungsten. In recognition of his abilities, he was elected to the chairmanship of the London section of the Society of Chemical Industry, and at the time of his death was a vice-president of the Institution of Mining and Metallurgy.

Lieut. Benjamin Albert Brown, of the Royal Engineers, who has died from wounds at the age of 25 years, took highest honours in the United Kingdom in surveying, and was awarded the King's medal. Subsequently he became a mining apprentice at North Biddick and Philadelphia Collieries.

Mr. John Angus, Whitefield, Morpeth, who has died at the age of 77 years, was a recognised authority in valuation matters, especially as concerned crops damaged by colliery workings.

The death is recorded of Mr. Walter Harrison, who for eight years carried on a coal merchant's business in Station-lane, Heckmondwike. He had reached his 56th year.

Housing Difficulties in Colliery Districts.—Mr. Stephen Walsh, M.P., Parliamentary Secretary to the Local Government Board, addressed a housing conference on Saturday at Wigan, when he referred to the housing difficulties in mining districts. He pointed out that the housing problem was one of exceptional difficulty in mining districts. Coal mining was not a continuing industry like cotton spinning or weaving, and from the first moment after the mineral was tapped a colliery became a wasting asset. No one could predict with accuracy the working life of any coal field. But, granting all pleas which might be advanced, it did not speak very highly for local governing authorities generally that over 95 per cent. of the existing house accommodation had been provided by private enterprise. The returns received by the Local Government Board in response to the circular issued in July last, showed that about 100,000 new workmen's dwellings were required urgently; but it was certain, he said, that more than twice that number would be required, speaking well within the mark. In his own belief, more than 500,000 would be required. So far as one might, he would deprecate any wild cat ideas. They could not get a million houses built all at once. Houses did not spring up like mushrooms in the night. There were a thousand and one questions—the important question of mining subsidence, and other matters—which went to show that, in tackling the housing problem, they must bring brains to it, so that it would be tackled on the right lines. Mr. Walsh added that no housing scheme ought to be contemplated which did not make adequate provision for the physical cleanliness of the people and a sufficient number of rooms compatible with decency. So far as he could speak, there was no intention of merely granting substantial assistance to local authorities only. All persons who were prepared to help in grappling with the housing problem, if they would submit plans and carry out the work in accordance with the designs and conditions of the Local Government Board, might expect substantial assistance.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

SCULCOATES (HULL), NOVEMBER 6.—Steam coal, three, six, or 12 months) for the Sculcoates Guardians. Forms from the clerk, 12, Harley-street, Hull.

SLIGO, NOVEMBER 7.—Coal (best Irish, Scotch, and English), coal tar, coal buckets, etc., for the Corporation during 12 months. Forms from the clerk.

SWANSEA, NOVEMBER 10.—Coal and patent fuel (six or 12 months) for the Harbour Trustees. Forms from the engineer, Harbour Offices.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

ABERDEEN, NOVEMBER 22.—Stores.—Castings, fireclay, signal wire, packing, bar iron, springs, tubes, wagons, etc., for the Great North of Scotland Railway. Forms (1s.) from the Stores Superintendent, 80, Guild-street, Aberdeen.

DUBLIN, NOVEMBER 14.—Stores.—Fittings, castings, fireclay, foundry requisites, galvanised sheets, tubes, wire, etc., for the Great Southern and Western Railway. Forms (6d.) from the storekeeper, General Stores, Inchicore, Dublin.

ENNISKILLEN, DECEMBER 1.—Stores.—Tubes, wire, copper plates, spelter, cement, castings, galvanised sheets, wire, iron, oils, tin-plates, etc., for the Sligo, Leitrim and Northern Counties Railway. Forms (1s.) from the secretary, Enniskillen.

SHEERNESS, NOVEMBER 19.—Boiler.—Lancashire boiler, superheater, etc., for the pumping stations. Forms (21s.) from the clerk, Council Offices, Sheerness.

WALSALL, NOVEMBER 5.—Stores.—Lubricating oils, castings, trolley wheels, etc., for the Corporation tramways. Forms from the manager, St. Paul's Buildings, Walsall.

SWANSEA, NOVEMBER 10.—Stores.—Iron, castings, chains, oils, etc., for the Harbour Trustees during six or 12 months. Forms from the engineer, Harbour Offices.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Anderston Foundry Company Limited.—Interim dividend of 4s. 6d. per share, less income tax, payable 1st proximo. Last year, dividend same.

Horden Collieries Limited.—Subject to the Controller's consent, a final dividend has been declared of 8½ per cent., less tax, payable on fully-paid shares Nos. 1 to 92,340, and of £4 on shares 92,341 to 100,000, making 12½ per cent. for the year.

Kinnell Cannel and Coking Coal Company Limited.—Dividend of 13s. per share, after writing off £5,000 for depreciation, and carrying forward £2,710.

Lancashire Waggon Company Limited.—The report for the half-year ended September 30 last states that the revenue account shows a profit of £3,587, which added to £938 brought forward makes a total of £4,525. The directors recommend the payment of a dividend at the rate of 10 per cent. per annum, free of income tax, on the ordinary shares; to add to the reserve fund £2,000; and to carry forward £1,174.

Lothian Coal Company Limited.—Interim dividend of 5 per cent., less income tax, on ordinary shares, payable 12th proximo. Last year, 12½ per cent., free of tax.

Metropolitan Carriage, Waggon and Finance Company Limited.—The directors have declared interim dividends of 5 and 6 per cent. on the "A" and "B" preference shares respectively, and 1s. per share (5 per cent.) on the ordinary shares for the half-year ended September—the same as last year.

Parkgate Iron and Steel Company Limited.—The directors have decided to pay on December 1 an interim dividend of 1s. 3d. per share, free of income tax, for the half-year ended September 30.

South Durham Steel and Iron Company Limited.—Final dividend of 2s., making 20 per cent. for the year ended September 30 last.

Westinghouse Brake Company Limited.—The directors announce an interim dividend of 5 per cent. (10s. per share), less income tax, on ordinary shares, payable 18th proximo. Last year, dividend same.

NEW COMPANIES.

Adams (David) and Sons Limited.—Private company. Registered office, Nelson Anchor Works, Cradley-road, Cradley Heath. Registered October 12. To carry on the businesses of iron founders, engineers, etc. Capital, £4,000. Directors to be appointed by subscribers. Subscribers: S., J. S., and D. B. Adams. Qualification 100 shares.

Bagnall (John) Limited.—Public company. Registered October 23. To acquire the business of a carriage and wagon builders, wheelwright, and blacksmith. Nominal capital, £5,000 in £1 shares. Minimum subscription, £500. Directors: J. Bagnall (Stafford), J. Bebbington, R. Brown, L. P. Dodd, and two others. Qualification, £100.

Birkby Coal Company Limited.—Private company. Registered October 22. To acquire the business of coal masters and colliery proprietors. Nominal capital, £5,000 in £1 shares. Directors: D. Lorraine (Workington), H. Richmond, and J. H. P. James. Qualification, £250.

Goodenough (Edward) Limited.—Private company. Registered office, 31, Stamford-street, Blackfriars, S.E. Registered October 24. To carry on the business of steel converters and refiners, engineers, iron and steel merchants. Nominal capital, £4,000 in £1 shares. Directors: T. M. and D. H. Goodenough. Qualification, one share.

Keen (S.) and Sons Limited.—Private company. Registered office, Wood Street Coal Depot, Walthamstow. Registered October 17. To acquire the business of a coal and coke merchants and factor and cartage contractors. Capital, £5,000. Directors: E. S. and S. Keen. Qualification, 50 shares.

Mossleys Estate Limited.—Private company. Registered October 16. To carry on business as miners for coal, storekeepers, mechanical engineers, builders, etc. Capital, £2,000. Directors: G. White, J. Ward, A. Sanders, and J. D. White.

Ward (Thos.) Engineering Company Limited.—Private company. Registered office, 134, High-street, N. Registered October 26. To carry on the business of iron founders, mechanical engineers, etc. Nominal capital, £6,250 in 5,000 £1 preference shares and 5,000 5s. ordinary shares. Directors: (one preference share) L. Tunstall and J. F. Joyce. Qualification, £1.

Whitehouse and Pendleton Limited.—Private company. Registered office, 12, Cherry-street, Birmingham. Registered October 22. To carry on the business of iron and steel merchants and metallurgists, etc. Nominal capital, £1,000 in £1 shares. Directors: P. L. Whitehouse and J. Penrith.

Wilson, Copley and Company Limited.—Private company. Registered October 19. To acquire the business of iron founders and engineers. Nominal capital, £15,000 in £1 shares. Directors: J. W. Brown (Middlesbrough) and W. H. Crosthwaite. Qualification, £250.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

THE FREIGHT MARKET.

The outward chartering of coal tonnage continues to be much impeded by the smallness of arrivals of "free" tonnage. On the north-east coast, business has been confined to the fixing of several steamers for London at 20s. 6d., a 3,100-ton steamer for Barcelona at 260s., three vessels for Gothenburg at from 185 kr. to 187½ kr., and two steamers for Stockholm at from 195 kr. to 197 kr. The Barcelona rate, it will be observed, is an easy record, for it is little over a week since 220s. was the highest quotation, and it is just a week since the port was done at 250s., which, up till that time, was far and away the highest rate ever paid. The Swedish rates are distinctly easier, however, the Gothenburg freights comparing with from 183½ kr. to 195 kr., and the Stockholm rates with from 205 kr. to 207½ kr. reported paid in last review of the market. Business in other directions is offering in large volume, but cannot be entertained until shipping supplies are improved. Thus, Portuguese ports are quoted at 95s. to Lisbon, and 105s. to Oporto. Bilbao could be repeated at 160s., a rate at which Santander also is quoted. Gibraltar is on offer at fully 100s. The Port Said market has not been tested for some time, and probably very much more than the 165s. (which represents shippers' ideas of the freight rate) would be paid. At South Wales, chartering has been almost exclusively confined to fixtures for the French Atlantic at scheduled figures, the only exception being that a 3,200-ton steamer has been taken up for Bilbao at 180s. The market at Cardiff and other South Welsh ports is very firm for all directions, and there is much competition for the few boats on offer.

Homewards, the River Plate is unaltered, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. American coal freights are steady, at 125s. from Virginia to the River Plate, with 33 dols. for Rio discharge. On net form, Northern Range is quoted at the unaltered rate of 200s. to the United Kingdom, with 250s. for North France, and 350s. for West Italy. For heavy grain cargoes, the Gulf is quoted at 32s. 6d. for France, and 35s. for West Italy, whilst 2s. 6d. less for each direction is being paid from the Northern Range. At the Far East, tonnage is still in strong request. Haiphong-Saigon to French Atlantic ports with rice is steady, at 500s., which rate is also quoted for kernels from Madras Coast to Marseilles. Kurrachee to the United Kingdom on scale is steady, at 250s. Bombay to the United Kingdom on d.w. basis is unchanged, at 250s., with 400s. for West Italy. Nitrate ports have paid 180s. for early loading to the United Kingdom and Continent, and 200s. is now quoted. The Mediterranean ore ports have a fair demand for tonnage for United Kingdom discharge, and rates are firmly maintained.

Tyne to Barcelona, 3,100, 260s.; **Gothenburg**, 2,000, 187½ kr.; **2,220 and 2,400**, 185 kr.; **2,500**, 184 kr.; **London**, 20s. 6d., several vessels; and **Stockholm**, 2,000, 197½ kr.; and **2,400**, 195 kr.

Cardiff to Brest, 1,100, 45s., neutral; **Bilbao**, 3,200, 180s., neutral; **Caen**, 900, 48s., neutral; **Cherbourg**, 500, 110s., sail; **Granville**, 400, 48s., neutral; **120**, 100s., sail; **Havre**, 2,000, 45s. 9d., neutral; **La Rochelle**, 1,300, 61s. 6d., neutral; **Morlaix**, 175, 120 fr., sail; **Rouen**, 1,200, 48s. 9d., neutral; **St. Malo**, 1,150, 43s. 6d., neutral; **1,000 and 1,150**, 21s.; and **St. Brieux**, 300, 42s. 6d., neutral.

Swansea to Cherbourg, 500, 110s., sail; **Guernsey**, 350, 42s.; **St. Nazaire**, 1,600, 61s. 6d., neutral; **Rouen**, 1,600 and 1,500, 48s. 9d., neutral; **900**, 50s. 3d., neutral; **St. Malo**, 1,100, 43s. 6d., neutral; **Granville**, 500, 48s., neutral; **Caen**, 950, 48s., neutral; **1,300**, 46s. 6d., neutral; **Havre**, 2,200 and 2,300, 45s. 9d., neutral; and **St. Brieux**, 300, 54s. 6d., neutral.

Newport to Morlaix, 200, 120 fr., sail.

Port Talbot to Trouville, 700, 48s. 6d., neutral.

Forth to Dieppe, 140, 100s., sail.

Tees to Fecamp, 1,250, 62s. 6d., pitch; and **Honfleur**, 1,200, 62s. 6d., pitch.

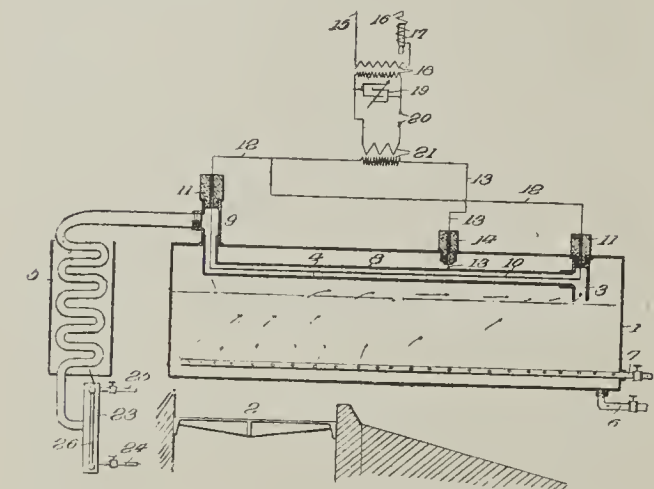
Seaham Harbour to London, 700, 20s. 6d.

Bunker Coal at Panama.—A cable message states that the price of bunker coal at Colon has been advanced from 8 dols. to 10 dols., and at Balboa from 9½ dols. to 11½ dols.

Tar Oils.—The Minister of Munitions announces that he has taken possession, as from November 1, 1917, until further notice, of all tar oils in the United Kingdom produced or derived from gas coal tar or coke oven tar of a specific gravity of 1,000 or exceeding 1,000, or produced or derived from water gas tar, producer tar, or Mond gas tar of any specific gravity. Licences are necessary except for the purchase of quantities not exceeding 5 gals. during any calendar month. The price is fixed by schedule, and all holders of stocks are required to send in returns periodically. Oil for fuel purposes, benzol washing, or Diesel engines is priced (subject to certain specifications) at 87s. 6d. per ton. For other engines and furnaces generally the prices are as follow:—Admiralty specification oil, 72s. per ton; 75 per cent. creosote oil and 25 per cent. benzol, 61s. 6d. per ton; 66½ per cent. oil and 33½ per cent. benzol, 58s. per ton; 50 per cent. creosote oil and 50 per cent. benzol, 56s. per ton; 40 per cent. and less creosote oil and 60 per cent. and upwards pitch, 47s. per ton. A commission not exceeding 2½ per cent., in addition to the prices mentioned above, may be charged by brokers, dealers, and merchants. All these prices include delivery free on board ship or barge.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

Improvements in the Treatment of Hydrocarbons of Specific Gravity and Boiling Point. L. B. 327, South-West Boulevard, Kansas City, Missouri. This invention relates to the treatment of hydrocarbons for the production of other hydrocarbons of different specific gravity and boiling point. In the drawing, 1 is a still of any suitable construction provided with heating means 2 and an outlet pipe 3 in connection with a condenser 5; 6 and 7 are fluid supply pipes, the pipe 7 having a perforated portion for distributing the fluid into the body of liquid contained in the still. 4 is an electrical treating chamber, and comprises a metallic tubular body 8, having one end in connection with the pipe 3, and its opposite end connected by a coupling 9, with the one end of the worm of the condenser 5. The body 8 constitutes one of the electrodes, the other electrode 10 being arranged centrally in said body, and supported by insulators 11. The electrode 10 is connected by conductors 12 with one terminal of the secondary winding of an oscillation transformer 21, the other secondary terminal of which is connected by a conductor 13 passing through an insulator 14 to the other electrode 8. 15, 16 are conductors connected with a suitable source of alternating current, and connected through the medium of an adjustable inductive resistance 17 with the primary winding of a transformer 18, the secondary winding of which is connected with the primary winding of the oscillation transformer 21, a spark gap 20 being included in the circuit, as is also a variable capacity 19. The current is of such nature and so controlled as to avoid sparking or arcing, and to provide a high frequency silent discharge, and yet so that the current is under convenient manual control to permit varying the frequency thereof to suit the peculiar conditions that may arise during any operation and the particular hydrocarbon compound product desired. In carrying the invention into effect, heat is applied to vaporise the volatile portions of the liquids in the still without causing substantial destructive distillation, so as to avoid precipitation of carbon and freeing of gases and consequent waste and breaking down of compounds. The vapours and gases are mechanically mixed and uniformly heated, and pass from the still through the treating chamber, wherein they are subjected for a suitable period of time to the high frequency silent electric discharge. The voltage will be such that the greatest ampérage will pass between the electrodes without causing arcing, and in practice probably runs upwards of 5,000 volts where electrodes are not less than 2 in. apart. The frequency employed will vary according to the distance between the electrodes and the gravity and boiling point of product desired, and may run upwards of one million cycles per second. If it be desired to produce a lighter and lower boiling point compound from a heavier hydrocarbon distillate of the paraffin series, the heavier hydrocarbon is introduced into the still through the pipe 6, and the flow of liquid is controlled so as to maintain the desired liquid level as the liquid is vaporised and passed off through the treating chamber. During the operation, a constant flow



of either free hydrogen, or hydrogen carrying gas or compound, is discharged into the liquid through pipe 7; the said compound or gas is thus heated by its passage through the liquid, becomes mechanically mixed with the vaporised distillate, and flows therewith into the treating chamber, where it supplies the hydrogen required to unite with the distillate vapour for the production of a final fluid hydrocarbon product of different molecular structure from either of the compounds originally introduced into the still, and of lower boiling point and lighter than the distillate introduced into the still. The product from the condenser is discharged into a trap or separating chamber 23, in which the liquid settles to the bottom, and is drawn off through valve pipe 24, while the surplus gas rises to the top of the chamber and is drawn off through valve pipe 25. The operator can, by observing gauge 26 on trap 23, determine whether to increase or diminish the volume of gas passed into the still. The electric discharge excites the vapour and gases, and causes re-arrangement of the molecular structures thereof, during which re-arrangement the structural elements are attuned or brought into step to produce a new molecular structure of the same series as the original hydrocarbon or hydrocarbons, but having a higher percentage of hydrogen, and this re-arrangement takes place preferably without loss of carbon. The frequency of the electric discharge is under the control of the operator, so that he can vary the same until he produces a product of the particular gravity and boiling point desired. (Four claims.)

109029. A New Overwinding Preventing Switch for Electric Cranes. S. H. Heywood and S. H. Heywood and Company Limited, Reddish, Manchester.—This invention relates to a new or improved overwinding switch for use in connection with electric cranes or other electrically-operated lifting means, the object being to provide a device capable of cutting out the controlling switch when the crane hook arrives at a predetermined height, the apparatus being designed to enable cutting out to take place at any particular height in accordance with circumstances. Fig. 1 is a front elevation of the complete device with the cover removed; fig. 2, front elevation in section on line 1-1 of fig. 1; fig. 3, sectional plan on line 3-3 of fig. 1. The drawing shows the mechanical and electrical parts, such as the switch arm 1, the spring 2, the contact 3, the stop 4, the buffer 5, the cellular arm 12, the vertical plates 15, the partitions 16, the notches 17, the V-shaped projection 18, the pin 19, the lever 20, the tumblers 21, the switch 22, the motor 23, the pump 24, the cylinder 25, the nozzle 26, the diverging pipe 27, the piston 28, the spring 29, the contact 30, the stop 31, the buffer 32, the cellular arm 33, the vertical plates 34, the partitions 35, the notches 36, the V-shaped projection 37, the pin 38, the lever 39, the tumblers 40, the switch 41, the motor 42, the pump 43, the cylinder 44, the nozzle 45, the piston 46, the spring 47, the contact 48, the stop 49, the buffer 50, the cellular arm 51, the vertical plates 52, the partitions 53, the notches 54, the V-shaped projection 55, the pin 56, the lever 57, the tumblers 58, the switch 59, the motor 60, the pump 61, the cylinder 62, the nozzle 63, the piston 64, the spring 65, the contact 66, the stop 67, the buffer 68, the cellular arm 69, the vertical plates 70, the partitions 71, the notches 72, the V-shaped projection 73, the pin 74, the lever 75, the tumblers 76, the switch 77, the motor 78, the pump 79, the cylinder 80, the nozzle 81, the piston 82, the spring 83, the contact 84, the stop 85, the buffer 86, the cellular arm 87, the vertical plates 88, the partitions 89, the notches 90, the V-shaped projection 91, the pin 92, the lever 93, the tumblers 94, the switch 95, the motor 96, the pump 97, the cylinder 98, the nozzle 99, the piston 100, the spring 101, the contact 102, the stop 103, the buffer 104, the cellular arm 105, the vertical plates 106, the partitions 107, the notches 108, the V-shaped projection 109, the pin 110, the lever 111, the tumblers 112, the switch 113, the motor 114, the pump 115, the cylinder 116, the nozzle 117, the piston 118, the spring 119, the contact 120, the stop 121, the buffer 122, the cellular arm 123, the vertical plates 124, the partitions 125, the notches 126, the V-shaped projection 127, the pin 128, the lever 129, the tumblers 130, the switch 131, the motor 132, the pump 133, the cylinder 134, the nozzle 135, the piston 136, the spring 137, the contact 138, the stop 139, the buffer 140, the cellular arm 141, the vertical plates 142, the partitions 143, the notches 144, the V-shaped projection 145, the pin 146, the lever 147, the tumblers 148, the switch 149, the motor 150, the pump 151, the cylinder 152, the nozzle 153, the piston 154, the spring 155, the contact 156, the stop 157, the buffer 158, the cellular arm 159, the vertical plates 160, the partitions 161, the notches 162, the V-shaped projection 163, the pin 164, the lever 165, the tumblers 166, the switch 167, the motor 168, the pump 169, the cylinder 170, the nozzle 171, the piston 172, the spring 173, the contact 174, the stop 175, the buffer 176, the cellular arm 177, the vertical plates 178, the partitions 179, the notches 180, the V-shaped projection 181, the pin 182, the lever 183, the tumblers 184, the switch 185, the motor 186, the pump 187, the cylinder 188, the nozzle 189, the piston 190, the spring 191, the contact 192, the stop 193, the buffer 194, the cellular arm 195, the vertical plates 196, the partitions 197, the notches 198, the V-shaped projection 199, the pin 200, the lever 201, the tumblers 202, the switch 203, the motor 204, the pump 205, the cylinder 206, the nozzle 207, the piston 208, the spring 209, the contact 210, the stop 211, the buffer 212, the cellular arm 213, the vertical plates 214, the partitions 215, the notches 216, the V-shaped projection 217, the pin 218, the lever 219, the tumblers 220, the switch 221, the motor 222, the pump 223, the cylinder 224, the nozzle 225, the piston 226, the spring 227, the contact 228, the stop 229, the buffer 230, the cellular arm 231, the vertical plates 232, the partitions 233, the notches 234, the V-shaped projection 235, the pin 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V-shaped projection 577, the pin 578, the lever 579, the tumblers 580, the switch 581, the motor 582, the pump 583, the cylinder 584, the nozzle 585, the piston 586, the spring 587, the contact 588, the stop 589, the buffer 590, the cellular arm 591, the vertical plates 592, the partitions 593, the notches 594, the V-shaped projection 595, the pin 596, the lever 597, the tumblers 598, the switch 599, the motor 600, the pump 601, the cylinder 602, the nozzle 603, the piston 604, the spring 605, the contact 606, the stop 607, the buffer 608, the cellular arm 609, the vertical plates 610, the partitions 611, the notches 612, the V-shaped projection 613, the pin 614, the lever 615, the tumblers 616, the switch 617, the motor 618, the pump 619, the cylinder 620, the nozzle 621, the piston 622, the spring 623, the contact 624, the stop 625, the buffer 626, the cellular arm 627, the vertical plates 628, the partitions 629, the notches 630, the V-shaped projection 631, the pin 632, the lever 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747, the piston 748, the spring 749, the contact 750, the stop 751, the buffer 752, the cellular arm 753, the vertical plates 754, the partitions 755, the notches 756, the V-shaped projection 757, the pin 758, the lever 759, the tumblers 760, the switch 761, the motor 762, the pump 763, the cylinder 764, the nozzle 765, the piston 766, the spring 767, the contact 768, the stop 769, the buffer 770, the cellular arm 771, the vertical plates 772, the partitions 773, the notches 774, the V-shaped projection 775, the pin 776, the lever 777, the tumblers 778, the switch 779, the motor 780, the pump 781, the cylinder 782, the nozzle 783, the piston 784, the spring 785, the contact 786, the stop 787, the buffer 788, the cellular arm 789, the vertical plates 790, the partitions 791, the notches 792, the V-shaped projection 793, the pin 794, the lever 795, the tumblers 796, the switch 797, the motor 798, the pump 799, the cylinder 800, the nozzle 801, the piston 802, the spring 803, the contact 804, the stop 805, the buffer 806, the cellular arm 807, the vertical plates 808, the partitions 809, the notches 810, the V-shaped projection 811, the pin 812, the lever 813, the tumblers 814, the switch 815, the motor 816, the pump 817, the cylinder 818, the nozzle 819, the piston 820, the spring 821, the contact 822, the stop 823, the buffer 824, the cellular arm 825, the vertical plates 826, the partitions 827, the notches 828, the V-shaped projection 829, the pin 830, the lever 831, the tumblers 832, the switch 833, the motor 834, the pump 835, the cylinder 836, the nozzle 837, the piston 838, the spring 839, the contact 840, the stop 841, the buffer 842, the cellular arm 843, the vertical plates 844, the partitions 845, the notches 846, the V-shaped projection 847, the pin 848, the lever 849, the tumblers 850, the switch 851, the motor 852, the pump 853, the cylinder 854, the nozzle 855, the piston 856, the spring 857, the contact 858, the stop 859, the buffer 860, the cellular arm 861, the vertical plates 862, the partitions 863, the notches 864, the V-shaped projection 865, the pin 866, the lever 867, the tumblers 868, the switch 869, the motor 870, the pump 871, the cylinder 872, the nozzle 873, the piston 874, the spring 875, the contact 876, the stop 877, the buffer 878, the cellular arm 879, the vertical plates 880, the partitions 881, the notches 882, the V-shaped projection 883, the pin 884, the lever 885, the tumblers 886, the switch 887, the motor 888, the pump 889, the cylinder 890, the nozzle 891, the piston 892, the spring 893, the contact 894, the stop 895, the buffer 896, the cellular arm 897, the vertical plates 898, the partitions 899, the notches 900, the V-shaped projection 901, the pin 902, the lever 903, the tumblers 904, the switch 905, the motor 906, the pump 907, the cylinder 908, the nozzle 909, the piston 910, the spring 911, the contact 912, the stop 913, the buffer 914, the cellular arm 915, the vertical plates 916, the partitions 917, the notches 918, the V-shaped projection 919, the pin 920, the lever 921, the tumblers 922, the switch 923, the motor 924, the pump 925, the cylinder 926, the nozzle 927, the piston 928, the spring 929, the contact 930, the stop 931, the buffer 932, the cellular arm 933, the vertical plates 934, the partitions 935, the notches 936, the V-shaped projection 937, the pin 938, the lever 939, the tumblers 940, the switch 941, the motor 942, the pump 943, the cylinder 944, the nozzle 945, the piston 946, the spring 947, the contact 948, the stop 949, the buffer 950, the cellular arm 951, the vertical plates 952, the partitions 953, the notches 954, the V-shaped projection 955, the pin 956, the lever 957, the tumblers 958, the switch 959, the motor 960, the pump 961, the cylinder 962, the nozzle 963, the piston 964, the spring 965, the contact 966, the stop 967, the buffer 968, the cellular arm 969, the vertical plates 970, the partitions 971, the notches 972, the V-shaped projection 973, the pin 974, the lever 975, the tumblers 976, the switch 977, the motor 978, the pump 979, the cylinder 980, the nozzle 981, the piston 982, the spring 983, the contact 984, the stop 985, the buffer 986, the cellular arm 987, the vertical plates 988, the partitions 989, the notches 990, the V-shaped projection 991, the pin 992, the lever 993, the tumblers 994, the switch 995, the motor 996, the pump 997, the cylinder 998, the nozzle 999, the piston 1000, the spring 1001, the contact 1002, the stop 1003, the buffer 1004, the cellular arm 1005, the vertical plates 1006, the partitions 1007, the notches 1008, the V-shaped projection 1009, the pin 1010, the lever 1011, the tumblers 1012, the switch 1013, the motor 1014, the pump 1015, the cylinder 1016, the nozzle 1017, the piston 1018, the spring 1019, the contact 1020, the stop 1021, the buffer 1022, the cellular arm 1023, the vertical plates 1024, the partitions 1025, the notches 1026, the V-shaped projection 1027, the pin 1028, the lever 1029, the tumblers 1030, the switch 1031, the motor 1032, the pump 1033, the cylinder 1034, the nozzle 1035, the piston 1036, the spring 1037, the contact 1038, the stop 1039, the buffer 1040, the cellular arm 1041, the vertical plates 1042, the partitions 1043, the notches 1044, the V-shaped projection 1045, the pin 1046, the lever 1047, the tumblers 1048, the switch 1049, the motor 1050, the pump 1051, the cylinder 1052, the nozzle 1053, the piston 1054, the spring 1055, the contact 1056, the stop 1057, the buffer 1058, the cellular arm 1059, the vertical plates 1060, the partitions 1061, the notches 1062, the V-shaped projection 1063, the pin 1064, the lever 1065, the tumblers 1066, the switch 1067, the motor 1068, the pump 1069, the cylinder 1070, the nozzle 1071, the piston 1072, the spring 1073, the contact 1074, the stop 1075, the buffer 1076, the cellular arm 1077, the vertical plates 1078, the partitions 1079, the notches 1080, the V-shaped projection 1081, the pin 1082, the lever 1083, the tumblers 1084, the switch 1085, the motor 1086, the pump 1087, the cylinder 1088, the nozzle 1089, the piston 1090, the spring 1091, the contact 1092, the stop 1093, the buffer 1094, the cellular arm 1095, the vertical plates 1096, the partitions 1097, the notches 1098, the V-shaped projection 1099, the pin 1100, the lever 1101, the tumblers 1102, the switch 1103, the motor 1104, the pump 1105, the cylinder 1106, the nozzle 1107, the piston 1108, the spring 1109, the contact 1110, the stop 1111, the buffer 1112, the cellular arm 1113, the vertical plates 1114, the partitions 1115, the notches 1116, the V-shaped projection 1117, the pin 1118, the lever 1119, the tumblers 1120, the switch 1121, the motor 1122, the pump 1123, the cylinder 1124, the nozzle 1125, the piston 1126, the spring 1127, the contact 1128, the stop 1129, the buffer 1130, the cellular arm 1131, the vertical plates 1132, the partitions 1133, the notches 1134, the V-shaped projection 1135, the pin 1136, the lever 1137, the tumblers 1138, the switch 1139, the motor 1140, the pump 1141, the cylinder 1142, the nozzle 1143, the piston 1144, the spring 1145, the contact 1146, the stop 1147, the buffer 1148, the cellular arm 1149, the vertical plates 1150, the partitions 1151, the notches 1152, the V-shaped projection 1153, the pin 1154, the lever 1155, the tumblers 1156, the switch 1157, the motor 1158, the pump 1159, the cylinder 1160, the nozzle 1161, the piston 1162, the spring 1163, the contact 1164, the stop 1165, the buffer 1166, the cellular arm 1167, the vertical plates 1168, the partitions 1169, the notches 1170, the V-shaped projection 1171, the pin 1172, the lever 1173, the tumblers 1174, the switch 1175, the motor 1176, the pump 1177, the cylinder 1178, the nozzle 1179, the piston 1180, the spring 1181, the contact 1182, the stop 1183, the buffer 1184, the cellular arm 1185, the vertical plates 1186, the partitions 1187, the notches 1188, the V-shaped projection 1189, the pin 1190, the lever 1191, the tumblers 1192, the switch 1193, the motor 1194, the pump 1195, the cylinder 1196, the nozzle 1197, the piston 1198, the spring 1199, the contact 1200, the stop 1201, the buffer 1202, the cellular arm 1203, the vertical plates 1204, the partitions 1205, the notches 1206, the V-shaped projection 1207, the pin 1208, the lever 1209, the tumblers 1210, the switch 1211, the motor 1212, the pump 1213, the cylinder 1214, the nozzle 1215, the piston 1216, the spring 1217, the contact 1218, the stop 1219, the buffer 1220, the cellular arm 1221, the vertical plates 1222, the partitions 1223, the notches 1224, the V-shaped projection 1225, the pin 1226, the lever 1227, the tumblers 1228, the switch 1229, the motor 1230, the pump 1231, the cylinder 1232, the nozzle 1233, the piston 1234, the spring 1235, the contact 1236, the stop 1237, the buffer 1238, the cellular arm 1239, the vertical plates 1240, the partitions 1241, the notches 1242, the V-shaped projection 1243, the pin 1244, the lever 1245, the tumblers 1246, the switch 1247, the motor 1248, the pump 1249, the cylinder 1250, the nozzle 1251, the piston 1252, the spring 1253, the contact 1254, the stop 1255, the buffer 1256, the cellular arm 1257, the vertical plates 1258, the partitions 1259, the notches 1260, the V-shaped projection 1261, the pin 1262, the lever 1263, the tumblers 1264, the switch 1265, the motor 1266, the pump 1267, the cylinder 1268, the nozzle 1269, the piston 1270, the spring 1271, the contact 1272, the stop 1273, the buffer 1274, the cellular arm 1275, the vertical plates 1276, the partitions 1277, the notches 1278, the V-shaped projection 1279, the pin 1280, the lever 1281, the tumblers 1282, the switch 1283, the motor 1284, the pump 1285, the cylinder 1286, the nozzle 1287, the piston 1288, the spring 1289, the contact 1290, the stop 1291, the buffer 1292, the cellular arm 1293, the vertical plates 1294, the partitions 1295, the notches 1296, the V-shaped projection 1297, the pin 1298, the lever 1299, the tumblers 1300, the switch 1301, the motor 1302, the pump 1303, the cylinder 1304, the nozzle 1305, the piston 1306, the spring 1307, the contact 1308, the stop 1309, the buffer 1310, the cellular arm 1311, the vertical plates 1312, the partitions 1313, the notches 1314, the V-shaped projection 1315, the pin 1316, the lever 1317, the tumblers 1318, the switch 1319, the motor 1320, the pump 1321, the cylinder 1322, the nozzle 1323, the piston 1324, the spring 1325, the contact 1326, the stop 1327, the buffer 1328, the cellular arm 1329, the vertical plates 1330, the partitions 1331, the notches 1332, the V-shaped projection 1333, the pin 1334, the lever 1335, the tumblers 1336, the switch 1337, the motor 1338, the pump 1339, the cylinder 1340, the nozzle 1341, the piston 1342, the spring 1343, the contact 1344, the stop 1345, the buffer 1346, the cellular arm 1347, the vertical plates 1348, the partitions 1349, the notches 1350, the V-shaped projection 1351, the pin 1352, the lever 1353, the tumblers 1354, the switch 1355, the motor 1356, the pump 1357, the cylinder 1358, the nozzle 1359, the piston 1360, the spring 1361, the contact 1362, the stop 1363, the buffer 1364, the cellular arm 1365, the vertical plates 1366, the partitions 1367, the notches 1368, the V-shaped projection 1369, the pin 1370, the lever 1371, the tumblers 1372, the switch 1373, the motor 1374, the pump 1375, the cylinder 1376, the nozzle 1377, the piston 1378, the spring 1379, the contact 1380, the stop 1381, the buffer 1382, the cellular arm 1383, the vertical plates 1384, the partitions 1385, the notches 1386, the V-shaped projection 1387, the pin 1388, the lever 1389, the tumblers 1390, the switch 1391, the motor 1392, the pump 1393, the cylinder 1394, the nozzle 1395, the piston 1396, the spring 1397, the contact 1398, the stop 1399, the buffer 1400, the cellular arm 1401, the vertical plates 1402, the partitions 1403, the notches 1404, the V-shaped projection 1405, the pin 1406, the lever 1407, the tumblers 1408, the switch 1409, the motor 1410, the pump 1411, the cylinder 1412, the nozzle 1413, the piston 1414, the spring 1415, the contact 1416, the stop 1417, the buffer 1418, the cellular arm 1419, the vertical plates 1420, the partitions 1421, the notches 1422, the V-shaped projection 1423, the pin 1424, the lever 1425, the tumblers 14

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

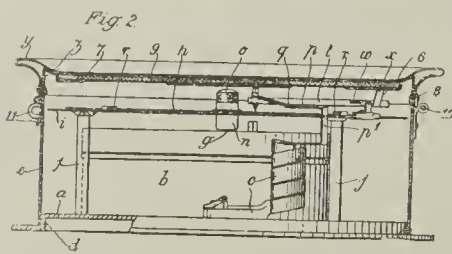
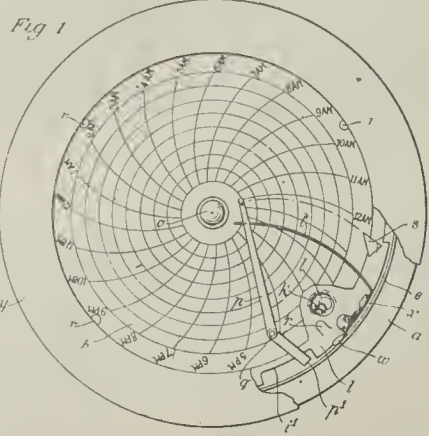
("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

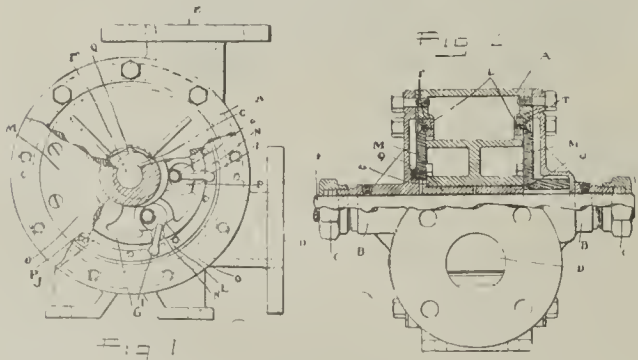
SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

plate *a*, upon which the clockwork mechanism *c* is secured to the latter by means of bolts or the like. The back or base *a* is stamped up at its outer edge in a concentric flange *d* (as shown in fig. 2). A tubular ring *e* is adapted to be secured as by cleats *f* to form the circular side of the case. The clockwork mechanism *c* is arranged in a case which is as shown, secured to the back *a* so that its rotating spindle *g* which carries the rotating chart *h* is in a central position in relation to the case. The chart is supported on a disc *i*, which is held in place by means of pillars *j* secured to the base *a* of the instrument, and in order that the said disc *i* may be readily removed when desired to give access to the parts hidden thereby, it is removably secured in place by means of screws *k* engaging the ends of the pillars and co-operating with keyhole shaped slots or apertures *l* formed in the disc *i*. Thus, by loosening the screws and slightly turning the disc *i* it may be readily removed, and



when put back can be effectively held in place by tightening up the said screws. A central aperture *m* is formed in the disc *i* for the accommodation of a flanged boss *n* on the central spindle. The flange of this boss is just slightly above or level with the surface of the disc *i*, and the chart *h* is clamped thereon by means of a screwed finger nut. The pressure tube *c* or other device used is as shown on the base *a* beneath the chart *h* and its supporting disc *i*, and the recording pen arm *p* is bent to a U shape at its end, with its intermediate portion *p'* passing up between the edge of the chart and its support *i* and the inside of the side *e* of the case. A notch *i'* is preferably formed in the edge of the disc *i* for the passage of the arm, but this is not essential as the disc *i* could equally well be slightly reduced in diameter except for the desirability of making it fit the case as neatly as possible, in order to keep out dirt and dust which might otherwise enter more freely. The straight upper portion of the arm *p* is preferably jointed in its length, as shown at *q*, to permit of any necessary slight adjustments between the pen and the chart. By this arrangement of the chart the pressure tube and the recording pen arm, a circular case can be employed instead of a case of pear shape, rectangular, or other form, in order to provide for the disposition of the tube outside the edge of the chart, whilst at the same time providing a practically full-sized chart. In the construction shown, the chart *h* is kept down flat on to the disc *i* by its periphery being slipped under lips *r* formed by stamping up portions of the said support as shown. A pointer or finger *s* is also similarly provided to indicate the path of the pen over the chart. (Four claims.)

109185. *Improvements in Rotary Engines and Pumps.* H. A. Bullard, Crocker Building, San Francisco.—This invention relates to rotary engines and pumps of the type having sliding-rocking vanes. The objects are, first, to minimise relative motion between the various operating parts, thereby reducing frictional losses, facilitating lubrication and increasing the efficiency; second, to minimise sliding contacts between the various operating parts, thereby reducing wear and tear, facilitating sealing, and preventing loss of pressure by leakage back; third, to minimise bulk, weight, and cost, by permitting the use of relatively high rotative speeds suitable for direct connection between driver and driven; fourth, to minimise vibration and pulsation, affording noiseless operation through well balanced rotating elements, ensuring uniform flow of fluids; fifth, to regulate, either arbitrarily or automatically, the point of cut off when used as a gas propelled engine, or the pressure of discharge when used as a gas



compressor; sixth, to handle thin, thick, or viscous fluids or fluids carrying much solid matter or grit. Fig. 1 is an end view of a liquid engine or a liquid pump with the casing and one of the side plates partly broken away; fig. 2 is an elevation and partial section through centre line of a liquid engine or liquid pump. In the construction shown the rotatable carrier *L* with side plates *M* is interposed between the rotor *G* and the outer casing *A*. The rotor *G* is provided with a rotatable carrier *L*, and operate with the rotor *G* through slotted hinged points *N*. The rotor *G* and the carrier *L* revolve synchronously with the rotatable carrier *L* through any suitable means, such as by the arrangement of studs *O* on the side plates *M*, and passing through holes *P* in

the rotor *G*. The rotatable carrier *L*, through one of the plates *M*, is attached to the shaft *F*, and revolves therewith, and the rotor *G* is thus caused to revolve about an eccentrically mounted bearing *Q*, which in figs. 1 and 2 is made a part of the stationary case *A*. One of the plates *M* is not attached to the shaft *F* directly, but is provided with a concentric bearing on *Q* or on *V*, according to the construction used. It is obvious that the rotor *G* revolves within the carrier *L*, but about a different centre, comprising a differential construction in which all sliding contact and practically all frictional resistance between the outer ends of vanes *I* and the carrier *L* is eliminated, there is no canting or cramping force on the vanes *I* creating undue friction in the slotted hinges *N*, and there is no need of springs or compensating pressure to ensure non-leaking contacts. The vanes *I* and the side plates *M* revolving synchronously cause only a very slight relative motion between them, and a practically non-leak contact is obtained due to relatively little wear; a spring-actuated packing strip may be used for extraordinarily high pressure. To prevent leakage and consequent loss of pressure between the surfaces of the rotatable carrier *L* with the plates *M* and the outer case *A*, the latter is provided with circular grooves *T*, which allow ample running clearance, at the same time preventing leakage back. By thus minimising the relative motion between the various operating parts, the frictional losses are greatly reduced, lubrication becomes a simple matter, and the efficiency is greatly increased; wear and tear are greatly reduced, sealing is readily effected, and loss of pressure through leakage back is reduced to a minimum. Bulk, weight, and cost are reduced since relatively high rotative speeds can be used for direct connection between driver and driven; vibration and pulsation are removed, affording noiseless operation and all rotating elements are well balanced; a uniform flow of fluids results, either the point of cut off or the pressure of discharge are regulatable, and all fluids of any character may be handled. (Five claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Abrahams, E. G. Dealing with products of combustion from furnaces. (15413)
- Aktiebolaget Atlas Diesel and Andersson, G. Pneumatic rock drilling machines. (15552)
- Arthur, J. Pneumatic percussive hammers, etc. (15388)
- Bagley, D. Multiple regenerators for coke ovens, etc. (15346)
- Bell, F. N. Gas suction and pressure controller for coke ovens. (15335)
- British Thomson-Houston Company (General Electric Company). Induction motors. (15316)
- British Thomson-Houston Company (General Electric Company). Systems of electrical transmission. (15394)
- Burney, S. C. Internal combustion engines. (15676, 15677)
- Caffin, H. A. Excavating machine. (15412)
- Canhac, G. E. Water tube generators. (15420)
- Carper, J. B. Fuel compounds. (15299)
- Craggs, A. R. Steam boiler furnaces. (15528)
- Curran, E. Fire bridges or arches for locomotive fire boxes, cylindrical furnace tubes, etc. (15658)
- Dakers, J. E. S. Furnaces. (15342)
- Dawe, G. S. Rotary gas engine. (15326)
- Dempster and Sons, R. Manufacture of gas in vertical retorts. (15662)
- Dixon, H. O. Method of manufacture of mining or pit props, etc. (15434)
- Dunker, L. Apparatus for purifying air, etc. (15470)
- Enclosed Motor Company. Dynamo electric machines. (15612)
- Foster, H. C. Hooks for cranes, derricks, etc. (15416)
- Gardner, E. and T. H. Internal combustion engines. (15605, 15607)
- Geary, J. and W. Electric controllers for direct-current motors for works, cranes, travellers, chargers, etc. (15415)
- Gibbs, G. J. Apparatus for softening and purifying water, metering fluids, etc. (15663)
- Glover, S. Gas producers. (15396)
- Gresham, H. E. Feed water heaters. (15668)
- Hughes, J. E. Fuel from waste materials, and apparatus for making and utilising same. (15495)
- Hutt, A. C. Soot cleaning appliances for boilers. (15453)
- Innerd, G. Hoist engines. (15619)
- Jacoby, H. C. E. Dynamo electric machines. (15612)
- Jasper, A. L. Internal combustion engines. (15499)
- Jefferson, T. Double-acting steam pumps. (15628)
- Key, T. H. R. Internal combustion engines. (15632, 15633, 15634)
- Macfarlane, O. P. Internal combustion engines. (15609)
- Martin, J. W. Pumps. (15436)
- Meck, J. W. Dealing with products of combustion from furnaces. (15413)
- Mellor, F. Mechanical ash cleaner for gas producers. (15377)
- Mossay, P. A. H. Dynamo electric machines. (15612)
- Ohborg, J. F. O. Internal combustion engines. (15318)
- Pulman, A. H. R. Internal combustion engines. (15609)
- Restler, J. W. Pumps of the reciprocating type. (15551)
- Rigby, A. A. and T. F. Fire lighter. (15643)
- Robertson, J. Charging and discharging vertical retorts for distillation of coal, shale, etc. (15284)
- Rothman, R. R. Fluid-driven motors. (15324)
- Schnackenberg, K. Devices for preventing gas explosions in gas pipes of coke ovens. (15539)
- Schultz, E. J. A. Pump for liquids. (15473)
- Southey, A. W., and Southey Gas Producers Limited. Production of gas. (15331)
- Spencer, J. A. Purifier grids, and means for supporting same in gas purifiers. (15297)
- Thuman, F. Apparatus for feeding and distributing fuel, etc., to gas producers, etc. (15537)
- Toogood, H. J. Manufacture of gas in vertical retorts. (15662)
- Tulloch, T. G. Fuel compounds. (15299)
- Vickers, W. B. R. Double-acting steam pumps. (15628)
- Walster, J. and S. Generating coal gas in electrically-heated retorts. (15445)
- West, J., and West's Gas Improvement Company. Gas producers. (15396)
- Wilson, H. M. Hoist engines. (15619)

Complete Specifications Accepted.

(To be published on November 15.)

[NOTE.—The number following the application is that which the specification will finally bear.]

- 1916.
9793. Stirling, D. R. Fuel supply of oil burners for furnaces and the like. (110368)
11466. London Electric Supply Corporation, and Fox, A. G. Means for feeding fuel to furnaces. (110372)
13671. British Thomson-Houston Company, and Young, A. P. Dynamo electric machines. (110376)
14602. Hinchley, J. W., and Gorton, G. Process for expressing liquid from peat. (110380)
14603. Hinchley, J. W., and Gorton, G. Apparatus for expressing liquids from materials containing the same. (110381)
14604. Hinchley, J. W., and Gorton, G. Processes and apparatus for expressing liquid from materials containing the same. (110382)
14605. Hinchley, J. W., and Gorton, G. Processes and apparatus for expressing liquid from peat. (110383)
14606. Hinchley, J. W., and Gorton, G. Apparatus for expressing liquid from materials containing the same. (110384)
14612. Wilkinson, G. Coal-fired steam boilers and the like. (110385)
14893. Brookes, A. J. C. Aerial ropeways. (110402)
15341. St. Stephens, R. de H., and Climax Rock Drill and Engineering Works. Valve gear for rock drills and other percussion tools. (110411)
15390. Simon-Carves Limited, and Brown, J. H. Process of distillation and still for carrying out the same. (110413)
15589. Houghton, S. A. Water tube boilers. (110418)
15742. Midgley, A. H., and Vandervell and Company, C. A. Dynamo electric machines. (110421)
15941. Morton, H. E. Vacuum breakers adapted for use with condensing steam engines. (110422)
17158. Thomas, T. J. Apparatus for detecting firedamp in mines. (110439)
17876. Jones, J., and McConwell and Company, A. Furnace fronts for steam boilers. (110445)
18270. Thuman, F. (Gartley, W. H.). Manufacture of toluol. (110448)
18546. Ionides, A. C. Furnace doors. (110452)
- 1917.
1081. Ransomes and Rapier, and Bowtell, W. J. Luffing cranes. (110458)
2543. Musker, A. Discharge of coal and like cargo in bulk from barges or vessels, and the elevation and delivery thereof. (110467)
8573. King, P. H., and Stoneham, J. A. Hydrocarbon fuel for use in internal combustion engines. (110520)

Restoration of Lapsed Patent.

An order has been made restoring the Letters Patent granted to William Brown Davidson and Alfred John Liversedge for "An improved gas scrubber," No. 26979 of 1911.

PUBLICATIONS RECEIVED.

"Monthly Bulletin of the Canadian Mining Institute" (No. 66), October 1917, edited by the secretary; "The Indian Journal of Medical Research" (Vol. 5, No. 1), July 1917, edited by the Director-General, Indian Medical Service, and the Sanitary Commissioner with the Government of India, price Rs. 2; "Department of Mines, India—Report of the Chief Inspector of Mines in India under the Indian Mines Act (VIII. of 1901) for the year ending December 31, 1916," by G. F. Adams, M.Inst.C.E., Chief Inspector of Mines in India (Calcutta: Superintendent, Government Printing, India), price 1 rupee and 12 annas, or 2s.; "The World's Work: the Anglo-American Review" (Vol. 30, No. 180), November 1917 (London: William Heinemann, 21, Bedford-street, W.C. 2), price 1s. net; "University of Illinois Bulletin" (Vol. 24, No. 35), April 30, 1917: "The Effect of Mouthpieces on the Flow of Water Through a Submerged Short Pipe," by Fred B. Seely, price 25c.; "Transactions of the Institution of Mining Engineers" (Vol. 54, Part I.), October 1916, price 6s.

GOVERNMENT PUBLICATIONS.

* * Any of the following publications may be obtained on application at this office at the price named **post free**.

Memoirs of the Geological Survey: Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1916. (London: Printed under the authority of H.M. Stationery Office). Price 2s.

The Geology of the South Wales Coal Field. Part 4: The Country Around Pontypridd and Maesteg. By A. Strahan, R. H. Tiddeman, and Walcot Gibson. (London: H.M. Stationery Office). Price 4s.

Statutory Rules and Orders, 1917: (No. 1067), Factory and Workshop Welfare. Price 1½d.

Coal Mines Control Agreement (Confirmation): A Bill to confirm and give effect to a certain Agreement relating to the compensation to be paid in respect of the control of coal mines and other matters arising out of such control. Price 4d.

Colonial Reports (Annual): (No. 934), Ceylon Report for 1916; dated October 1917. Price 8d.

Institution of Civil Engineers.—The first ordinary meeting of the institution will be held on Tuesday, November 6, at 5.30 p.m., at Great College-street, Westminster. An address will be delivered by Mr. H. E. Jones (president), and medals awarded by the council will be presented.

Lantern Slides for Lectures.—Messrs. Ed. Bennis and Company Limited inform us that they have a large number of lantern slides dealing with the development and present practice in connection with automatic stokers, coal elevators, and conveyors, etc., which they will be pleased to lend to any responsible enquirer for lecture purposes. A set of slides on the subject of ash removal is in course of preparation, and will be ready shortly. A list of slides and particulars of their subject matter can be obtained on request. Applications for slides should be made as far in advance of the lecture date as possible, and should be addressed to Messrs. Ed. Bennis and Company Limited, 28, Victoria-street, London, S.W. 1.

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On the Splitting of Coal Seams by Partings of Dirt.*

PART I.: SPLITS THAT RE-JOIN.

By P. F. KENDALL, M.Sc., F.G.S.

The splitting of coal seams by the intercalation of wedges or lenses of sedimentary materials offers one of the most disconcerting problems confronting the mining engineer. There is probably no important seam in the great Midland coal field but exhibits the phenomenon in one or other of its forms. Two types of split can be recognised—one having its cause and origin in local depressions of the original area of coal accumulation, converting it from a condition of swamp forest into actual lagoon, and thereby drowning the contributory plants and arresting further growth until the deposition of sediment had again built up a platform upon which the vegetation could re-establish itself. They may be termed "tectonic splits"—that is, splits brought about by earth movements. To this type all the splits noticed by geologists seem to have been tacitly assumed to belong.

The second type of split—which has not hitherto, so far as the author can discover, been recognised—is characterised by the following features:

(1) They are usually accompanied by signs of erosion of the lower part of the seam, and the attenuation of the upper part.

(2) The parted seam re-joins in a short distance.

(3) The zone of parted seam forms a belt taking a sinuous or meandering course, at once suggesting the track of a river.

(4) The plane of the lower portion of the seam is undisturbed, or but little disturbed, but the upper part is bent into an arch over the lens of dirt.

Seventy-seven years ago, J. E. Bowman† gave a clear account of the way in which splitting by tectonic agency might affect a seam, and his explanation could be invoked to explain the splitting and re-union of a seam, but its inadequacy confronted the author at the very outset of his study of split seams. His attention was first directed to the subject of Mr. Isaac Hodges, under whose guidance he examined an exploring drift passing across the whole breadth—perhaps obliquely—of a split in the Silkstone (Middleton Main) seam at Whitwood. The floor of the drift was at a nearly uniform slope, and followed the bottom of the seam, while the Top coal rose over a steadily thickening shale parting, and disappeared overhead. Boreholes put up disclosed that the parting was, at the least, 29 ft. thick; at the farther end of the drift the Top coal came down and the integrity of the seam was restored.

Here was a new problem. According to Bowman, the seam should be convex downward, and the roof should maintain its gradient, whereas the exact reverse was seen. For several years the author sought an explanation of the anomaly; and the very simple solution that he now publishes for the first time he has been teaching for five or six years in the University of Leeds.

It should be mentioned that the Whitwood drift is not now a solitary case; a second drift across the same split in another part of the colliery shows the same features. It is repeated at Ackton Hall, and at South Kirkby an example truncated by a wash-out was found in the Haigh Moor seam. A smaller illustration is now exposed in a small pit working the Middleton Main coal near Whitkirk, and Mr. Stanley Nettleton has furnished a rough sketch of a very typical specimen in a cannel seam at Pildacre Colliery, Ossett. Other examples have been noticed by many previous observers in this country, as well as abroad; perhaps the best being that figured by Jukes in the memoir of the Geological Survey on the South Staffordshire coal field. This shows very clearly arching of the top of the seam, but no explanation of the phenomenon is offered.

Before proceeding to the detailed description of the split in the Middleton Main coal, which is the example best known to the author, it will be well to present the hypothesis by which he will seek to explain the anomalous arching.

Explanation of Anomalous Arching.

The subject of the degree of compression or reduction of thickness attending the conversion of the original mother substance or peat into coal has been much discussed, and, while estimates vary very considerably, there is unanimity in the opinion that many feet of peat would be needed to produce 1 ft. of coal. Experiments conducted in the laboratories of the University of Leeds show that under a pressure of 50 tons to the square inch (the equivalent of, roughly, 100,000 ft. of superincumbent strata), dry peat of fibrous texture may undergo compression to the extent of 80 per cent.—that is, from 5 in. to 1 in.—and this

without any chemical change or, indeed, any obliteration of the delicate cellular or vascular structures of the constituent plants. The loss of volatile matter accompanying the chemical changes must result in a still further reduction. Let it be granted, for the purpose of illustration, that the ratio is 20:1, the sequence of events by which a split coal seam having an arched roof can be produced can now be considered.

We may first imagine a great swamp upon which accumulation of vegetable *débris* by growth and death of successive generations of plants results in the formation of a mass of peat sufficient to become a bed of coal 2 ft. thick. On the 20:1 ratio, this would be 40 ft. thick. Now, as such a swamp must be in proximity to a river, perhaps in the delta area, a period of exceptional flood (or even, in normal times, the partial or total choking of the regular channel) may be supposed to send a strong current of water over the area, tearing up the peaty stuff and carrying it away. The erosion may bite completely through the deposit to the seat-earth upon which it reposes, or may fail to penetrate more than half-way. This incursion may be but a single episode, or it may be that the stream continues for a long time to occupy its new channel. Whichever it be, sooner or later this course is abandoned, and in process of time is silted up by the dwindling stream. The surface now becomes gradually restored, plants creep out over the mud or sand-filled cut-off, and an accumulation of peat is resumed over the whole area. This is the condition shown in a seam consisting of two parts, the upper continuous and uniform in thickness, the lower interrupted by a mass of alluvial deposit taking a winding course, and presenting in transverse section the appearance of a plano-convex lens with the convexity downward. In course of time the accumulation of a great superincumbent load of sediment, aided by chemical changes attending loss of volatile matter, reduces the thickness of the original peaty mass in some such ratio as 20:1, while the sedimentary materials undergo a compression of much less amount.* In the case under consideration, the infilling is principally bind (or shale)—that is, an indurated laminated clay—and though freshly precipitated clay, still in a flocculent condition, almost like that of snow, may contain 90 per cent. of water, yet, by the time the deposition of the upper bed of peat substance was complete, it would have expelled by far the greater part of this, and might have reached a condition in which the porosity was about 30 per cent. In its present condition, the porosity may be taken to be from about 12 to 15 per cent., so that, whereas, on the assumption that the coal peat has been reduced in the 20:1 ratio, the mud has been reduced only in the ratio 100:82 or 85, an amount so small as, for the purpose of the author's present argument, to be negligible.

We may then consider what will happen to the incompressible lens of "dirt" during the compression of the peaty lower half of the seam. Its original thickness under the edge of the parting may have been $2 \times 20 = 40$ ft. This would be reduced to 2 ft., and the margins of the parting would therefore be lowered 38 ft.; on the other hand, down the axis of the parting, where no peat, or very little, existed, the lowering would be either nothing or a few inches. The dirt filling would consequently reverse its curvature and present an arched upper surface and a practically plane lower one. The upper element of the seam would be reduced in thickness proportionately to the lower, and would follow the curvature of the lens of "dirt."

Silkstone Seam Parting.

Having now disposed of the difficulty of the form of a split, we may consider the specific case of the parting of the Silkstone (or Middleton Main) seam in the neighbourhood of Castleford, first briefly describing the seam and its subdivisions. Here there is a floor of spavin (a species of fireclay traversed by innumerable roots and rootlets), followed by the Whetstones, a kind of impure coal with thin dirt bands and much iron pyrites. The Gas Coal Softs or Bottoms, which is usually about 3 to 3½ ft. thick, is succeeded, commonly without any parting of dirt, by the Hards or Tops, about 18 in. thick. The immediate roof is a black shale with streaks of Bright coal; the Blacks are 7 or 8 in. thick. *Sigillaria* stems are of frequent occurrence in the Blacks.

The first indication of its nature seems to have been obtained in the development of the Ackton Hall Colliery. Mr. H. St. John Durnford has described†

* If the infilling were of sand, it would probably undergo very little reduction of thickness, for sand-grains adjust themselves during deposition to a position closely approximating to the tetrahedral arrangement, which is that of closest possible packing.

† *Trans. Inst. M. E.*, 1895-1896, vol. x., p. 444.

how, in sinking a shaft at this pit, the Silkstone seam was passed through without being recognised; but that when lower seams were identified, an exploration was undertaken of a thin seam that appeared at about the position, relatively to known seams, that the Silkstone should occupy. This led to the discovery that the shaft had gone down through an area of split seam, and that the two elements re-joined within a few yards to the west of the pit bottom. A main road running north and south skirts the split, and the main east road traverses it completely, and opens up an area of the full seam on the east. Both south-east and generally on the west the margins of the split have been traced, and its course determined. The author has made many examinations of the main east road, and of some astonishing phenomena displayed by the seam and the accompanying measures.

The next essay to explore this great interruption was in the drift at Whitwood Colliery, previously alluded to, made by Mr. Isaac Hodges, and examined by the author under Mr. Hodges's guidance soon after its completion. This drift, which is 700 yds. long, has made a complete transverse section (probably somewhat oblique) of the split, and terminated where the seam re-joined, somewhere near the boundary of the Whitwood take. Another exploration from the Whitwood workings was in progress until the shortage of labour compelled its suspension. In this case, the exploring drift followed the Hards (the upper element of the seam), and, as before, an arched form was disclosed; but though the drift seemed to have passed well beyond the crown of the arch, its prosecution was arrested when evidently but a short distance remained to be traversed before the seam re-joined.

Workings have proved much of the margin on the Whitwood or western side, and the Ackton Hall workings largely supplement the evidence; but on the eastern side the Ackton Hall workings encountered greatly disturbed ground north of the main east road, and the margin south of that position is known with an approach to accuracy for only a short distance.

Sufficient is known to justify the conviction that the series of phenomena here record an interesting piece of coal measure physical geography. The long sinuous track of divided coal evidently marks the site of a river meandering over the swamp at a late stage in the accumulation of the Silkstone seam, and it becomes a matter not merely of academic interest, but of considerable practicable importance, to trace as far as possible its further course, in order to predict, if possible, where pits might be put down with a reasonable prospect of escaping the fate that so imminently threatened Ackton Hall with disappointment, if not with financial disaster. In a southerly direction the split seems to be swinging somewhat to the westward, but the Ackton Hall workings have not extended beyond about St. Thomas's Church, Purston Jaglin; and a great tract in which no exploration of the Middleton Main horizon has yet been attempted intervenes between this point and the pits in the neighbourhood of the Don Valley. Further west, the seam appears under the guise of the New Hards,* and, although it is in the nature of the case impossible to identify this particular river, signs are not lacking of similar features. For example, the absence of any recognisable representative of the New Hards at Woolley may possibly indicate that a similar condition prevails there to what is found at Ackton Hall.

When one turns in the opposite direction, one finds many highly significant facts that must be taken into consideration. At Allerton Bywater, the shaft went down into the split seam, the Hards being of normal thickness, but being separated from a representative of the Gas coal 3 ft. thick by a dirt parting no less than 18½ ft. thick—if the information contained in the "Sections of Strata" is correct as to the identification of the seams. In any case, the Tops are clearly afloat, as it were, on a mass of dirt that stands in the position of the filling of the Whitwood split. The close proximity of this site to the most northerly workings at Whitwood puts this beyond mere conjecture. The next link in the chain is furnished by the Wheldale and Fryston workings. Mr. Soare has informed the author that in the Wheldale western district a good undivided Silkstone was found, but that, starting from a point 1,000 yds. east of the main south haulage road, at a distance of one mile from the pit bottom, the seam was split by a dirt parting that thickened to the east, and at Fryston shaft attained a thickness of 39 ft., and even in the most easterly workings showed no reduction. The parting came between the Whetstones and the Gas coal, but in passing eastward it encroached upon the latter, for at Fryston shaft the Gas coal was only 13 in. thick; the Hards also showed signs of some deterioration, the lower part being described as "drossy coal." The parting has been proved to extend to 1,000 yds. east of the shaft, and a borehole has proved the presence of the Whetstones. In this instance, as in other cases, the plane of the floor is little disturbed, the seam being convex upward.

* See "The Correlation of Some Yorkshire Coal Seams," *Trans. Inst. M. E.*, 1917-1918, vol. liv., p. 67.

* Paper read before the Midland Institute of Mining, Civil and Mechanical Engineers on November 3.

† "On the Origin of Coal; and the Geological Conditions under which it was Produced," by J. E. Bowman. *Trans. Manchester Geol. Soc.*, 1840, vol. i., pp. 107-8.

in of the split at Wheldale was traced from a nearly straight north-and-south line to the River Aire, when it swept round across the north side of the colliery. It then ran into close proximity to the Ackton and split. From Allerton Bywater in a section (that is, up the valley of the Aire) there is a space of about three miles, respecting which the author has no information, but before Woodlesford is reached the Water Haigh workings on the south side of the river show a normal development of the seam, save for a remarkable lens of dirt round the shaft pillar, to which allusion will be made later. About Woodlesford the seam is again split by dirt partings, the following points being noted. At Swillington Bridge a thickness of 6.5 ft. separates the Soft coal from the rather attenuated Hards. Just west of the village a species of pocket of thick dirt with thicknesses of 7, 11.8, and 12 ft. was encountered in the workings from the Rothwell Haigh Colliery; and the Beeston pit of the Waterloo and Woodlesford collieries, close to the south bank of the river, proved a parting amounting to 7 ft. 2 in. between a full section of the Hards, and a reduced Bottom coal. Half a mile due north the seam, according to the official maps, is "much divided." In the next section, at the Oak pit, about 600 yds. north, the seam shows a much reduced Soft coal (2½ ft.) and thin Hards, but only a trifling dirt parting of 2 in. Another quarter of a mile further north a borehole proved a parting of 5½ ft. between the Soft coal and the Hards. Beyond this there is little information available, but the author is informed that the seams exhibit a very variable development to the west and north-west. At a point about 1½ miles north-by-east from the borehole just mentioned is a little pit at Colton, near Whitkirk. Here the seam is undivided at the pit bottom, but about six chains from the shaft in a north-north-westerly direction a dirt parting comes in very suddenly, by which the Hards are carried up out of reach. The maximum thickness of the parting is 12 ft., and its breadth about 100 yds. The Tops are arched and the plane of the Bottoms is undisturbed. The general direction of the split is about south-west to north-east, and the point at which the author examined it is nearly beneath the village of Whitkirk.

The facts disclosed by the Whitwood and Ackton Hall explorations may now be considered in greater detail. The three nearly complete traverses of the split, though differing a good deal one from another, yet display some common features that enable a fairly clear view to be obtained of the sequence of events of which they are the record.

The Three Traverses of the Split.

The northern drift section followed the lower element of the seam, which maintained a nearly continuous gradient from end to end, although slightly disturbed by three faults of trivial amount. The lowest dirt parting here is about 18 in. from the bottom of the Gas coal, and is overlain by more of the Bottom coal. This parting increases towards the middle of the split, encroaching upon the coal below, and for a short distance coming down on to the Whetstones, but nowhere cutting them out. This seems to indicate that after the deposition of so much of the mother-substances as would make the Whetstones and 18 in. of Gas coal, a river began to course over the area and to cut through the peaty mass. The streak of coal overlying a portion of this dirt parting marks either the total temporary diversions of the river or a swing over to the opposite side of its course, in either case permitting the resumption of peat growth for a time, until a return swing of the stream brought another layer of mud over the peaty layer. Over all the Hards were formed after the entire cessation of the stream action and the complete silting up of the channel. The Hards were not traced continuously, but three boreholes put up through the roof of the heading proved the presence of this division of the seam. Near the middle line of the split the dirt had a total thickness of 20 ft. On the eastern side the succession was simpler, only one dirt parting being found surmounting 19 in. of Bottom coal (Softs or Gas coal). It is worthy of note that the bind immediately beneath the Hards contained a few strap-like roots or rootlets, but it was in general well-bedded.

In the second drift, the Top coal was followed, and with some variation of thickness extended in a continuous arch for over 400 yds., its descent at the far end of the drift justifying the hope that a short distance of further exploration would show the re-union of the seam.

The feather edge of the lowest dirt parting rested on 2 ft. of Gas coal, and was covered, as in the other section, by a thin streak of coal separating it from another layer of dirt, with which it became continuous in a short distance. The inference regarding the vicissitudes of the stream is sustained by the evidence of this new drift as far as it goes. The coal at a little distance on each side of this interruption is quite normal and undivided, except to a quite trivial extent. On the east, another split was found in the workings at Wheldale, but the author is not inclined to regard it as belonging to the same phase, and perhaps not performing the same rôle as the one now under discussion. Again, in the block of country between the Aire and the Calder from Leeds to Wakefield the seam is substantially intact.

Two points may be noted: (1) That the lowest bench of the Gas coal tapers somewhat in one place, and des ends rather sharply; (2) that the Hards somewhat further on are very abnormal in thickness, a fact probably connected with a slight inflexion of the seam along "swilley." About this point the author went down, but failed to find coal. The east road is much more difficult, and the lapse of time since it was last disturbed of the stratification of the coal where workable was presented by pack.

The main features of the Whitwood sections are here repeated, with some variations of the main conclusions in order to adapt them to this case. The first horizon at which splitting takes place is substantially that already recognised, namely—about half-way up the Gas coal; but here the dirt parting more quickly attains to a considerable magnitude, and it is interesting to observe the intercalation at this stage of a band of cancell, probably to be interpreted as a deposit of completely pulped vegetation accumulated in a swampy pool during temporary interruption in the flow of the stream.

A second split, cutting off the Hards, occurs at both ends of the section, but whereas at the western limb of the arched Top coal the full succession, including the Blacks, rises up and is lost sight of in the roof of the road, the Hards are absent for a considerable stretch near the crown of the arch, and when they appear as a feather edge on the east they are where first seen unaccompanied by Blacks.

Alternative Hypotheses of Origin.

The author is unable at present to offer with any confidence an explanation of the contrast thus presented both to the Whitwood sections and to the western limb; perhaps when more examples have been studied his perplexities may disappear. For the moment it must suffice to offer three alternatives:—(1) That the top of the mass of relatively incompressible dirt did not sink to the level at which plant growth would be resumed; (2) that the levelling was insufficient to raise the surface to the level of plant growth; or (3) that the Hards were deposited and subsequently washed away.

Reviewing the evidence, there would seem to be here a stretch of some three miles of the course of a river that began to run over the coal forest area at a stage when about half the thickness of the Soft coal had accumulated, and that did not wholly abandon this course until at earliest the stage of formation of the Hards had begun.

The position of the principal parting at Allerton Bywater and in all the other sections in the Valley of the Aire shows that incomparable conditions prevailed there, but when the Wheldale and Fryston sections are examined, a very different set of conditions is indicated. The dirt parting appears between the Whetstones and the Soft coal, and enlarges at the expense of only the lower part of the seam. Thus it began and finished earlier, and manifestly, although approaching so near to the Allerton Bywater split, it must belong to a distinct physiographical phase.

Whether, in view of its enormous extent, the Wheldale-Fryston split can be regarded as an area over which the meander of a river had swung, or whether it marks the edge of the coal swamp, cannot be decided at present; but, if the former explanation be adopted, it might well have happened that this channel was discarded in consequence of the river in some time of flood breaking its bank near Allerton Bywater, and cutting the new channel. It must be remembered that streams flowing over marshy areas of very low gradient are extremely inconstant in their wanderings. Wide meanders and innumerable loops and branches result in a network of great complexity. Abandoned loops or "otbaws" (the "Bayous" of the Mississippi swamps) are invariable features of such modern river marshes as furnish the clearest comparison with the conditions generally accepted as prevailing during the formation of our coal seams.

It is a commonplace of river study that a river discharging into a great delta is tree-like in general arrangement: near its source it has its tributary system, like roots, its intermediate trunk, and its distributary system subdividing and meandering over the delta with a complexity baffling all description.

One detail remains to be mentioned: the remarkable discoid split at Water Haigh. When this was encountered during the sinking of the pair of shafts much anxiety was felt lest it should prove to be a repetition of the costly experience at Whitwood, and, though the progress of opening out the pit showed that the parting increased much beyond the magnitude first encountered, further work proved the circumscribed nature of the interruption. The Top coal came down in every direction, and the seam resumed its normal condition. It is interesting to note that there is a fringe of cancell round the greater part of the periphery of the split. How this pool was formed cannot now be discussed at length: agencies were at work in the area during coal measure times that it would be premature to mention; but, given such a depression in the area of accumulation, it is not difficult to imagine the infilling with sediment brought by occasional floods.

As to the direction in which the supposititious river flowed, the author has no definite opinion to offer. The infilling of the channel is by bind, a material that very rarely shows any sign of current bedding; if it had been sandstone the difficulties would probably have been much reduced.

Again, the form of the meanders sometimes furnishes an indication, but a river of considerable breadth flowing over a surface of extremely low gradient will have meanders with so wide a sweep that only when they are traceable over a vastly larger area than that under review is it possible to draw any safe inferences from this class of evidence. *A priori*, one would expect that the general flow would be from north or north-east, but a single small segment of a river flowing in intricate meanders might be flowing towards absolutely any point of the compass. One small piece of evidence the author offers for what it is worth: Mr. W. D. Lloyd showed him in the roof of the seam under consideration at the Fox pit, Stanley Ferry, a beautiful section of a small sandstone "wash-out," of which careful measurements were made. This "wash-out" was traced for about half-a-mile across the pit, and in that distance the base of the "wash-out" descended from 4 ft. above the coal until, at the place where the author saw it at the south-western end, it had cut out the topmost layer of the coal, the

Blacks. It might be inferred from this that the flow was from north-east to south-west.

To summarise, the author hopes to have shown:—

(1) That linear splits in coal seams that re-join are erosion phenomena, and not, as Bowman supposed, tectonic in origin.

(2) That the common phenomenon of the arching of the upper portion of the seam over the dirt parting is the result of the relative incompressibility of the sedimentary material.

(3) That the Whitwood-Ackton Hall split marks the course of a stream traversing the area during the formation of the Silkstone (Middleton Main) coal.

(4) That this stream was probably the same as that whose traces are found at Allerton Bywater, and possibly the same as that at Woodlesford, Swillington, and Newsam Green, but probably not that at Colton.

(5) That the split at Wheldale and Fryston is of somewhat earlier date than the Whitwood split, and that, if of the same type, it is on a vastly larger scale.

(6) That the discoidal splitting at Water Haigh is due to a different cause, but that the infilling was accomplished by the overflow of muddy water from the adjacent river.

THE COAL PROBLEM IN FRANCE.

In an article on the French metallurgical industry after the war, Mr. R. Pinot (*Bulletin de la Société Minérale*) states that according to the last official statistics published in 1913, the French output of coal equalled about 40 million tons, whilst the consumption reached 63 million tons, which shows a shortage in the home production of 23 million tons. This shortage had been of many years' growth, till on the eve of the war, France was importing fuel all round—from England, Belgium and Germany.

With regard to coke the figures of the home industry were still unfavourable. The imports amounted to as much as the home output, and France had been a big customer to Germany. In 1913, the net sum paid for imported fuel (coal and coke) reached 531 million francs. Out of this sum 90 million francs were paid for coke, and this did not include the foreign supplies to metal foundries on private contracts, amounting to some 100 million francs, more than half of which sum went to Germany.

In the event of the retaking of Alsace-Lorraine by France, the deficit in output would be still greater, for that province produces only 4 million tons of coal and no coke, and its consumption of coal amounts to 6 million tons, with the addition of 4½ million tons of coke (equivalent to another 6 million tons of coal). On the other hand, the inclusion of the Sarre district, in French territory, would reverse the position. This district produces 10 million tons of coal and 3 million tons of coking coal yearly, of which only 5 million tons are required for local consumption, leaving a surplus of 8 million tons to balance the shortage from Alsace-Lorraine.

The combined production of Alsace-Lorraine and the Sarre may be put at 17 million tons—14 million tons of ordinary coal and 3 million tons of coking coal—whilst the consumption of coal (8 million tons ordinary and 1 million tons of coking coal) is 9 million tons; consequently, with her enlarged frontier, France would not have to face a greater shortage than before the war, the only difference being that 13 million tons of ordinary and 10 million tons of coking coal would be required, instead of 19 millions and 4 millions respectively.

In 1913, the French import figures stood as follow:—

From	Tons.
Germany.....	3,491,000
Belgium.....	3,669,000
Great Britain.....	11,257,000
Other countries.....	294,000
Total.....	18,711,000

According to these statistics, France, after the war, will be minus the 3½ million tons received from Germany. The imports from Belgium could be reduced to about 1 million tons, although if Belgium dispenses with the importation of coal from Germany she will probably have no surplus for export. Luxembourg, too, is another good coal customer of Germany's, taking at least 500,000 tons a year, not including coke.

With Germany barred and Belgium limited to the production of home supplies, England will have practically the monopoly of coal exports to France.

With regard to metallurgical coke, France imported in 1913:—From Germany, 2,393,000 tons; from Belgium, 547,000 tons; and from other sources, 130,000 tons, making a total of 3,070,000 tons. The consumption by the industries of Lorraine and the Sarre would increase the shortage to 7 million tons; the demand would have to be met by imports from somewhere. The coke problem presents greater difficulty than the coal question, because not all coal is suitable for coking, and the Sarre coal does not make a good metallurgical coke, the yield, moreover, being only 50 to 55 per cent., instead of the usual 65 to 66 per cent. Processes may, perhaps, be discovered for cheaply converting all kinds of coal into coke without loss, but experiments take time, and present needs are all-important.

Before the war, Germany delivered to foreign metallurgical undertakings as much coke as they wanted, but always refused to sell the coal from which that coke was obtained—a policy by which she could retain all the by-products for her own chemical industries. After the war, France will still have to seek a part of her fuel supplies abroad, but in the interests of her metallurgical industries she must import not coke but coking coal, and thus adopt the same economic principle as Germany.

The question now remains to find a country to furnish a sufficiency of such supplies. Only three countries in Europe have coking coal in any appreciable quantity—viz., England, Belgium and Germany. Belgium, in 1913, exported 1,119,000 tons of coke, but she also imported 1,128,000 tons, almost entirely from Germany, because the Belgian coal had to be mixed with another

quality to obtain the percentage of coke required for metallurgical purposes.

Before the war the large French metallurgical companies, which had sunk large sums for investigation in the Nancy extension of the Sarre basin, being unable to obtain concessions from the French authorities, turned to Belgium for supplies, and invested capital in the Campine field, which will, however, not be productive for a considerable time.

Then, as to Great Britain, which exported, in 1913, 1,235,000 tons of coke, constituting a record; even this quantity would fall far short of the 7 million tons needed by France. The difficulties in shipping and storing coke must also be taken into consideration, not to mention the extra cost of carriage from a distance. Here again, coking coal would be preferable to the coke, especially for the blastfurnaces, etc., situated on the northern coast. An electric-towage canal, connecting the coast with the Lorraine district, has been suggested; but this would take a long time to construct, and present needs are very pressing.

In imposing peace terms on Germany, a tribute payable in coal might very well be exacted. By the Franco-Prussian Convention of 1861, regarding the Sarre Canal, Prussia engaged to deliver to France a certain yearly tonnage of coal free of export duty, and at specially favourable rates; but owing to an omission in the wording of the treaty this important clause was rendered null and void. Such a contingency must be prevented in any future agreement.

The industrial position of France after the end of the war will be unsatisfactory in comparison with that of Germany, England or the United States. As a coal country Germany stands pre-eminent among European states; with a resource of 410 thousand million tons of coal and 13 thousand million tons of lignite she possesses more than half the entire coal content of Europe. England, with 190 thousand million tons, stands next; then Russia, with 60 thousand million, and Austria-Hungary, with 54 thousand million, fourth. France comes fifth, as she has only an uncertain total of 17½ thousand millions, distributed as follows: anthracite, 3½; coal, 12½; and lignite, 1½ thousand million tons. Thus, with her pre-war frontier, her reserve is only one-twentieth that of Germany. The Sarre district in German Lorraine alone contains more coal than all the known French sources put together, and even if Germany lost the Sarre district, she would, with the immense deposits in Westphalia and Silesia, still be as rich as all the rest of Europe. This fact must never be lost sight of in the consideration of European economic conditions after the war. (Extract from an article by M. P. Ternier, Inspector-General of Mines.) Coal deposits exist in the Lyons district, but mining requires time and money, and prospectors will have to be encouraged by offering a certainty of obtaining the benefit of their enterprise, and not merely leaving them to bear the burden of outlay unaided.

With regard to water power as a supplementary source of energy, private undertakings have proved of value to a certain extent. The present installations provide something like 900,000 h.p., which corresponds to 5 million tons of coal; but however bright may be the future of water power in France, it cannot lighten the present dark outlook presented by the coal shortage.

After the war, the situation of the three great European countries, from a national economic standpoint, will be as follows:—England, with coal worth upwards of 286 million tons yearly, and a surplus of 100 million tons over her home consumption; Germany, even though shorn of the French provinces, still producing 174 million tons, with an excess of 40 million; and France, within her new boundaries, with an output of only 57 million tons, and a shortage of 80 million tons. That this deficit will not be easily made good is evident from M. P. Ternier's report already alluded to, in which he states that the still unmined coal in France will yield enough for a yearly consumption of 60 million tons for the next three hundred years, but if—as is very probable—the national needs rise to 100 millions, the supply will be exhausted in two hundred years at the longest. Assuming that the Sarre coal field is annexed to France, and that the extension in Meurthe-et-Moselle is really workable; that the St. Etienne coal field extends far under the plain of the Rhone, even as far as the Jura mountains, and that other deposits are discovered at workable depths to the north-east of Paris; with every available source taken into account, France possesses a store of coal sufficient for only a few centuries.

The London County Council are reported to have bought 39,500 tons of coal and about 100 tons of coke for their generating station at Greenwich, at a total cost of £68,000. The Norwegian State Railways have lodged their contracts for 18,500 tons of steam coal, for delivery over December and January, with two Newcastle firms, equally dividing the quantity between them.

Drill Holes and Blasting Charges.—In the rock excavation in connection with the widening of the Louisville and Portland Canal at Louisville, Kentucky, the proper spacing for drill holes was determined largely by trial. At first, holes were drilled at corners of 10 ft. squares, but later the dimensions of the squares was reduced to 7 ft. Even then (according to *Engineering and Contracting*) some pieces of the disrupted limestone were too large for the shovel dipper, and an additional hole was drilled at the intersection of the diagonals of each square, and sometimes several small air-drilled holes were made through the limestone. These small holes were made by small motor-driven compressed air drills. The amount, distribution, and strength of the blasting charge was determined by trial. Experiments were made, using dynamite varying in strength from 40 to 75 per cent., and concentrating the dynamite charge near the bottom of the holes, at top and bottom of holes, and uniformly distributing the charge throughout the holes. The best results were obtained with the holes spaced 7 ft. in both directions, and with a charge of 75 per cent. dynamite concentrated in equal amounts near the top and bottom of holes. The drill holes were carried 18 in. below grade, but in spite of this it was occasionally necessary to re-drill the bed rock after blasting. With this method of drilling and charging, the amount of dynamite used per cubic yard of rock averaged 0.4 lb.

THE JURASSIC AND LOWER CRETACEOUS ROCKS IN EAST KENT.*

By G. W. LAMPLUGH.

Since the publication of the Geological Survey memoir on "The Mesozoic Rocks in some of the Coal Explorations in Kent" in 1911, the officers of the Survey have had opportunities for examining the cores of the mesozoic rocks from most of the numerous borings which have been made in Kent. A summary of the information obtained may now be given.

Almost all the new borings lie farther north than those previously described, and are therefore in the region where the sequence of mesozoic rocks is shorter and less nearly complete than in the Brabourne and Dover sections already dealt with. They are sufficiently numerous to bring out clearly the underground range of the various formations proved in the older borings, and incidentally to confirm the deductions as to the underground structure which were stated in the memoir referred to. The unexpected fact that in this district the palaeozoic floor is reached at a less depth beneath the highest outcropping formation (eocene) than beneath the lowest (Wealden) is explained mainly by the disappearance northward of all the oolitic formations in turn, under the cretaceous unconformity, and the similar disappearance of the lias under the unconformity of the oolites. As a result of the borings we are able to fix the position of the ancient outcrops of the formations beneath the unconformities and approximately to trace their hidden boundaries. This information is likely to be of practical service where mining operations are contemplated.

The structure of the concealed jurassic rocks in this area proves to be comparatively simple. If all the tertiary and cretaceous formations could be stripped off from the country south of the Stour valley (and these excluded) a broad smooth slope would be laid bare, descending nearly north-eastward from the Folkestone-Ashford area to the tract under the present Stour at a rate diminishing from about 40 ft. per mile in the south to 20 ft. or less in the north; and across this slope the outcrops of the successive formations from the Portlandian upward to the Portlandian would be found to stretch in parallel belts striking, with slight irregularity, west-north-westward from the line of the present coast. The lias would still remain hidden by the unconformable overlap of the lower oolites; but its course is nearly, though not quite, parallel to that of the other jurassic formations. The strike of these belts is nearly the same as that of the cretaceous rocks now seen at the surface, but their dip, though slight, is diametrically different, being southerly instead of northerly, so that if they were at the surface their escarpments would face in the opposite direction to that of the chalk.

The relative underground positions and approximate boundaries of the jurassic belts in north-east Kent are shown diagrammatically in fig. 1, and the structure, down to the palaeozoic floor, is illustrated by the section forming fig. 2.

The salient characters and stratigraphical relations of the several formations, in ascending sequence, are as follow:

Lias.—The northward limit of the lias is nearly coincident with the main railway line between Canterbury and Dover, and the formation has been proved in all the East Kent

sandy shale with a few thin limestone occurrences of a conglomeratic band in at Chilton suggests the neighbourhood northward, and it is probable that the were above sea level during part of the north-eastern corner of the area shown.

The trias, proved in the older borings, is absent from all the borings examined to the northward and eastward; and the lias wherever present in the newer borings is found to rest directly upon a freshly-eroded and unweathered surface either of the coal measures or still older rocks.

Lower Oolites.—The lower oolites are the last portion of the jurassic sequence to be cut out northward by the lower cretaceous unconformity, and they therefore occupy a larger area underground in East Kent than any other division of the jurassic system. In the west, their northward termination probably lies well within the tertiary area, about three miles north of Canterbury, but, striking east-south-east, leaves this area before Sandwich is reached, and curves south eastward into the chalk country a mile or two west of Deal, evidently controlled by the shape of the rising palaeozoic platform.

In the borings nearest this northern margin the lower oolites appear to range from about 20 ft. to about 40 ft. in thickness, and to consist mainly of the great oolite limestone; but the method of boring has yielded only imperfect evidence. Southward and westward from the

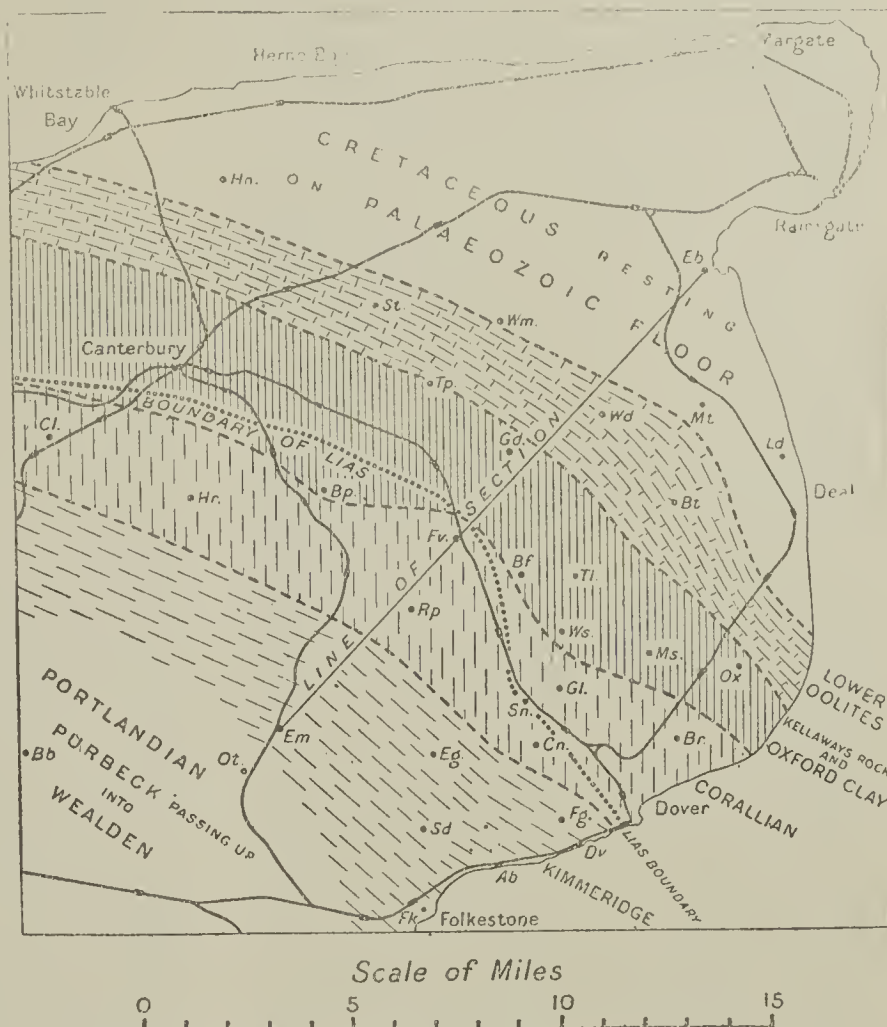


FIG. 1.—SKETCH MAP SHOWING RANGE OF BURIED JURASSIC FORMATIONS IN EAST KENT.

Railways, with position of stations, shown by continuous black lines. Borings (and shafts) from which information has been obtained, indicated by black dots, lettered as follows:—

Ab., Abbotscloft.	Em., Elham.	Ot., Ottinge.
Bb., Brabourne.	Fg., Farthingloe.	Ox., Oxney.
Bf., Barreston.	Fk., Folkestone.	Rp., Ropersole.
Bp., Bishopsbourne.	Fv., Fredville.	Sd., Lower Standen.
Br., Bere Farm.	Gd., Goodnestone.	Sn., Stone Hall.
Bt., Betteshanger.	Gl., Guildford (shaft).	St., Stodmarsh.
Cl., Chilham.	Gt., Gt. (shaft).	Tl., Tilmanstone (shafts).
Cn., Chilton.	Hr., Harmansole.	Tp., Trapham.
Dv., Dover (shafts).	Ld., Lydden Valley.	Wd., Woodneborough.
Eb., Ebbsfleet.	Ms., Maydensole.	Wm., Wamstone.
Egl., Ellinge.	Mt., Mattice Hill.	Ws., Walsershare.

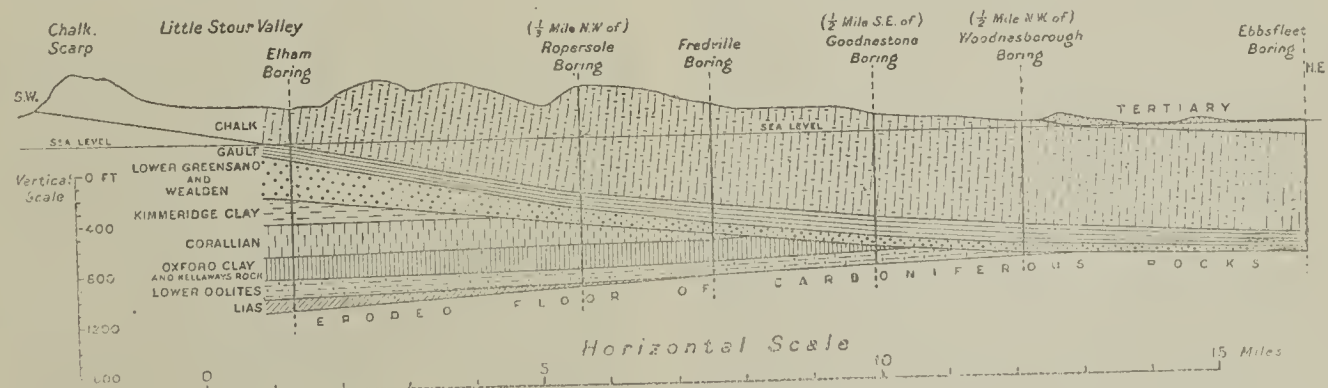


FIG. 2.—SECTION ACROSS EAST KENT, ALONG THE LINE SHOWN IN FIG. 1. Vertical Scale 10 times the horizontal scale.

borings south-west of that line. Its thickness diminishes steadily from 140 ft. in the south-west (Brabourne) to less than 15 ft. near its northern margin, partly through the thinning of its individual members and partly through the shaving down of its top before the deposition of the lower oolites. But even in some of the borings where thinnest (Fredville, 13½ ft.; Bishopsbourne, 22 ft.; Chilton, 25 ft.), the presence of beds belonging to the three major subdivisions, upper, middle and lower lias, has been proved by the evidence of fossils.

The upper lias consists mainly of smooth clay shale; the middle lias, of alternations of shale, hard shelly limestone and calcareous sandstone, occasionally rather ferruginous; the lower lias, mainly of clay shale and

margin the division increases steadily in thickness, until at Brabourne, in the south-western corner of the area, it measures 194 ft. The belt in which the lower oolites form the floor immediately beneath the unconformable cretaceous rocks has an average width of about 2 miles, but becomes narrower before reaching the present coast line between Deal and St. Margaret's Bay (see fig. 1).

Stratigraphically and palaeontologically, the development of the lower oolites in East Kent is similar to that in the south-west of England, and is unlike that in the East Midlands and Lincolnshire. In all the sections the full sequence was represented by a continuous belt, and it was possible to recognise the main subdivisions in the south-west of England, from the top of the downward to the bottom of the great oolite.

* See "Mesozoic Rocks in some of the Coal Explorations in Kent." *Mem. Geological Survey*, 1911, pp. 51-54.

the oolite was identified in a few places only, and is to be often absent and nowhere complete. The sub-divisions determined in the range of their thickness, in round numbers, are not affected by the cretaceous uncon-

	Ft.
Crash	10 to 20
Forest marble	10 " 20
Great oolite limestones	40 " 120
Great oolite sandy beds, with part of inferior oolite in places	0 " 40

The bottom sandy beds are thickest and best marked in the borings farthest east; they thin out northward, while westward and south-westward they tend to lose their individuality through the intercalation of sandy limestones and bands of shale. The sands generally contain large calcareous "doggers" and are often mottled, with fragments of lignite; they pass unconformably across the lias to the bare palaeozoic platform which must have suffered renewed erosion in the northern area during their deposition. They represent the scourings from adjacent land, swept off shore and deposited in shallow water.

The great oolite limestone is the most conspicuous member of the lower oolites, and also the most variable in thickness, so that most of the south-westward increase of the lower oolites is due to the swelling of these limestones. Its main beds are composed of pale massive oolite, usually of medium or close grain, and poor in fossils; but toward the north and east these become attenuated and split up by partings of clay shale and oolitic rubble, in which fossils are often abundant. The close-grained rock, if accessible, should make an excellent building stone, a point worth mentioning in view of the fact that mining shafts have already been sunk through it and that more are in prospect.

The Forest marble series and the Cornbrash are relatively minor subdivisions, and show comparatively little change in thickness within the area, being, if anything, slightly thicker in the north-eastern part of their range than elsewhere. Both are heterogeneous deposits, chiefly of marl and clay with irregular bands of limestone, calcareous sandstone and oolitic rubble. They are distinguishable mainly by their fossils, which are numerous, and by the presence of green clay and a peculiarly compact limestone in the Forest marble.

Kellaways Rock and Oxford Clay.—Where pierced in the Kentish borings, the Kellaways rock is readily identifiable by its composition and fossils, though there is sometimes difficulty in determining precisely its upper and lower limits. Its underground contact with the overlapping cretaceous strata occurs in a narrow belt running E.S.E. from the neighbourhood of Canterbury to the coast near St. Margaret's. This belt is not wide enough to be shown separately in fig. 1, and it is therefore united with the broader belt of the overlying Oxford clay, the two together having a breadth ranging from about 1½ miles in the east to about three miles in the west.

The Kellaways rock appears to attain its greatest thickness about midway between Canterbury and the coast, 43 ft. being assigned to it in the Fredville boring, whereas farther east it drops to between 30 and 37 feet, and farther west to under 20 ft. (Brabourne and Harnansole). The differences may be in part due to the uncertainty as to its boundaries, but seem also to indicate some interchangeability of composition with the lower portion of the Oxford clay, as in other parts of the country. In its lithological aspect, the Kellaways rock shows much local variability; in the more southerly and south-easterly sections its chief component is an impure marly sandstone with some ferruginous beds, but inland and northward the main portion is a ferruginous marlstone, sometimes highly glauconitic. Much of the iron in this ferruginous rock is disseminated in round coffee-coloured "millet-seed" grains; and it therein resembles the upper corallian iron ore, though stated to be less rich in iron and to contain a larger proportion of deleterious matter. Its possible commercial value, however, deserves attention. In some of the borings, particularly Fredville, parts of the rock are so rich in glauconite as to be quite green in colour.

The Oxford clay is the least variable of all the Kentish jurassic deposits; wherever seen, it has consisted almost wholly of fine-textured marly clay without conspicuous bedding, and mostly of a palish grey-blue tint with some subordinate brown bands. It thickens rather rapidly westward from 88 ft. at Dover to 173 ft. at Brabourne, and about the same at Chilham, with intermediate values at points between these places.

Corallian Series.—The corallian rocks have a strong development in the southern part of East Kent, their range including nearly all the tract south-west of the main road (Watling Street) between Dover and Canterbury. The thickness of the whole series, as ascertained in the Dover shafts, is 310 ft., and in the Brabourne boring 342 ft., so that the westerly expansion is not so marked as in most of the jurassic formations. The beds probably become thinner northward, but owing to the incomplete state of the series in this quarter, comparison is difficult. The northern edge of the formation lies a mile or two south of Canterbury, and runs E.S.E. to the coast between Dover and St. Margaret's. The boundary appears to have a pronounced southward bulge near Bishopshorne and a northward bulge between Fredville and Barfreton (see fig. 1). These bends may denote faulting, or they may indicate that the thick limestones of the series have an irregular escarpment buried under the Wealden deposits. The average width of the corallian belt beneath these deposits is about 3 miles.

The most characteristic and persistent portion of the Kentish corallian series is the thick mass of pale coralline limestones which forms the middle part of the series. To the south, a thickness of 125-150 ft. is assigned to it, and below these limestones the series consists of clays, marls, marlstones and sandstones, with subordinate bands of impure limestone. There is frequently an admixture of iron ore in the form of small coffee-coloured grains, and iron oxide, which are in places

segregated into bands of iron ore like that of Westbury, in Wiltshire. The thickest of these bands occurs in the Dover district in the beds above the coralline limestones, and is likely to prove of economic value.

The separation of the corallian from the Oxford clay below and the Kimmeridge clay above is largely dependent upon palaeontological evidence. Fortunately, fossils are sufficiently abundant to define the boundaries within narrow limits.

Kimmeridge Clay.—The few additional borings which have pierced the Kimmeridge clay have yielded hardly any material for examination. Fortunately, the explorations previously described gave full opportunity for the study of this formation, while the recent borings have sufficed to fix its underground range fairly closely (see fig. 1).

Attention may be called to the conditions revealed by the deep boring near Battle, in Sussex, in which

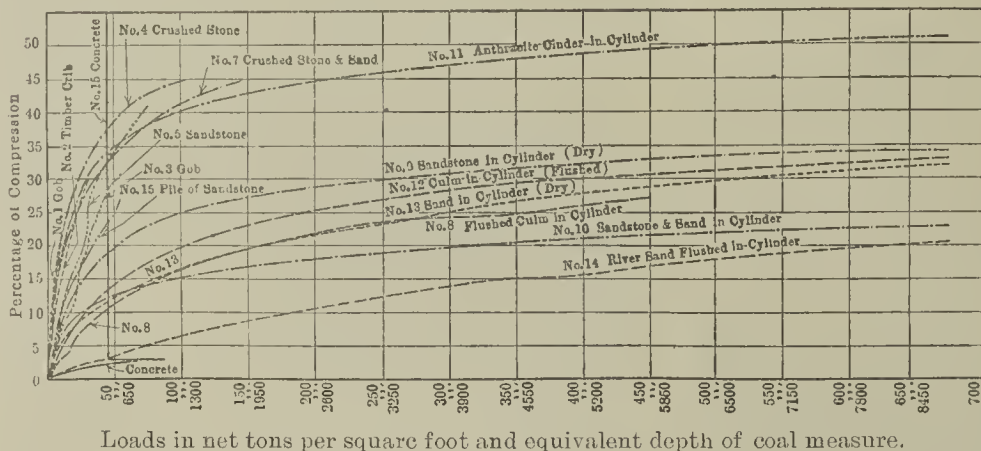


FIG. 1.—TESTS OF SCRANTON MINE CAVE COMMISSION AT LEHIGH UNIVERSITY.

the Kimmeridge clay was fully displayed, and the Portland and Purbeck beds also.

Portland and Purbeck Beds.—None of the Kentish borings recently examined lie within the range of these rocks.

Lower Cretaceous—Wealden and Lower Greensand.—Lower cretaceous strata were passed through in all the borings examined with the doubtful exception of that near Herne; but cores were available in only a few instances. Fortunately several of the beds can be identified even from small chiselled chips; in particular, the glauconitic rock band just below the gault; the chocolate-brown bed in the Atherfield clay; the cyprid shales of the Weald clay; and the sharp quartz sands at the base of the Wealden.

The Wealden beds stretch well beyond the area covered by the jurassic rocks in East Kent. In this quarter they probably continue nearly as far northward as the lower greensand, and the two appear to be practically conformable, though the lower greensand is known to overlap the Wealden beds in the north-western part of the county. Both formations are present at Ebbsfleet, and both are believed to be absent in the neighbourhood of Herne; but the evidence in this northern tract is as yet insufficient to define the boundaries of either formation. It is certain, however, that their strike is not quite the same as that of the jurassic rocks or of the gault.

The thickness of the Wealden series in the Ebbsfleet boring is only 15 ft., but it increases steadily southward to 85 ft. at Dover, and appears not to exceed this in any of the borings between Dover and Canterbury, with one doubtful exception (Chilton). To the south-westward of this belt the expansion must be more rapid, as the Brabourne boring proved 309 ft. of Wealden deposits. Even where thinnest, the series shows a change of character from sandy and silty beds in the lower portion to clayey and shaly beds in the upper portion; but these thin subdivisions can hardly be regarded as strictly equivalent to the thick masses of Weald clay and Hastings beds that are seen in the Weald in similar relationship.

The lower greensand appears to be less regular in thickness, though increasing as a whole southward and south-westward like the Wealden beds. At Ebbsfleet it is 36 ft. thick, but is apparently rather less than this at two or three places farther south, and not much thicker in certain borings to the westward. Nevertheless, on reaching Dover it has expanded to 130 ft., and at Brabourne it is 237 ft. thick. The Atherfield clay forms the lowest portion of the series over most of the area, but was not found in some of the north-easterly and north-westerly sections. In most places the greater part of the lower greensand consists of beds of the Sandgate type—muddy and loamy glauconitic sands and clays—with a thin bed of coarser and cleaner glauconitic sand of Folkestone type at the top, the uppermost portion of which is usually indurated into a concretionary band of hard calcareous glauconite grit. No beds of the Hythe type were found in any of the borings. The Atherfield clay, where present, appears to have suffered some erosion before the Sandgate beds were deposited, probably by current action on a sea bottom.

From the section forming fig. 2, it will be seen that the jurassic and lower cretaceous rocks together form a great wedge with a northward apex, intervening between the palaeozoic floor and the basal bed of the upper cretaceous. The N.N.E. dip in the cretaceous rocks is thus changed to a S.S.W. dip in the jurassic rocks, and the northern part of the great superficial anticline of the Weald is found to be superimposed upon a syncline of the deeper rocks. This structure was demonstrable from the evidence of the four early borings dealt with in the memoir already referred to, but it is brought out much more clearly by the later borings. The Battle boring shows that the jurassic rocks rise southwards, and become thinner under the southern side of the Wealden dome.

RESISTANCE OF ARTIFICIAL MINE ROOF SUPPORTS.*

By WILLIAM GRIFFITH, C.E., Scranton, Pa.

The purpose of this paper is to make public record of new information in regard to the sustaining power of artificial mine roof supports (not timber props), the result of investigations recently made in the anthracite coal fields of Pennsylvania: (1) By the "Scranton Mine Cave Commission," appointed to investigate the mining conditions under the City of Scranton; (2) by the "Pennsylvania Mine Cave Commission," appointed by the Governor to investigate the general subject of mine caves in the anthracite region of Pennsylvania; (3) by the personal researches and tests made by the author in an effort to secure a better artificial mine roof or surface support.

During the progress of the work of the Scranton Mine Cave Commission, the engineers for the Commission, Messrs. Conner and Griffith, being aware of the general lack of exact information in the engineering profession as to the strength of the ordinary artificial mine roof or surface support, and particularly the stronger kinds, such as mine cogs, rock piers, etc., had tests made at the Fritz Engineering Laboratory at Lehigh University, to determine the sustaining power under various compressions of the several kinds of artificial mine supports in use in the anthracite region of Pennsylvania. A report of these tests was included in the report of this Commission, which was published as Bulletin No. 25 of the United States Bureau of Mines, Washington.

A similar series of tests, more extensive and more elaborately planned, were subsequently made for the Pennsylvania Mine Cave Commission at the U.S. Government Testing Laboratory at Pittsburgh, Pa. The report of this Commission was made to the Governor, but has not yet been published.

The author, during his connection with the Scranton Mine Cave Commission, observed that of all the various

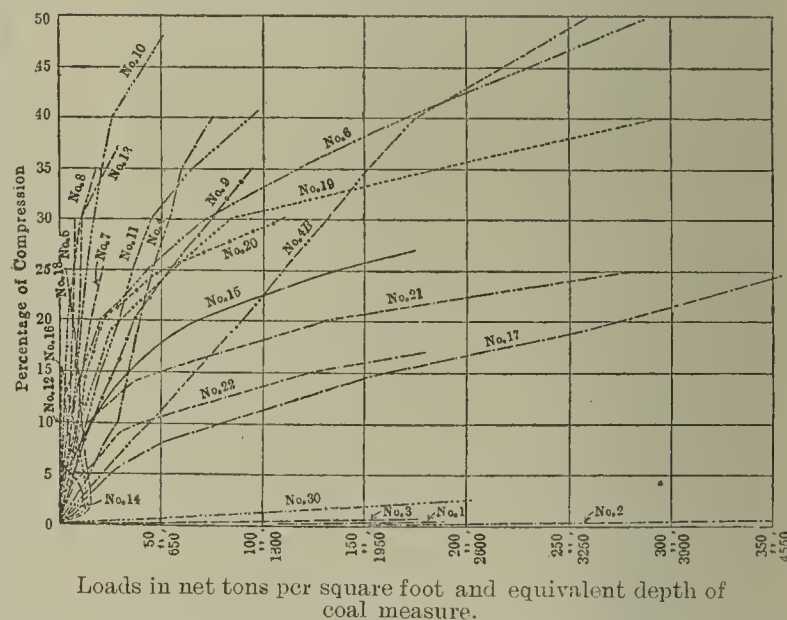


FIG. 2.—TESTS FOR THE PENNSYLVANIA STATE MINE CAVE COMMISSION AT GOVERNMENT LABORATORY, PITTSBURG, PA.

devices employed for sustaining the roof of coal mines, the one universally used and the best known—the "timber cog," consisting of a cribwork of logs filled with mine rock and rubbish—was possessed of comparatively small resistance under the initial pressure, but withal was exceedingly elastic, its sustaining power increasing rapidly under compression. Such cogs or cribs would

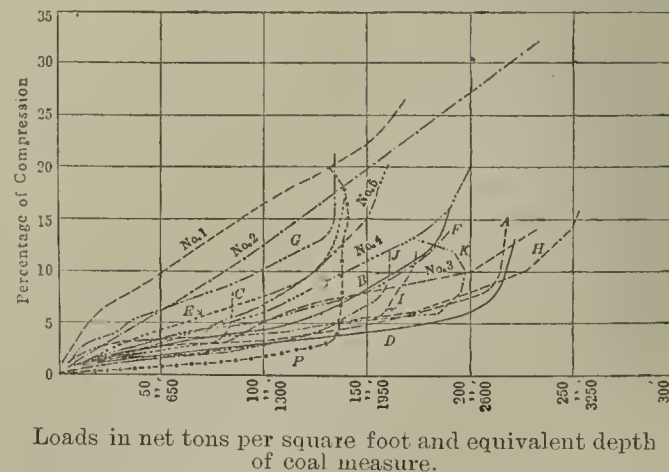


FIG. 3.—TESTS OF GRIFFITH'S MINE PIER AT D.L. AND W. LABORATORY, SCRANTON, PA.

not fail completely until the compression amounted to one-third or one-half the original height of the structure.

The kind of roof support that seemed to have the greatest initial resistance was found to be concrete piers, which, although somewhat costly, are nevertheless used to a small extent in some portions of the anthracite region; but the tests showed that such rigid piers

* Transactions of the American Institute of Mining Engineers.

would fail completely when the load upon them was sufficient to cause a compression of about 3 per cent. of the total height, and this failure of concrete piers under pressure was sudden and without warning, thus being a menace to the safety of the miners.

It was desirable, therefore, if possible, to devise some sort of artificial roof support which would partake of both the elasticity of the timber cog and the rigidity of the concrete pier, and the author tested a number of devices in order to accomplish this end. The result of

structure is completed the unfilled spaces may be pointed with a trowel, from the outside, after which the outside of the pier may be coated with cement by the use of a cement gun or any other device.

It will be impracticable to build such a crib tight against the mine roof. There will be a small space which should be filled by ramming with dry concrete—that is, concrete with a small proportion of water. Thus will be formed a very lasting mine pier, because each timber will be surrounded or embedded in concrete.

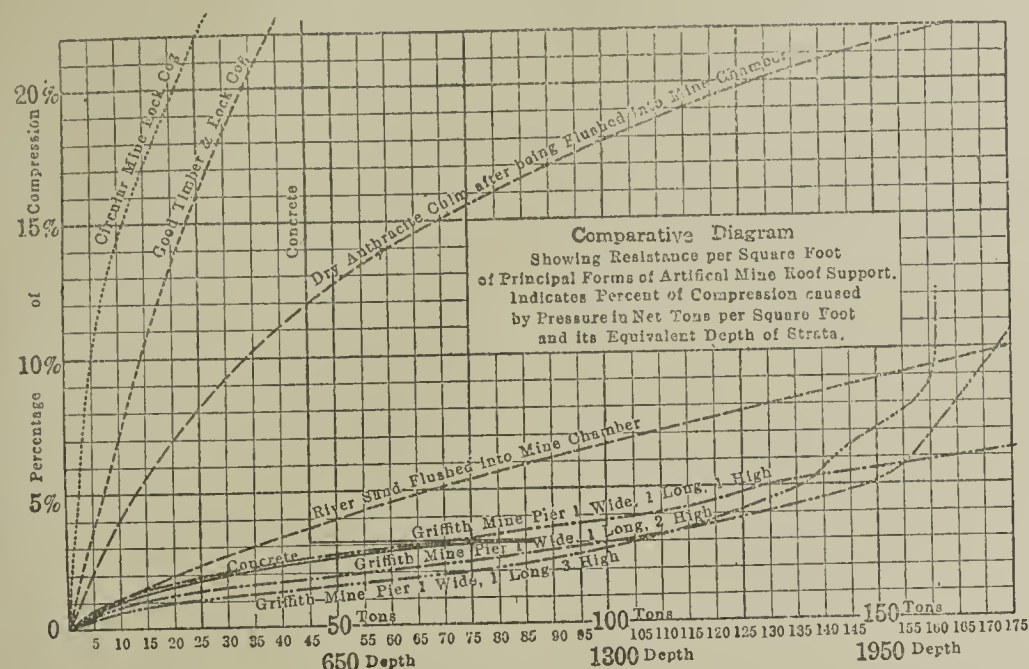


FIG. 4.

this series of tests was the production of what is referred to in this paper as "Griffith's mine pier," which consists essentially of a timber crib, each element or member of which is provided with a series of notches, and which may be framed in quantity, by machinery, and creosoted outside of the mine, so that the crib may be easily erected inside, the members fitting together one upon the other and forming a rigid cribwork. Concrete is poured into this crib, thus forming an artificial mine pier of simple construction, yet having an initial resistance equal to a concrete pier of the

and if the timbers are first creosoted the construction should be very durable.

In nearly all cases it was found that there was an elasticity of about 3 per cent. in the pier when the load was removed. In other words, the height of a tested piece, after the load was removed, was about 3 per cent. more than the height under greatest pressure. Some of the piers were tested the second time, and sustained the same weight, under the same compression, as in the first test.

There are many localities and circumstances in coal

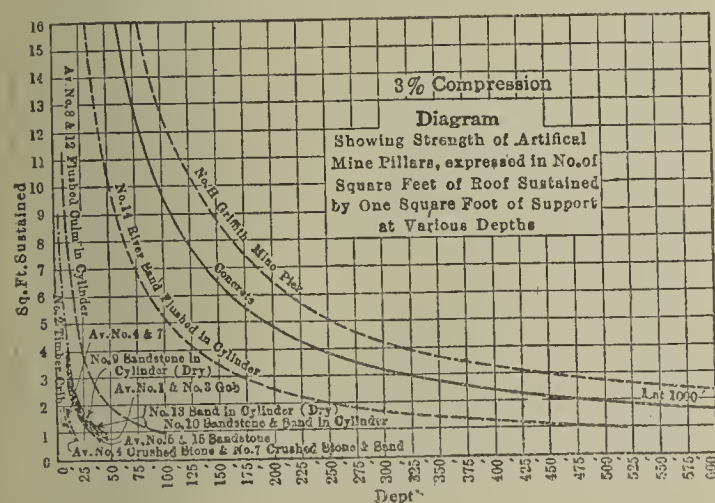


FIG. 5.

same dimensions, but which is so elastic that it will not fail under pressure until the total compression amounts to nearly 15 per cent. of the original height and the ultimate load sustained is equal to about three times the ultimate strength of concrete piers of the same dimensions, and about 20 times the resistance of the well-built timber cog. We have thus produced a concrete pier reinforced with notched timbers, in the manner described.

The variety of concrete proved by the tests to be

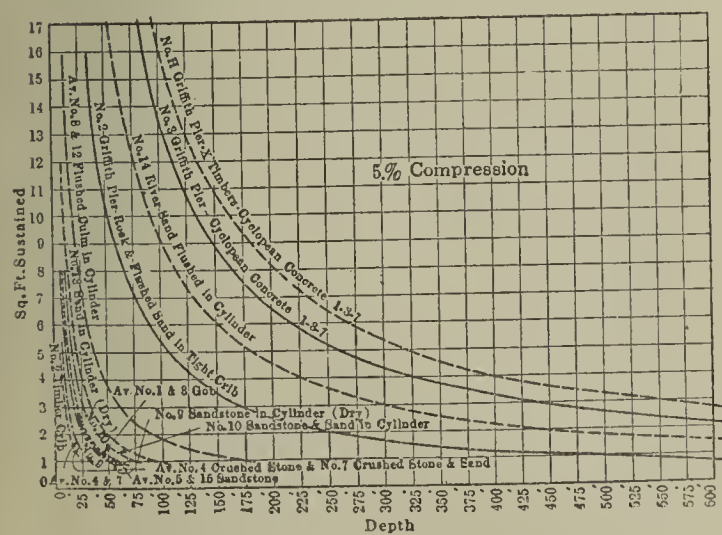


FIG. 6.

most efficient seems to be the cheapest mixture that can be made—viz., cyclopean concrete composed of pieces of mine rock as large as can be conveniently handled by one or two men; the interstices between these pieces of rock being filled with ordinary concrete grouting composed of cement, sand and small broken stone, the object being to secure the greatest density possible. In preparing the crib mentioned, the notches in the timber should be of sufficient depth—that is nearly one-fourth the thickness of the timber—so that when the crib is finished the timbers will be separated by a space of about 1 in. or less. This permits the grout to flow in and partly fill the space between the timbers during the course of construction. After the

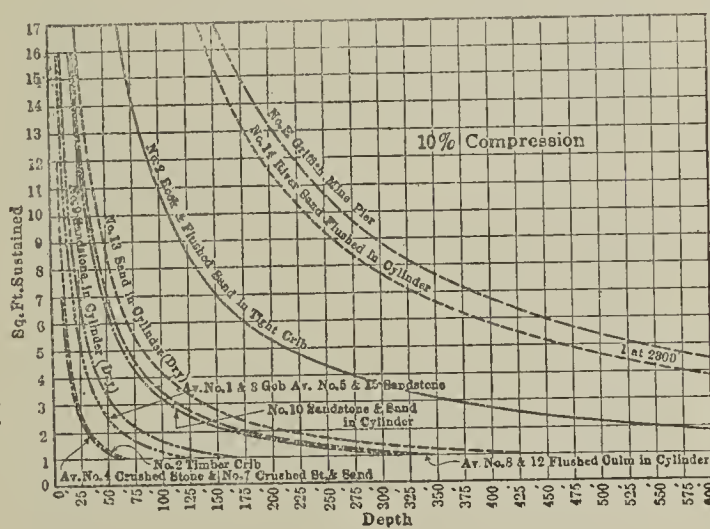


FIG. 7.

and metal mines where strong, elastic roof supports of this sort would be exceedingly useful, and the cost of placing the same for such emergencies would not be excessive.

Since it is a practical impossibility to introduce artificial roof support in a mine in such a manner as to prevent minute subsidence, it is necessary to assume a certain amount of surface settlement as permissible. The diagrams show the approximate sustaining power of the various kinds of artificial roof support which may be used in mines, and the percentage of compression that will be produced by the load sustained.

The Coal Shortage in America.—Mr. Garfield, the U.S.A. Coal Administrator, says the shortage of coal is largely due to hoarding, and proposes to make hoarders unload. He also urges the companies that manufacture ice to depend upon the harvest of natural ice this year in order that coal may be saved. He indicates the order in which the consuming public will be served with coal. The railroads will come first, the Government and munitions factories second, public utilities third, and the general consuming public last. Commercial coal will be distributed by giving preference to the Government, domestic users, public utilities, and all commercial organisations using coal. Mines must contribute the amount declared to be equitable by the Fuel Administration at the Government price.

Deterioration of Storage Coal.—A report on the deterioration in the heating value of coal during storage, covering a five-year period, has just been issued by the Bureau of Mines, Department of the Interior, U.S.A. Except for the sub-bituminous Wyoming coal, no loss was observed in outdoor weathering greater than 1·2 per cent. in the first year, or 2·1 per cent. in two years. The tests with New River and Pittsburg coal were made to determine the advantage to be gained by storing coal under water, and particularly under salt water. The results show that storage of New River coal under water effectively prevents deterioration of calorific value, and that storage in the air under severe conditions causes only small deterioration, about 1 per cent. in one year's exposure, and about 2 per cent. in two years. After two years the loss is continuous but slow, reaching 2·5 to 3 per cent. in five years. The deterioration of Pittsburg coal during one year's open-air storage was practically negligible. During the second, third, fourth, and fifth years the deterioration proceeded very slowly, and did not reach an amount greater than 1·1 per cent. in five years. The submerged portions suffered no loss measurable by the degree of accuracy of the methods used.

MIDLAND INSTITUTE OF MINING, CIVIL
AND MECHANICAL ENGINEERS.

The Midland Institute of Mining, Coal and Mechanical Engineers, at its meeting at the Devon Hotel, Doncaster, on Saturday, November 3, 1917, had interesting discussions on the splitting of coal seams and on the training of colliery officials. The PRESIDENT (Mr. W. D. Lloyd) occupied the chair.

The following new associates were elected:—Mr. G. Kilner, Mr. F. Poole, and Mr. F. J. Dykes.

The Splitting of Coal Seams by Dirt Partings.

Prof. P. F. KENDALL, M.Sc., F.G.S. (Leeds), read his paper, illustrated by limelight slides, "On the Splitting of Coal Seams by Dirt Partings—Part 1.: Splits that Re-join." (See page 883.)

DISCUSSION.

The PRESIDENT said Prof. Kendall had given them some most interesting observations on the curious phenomena which occurred in West Yorkshire, in the Silkstone seam, and which had caused great difficulty in the mining of that seam. If Prof. Kendall could go a step further, and give them in plan the meanderings of the splits, and the courses of the ancient rivers, it would be a most interesting contribution to the history of mining in West Yorkshire. He should like to ask whether Prof. Kendall had any information as to the character of the dirt between the various split coals, and whether it had any connection with similar measures overlying the seam in the ordinary way. One interesting point he should like to mention was that at Altofts, although they were to the west of the disturbance, there was a curious cannel coal which ran in below the Hards just at the same point in the seam where the split occurred to the east; and this coal gradually thinned out until it was lost westwardly. It would be interesting to know what Prof. Kendall thought as to whether that cannel was due to dirt filtering into the coal when it was deposited, from the same cause, or not.

Mr. T. BEACH asked whether Prof. Kendall could give any information as to the relative thickness, or width, of the ancient river that caused the disturbance. He noticed that in the section showing the Ackton Hall wash-out, the Hards went up very much more abruptly, and he wondered whether it was possible that that was an indication that the water which deposited the sandstone, or whatever it was, was much deeper at that point, perhaps narrowing the whole width of the river.

Prof. FEARNSIDES said that one of the most important factors in determining whether Prof. Kendall's explanation could, or could not, stand was the actual quality of the material which had been made into coal. He thought most of them were in agreement that coal, at any rate, in part, had accumulated where it was found, and possibly as peat—though he did not think they were all quite agreed about that. He did not think they were all agreed, either, as to the condition the coal was in when it had just finished being deposited, when it had just been laid in association with its present bed, and was just about to be followed by its present roof material. Prof. Kendall had told them some of the results of a very interesting experiment on the compression of peat. He supposed that that peat, as compressed, was dry; certainly the experiment could not have been done if it had been full of water. He took it, therefore, that one of the most important things which Prof. Kendall accomplished was the complete, or fairly complete, compression of the entangled air. The reason that the peat, after the compression, preserved its beautiful structures was that the air entangled in the cells expanded after compression; and he took it that the analogy between the peat so compressed and the state of the coal as it was formed was hardly a complete one. Mainly, he thought, the effect was that the air entangled with the peat was compressed. He thought they also agreed with the general principle laid down by the late Dr. Sorby, that sediments deposited under water carried a definite amount of water entangled with them. They all knew that shaly material wetted readily, and they agreed that sandy material did not get so wet. Therefore the thickness of the pellicle carried by muddy material was very much greater than that of sand. To that extent, he agreed that Prof. Kendall's explanation must be sound. Nevertheless, it was of great importance that they should know what was the material that they found inside the splits. In the district where Prof. Kendall had been investigating these phenomena there were other seams exhibiting the phenomena that he (the speaker) had called rock faults. It was a district where the rocks had been disturbed. Coal people spoke of this condition as "disturbed ground." They did not say how it was disturbed, but disturbance generally meant that they had added something to the complexity of the familiar arrangement. There might be a shuffling of the layers over one another, associated with this bringing in of extraneous material in the middle of the seam. The question of scale was also an interesting point. Most of them realised, if they saw a river course, that the cross section of that course bore a definite relationship to the quantity of water passing. Much also depended upon the grade; but nevertheless, in one and the same river there would be some very close relationship between the cross section of the channel at any two points. Reverting to the question of the constitution of the coals, he should like to know if Prof. Kendall had any information as to whether the Silkstone seam was one of those coals which appeared to be deposited under water, or whether it appeared to have grown *in situ*. He knew that Dr. Gibson had examined many of the seams a little further south. He concluded that they had been deposited in water. He should like to know what was the case in that respect with regard to the Silkstone. A great deal had been done with regard to the micro-structure of a few samples from the Silkstone seam at various

in South Yorkshire and also in West Yorkshire, and had seen some of those sections, which present a structure equally well with the peat. Prof. Kendall had shown on the screen. He gave the explanation that that coal had effectively been "rotted" by the vegetable structure, which had soaked up a quantity of organic material, such as decayed plants. That seemed to show that the material, as it had been deposited, had collected some liquid material from the decay of other plants not now preserved. He should like to know what the microscopic evidence was as to the conditions of the deposition of the Silkstone seam in that particular area which Prof. Kendall had investigated.

Prof. KENDALL, in reply, said the dirt was in general a bind, with plant remains, but sometimes there was an intervening layer of cannel, as at Ackton Hall, and possibly a layer of cannel in the position of the one referred to by the president. But it was just a dark bind, and beneath the upper element of the seam it commonly showed roots and rootlets, furnishing a new illustration of the validity of the theory of growth *in situ*, which he firmly held. It was a very remarkable thing in the history of the origin of coal that, in spite of the enunciation of principles in the clearest terms, sustained by a categorical statement of evidence, no one had challenged that theory with a similar categorical criticism of the evidence. He was very familiar with Dr. Walcot Gibson's ideas upon the subject, but neither he nor any other British geologist or mining man had ever attempted to reply categorically to the arguments advanced by Binney and by the late Prof. Green. Until that was done, he should hold that our coal seams had accumulated by growth in place, and not by any form of aqueal separation. That he was prepared to maintain, and he could give many new additions to Green's arguments. The occurrence of roots beneath the Top coal was quite consistent with the growth-in-place theory, but was exceedingly difficult of explanation on the theory that the plants had drifted into position. As to the suggestion that the lenses of coal had been injected—that he took to be Prof. Fearnside's implication—he did not think there was a particle of evidence to support it. He was well aware that the district he had been investigating was a disturbed one—this very seam was disturbed in a highly significant and peculiar manner—but the disturbances were at right angles to those that he had been describing, and were, he thought, due to fundamentally different causes. As to the entanglement of air, the compression to which he subjected the peat was administered in such fashion that he thought the far greater part of the air would be expressed, and not compressed. In connection with the relations of cross sections of the washes, it must be borne in mind that a river did not occupy the whole of its valley, but only the whole of its bed, and that only when it was in flood. It would swing, as the meanders changed their course, from side to side of its valley. The irregular conditions that seemed to be shown in the transverse sections very probably represented the swinging of the river first to one side of its course, and then to another. But there was something like a ratio preserved in the three sections that he had given. He believed that the north-westerly one, which was 700 yds. long, was an oblique section; the other two were fairly direct; certainly the Ackton Hall section was a true diameter of the channel. That was 400 yds. The incomplete one was also about 400 yds., and he thought it showed, from the descent of the Hards—the Top seam—that it was very nearly a full and complete section. Those further northward he could not attempt to pronounce upon, because the evidence was so extremely imperfect. He thought these were all the points he should like to deal with at the moment. Perhaps on a future occasion there might be an opportunity to discuss these or others more at length.

The PRESIDENT proposed a vote of thanks to Prof. Kendall for his paper.

Mr. J. R. WILKINSON, in seconding, said the paper ought to act as a great incentive to those who came in contact with the disagreeable conditions described, to take every possible note, and he thought they might with advantage submit their information to gentlemen who were devoting the whole of their time to the elucidation of this great question, to the benefit of all of them.

The vote was carried, and the further discussion on the paper was adjourned.

Higher Education of Colliery Managers.

A discussion followed on a paper on "The Higher Education of Colliery Managers," by Mr. G. L. KERR, read before the Mining Institute of Scotland on June 9, 1917.*

The PRESIDENT said Mr. Kerr's was the third paper on education which had recently been read before the Mining Institute of Scotland, the previous ones being by Mr. R. W. Dron, on "The Training of Mining Engineers," and by Mr. John Gibson, on "The Education of the Colliery Manager." On the same subject, a paper had also recently been read by Mr. N. T. Williams before the Manchester Geological and Mining Society. These papers had led to interesting discussions. Mr. Kerr's paper dealt particularly with "the higher training of colliery managers educationally and technically at the universities or technical colleges, and the means by which any young miner who wishes to become a colliery manager may attain it." Mr. Kerr put very clearly the necessity of having the best highly trained and mentally equipped men as colliery managers to deal with the difficult problems which had to be faced. He suggested the institution of a course of not less than £50 a year, for three years, to enable students to give up mining and spend six months in university, the remainder of the year being spent in the mines gaining practical

experience and earning wages. No doubt Mr. Kerr was right that "between the ages of 14 and 18 or 20 the knowledge and experience gained in practical mining is invaluable, and can never be gained by any young man, however highly trained, who takes his practical mining work after 20." He therefore suggested that the candidates for such scholarships should be taken from lads who had attended evening classes from the time of leaving school and entering the mines at the age of 14. It might be noticed that the author did not attempt to deal with the course of education to be taken by the student at the evening classes, nor with the difficulty and strain of attending evening classes. Possibly these two points were somewhat outside the scope of the paper, but they were extremely important, and required full consideration in deciding on a complete scheme of training. For the purpose in view, it seemed very desirable that the scheme of work in the evening classes, technical schools, and universities should be correlated, with the object of giving the student as thorough a general education as possible, to enable him to take full advantage of the subsequent training at the university. The possibility of obtaining some, at least, of the preliminary education at a secondary day school, or alternatively by attendance at a part-time secondary school, even if this interfered with the early years of practical work in the mine, should not be overlooked. There were a number of men who had already taken the highest course provided at the evening technical schools, and who had still two or three years before they would be old enough to take their examination for mine managers, who would readily use this time to take a more advanced course at the university if they were helped financially by scholarships such as suggested. The whole subject of the training not only of managers but also of deputies and other officials was one of great interest and importance to the mining industry. It was exercising the minds of a good many people at the present time, and was receiving the attention of the council of the institute. An opportunity was now given to members to express their views in the discussion. He thought they need not confine themselves to the training of colliery managers, but could deal with the question as relating to officials generally.

Mr. G. BLAKE WALKER (Tankersley) said he did not know whether all present had read Mr. Kerr's paper, but, if not, he cordially recommended them to do so, and not the paper only, but the interesting discussion which had taken place on it. The subject of better colliery management was a very pressing one at the present time, and it was perhaps the most interesting of subjects to those who had the management of collieries in their hands. They were all getting older—even the youngest of them—and they had to think of those who would be their successors at a nearer or more distant date; and the problems they had to face were becoming more and more difficult every year. Mr. Kerr mentioned some of these difficulties—greater depths, thinner seams, increasing costs, higher wages, and lower outputs, harassing legislation, and the eternal labour problem. In particular, he referred to the constantly increasing costs, and the higher wages and reduced output, which were all part of the same trouble. Mr. Kerr pointed out that, while almost all other countries, especially the United States, were increasing their output per man employed, and producing coal for a less price, our output per man per annum was decreasing, and our cost of production had nearly trebled since 1887. This, of course, involved the increased cost of iron and steel and everything else, and was crippling our country in its effort to retain its position among the manufacturing nations of the world. They all looked forward to the end of the war, and hoped, when it was over, there would be a time of immense commercial activity; but we were going into the competition with a tremendous handicap, and after the first wave of demand was over we should begin to realise that it would be hard work not to let other countries outstrip us. It was a very serious business. They in that meeting mostly represented capital in the coal trade, and they had a partner in labour who was now undoubtedly the "predominant partner." How could they accomplish much if the predominant partner was pulling the other way for all he was worth? How were they going to persuade the collier to put out as much coal as in the 'eighties—not to speak of as much as an average collier did in America? How were they to persuade him that it was all-important we should produce our coal as cheaply as anyone else? Mr. Kerr said they must have better-educated managers. In what was their superiority to consist? Was it as mechanicians and physicists, or as Solomons or male syrens? Were they to put Paddy's pig into a cart and take it to market by horse-power, or were they to proceed to get him thither on his own feet "by peaceful persuasion"? He meant that no amount of technical knowledge would save the situation unless they could in some way or other get the co-operation of the men. No one would suspect him of being indifferent to technical and scientific education. They must have that, but it was not the most difficult part of a colliery manager's task. A colliery was in many respects like a ship. It had to be scientifically navigated, kept off the rocks, and made to earn a revenue. The manager was like the captain, the under-manager was the first mate, the deputies were the junior mates, and the workpeople were the crew. The captain would be helpless without the subordinate officers, and, as a matter of fact, they were the people who really ran the ship under his general directions. To his (the speaker's) mind, it was more important that the education of the mates should be provided for than that of the captain, who could not act without getting his certificate. The vital point in the organisation of a colliery was in its deputy staff. They did not think enough of the importance of these officials, neither did those officials realise their importance themselves. Unless the colliery manager's staff was loyal and competent, he could not run his colliery successfully or safely. In the past, the deputies had been considered, and had

considered themselves, as "master's men." It was one of the most unfortunate things of the calling to-day that a great many of their staff were not looking on themselves in that light. They looked at money, and nothing else. That was not the spirit of our naval and maritime officers. They could certainly say that they were not too well paid, but they were loyal to their ship and its commander. On no other conditions could our Navy and our merchant marine perform its arduous duties. It was just as much so in a colliery. They must have officers, and they must be the masters' men. If they were worthy of the posts they held, they would do more than anyone else to ensure safety and good order and satisfactory work in the mine. A good staff of deputies had more influence with the workmen than the manager could possibly have. They were with them all day and every night. His hearers would all admit their immense debt of gratitude to the old deputies they had worked with all their lives and those with whom they were now working. But, as Mr. Kerr pointed out, the conditions were constantly getting more difficult, and they wanted more *esprit de corps*, greater intelligence, and higher education. The masters were conscious of this, and a movement was on foot to secure a new order of deputies, more highly educated than their predecessors, and from whose ranks the managers and under-managers of the future would be largely drawn. They hoped that the deputies would be inspired by a spirit of pride in their positions, and, seeing they were now recognised by the State, would look on themselves as part of the staff, and identified with the success of the concern with which they were associated. Plans for facilitating the education of promising youths had been drawn up, and the colliery owners were, most of them, willing to do a good deal in the way of financing the scheme. Mr. F. J. Jones, of Rother Vale (chairman of the South Yorkshire Coal Owners' Association), had set a striking example, and where he had led, others would follow. He (Mr. Walker) looked forward to see the beginnings of a new order of things, which should give them a class of deputies better educated, heart and soul loyal to their companies, recognised and trusted as officers of the ship, and better paid. These things must go together. Education was not everything. Character was more. There must be loyalty, there must be confidence, and there must be recognition of an officer's status.

Prof. E. L. HUMMEL (Leeds University) said the president had asked him to speak concerning (1) the provision at the University of Leeds for training in mining engineering, consisting of a university course combined with practical work at the mines; (2) the number of scholarships available for mining courses at the university; and (3) the extent to which the West Riding County Council helped with free studentships, etc. With regard to a university course combined with practical work at the mines, they had only one definite regulation, viz., that all candidates for degrees or diplomas in mining must put in a minimum of four months' practical work at mines during their three years' university course. Actually, it was possible to put in eight or even ten months' practical experience during vacations, and these were sometimes put in, but only the minimum of four months was insisted upon. As to scholarships for mining courses available at the university, there were three entrance scholarships of £20 for two years and five entrance scholarships of £40 for two years, which were renewable. These were not confined to mining students, but were open to all students, and they were conferred on either men or women. A mining student had a chance of perhaps getting one annually, or perhaps a little less often. Then they had one William Cooke and Company scholarship, confined to mining students, of £21 for three years, which could be utilised in taking a diploma. It only paid two thirds of the fees, was only available for three years, and was awarded on the results of a special examination. Then there were several university scholarships of £50 for one year, open to honours students, for research either inside or outside the university. A mining student obtained one of these in 1914, but such students were just competitors, along with their fellow students, for a very limited number of scholarships—perhaps five or six. Mining students occasionally came to the university with scholarships of £30 to £40 for three or four years, which had been awarded by private schools in various parts of the county. He had recently had two—one from Ilkley and one from Pickering. These students thus often came from places outside the coal field. It was possible that there might be two or three full-time students holding scholarships at the mining department at one time—two or three would be an outside number at the present time. The West Riding County Council provided about six county technological scholarships annually, worth about £60 to £65, available for three years. They were intended for young workmen who had had three years' practical experience in an occupation; they were not confined to miners, but were open to workmen of all kinds. They were awarded on the results of the Board of Education and City and Guilds examinations, as a rule, and on the merits of each individual candidate. The County Council also provided about eight county coal mining exhibitions annually, worth about £5 a year for four years, and tenable at the part-time course at Leeds. These were awarded on the results of a competitive examination held every year. Also the County Council provided about 12 grants in aid, worth about £5 per annum, and tenable at special courses for mining teachers. Further, some of the county boroughs, such as Leeds and Dewsbury, awarded free studentships, worth about £5 per annum, for both the part-time four years' course and for the mining teachers' courses. Going on to speak of Mr. Kerr's paper, and others on the same subject which had been read during the past 2½ years, Prof. Hummel said they were all extremely valuable, and had elicited many useful suggestions. They were evidently considerable differences of opinion between the advocates of various schemes, but also on some points a consider-

able amount of agreement. At any rate, one deduction was possible, namely—that apparently nobody, or hardly anybody, was satisfied with the present arrangements for training mining engineers and colliery managers. This was not at all surprising when they remembered that practically the whole of technical education was at present coming under review. He should like to make a few suggestions with regard to the training necessary for the highest type of mining engineer and colliery manager. Firstly, they wanted a thorough secondary school education, terminating with some kind of leaving certificate at the age of 17. It should embrace training in literary subjects, science and art subjects: English, French, German, chemistry, physics, mathematics, physiography, biology, geometry and drawing. Secondly, he thought a thorough technical and science training at a university, technical college, or school of mines, for three or four years, was necessary, with practical experience in vacations, terminating in the degree or diploma in mining engineering at the age of 20 or 21. Thirdly, he advocated a systematic apprenticeship at mines for three or four years, till the age of 24 or 25, at which age an examination very similar to the present colliery managers' examination should be passed. This did not provide for the boy who went down the mine at the age of 13 or 14. He, the speaker thought, was the most difficult person to cater for, and he would need to be satisfied with a much less ambitious training, probably at evening classes and part-time university or technical school courses, as at present. But he thought that provision should be made for a two years course for picked men, such as deputies, to give them systematic training, and to enable them to attain at least the present standard of the under-manager's certificate after they had been picked out at their respective collieries. He would advocate that this two years full-time course should be paid for partly by the deputies and partly by the industry. With regard to practical experience during the course of training entered upon by the highly-trained mining engineer, it must be remembered that he was going to spend the whole of his after-life in obtaining practical experience; therefore he thought it was not advisable to curtail the only time when he could get schooling in science and technical subjects at classes, by insisting on a large amount of practical experience in his early years at technical school or university. As regarded this debatable question of practical experience, during or following technical training at institutions, they should consider what was done in Allied and enemy countries, and also in the British Dominions. As a rule, the three- or four-year period at the school of mines was not encroached upon for actual practical experience, except in vacations. He had no information that what was termed the "sandwich" system existed in these various countries. Seeing that they had apparently solved the problem to their complete satisfaction than had been done in this country, what they had done ought to be considered in any scheme that was drawn up here. He had spoken of a systematic apprenticeship of three or four years. This was a direction in which much could be done. The present system of apprenticeship might be either excellent or very bad. That depended partly on the pupil and partly on the master. The pupilage years should be so regulated that definite amounts of practical experience were obtained in the numerous departments of actual practical mining work. In former days, before technical education was organised, the pupilage system was the only one available, just as in the case of the medical and other professions, but now the complexity of training required was so great that the underlying principles of mining could not be adequately studied at mines under the pupilage system. There was no time, there was no equipment, for teaching chemistry, physics, mathematics, and geology. There were no teachers who had the necessary leisure. For the systematic study of the fundamental sciences, chemical, physical, geological, and engineering laboratories were necessary, and also the student must spend two- or three-hour periods in these doing practical work at one time. The university training should provide the young mining engineer with a set of tools which he had learnt how to use on any branch of mining. Practical experience provided the problems on which these mental tools could be used. As to finance for any improved schemes, whatever they might do, he would like the institute to remind themselves of what had been done in South Wales. What could be better than the South Wales coal owners' scheme of a levy of a tenth of a penny per ton on a tonnage basis. The total tonnage of all the collieries joining in the South Wales scheme was 30 million per annum, which would provide an income of £12,500 annually, of which he believed £6,000 was given to the Cardiff University. In 1913—the year before the war—over 44 million tons of coal, fireclay, and ironstone were raised in Yorkshire alone, valued at nearly 20½ million pounds. A levy of one-tenth of a penny per ton on that tonnage would provide over £18,000 per annum. A fund of these dimensions would be ample to provide for all the needs of mining education throughout the county, in the universities of Leeds and Sheffield, the technical schools, and evening classes, the provision of scholarships and prizes of all kinds, also special courses of public lectures by the most eminent men of this and other countries. Suppose he (the speaker) burned 10 tons of coal annually, his share of the fund would be one penny. He would not object to pay that, nor did he suppose any man would. In this way the burden of providing for mining education, whatever it might be, would be spread indiscriminately on all who benefited from the work of the miner, i.e., the whole community. Naturally, those who provided the money would have a full share in the administration of the fund. Each coal field, he thought, should look after itself in that way. He was not advocating that this scheme should be taken up, but was simply mentioning it in order that it might be revolved in their minds. They must always remember that the scheme was at work in South Wales,

and it was well worth going into in considering any educational scheme which they might think of in the future.

Mr. J. ENSOR (Tinsley Park) was afraid that educational provision was not sufficient without compulsory attendance. The four years from 14 years of age to 18 were the most important of a man's life. When the County Council technical scheme was first instituted, about 1890, it was scarcely possible to gain admittance to any of the classes in South Derbyshire, but in the course of a very few years everybody seemed to lose interest in the matter, and the classes died down. They could not get people to attend, and the only way to make such a scheme successful, in his opinion, and after a good many years' experience, was for the Government or some other authority to make it compulsory for a lad to continue his education from 14 to 18. He was afraid that until that was done, no matter what scholarships or prizes were offered, they would not get lads to take up these subjects. Look at the counter-attractions that there were in a big town like Sheffield to take lads away from anything of this kind—the picture palaces and music halls. These were crowded every night. On the pit bank at Tinsley that day he had seen an almost pathetic notice from the teacher of the mining class asking for students. That was where the trouble lay. Lads of 14 to 18 now had as much or more authority than their parents. The latter had very little authority over them. A lad of 17, working in the pit in Yorkshire now, was taking home somewhere about £2 per week, and they would be surprised if they knew how much he got for spending money. If they could not interest the parents, to make the boys go to the classes, he thought the Government ought to step in and compel them to go. He had been connected with the question for over 20 years, either as school manager or member of committees. He was an old student himself, and, if it had not been for the classes, he would probably not have been in his present position. One of the best colliery managers he knew worked in the pit and attended county council classes at the same time; at 23 he got his under-manager's certificate, had three years as under-manager and deputy; at 29 he was appointed a colliery manager, and he had made his mark. But where they would find one lad to take an interest in education like that, they would find 10,000 who would not. They were wanting deputies badly, but how were they to get them? They would not get them by asking them to attend classes. He was afraid that the loyalty of which Mr. Blake Walker spoke was fast disappearing. It seemed to him that the more they educated deputies, and the higher class they put them in, the worse they got. Besides advocating that lads should be compelled to attend classes, he would say that if they wanted officials, they must make it worth the men's while to take up the positions.

Mr. W. H. BALL (Thrybergh) supported Mr. Ensor's views. They had to make it worth the men's while to become deputies, and therein lay the secret of the matter. His experience was that the type of deputy, during the last few years, had gone rather too much on technical lines. The deputies of to-day did not show the same quality, as practical men, that they did some years ago. The training had been far too technical, and the system of looking after the face work had been dropped. This was largely due to the stringencies brought about by the law, requiring a deputy to do too much in reporting, instead of practically supervising and demanding on the spot that work should be done. He thought the best system of training was one similar to that which had recently been set on foot in South Yorkshire—encouraging the lads to go to secondary schools until they were 16, then sending them to the mines, and giving them a part-time course at the university for two or three years, paying them as if they were at work during the time they were taking that part-course. That, to his mind, appealed to their instinct better than anything else. In the Thrybergh and Dalton district, young lads were attending the industrial courses opened by the County Council much more than had been the case for some years past. At the Thrybergh schools there was a very good class of over 20 students, all of whom were mining workers. They were what he should call the better type of lad—not only the lad who was seeking to get some good knowledge, but the lad who was a good practical hand. That was the kind of lad they wanted for the future. They did not want to get hold of a lad whose idea was that he was going to learn something out of a book, and afterwards to get his living as a deputy or official by simply carrying his stick about. The successful colliery official, to his mind, was the one who could go about giving definite instructions as to how a thing was to be done, and could see that it was done—not merely say that he wanted it doing, and leave it with a man to say how it had to be done. The man wanted to have a practical knowledge as he went along, and if the part-time courses were followed up and encouraged by the coal owners, he thought they would be the making of very good deputies in the future. The boys should attend evening classes from the age of 14 to 16, and that from 16 to 19 they should do practical work for three or four days a week, and attend a secondary or university course for two or three days, for which they should receive their wages.

Mr. ENSOR said it might interest some of the members to know that his two best deputies could scarcely write their own names.

The PRESIDENT said they were of the old school.

Prof. KENDALL said there were one or two small points which he thought might well be borne in mind. In the first place, they wanted character—that was the first essential—and that, he was afraid, they could not get by any system of schooling. In the second place, they wanted education. They must have the material, and they must make the position of deputy attractive to a young man. His experience, after 25 years of teaching, was that when the prosperity curve of the coal trade went up, the student curve went down. The fixed wage had no attraction in pros-

perous times, because a man could make money by working at the coal face. It had been a reasonable fact of observation that in the periods of depression they had had the greatest influx of students—and good students, too. He thought that part-time instruction should be not by parts of days but by parts of weeks. After a man had done his shift, gone home to get a meal and a wash, and then travelled to the university, he was by that time ready for bed. Only two days before, a man told him that he (the speaker) had been harsh with him when he was a student a dozen years or so ago. Well, he did not think he ever was harsh to a student. If he wanted to chide, he did it by those little pricks of sarcasm which were quite as effective. But the point that this old student made was that he used to arrive at the university tired out. It would be far better to release a man entirely for one or two days than for half-days. This would give him a far better chance of taking advantage of the instruction that was offered to him.

Mr. BLAKE WALKER thought they must all realise that the question was a very live one, and that they had to solve it. They could not run their collieries without good and capable practical men as deputies. At present, union organisation among them was very much in the air. One would not wish to discourage them in doing whatever was for their real benefit, but, unless they were loyal to the success of the concerns to which they belonged, he was afraid they were not going to be really efficient helpers. He was quite certain that no more important subject had been discussed by the institute, because it was their bread and butter, everyday business. They had to run their pits, and to run them by the aid of the deputies, and how that was to be successfully accomplished they must thrash out.

The further discussion of the subject was adjourned.

LANCASHIRE AND CHESHIRE COAL ASSOCIATION.

The 74th annual meeting of this association was held at the Queen's Hotel, Manchester, on Tuesday, the 6th inst., and was largely attended.

In the unavoidable absence of the president (Mr. G. C. Greenwell), Sir HENRY HALL, I.S.O., occupied the chair.

The president's report for 1916-17, advance copies of which had been issued to members, was taken as read, together with the audited balance-sheet and statement of accounts; and the same were approved and adopted, as was also the report of the Finance Committee on the accounts.

On the motion of Mr. W. H. HEWLETT, seconded by Mr. TOM STONE, Col. Lionel E. Pilkington, C.M.G., who had been nominated by the owners in the St. Helens district, was unanimously elected president of the association for the ensuing year.

Col. PILKINGTON, on taking the chair, said it was very difficult to reply to the kind words which had been used by the mover and seconder of the resolution. He assured the meeting that he deeply appreciated the honour they had conferred upon him. He could only thank Mr. Hewlett and Mr. Stone for their very kind words, and the meeting for the spirit of comradeship manifested. He felt they would have a difficult year, but hoped they might be blessed with a lasting peace after the war during his year of office. He thanked them very much.

A resolution, conveying the best thanks of the association to Mr. Greenwell for his valuable services as president during the past year, and the great regret of the members that he was not able to be present, was unanimously passed.

The call for the ensuing year having been fixed, the cordial thanks of the association were accorded to Sir William Scott Barrett for his greatly appreciated services as honorary auditor of the accounts, coupled with a request that he would favour the association by continuing to act in the capacity named.

Sir William was not able to be present, by reason of his being engaged in Liverpool as Chairman of Quarter Sessions.

The Parliamentary, Railway, and Finance committees having been re-appointed, the ordinary business of the association was proceeded with, and at the close, on the motion of the PRESIDENT, seconded by Mr. WALLWORK, a very hearty vote of thanks to Sir Thomas Ratcliffe-Ellis for his services as solicitor and secretary to the association—a position, as mentioned by the proposer, which he had held for 25 years—was carried with great unanimity.

Sir THOMAS having acknowledged the resolution, the proceedings terminated.

Higher Wages Applications.—The Committee on Production on Wednesday heard applications for an advance of 100 per cent. in wages above pre-war rates from workmen employed in Bristol Channel ports. The question of working hours was also raised by iron foundries from Cardiff and Barry Docks, who asked that they should start at 7 o'clock instead of 6. The decision of the Committee will be communicated to the parties.

Middlesbrough Iron and Steel Shipments.—Shipments of iron and steel from the port of Middlesbrough during October totalled only 60,777 tons, of which 29,412 tons were pig iron, 2,448 tons manufactured iron, and 28,917 tons steel. Loadings of pig for the previous month reached 45,384 tons, and for October last year they were returned at 53,610 tons. Last month's 31,365 tons clearances of manufactured iron and steel show an increase on the September shipments of no less than 23,220 tons.

Decimal Coinage.—At a recent joint meeting of representatives of the Institute of Bankers, the Association of Chambers of Commerce, and the Decimal Coinage Committee, a unanimous agreement was reached on a plan for decimalising the coinage with the present pound sterling as the unit. The scheme was brought before the council of the Association of Chambers of Commerce this week, and unanimously approved, a further resolution being carried to press the need for this reform through the Chambers of Commerce in all parts of the United Kingdom.

CONTENTS.

ARTICLES:—	PAGE
Wales Ballot	891
Programme of Reconstruction	891
Slitting of Coal Seams by Partings of Dirt	883
The Coal Problem in France	884
The Jurassic and Lower Cretaceous Rocks in East Kent	885
Resistance of Artificial Mine Roof Supports	886
Pyrometers and Pyrometry	895
South Wales Mining Timber Trade	895
The American Coal Trade	895
Obituary	895
Miners and Recruiting	896
Labour and Wages	896
Open Contracts	900
The Freight Market	900
Abstracts of Patent Specifications Recently Accepted	900
New Patents Connected with the Coal and Iron Trades	902
Government Publications	902
Publications Received	902

LETTERS TO THE EDITORS:—

Rope Haulage in Mines..... 900

REPORTS OF MEETINGS:—

Midland Institute of Mining, Civil and Mechanical Engineers..... 887

Lancashire and Cheshire Coal Association..... 889

THE COAL AND IRON TRADES..... 892-895

The London Coal Trade..... 894

The Tin-plate Trade..... 894

The By-Products Trade..... 895

PARLIAMENTARY INTELLIGENCE..... 896

NOTES FROM THE COAL FIELDS..... 897

COAL, IRON AND ENGINEERING COMPANIES..... 900

MISCELLANEA:—

Drill Holes and Blasting Charges..... 885

The Coal Shortage in America—Deterioration of Storage Coal..... 887

Higher Wages Applications—Middlesbrough Iron and Steel Shipments—Decimal Coinage..... 889

Cheap Coal in South Africa—Mr. Smillie on Industrial Unrest—Institution of Mechanical Engineers—Peat Substituted for Coal..... 894

Low-grade Fuels..... 895

Proposed Nationalisation of Austrian Coal Mines—Coal Owners and Control Bill..... 896

Partnership Dissolved—Hull Coal Trade..... 900

United States Export Trade—Increased Production of Coke—Refractory Materials..... 902

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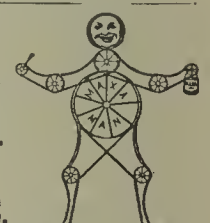
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(At present on Active Service).

LONDON, FRIDAY, NOVEMBER 9, 1917.

All the London depots are now in a fairly good position for facing the winter demand, and during the past week railborne coals have been brought forward in good quantities. The pressure for both house and steam coal continues strong. Stocks on the ground are gradually increasing.

The demand for steam coal in Northumberland and Durham continues, but the spot tonnage shortage still clogs business. Supplies at scheduled figures are ample. Gas coal offerings are excessive. Lancashire merchants are reported to be overtaking some of the arrears in orders for household coal. A slight decrease in pressure is noted in Yorkshire. Small steams are in brisk demand in the Barnsley area. The temporary stoppage in South Wales, though it caused a great loss of output, greatly reduced accumulations and congestion. The market is more animated. There is a good supply of patent fuel, but a decided scarcity of coke. The course of business in Scotland is still unsatisfactory.

Coasting business is in increased demand on the north-east coast. The rate to London is firmer at 21s. Scandinavian freights tend to advance. Enquiries are active in Cardiff, and rates for limitation ports

are steady. Freights are firm in the United States at the maximum figure.

Early returns relating to the South Wales miners' ballot show an overwhelming majority in favour of the "comb-out" and against the "down-tools" policy.

The South Wales Colliery Examiners' Association rejected the owners' terms, but decided to resume work forthwith in the national interest, and to continue active negotiations while at work.

Swansea coal exporters have decided to vote on the pooling of profits derived from French business, which is Swansea's largest coal export trade.

The Northumberland Miners' Association report that in the course of an interview the Coal Controller promised to give careful consideration to the suggested better distribution of trade among the pits of the country.

The Association of Mining Electrical Engineers (Midland Branch) will hold a meeting to-morrow (Saturday) at the Midland Hotel, Mansfield, commencing at 3.30 p.m. Mr. M. Baird's paper on the "Installation and Maintenance of Underground Plant" will be open for discussion.

In a debate on the second reading of the Coal Control Bill in the House of Commons, several members urged that the Bill was unfair to the coal owners. The debate was adjourned.

The annual conference of the National Union of Scottish Mineworkers on Thursday unanimously passed a resolution in favour of the nationalisation of mines. The resolution urged the executive council of the Miners' Federation of Great Britain to carry on a vigorous agitation in order to create a strong public opinion throughout the country in favour of the movement. The conference resumed its proceedings to-day (Friday).

The South Wales Ballot.

FROM some points of view it is a good thing that the South Wales miners should have had an opportunity of expressing an opinion upon the war and all that it means for the future of the country. It has brought matters to a head, and has shown what the effect has been of the pacifist agitation which for the past two years has been carried on in the coal field by the Independent Labour Party, the Union of Democratic Control and similar organisations. The facts are well known. The combing-out scheme formulated by the Government was adopted by the Miners' Federation of Great Britain, and was recommended by the South Wales executive council to a conference of delegates on October 8. These delegates in theory represent the lodges, but in practice most of them only represent an unpatriotic element which, under various designations, is agitating for "peace by negotiation."

Whether these people understand what they are about is questionable. The probability is that they see a chance of forwarding their syndicalist interests by attempting to bring about an inconclusive peace. As a contemporary puts it, they are actuated by expediency rather than by principle. Their ultimate aim is revolutionary, and their quarrel is with the very foundations of society as at present constituted. We need not complain about their holding such views, foolish as they appear in the eyes of the majority of their fellow men; but we, and the country generally, have a right to protest against the methods they have employed in this time of national crisis. These are the men who pose as delegates to represent the interests of the South Wales miners. That the affairs of the lodges should have been entrusted to such men is due to the want of interest taken by the miners in their own organisations. The lodges are run by a mere handful of reactionary spirits, often representing less than 2 per cent. of the members. It is not, therefore, surprising that the lodges elect revolutionary delegates, who defy even the authority of the executive of the Federation. This is what has happened on the present occasion. The executive is in favour of the patriotic policy adopted by the Miners' Federation of Great Britain; but, having to deal with their recalcitrant delegates, there was no course open but to put the question to the ballot. It is so provided by the rules of the Federation, and the challenge of the delegates had to be accepted accordingly.

We state these facts for the purpose of showing that the executive council of the South Wales Miners' Federation was not responsible for the ballot.

In fact, it did the correct thing by recommending the miners, one and all, to oppose the "down-tools" policy. Mr. W. BRACE, also, president of the Federation, and a member of the Government, went down to Tonymandy for the purpose of telling the miners precisely what a strike upon this question would mean.

It was, perhaps, unfortunate that the firemen's strike should have taken place at this time, because such a disturbance in the industrial routine could hardly fail to complicate the issue. Whether it was actually so designed we cannot say; but, if so, it failed in its purpose. It is a pity that the firemen did not earlier realise that a stoppage of work was likely to "imperil the nation in these days of stress and difficulty owing to the war," but it is none the less satisfactory that they have decided to resume work, which it would have been better not to have been interrupted.

As regards the ballot on the "combing-out" scheme, the issue was put so plainly before the miners by Mr. TOM RICHARDS, secretary of the Federation, that no one could evade the responsibility imposed upon him, and the result of the ballot serves, therefore, as an index to the loyalty and patriotism of the miners. The men who organised this ballot now know more clearly than before what is the effect of their pro-German propaganda upon the miners as a whole. And the country knows to what extent the men have been led away from their allegiance to their country's cause. These have been shown to be in a hopeless minority, and it is satisfactory to find that the reactionary forces in South Wales form so small a proportion.

We may hope that good will come of the revelation, and that the lodges will take care in future to be represented by delegates who reflect the real views of the miners. The small but noisy group which has assumed the control of the lodges is not fighting for trade-union principles at all, but for nothing less than the destruction of the economic machine which has made South Wales one of the most prosperous centres of industry in the kingdom.

A Labour Programme of Reconstruction.

WE have received a copy of the draft recommendations for national and industrial reconstruction drawn up by the executive committee of the British Workers' League, for the consideration of their General Council. Before discussing these proposals, it should be stated that the British Workers' League is a patriotic organisation of trade unionists and others, which has been formed mainly with the object of counteracting the sinister influence of the Independent Labour Party and others who have shown little disposition to apprehend the true significance of the great struggle in which this country is engaged.

The aims of this growing body of British working men may be stated as follows:—It seeks to "enlist the co-operation of all sections of the community in (a) strengthening industrial organisations; (b) advancing the social and political interests of the people, providing for their more efficient education, and securing for them a higher standard of life; (c) developing the resources of the Empire, fostering both agricultural and industrial production, and providing for the better organisation of the distributive industries; (d) supporting all such measures as may tend to the security of the Empire and the well-being of the nation as a whole." The above very laudable objects are taken from the statement issued in connection with the establishment of the new Labour paper, *The British Citizen and Empire Worker*, as the official organ of the League, upon the directorate of which are the names of prominent Labour leaders, with the support of well-known members of Parliament, including the Right Hon. JOHN HODGE (president of the League), and Mr. STEPHEN WALSH. Upon the council of the League we notice the names of Messrs. W. ABRAHAM ("Mabon"), W. CROOKS, Sir LEO CHIOZZA MONEY, H. G. WELLS, D. GILMOUR (Scottish Miners' Federation), J. ROBSON (Durham Miners' Association), and others equally representative of Labour views. The chairman of the organisation committee is Mr. J. A. SEDDON, and the hon. general secretary is Mr. VICTOR FISHER.

The above names are selected from a long list of distinguished members of the League, merely as an

indication of the strength of the opinion in which it is supported. It is intended, we understand, to present a considerable number of candidates at the next Parliamentary Election; and it is clear that we have here a powerful attempt to organise that large body of working men who are not inclined to be dragged at the tail of the pacifist-Socialist group. The movement will undoubtedly receive a sympathetic hearing, even if all the items of its programme are not approved. Its determination to put country and national welfare before any other consideration will certainly commend itself to every patriotic section of the community.

Coming now to the programme itself, it should first of all be recognised that its compilation at so critical a stage of the war must be a matter of considerable difficulty. Very few, if any, have as yet any clear idea of what is going to be the position of the country when the war comes to an end. It is not yet certain whether the full peace programme of the Allies can be achieved; and upon this question must depend, in a large measure, our future plan of action. But the war has already taught the nation many things, especially in regard to the importance of our key industries, and the maintenance of the supply of raw materials upon which they depend. The programme before us does not fail to recognise these facts, but it seems to be more enamoured of State control than many would approve. It is recommended, for example, to continue the present control of railways and canals for five years after the war, during which time some permanent system of State management is to be devised. Proposals are also made for State assistance for essential industries threatened by foreign competition, in return for which there are to be ensured proper industrial conditions, a minimum wage and a limitation of profits. All these things exist now in certain cases, and the practical result of the League's proposals would be to extend their scope and render them permanent. There is, in short, a distinct tendency towards public control and industrial compulsion which probably goes farther than would be generally approved. But it is not necessary to quarrel with this attitude, based, as it appears to be, upon purely national interests.

Upon the question of industrial peace the recommendations of the Whitley Report are approved, but it is further urged that agreements made under this scheme should be legally upheld. This is going a long way beyond the expressed intentions of the Government, and is in opposition to the views of many trade unionists; but it is satisfactory to find a body of workers bold enough to recognise that, as experience has shown, without some element of legal enforcement agreements are not worth the paper they are written upon.

The above are, perhaps, the most contentious items of the programme. Upon the question of restriction of output, it is recommended that where a minimum wage is enforceable (whether under State enactment or regulation or under district agreement), a standard output is to be recognised, based on average capacity, and an additional payment is to be made to those whose production exceeds the standard. The case of those workers whose capacity is below the standard is to be dealt with (so far as applicable) on the lines of existing machinery, as embodied in the Trade Boards Act and the Coal Mines (Minimum Wage) Act. Unemployment is dealt with upon national and imperial lines, with the assistance of a judicious distribution of Government contracts with due regard to periods of boom or depression. In this work the Dominion Governments are to co-operate, and reliance is placed upon an Imperial Development Board, as recommended by the Dominions Royal Commission.

There are numerous other suggestions covering a wide field of national activity, including, amongst others, such subjects as the reorganisation of the Civil Service, Housing, Child Life, Education and Agriculture. The long list of recommendations concludes with the proposal to institute an Imperial Cabinet, and to constitute a League of Nations for the preservation of peace.

We are not now debating the merits of these proposals, all of which seem to deserve careful study. Their chief interest lies in the absence of those fantastical doctrines which have hitherto discredited so many programmes of social reform. It is a constructive rather than a destructive policy which the British Workers' League has adopted.

THE COAL AND IRON TRADES.

THURSDAY, NOVEMBER 8.

Scotland.—Western District.

COAL.

Little change to report in the Scotch coal trade compared with the preceding week. Markets continue dull, and business is still subjected to considerable dislocation, owing to the reorganisation which is necessary under the new distribution scheme. In the west of Scotland district the chief feature is the demand for household fuel. Trade in other directions is quiet. Shipments for the week amounted to 95,466 tons, against 121,478 in the preceding week and 99,293 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	21/-27/6
Ell	26/6-28/	26/6-28/	26/-28/
Splint	28/-30/	28/-30/	25/-32/6
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The various branches of the Scotch iron trade have again been extremely active throughout the past week. The shortage of supplies for ordinary consumption has been even more pronounced, and if the present conditions last much longer, private trading will be practically at a standstill. In pig iron the output of hæmatite is absorbed by local steel works engaged on national business, and, apart from forge qualities, iron-making brands are almost unobtainable. Prices are firm. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Outputs of malleable iron are almost entirely connected with war requirements, and exports are of little account apart from business in mining and agricultural implements. Black sheet makers have full order books, and deliveries cannot be guaranteed. The price is still about £18 net f.o.b. Glasgow, but is likely to be firmer shortly. Machinery makers are overburdened with work, and find great difficulty in overtaking arrears. Shipments, generally, are very restricted.

Scotland.—Eastern District.

COAL.

The coal trade in the Lothians is particularly dull. Export is on restricted lines, and local demands are not sufficient to absorb outputs. Consequently broken time is frequent. Shipments amounted to 19,031 tons, against 15,900 in the preceding week and 25,381 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	30/
Secondary qualities.....	25/6	25/6	29/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Conditions in Fifeshire show no improvement. In all departments business is slow, and, in spite of a prevalence of broken time, stocks are accumulating. Shipments were 24,165 tons, against 30,627 in the preceding week and 54,557 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	30/-40/
Unscreened do.....	24/-25/	24/-25/	28/-35/
First-class steam coal.....	28/	28/	28/-35/
Third-class do.	24/	24/	22/-25/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The aggregate shipments from Scottish ports during the past week amounted to 138,662 tons, compared with 168,005 in the preceding week and 179,231 tons in the corresponding week last year.

The prices quoted are subject to the recent increase of 2s. 6d. per ton, with the exception of shipments to France and Italy.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The local coal market is in a very depressed condition this week by reason of lack of tonnage. There is a brisk enquiry for all descriptions of fuel, but little business is possible because of the tonnage shortage. Many pits in the counties of Northumberland and Durham are working only partially, whilst others are suspended outright for the time being. All descriptions of coals are in plentiful supply at minimum prices. The official demand for coal has slackened considerably, so that collieries have not even this support. The inland enquiry is still very good, however, a circumstance which is benefiting the smithy, coking and gas coals sections of the market in particular. Coke is affected by the shipping scarcity, and is offering more abundantly than has been the case for some time past. Selling values, however, are firmly maintained. A further adjustment of prices for home consumption has been made, and the price of hæmatite and foundry coke remain at £18 net f.o.b. to France and Italy, and 45s. for other descriptions. Foundry coke low in phosphorus is quoted by 7s. 6d. per ton for home use, and 48s. All blastfurnace coke has been quoted at 38s. per ton, making the ordinary or high quality coke 33s. per ton at the ovens and phosphorus qualities 35s. 6d. per ton. These

increases are almost certain to find their reflex in proportionate advances in iron and steel prices.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/-32/6
Do. Tynes (Bowers, &c.)	29/6-32/	29/6-32/	30/-32/6
Secondary, Blyths	25/6-28/	25/6-28/	27/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	27/6
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	20/
Do. Tynes.....	18/6-21/	18/6-21/	17/6-20/
Do. specials.....	20/6-23/	20/6-23/	20/-22/6
Other sorts:—			
Smithies.....	25/-30/6	25/-30/6	20/-22/6
Best gas coals (New Pelton or Holmside)	25/-27/6	25/-27/6	30/
Secondary gas coals (Pelaw Main or similar)	23/6-26/	23/6-26/	21/-23/
Special gas coals	26/6-29/	26/6-29/	30/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	18/-20/
Do. do. Northumbrians	26/6-27/6	26/6-27/6	20/
Coking coals	24/-27/6	24/-27/6	20/
Do. smalls	24/-27/6	24/-27/6	18/-20/
House coals	28/6-32/6	28/6-32/6	30/-35/
Coke, foundry	42/6-45/	42/6-45/	33/-40/
Do. blast-furnace	42/6-45/	42/6-45/	33/-35/
Do. gas	32/6-35/	32/6-35/	33/-35/

Sunderland.

COAL.

For all practical purposes business is at a standstill, as merchants cannot find the necessary tonnage. Otherwise collieries generally are well sold ahead, but boats are essential to the steadying of the market. Without being brisk, the enquiry from abroad is fairly steady, while the demand for house and industrial fuels of all classes in the home trade continues fairly good. Admiralty requirements of steam coal, however, are quieter, and the collieries producing these qualities are in a less satisfactory position than they were last month. Smithy coal is firm, and the bulk of the output is still finding a ready sale inward. Bunker coals are in over supply, and are freely offered at current quotations. Coke is in good demand, but exports are kept in check by lack of steams. Gas coke is firm. Prices all round are nominal at schedule figures and without change.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	30/
Secondary do.	25/-27/6	25/-27/6	25/6-26/
House coals:—			
Best house coals	32/6	32/6	30/
Ordinary do.	30/6	30/6	25/
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	30/
South Hetton do.	31/-32/6	31/-32/6	30/
Lambton unscreened ...	26/6	26/6	20/
South Hetton do.	26/6	26/6	20/
Do. treble nuts	22/6	22/6	23/6
Coking coals unscreened	27/6	27/6	21/6
Do. smalls	27/6	27/6	18/6
Smithies.....	27/6	27/6	19/
Peas and nuts	27/-28/6	27/-28/6	25/
Best bunkers.....	27/6	27/6	23/
Ordinary bunkers.....	26/6	26/6	17/6
Coke:—			
Foundry coke	42/6-45/	42/6-45/	37/6
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke.....	32/6	32/6	31/

Middlesbrough-on-Tees.

COAL.

The position in the coal trade shows little alteration, but the market appears to be less depressed. A number of collieries report loss of time. Enquiries from neutrals continue quiet, and only small orders are coming in. The general home demand for fuel is large, and is receiving all the attention possible. Considerable enquiries are reported for special manufacturing sorts, particularly washed smalls, and good quality of peas and nuts. Gas coals are in strong request, but bunkers continue depressed with small business passing. Steam smalls are very dull, and in excess of supply with stocks accumulating. Household coal is strong, and coking coal continues to be fairly well taken up. Coal values are stationary, and at the new minimum figures sellers are keen to secure business. Best Durham gas coals are 27s. 6d., and seconds 26s.; whilst Wear specials are 29s. Unscreened Durham bunkers run from 26s. 6d. to 27s. 6d. Coke, generally, is quiet. For shipment to neutrals both beehive and patent oven remain at 45s., and gas-house product is in good request at round about 35s. No difficulty is experienced in meeting the heavy demand for coke for local consumption, supply of the descriptions needed being very ample. Average blastfurnace qualities are 33s. at the ovens, and low phosphorus sorts 35s. 6d. at the ovens.

IRON.

As was to be expected, the market has quietened down after the recent heavy buying of Cleveland foundry pig under the very liberal allocations for consumption on the north-east coast and in Scotland. Sales of forge iron are also on a very limited scale, consumers being well covered. This month's home deliveries of Cleveland pig promise to be very heavy, though they may be hampered to some extent by shortage of trucks. Interest still centres in the question of advance in pig iron prices as a result of increased cost of output due to recent rise in coke, and opinion differs as to whether such a movement is advisable, or the position should be adjusted in another way. Export business is very dull. For home consumption No. 3 Cleveland pig, No. 4 foundry and No. 4 forge are all quoted 92s. 6d., and No. 1 is 96s. 6d.; whilst for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Stringency continues pronounced in the east coast hæmatite branch. Minimum needs of home users are met, but when these have been adequately satisfied, very little iron is available for shipment abroad. Nos. 1, 2 and 3 are 122s. 6d. for home use, and 141s. for export to the Allies. There is no change to report in manufactured steel, but the opinion prevails that a readjustment of prices is inevitable.

Cumberland.

COAL.

The coal industry in West Cumberland remains very active, and the most encouraging feature this week is that production is increasing. Supplies are more abundant, and at the moment important consumers are practically getting as much coal as they need. Manufacturing fuel is in strong demand. The coastwise trade is fairly active, and the demand for fuel for Ireland is well maintained. During the week seven vessels have sailed with coals, all for Irish ports, and the shipments have amounted to 1,105 tons, compared with 1,645 tons for the previous week and 3,205 tons this time last year. The shipments for October were 8,30 tons compared with 14,035 tons for September and 15,185 tons at the corresponding period of last year. At Workington best coal delivered is obtainable at from 1s. 3d. to 1s. 6d. per cwt. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls ..	19/2	19/2	16/8
Do. peas ..	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	25/
Best works fuel.....	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gasworks	21/6	21/6	19/

IRON.

The hæmatite pig iron trade in West Cumberland and North Lancashire continues to increase in strength. The position is now more satisfactory all round. Over 100 Scottish miners have been at work for a fortnight in the Egremont district, and another batch is expected this week at work in the Bigrigg mines. Supplies of native ore are now more abundant. Prices are still quoted at the official maximum. Some good consignments of ordinary Bessemer iron are being sent to a number of approved users outside of the district. The imports of foreign iron ore for the month have amounted to 12,900 tons.

South-West Lancashire.

COAL.

In the household coal trade inland merchants are slowly overtaking the long list of arrears, but the calls for emergency coal for so many of the towns are getting more acute as the Controller's time limit for stocking nears its end. The shipping position is much as it was. The arrival of steamers has been delayed by the gales, and this has affected the immediate demands for steam coal for bunkering and export, but prices, of course, remain at the schedule rate, plus the Controller advance of 2s. 6d. In the coastwise and cross-channel trade pretty much the same state of things applies as has been noted for the last week or two. It is only here and there that there is to be found any surplus slack, and that in small tonnage. It is altogether in the commoner or finer grades, the best steam slacks being keenly enquired for.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net)	27/ upwds.	27/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/-20/
Do. (f.o.b. Garston, net)	26/ upwds.	26/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net)	25/	24/-25/	24/
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	23/-24/
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

The Manchester Coal Exchange was well attended on Tuesday. The pressure still continues for really all qualities of house, steam and furnace coal. What coal is being shipped continues to be mostly on contract account. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal.....	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington) ..	—*	—*	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

The recent advance to colliers and surface hands has caused the price of coke to rise as much as 6s. 4d. per ton. This must have the effect of a substantial increase in the cost of pig iron, more especially to those furnaces which are engaged on the smelting of lean native ores. Prices for finished material have not yet been altered, but large advances must take place. There is very little work doing

except for Government, whose requirements seem to increase rather than diminish. Engineers, wagon works, foundries, are all at top pressure. Wrought iron scrap continues to be very scarce, and is hard to procure at the Ministry prices. Steel is rather more plentiful.

Yorkshire and Derbyshire.

Leeds.

COAL.

Conditions in Yorkshire are generally without change, which means that there is keen pressure for deliveries of coal of every description, that there is a prompt call for every ton the collieries can raise, and more, and that only in exceptional circumstances is an occasional parcel available for new business. The whole output practically is either under direct official control or is reserved for contracts and regular customers, and if there is any exception it is in the case of the inferior small pea slacks, of non-coking qualities. The market on Tuesday attracted the usual large attendance, but transactions were few. A few complaints were to be heard of unsatisfactory running of wagons, and of private trucks being utilised without reasonable compensation to the owners, but on the whole collieries are fairly well placed with regard to the wagon supply. The keen demand for house coal for London is maintained, although there is not the same apparent anxiety that there was a few weeks ago. Collieries are being pressed still for extra deliveries, but not to the same extent, and there appear, at least, to be indications that the closer control of distribution in London has done something to ease the situation. Coastwise trade is quiet. In the West Riding markets, slightly better supplies are coming to hand, but as a rule merchants are in arrears with their orders, and where any progress has been made in acquiring stocks at the depots it has generally been at the expense of customers, although the operation of the distribution regulations has done a little to ease the pressure. In regard to no quality of coal is the demand for supplies more insistent than for gas coal. Most contracts are in arrear, while stocks at the gasworks are probably on the average not more than half the usual size at this period of the year. It is stated that some gas engineers have received circulars from the Controller urging them to increase their stocks, but this is impossible on the basis of present deliveries. The consumption of manufacturing coal in the West Riding is very heavy, but supplies are apparently evenly distributed and there is no complaint of real shortage. There is a marked shortage of coking qualities of slack, and large coal is being crushed in some instances in order to maintain full work at the ovens, the output of which is promptly absorbed by the demand for furnace coke. The increase in the price of coke to 32s. at the ovens is not yet officially announced, but it is regarded as definitely settled and is expected to be retrospective.

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallsend & London best	21/-21/6	21/-21/6	19/-20/
Silkstone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkstone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/6	20/6-22/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal.....	17/6-18/6	17/6-18/6	16/-17/
Gas nuts.....	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts.....	18/6-19/6	18/6-19/6	17/-18/
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts.....	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal.....	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks.....	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	25/8	32/	25/8

Barnsley.

COAL.

Although there are indications of a more satisfactory supply of manufacturing fuel, the demand continues to be of a very extensive character. The output continues to be insufficient to meet the situation, though, perhaps, collieries are subjected to less pressure for supplies, owing to the improvement in transit or to the realisation of the fact that collieries can do no better than has been the case of late. The character of the demand showed little alteration, and there is practically no free coal offering on the market with the production fully distributed for contracts. A big tonnage of hards continues to be sent to Hull, for the use of the Allies and for Admiralty purposes, whilst a big tonnage continues to be required on home account. The railway companies are pressing for larger deliveries in

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	22/6-24/6	22/6-24/6	20/-22/
Best Barnsley softs.....	21/-21/6	21/-21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/
Secondary do.	18/-18/6	18/-18/6	15/6-16/
Steam coals:—			
Best hard coals.....	20/-21/	20/-21/	17/6-18/6
Secondary do.	19/-20/	19/-20/	16/6-17/6
Best washed nuts.....	18/9-19/	18/9-19/	16/3-16/6
Secondary do.	18/-18/9	18/-18/9	15/9-16/3
Best slack	15/-15/6	15/-15/6	12/6-13/
Secondary do.	13/-13/6	13/-13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/
Gas nuts.....	18/9	18/9	16/
Furnace coke.....	32/	32/	25/8

order to enable them to put away stocks to provide against delayed deliveries occurring through bad weather. The bulk of the output of steam nuts is being taken by the munition works, and ordinary consumers have still to use other kinds of fuel. The enquiry for all descriptions of small steam coal is very brisk, and anxiety continues to be shown in regard to supplies of gas coal. Not only are contract deliveries frequently in arrear, but it has been found that the supplies arranged for are insufficient to meet the needs of the present day of many gas concerns. To obtain supplementary deliveries is a very difficult matter. In regard to house coal, there appears to be more satisfaction in respect to deliveries to the West Yorkshire and nearer districts. In certain cases collieries are not pressed to send so large a tonnage to London as formerly, and this enables attention, which is much overdue, being paid to the normal customers. The position in regard to furnace coke continues to be one of difficulty, owing to the short supply of coking slacks and the very heavy consumption of coke in the pig iron districts.

Hull.

COAL.

The leading features are a firm market and pressure to obtain supplies. Efforts are being made to increase the shipments to France, which have of late been not quite so heavy as at some former times, and so far as shipping tonnage permits this will be done. Meanwhile, there is an active demand from our Ally for screened coal in general, and West Yorkshire Hartleys in particular. Large steam coal continues to be so well taken up by the Admiralty and for other official purposes, that there is little left over, neutral buyers being willing to pay up to 35s. for best South Yorkshire hards in small handy lots. Shipments to Holland, however, are still held up. The demand for industrial fuels is as strong as ever for home purposes, and prices are sustained.

Chesterfield.

COAL.

The demand for every class of coal is unabated, and every ton of output is eagerly awaited by consumers, whether manufacturers or householders. As the year advances, orders for fuel for domestic use increase steadily in number. Delay in the execution of these is, however, unavoidable. There is a persistent call for cobbles and nuts for gas-producers, and collieries experience very great difficulty in satisfying the needs of their customers. Slack for boiler firing is much wanted and secondary qualities now find a ready outlet. Hard coal is in brisk demand for the Sheffield district, while gas coal, and steam coal for locomotive purposes, are eagerly sought for. There are no signs of any improvement in the export trade. Licences for Derbyshire coal are at present unobtainable. The Admiralty are drawing good supplies of steam coal from this district. The coke market is unchanged, the demand for all qualities of coke being active. Prices of coal are firm.

IRON.

The iron trade of the district continues in a state of great activity, all the plant being employed to its utmost capacity.

Nottingham.

COAL.

The condition of the trade in this county shows little change. While the demand on local merchants for household fuel continues active, the position is such that the urgent needs of the public are being attended to, and taking the exceptional conditions into consideration there are few cases of just complaint, as the limited supplies obtainable by merchants from the collieries are being fairly evenly distributed. Pressure on the collieries for deliveries to the various areas supplied by this district is still being exerted, and owners are doing their best to comply with the control arrangements, so far as the output will permit. As the season advances the demand for steam-raising fuel continues to increase. With the strong tonnage required for the different branches of war work, most collieries find it difficult to fulfil contract obligations, and for any odd steams to be found in the open market there is keen competition. Slacks continue in good demand, better class grades more particularly. The output of coking slacks remains unequal to requirements.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/	21/-22/	19/-20/
Good house coals	20/-21/	20/-21/	18/-18/6
Secondary do.	19/6-20/	19/6-20/	17/-18/
Best hard coals.....	18/6-19/6	18/6-19/6	17/-18/
Secondary do	17/9-18/3	17/9-18/3	16/-17/
Slacks (best hards)	14/6-15/	14/6-15/	12/-13/
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/	—	11/

Leicestershire.

COAL.

The complications in administration and in the manipulation of transport continue to increase, and the position of merchants with only limited numbers of privately owned wagons is becoming very serious. Railway-owned wagons have now to be very strictly reserved for the transport of coal for military purposes and for the supply of locomotives and other essential railway requirements. Merchants are now being advised that the principle in question must be "no wagons, no coal." This change has been rendered essential by the ever-increasing needs of the Army for the means of transport at the various war fronts. In country districts the efforts to create reserves under the control of civic authorities have come too late, and all the deliveries available are absorbed to meet the urgent needs of the moment. The coal yards at country stations have been swept clean of all stocks, and difficulty has been experienced in keeping munitions and other essential works under Government control fully supplied with fuel. Very great efforts are being made to restore and maintain the maximum deliveries for London and district, and all classes of household are in very keen demand for speedy delivery. Main and deep cobbles and nuts are taken up in large quantities, while bakers' nuts and small nuts for mechanical stokers are cleared as fast as they become available. The deliveries to country merchants are now further in arrears than at any previous time since the outbreak of war, and there are no signs of relief in the near future. There are no stocks of any kind at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-18/
Second, hand picked	19/-20/	19/-20/	16/-17/
Deep screened cobbles ...	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/
Small nuts.....	17/-18/	17/-18/	14/6-15/6
Deep breeze	15/3-16/	15/3-16/	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/
Main nuts for London:			
kitcheners	16/-17/6	16/-17/6	14/-15/
Steams, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Steams, seconds	15/6-17/	15/6-17/	13/6-15/
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

Merchants rather welcome the new Order issued by the Coal Controller prohibiting the supply of coal to customers who have more than a month's stock on hand. It is thought the new regulation will have the effect of steadying business, and that it will make for a more equitable distribution. During the last few days supplies to the wharves have been better, less coal being diverted to London. There is an incessant demand for munition and general engineering works, and precedence is given to these and to other establishments engaged on work of national importance. There is the customary stringency in nuts and the higher class slacks.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	24/6	24/6	22/
Do. seconds deep	22/6	22/6	20/
Do. best shallow	21/6	21/6	19/
Do. seconds do.	20/6	20/6	18/
Best hard	21/	21/	18/6
Forge coal	18/6	18/6	16/
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/
Do. hand-picked			
cobs	20/6	20/6	18/
Best hard spires	22/6	22/6	20/
Forge (steam)	18/6	18/6	16/
D.S. nuts (steam)	17/	17/	14/6
Small (do.)	17/	17/	14/6

IRON.

The delay of any announcement regarding the expected revision of official rates is undoubtedly having an unsettling effect on the market. Blastfurnace owners and makers of finished material are unwilling to do business except under proper safeguards—some big people, indeed, are keeping off the market altogether meanwhile. The probability that the new prices will be made retrospective will not lessen the inconvenience which the readjustment will necessarily involve, and everybody will welcome an early decision by the authorities. The only change in conditions is in the direction of increased stringency—due in part, no doubt, to the uncertainty in respect of prices and the resultant difficulty of getting new orders through. Pig iron shows a continued scarcity, and the higher grades, which machine exceedingly well, are scarcely obtainable. Derbyshire No. 3 is quoted at 92s. 6d., Northamptonshire No. 3 90s. 6d., and South Staffordshire part-mine 102s. 6d., subject in all cases, of course, to the proviso that new prices, whatever they are, shall apply. Very little business is passing in finished iron, but order books are already generally overloaded, so that producers rather welcome a quiet period. Stiffer terms are being realised for uncontrolled material. Makers of puddled bars affirm that, with the higher cost of coal, they cannot afford to sell at the old rates of £12 10s., and are keeping off the market as much as possible, pending the expected re-arrangement of prices. Gas strip, too, has been forced up to about £16 a ton, and steel strip is about £18 minimum. Tremendous quantities of the latter material are going into consumption for ship repairs, aeroplane construction, and a variety of other war purposes. Bedstead makers cannot get supplies except they are engaged on hospital beds, and they use discard steel wherever possible. Galvanising material is at a prohibitive figure, and there are no galvanised sheets on the market. Painted sheets are substituted. Wrought iron scrap is a quiet market. Some cast iron scrap can be obtained, but there are not large quantities of any material available. The distribution of raw and semi-raw steel remains under close control, to safeguard war needs.

Forest of Dean.

Lydney.

COAL.

No change of importance in the position of the house coal market has occurred during the week. There is no indication of any decline in the demand, or any prospect of it, and there is considerably more business offering than can possibly be accepted by the collieries. The pits are all working full time, endeavouring to clear heavily filled order books. The steam coal market keeps very strong and active, with the demand too much for the supply.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/
Forest	25/6	25/6	—
Rubble	25/9	25/9	—
Nuts	24/	24/	—
Rough slack	16/	16/	—
Steam coal:—			
Large ..	22/6-23/6	22/6-23/6	—
Small ...	18/6-19/	18/-18/6	16/6-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

Devon, Cornwall, and South Coast.

COAL.

Trade and Son report that coal is still coming into the No. 13 area. Vendor contractors that they are hampered by the scarcity of coal. Some of the wholesale vendors are sending the contract quantities of allocated coal, while others are neglecting their obligations. It is fortunate for No. 13 district that up to the present very cold weather has not been experienced, as in many districts coal is perilously short, owing to the Derby, Nottinghamshire, and various other coal fields having been cut off from supplying house coal to this large part of England. It is still reported that coal is over-plentiful in the north-east coal fields of England and Scotland, and that collieries are working only three days weekly and that an abundance of empty wagons are daily running back south from Scotland which could be employed.

THE LONDON COAL TRADE.

THURSDAY, NOVEMBER 8.

Reports tend to show that a better supply of house coal has been brought forward by rail. Depot stocks have increased, and, although the arrivals have not overtaken the demand, the pressure is in many cases lessened. Some of the northern depots have been obliged to cancel further orders that may be on hand, as the yards are blocked with loaded wagons. Others, unfortunately, are still exceedingly short of coal, and are seriously concerned about the winter's supply for putting on the ground. Steam coals are scarce, and factories are pressing for better supplies. Slacks continue plentiful, but as the bulk of the works have now plenty of slack in hand, the demand is very quiet. Bakers' nuts and kitcheners cobbles are moving freely, but the arrivals have been slow. The special efforts made during the summer to lay in a fair stock by all the principal houses and large users, is now beginning to prove a benefit and to ease the market in many directions. The shipping market continues fairly well supplied, although vessels are very difficult to obtain; 19 contract cargoes arrived in the River Thames for Monday's market, and 10 for Wednesday, almost exclusively gas coals. The returns show that a very heavy demand is experienced at all the Humber ports, and Newcastle says that business is exceedingly difficult. Freight rates are very firm, but the quotations this week are slightly lower; 19s. to 20s. has been fixed from the Humber to London. The attendance on the market has been very meagre lately, and the trade generally has had very little animation, largely due to the fact of there being no free coal to buy and no semblance of anything like spot lots to pick up. Colliery representatives have little or nothing to offer, and factors have had very little for sale, so that many of the usual frequenters of the market find the time can be more usefully employed at the office or depot. The mass of requisition forms to be filled up and dealt with also occupies a considerable amount of time and labour. Since the middle of October more coals have been put upon the ground, but the required tonnage in accordance with the Controller's suggestion that a full three weeks supply should be kept in hand is far from complete yet. Happily the cellars in all the larger houses have a good supply, and the weather conditions have not been very severe yet, so that the whole of the trade can be centred upon the smaller buyers and the depots in the poorer neighbourhoods. In a good many directions London merchants whose wagons have been sent to collieries for coal urgently needed, and have been used by the Controller's instructions for the conveyance of coal to other districts and for other merchants, have suffered a serious amount of annoyance and unpleasantness; but, as a whole, the emergencies of the case and the special wishes of the Coal Controller have been recognised. Nothing fresh has yet been reported in connection with the canal transport or the waterways from the Midlands to London.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, NOVEMBER 2.—There was a fair supply of seaborne house coal, which readily found purchasers, but no quotations were reported. Cargoes, 30.

MONDAY, NOVEMBER 5.—Seaborne house coal was again in good demand, but no available cargoes on offer. Cargoes, 19.

WEDNESDAY, NOVEMBER 7.—Seaborne house coal was in demand, and a cargo was disposed of, but the price was not obtainable. Cargoes, 10.

THE TIN-PLATE TRADE.

Liverpool.

Makers of tin-plates are now asking 30s. 4½d. basis net f.o.t. at works for cokes, which figure they are entitled to quote owing to the advance in block tin. With very few exceptions, they are firmly adhering to the price. Works are by no means anxious to sell forward in the present uncertain state of raw materials and labour. Wasters are accumulating (permits coming along very slowly indeed), with perhaps the exception of 28 x 20, of which there is a scarcity.

Cheap Coal in South Africa.—At a meeting of the shareholders of the African Freehold Coal Lands, it was stated that over 100,000 tons of small coal had accumulated at that company's colliery. The quality of the company's coal was declared to be good, as compared with South African coal, and could be brought to the pit's mouth at about 2s. 6d. a ton.

Mr. Smillie on Industrial Unrest.—Mr. Robert Smillie, who presided at the conference of the National Union of Scottish Mine Workers at Edinburgh, said that he had helped to fan industrial unrest because of its deep-seated causes, but that he bitterly repudiated the revived story that much of the unrest was caused by German gold. The action of the colliery firemen in South Wales, he stated, was due to the bad conduct of the coal owners.

Meeting of Mechanical Engineers.—A general meeting will be held in the rooms of the Institution of Mechanical Engineers, Great George-street, Westminster, on November 16, commencing at 6 p.m. A paper on "Air Lift Pumping," by Mr. A. W. Thomas, will be read. The Thomas "Heat Engines," by Capt. H. R. delivered on November 30, at 6 p.m.

THE WELSH COAL AND IRON TRADES.

THURSDAY, NOVEMBER 8.

Monmouthshire, South Wales, &c.

Newport.

COAL.

There was an appreciable reduction in the stocks of coal last week, due to the stoppage of a large number of collieries, but with the resumption of work on Monday matters began to settle down again to a normal condition, and in the course of a few days there was a considerable amount of coal in stock, especially small coal. There was a keen demand for house and gas coals. As most of the large coal was commandeered it was not available for the general market. Coke was in great request. There was an ample supply of patent fuel for all purposes. Tonnage arrivals were not much above the average, and further trouble is feared by wagons being held up.

Prices f.o.b. cash 30 days.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Black Vein large...	32/6	32/6	34/-35/
Western-valleys, ordin'y	31/6	31/6	33/-34/
Best Eastern-valleys ...	31/6	31/6	32/-33/
Secondary do.	30/6	30/6	30/-31/
Best small coals	23/6	23/6	23/-24/
Secondary do.	22/6	22/6	21/-22/
Inferior do.	20/6	20/6	20/-21/
Screenings	25/6	25/6	23/6-24/
Through coals	29/6	29/6	24/-25/
Best washed nuts.....	32/6	32/6	28/-30/
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	24/-26/6
Secondary do. do. ...	33/3	33/3	22/-24/
Patent fuel	32/6	32/6	40/-42/6
Furnace coke.....	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	57/6-60/

IRON.

All the works are again in full swing, with maximum outputs. Pitwood has arrived rather more plentifully, but prices still remain firm at about 75s. for best fir.

Cardiff.

COAL.

The past week has been one of difficulty and anxiety, but to some extent the troubles have proved a sort of blessing in disguise. The examiners never seriously realised that their threat, if carried into effect, would mean the stoppage of the entire coal field. The actual loss of output was estimated at upwards of 300,000 tons. Fortunately, the collieries on the Admiralty list, producing the best descriptions of steam coal, were not materially affected, and were kept working under almost normal conditions. Shipping proceeded as usual at the various docks, and the huge accumulations of coal in the sidings, which had been a source of congestion and anxiety, were reduced to such an extent that the work of transport was able to be carried out under almost normal conditions. Large numbers of wagons were released, with the result that collieries had plenty of empties at their disposal when work was resumed on Monday. With several unimportant exceptions this prevailed throughout the coal field. In some of the Monmouthshire districts there is still some amount of congestion, particularly of small coals, and now that the collieries are again working more regularly, it is not improbable that the accumulations may increase. Tonnage has been coming forward more freely, although not in sufficient quantities to meet ordinary requirements. There was also an improvement in chartering, the amount of tonnage taken up being 21,450 tons compared with 16,670 tons in the preceding six days. The examiners have resumed their work without having achieved anything but a promise that their claims shall be investigated. The old adage that "A stitch in time saves nine" has been frequently quoted and the department is blamed for not taking earlier action to prevent the loss of 300,000 tons of output. The other factor in a situation of great uneasiness has been the ballot on a "down tools"

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	32/-34/
Ordinary	30/	30/	30/-31/
Steam smalls No. 1	21/6	21/6	23/-24/
Do. 2	21/	21/	—
Do. 3	20/6	20/6	21/-22/
Do. 4	20/	20/	—
Do. 5	19/6	19/6	18/-20/
Do. 6	19/	19/	—
Do. 7	18/6	18/6	18/-19/
Do. 8	18/	18/	—
Best dry coals	30/	30/	30/
Ordinary dries	28/6	28/6	30/-31/
Best washed nuts	30/	30/	30/-32/
Seconds	28/6	28/6	30/-31/
Best washed peas.....	27/6	27/6	30/-31/
Seconds	26/6	26/6	29/-30/
Monmouthshire—			
Black Veins	30/	30/	32/-34/
Western-valleys	29/	29/	31/-32/
Eastern-valleys	29/	29/	30/-31/
Inferior do.	28/	28/	29/-30/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	34/-35/
Small	26/	26/	27/-29/
No. 2 Rhondda—			
Large	27/	27/	30/-31/
Through-and-through	22/-23/6	22/-23/6	24/-25/
Small	17/-19/	17/-19/	20/-21/
Best patent fuel	30/	30/	41/-42/6
Seconds	30/	30/	40/-41/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	57/6-62/6
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	75/	70/-75/	44/-45/

* Nominal.

policy. This has had no material effect on the market, and fortunately the ballot is against the pacifist element. Operations continue to be conducted on the basis of the Controller's fixed schedule, with the addition of 2s. 6d. per ton on all coals except those shipped to France and Italy. The classification list is still unpublished and transactions are subject to modification. There is a strong demand for gas and household coals and also for coke, and the supply is distinctly on the short side. Patent fuel on the other hand is plentiful, and stocks are accumulating owing to lack of transport facilities. Pitwood arrivals have not been so numerous, and importers have no difficulty in securing 75s. per ton for best French fir.

IRON.

Outputs at the steel works were considerably interfered with owing to the strike of examiners. Steel works were unable to obtain the necessary supplies of coal before Tuesday. All the works are turning out maximum outputs, and the rail and bar mills are being hard pressed to maintain regularity of deliveries. In the tin-plate trade there is practically no change. The increased allotment of bars will provide more regular employment at the mills now in operation, but there is little prospect of the idle mills being restarted until conditions are still further improved. Shipments of tin-plates last week amounted to 22,732 tons, against receipts from works amounting to 27,347 boxes, thus increasing stocks in the docks warehouses and vats to 58,136 boxes, as compared with 53,521 boxes the previous week and 118,220 boxes at the corresponding date of last year. As reported last week, stocks of wasters are increasing, and efforts are being made to induce the Controller to grant permits more freely for dealing in these goods. There is a brisk demand, and the accumulations are not only a source of inconvenience, but an expense, owing to an unnecessary amount of capital being rendered unremunerative through the restrictions. Prices are still on the basis of 30s. per box for standard sizes. In the galvanised sheet trade there is no improvement, and the few mills working are almost exclusively employed in the manufacture of black and trench plates and painted sheets, for which there is a considerable official demand. Outputs from the blastfurnaces are steadily increasing, and the tonnage is expected to be considerably augmented by the production from the Cyfarthfa furnaces, which were restarted last week after a lapse of 10 years. Supplies of iron ore continue to be satisfactory. There is a scarcity of scrap metals, and maximum rates are being obtained. In all departments quotations are nominal and controlled.

Swansea.

COAL.

There was a capital attendance on 'Change, and the conditions prevailing in the anthracite coal market were very strong. All supplies were fully stemmed. With the resumption of work at the collieries, supplies should be more ample. Steam coal conditions are unaltered, this branch of the trade being still on the weak side.

Llanelli.

COAL.

The local market has been very irregular during the past week. The examiners' strike caused a stoppage of work at many of the collieries, and there was a consequent reduction in the available supplies of certain qualities which were previously scarce. Anthracite large kinds have been very firm, and all parcels offering, of the higher grades in particular, quickly disposed of. Nuts and beans are a strong enquiry, but owing to the stoppage of work at many pits, buyers find it difficult to secure their quantities. Cobbles are also active, and peas are in better request. Culm and duff are, however, still slow and stocks heavy. Large steam coals of superior grades are moving better, but throughs and smalls are not very brisk, owing to the heavy stocks which had accumulated. Manufacturing coals and house coals are in good demand, and not many free parcels offering.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	26/6-27/6
Machine-made cobbles.....	42/6	42/6	39/6-42/
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	30/-31/
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/-22/
Rubbly culm.....	13/	13/	14/-14/6
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	31/6-32/6
Seconds	27/	27/	—
Cargo through	23/6	23/6	26/-29/6
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Smalls	19/	19/	18/-20/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	18/6-21/
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

The prices in list are subject to an increase of 2s. 6d. per ton to meet the war wages increase, except in the case of shipments to France and Italy and coal for the manufacture of patent fuel for shipment thereto.

Peat Substituted for Coal.—In *Commerce Reports* (Washington), the United States Consul at Berne states that a semi-official organisation, whose headquarters are in that city, is encouraging the use of peat as a substitute for coal in Switzerland, and that the organisation is in the market for the purchase of improved machinery for cutting, raising, drying, and compressing peat.

THE IRISH COAL TRADE.

THURSDAY, NOVEMBER 8.

Dublin.

No further change in the situation has occurred here, the continued shortage of best house coals still being detrimental to the trade. Demand is keeping fairly good. Current quotations are as follow:—Best Orrell, 48s. 6d. per ton; best Arley, 47s. 6d.; best Wigan, 46s. 6d.; Pemberton Wigan, 44s. 6d.; best Whitehaven, 46s. 6d.; best kitchen coal, 45s. 6d.—all less 1s. per ton discount for cash. Scotch steam coal, 39s. per ton; Welsh steam, 50s.; coke, 46s. 6d. per ton delivered. Present prices of Irish coal from the Wolfhill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton—all f.o.r. Athy, the nearest railway connection with the mines. Best large coal at the Castlecomer Collieries, co. Kilkenny, is 28s. 4d. per ton at the pithead. The total quantity of coal discharged upon the Dublin quays from English, Scotch, and Welsh ports during the past week was 22,105 tons, as compared with 21,537 tons the week previously. On Thursday of last week the Irish Railway Executive Committee visited the mines of the Arigna Mining Company, co. Leitrim. The various coal mines of the company were inspected, and a visit was paid to the new mine opened recently, where a thorough examination of the coal and the methods of mining was made.

Belfast.

Coal vessels delayed by the late storms have been arriving during the week, and it is expected that supplies will soon be up to the usual average, with the exception of those classes of English coal which are not now being shipped to Ireland. There is, upon the whole, a good demand in this port, prices being without further change, viz.:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. The special committee appointed under the Retail Coal Prices Order by the Belfast Corporation, after consultation with the coal merchants, have agreed to a freight charge of 11s. per ton, and resolved that the maximum price of household coal should be fixed at 45s. cash per ton. The price of inferior grades of coal has yet to be fixed, also the scale of charges to hawkers and others. It appears that the new Order in connection with coal deliveries does not as yet apply to Ireland.

SOUTH WALES MINING TIMBER TRADE.

Arrival of pitwood cargoes from abroad have been better, but the total quantity received is still much below what the market could do with, consequently market prices been strongly held at 75s. per ton ex ship South Wales ports. France is now the only source of our foreign pitwood supplies, for no cargoes have been received from Portugal or Spain for some time back. It is understood that some thousands of tons of pitwood is lying at Spanish ports, and, owing to the high price of coal, is being utilised for fuel. It is highly improbable that any supplies of Spanish wood will be received here during the continuance of the war. The scarcity of available tonnage has been such that vessels are very difficult to procure for the carriage of French timber, with the result that the monthly quantities received by importers have been actually below those allowed by the Controller of Import Restrictions. Meanwhile, the greater use of home-grown wood has neutralised the deficiency of foreign supplies.

Colliery Costs Abnormal.

The cost of producing South Wales coal has risen to such an extent that colliery proprietors anticipate that the dividends of the previous year will not be maintained; for the largest proportion of the coal exported abroad does not take the 2s. 6d. per ton increase granted as a result of the increased wages given to miners. This heavier expense coincides with a sharp increase in the price of French pitwood, and colliery proprietors contend that French pitwood should be sold at the same sacrificial maximum price as is Welsh and other British coals to France. It is not at all unlikely that the next few weeks will witness standardised prices for mining timber, for the tendency is for values to go to still higher levels.

Imports of Foreign Pitwood.

For the week ending November 2 the total quantity of mining timber imported into South Wales from abroad amounted to 13,660 loads, the cargoes being as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Oct. 27	Morgan and Cadogan	180
" 27	Morgan and Cadogan	450
" 27	A. Bromage and Company	780
" 27	E. Marcesche and Company ...	120
" 29	Lysberg Limited	1,560
" 29	Lysberg Limited	840
" 29	Lysberg Limited	840
" 30	Morgan and Cadogan	120
" 30	Morgan and Cadogan	100
" 30	Morgan and Cadogan	510
" 30	Lysberg Limited	600
" 30	Lysberg Limited	1,920
" 31	Lysberg Limited	4,800
" 31	Morgan and Cadogan	840

Total.....13,660

Newport, Swansea and Port Talbot: No imports reported.

Of this quantity 10,560 loads were taken by the Admiralty agents, while the balance, 3,100 loads, were divided amongst the qualified pitwood importers. It will be seen, therefore, that pitwood importers are being severely hit by the Government regulations and the scarcity of tonnage.

Home-Grown Timber.

A few importers, such as Messrs. Vyvyan and Kelly, Evans and Reid, F. R. Howe and Co., and C. Tennant, Sons and Co., have for some time past been connected with the home-grown trade. Large tracts of woodland area have been purchased, and cutting on a large scale has been going on. The Monmouthshire and South Wales Coal Owners Pitwood Association has also purchased large areas, and their deliveries to members amounts now to over 2,000 tons per week. The heavy decline in the imports of foreign pitwood during the past few weeks has led to an exceptionally heavy demand for home-grown wood greater in fact, than was thought would be the case. The result has been that cutting and transportation have been speeded up, but prices have steadily advanced until the best descriptions are quoted at the same price as that at which French fir is selling, viz., 75s. per ton. The next few months, however, is likely to be a critical period, and the question arises

as to whether a shortage may ensue as a consequence of the set-back which foresters and haulers must inevitably encounter during the winter. The difficulties in the way of the home trade are many. Suitable labour is hard to procure, and the supply of wagons is most irregular. A spell of hard weather must reduce the deliveries to collieries to a sharp extent, and with imports down to rock-bottom levels, and no stocks to speak of, collieries are faced with the danger of stoppages. The experiments with respect to concrete pit props are going on at Cardiff, and a demonstration yard has been set up in the district. Owing to the increasing scarcity of wood of suitable size it is becoming imperative to look round for a substitute. In the United States the use of concrete props is increasing, the Oliver Mining Company of Libbing, Minnesota, now using nothing else for timbering and shaft lining. For the lining of shafts concrete is now becoming universal in the United States, while pre-moulded props are displacing wood.

THE AMERICAN COAL TRADE.

A cable message announces the intention of the Fuel Administration to commandeer 10 per cent. of the output of virtually every coal mine, in order that the Government may distribute it to meet emergencies wherever they arise.

Mail advices report a general shortage of bituminous coal, except in the North-West. The *Coal Age* (October 12) states that a general scarcity of miners, a shortage of cars, an abnormal industrial demand, and various labour troubles throughout different parts of the country, have contributed to this condition. A few sales have been reported on the 2dols. official basis, and a few contracts have been closed at that figure; but the great volume of the tonnage still moves upon contract, and spot coal in the open market has disappeared. The priority order, as it affects shipments of coal to the North-West, has been a potent factor in the coal shortage of other Central regions.

Nothing is heard on New York market regarding purchases of 2dols. coal. Reports from Philadelphia state that there is little chance of obtaining any coal except on contract. Coal supplies in Baltimore are dwindling. The shortage of stocks at all of the Hampton Roads terminals has become acute, and practically all shippers are short of coal. Delay in securing export licences is playing its part in the general mix-up and delay. The whole trade is more or less demoralised and disgusted. There are no quotations obtainable for prompt business.

There would appear to be no serious reduction in the amount of anthracite produced and sent to the market. The consumption of this kind of coal is, however, abnormally heavy, probably on account of the scarcity of bituminous. Some wholesale dealers are refusing further orders for domestic coal on account of its scarcity. The steam grades are also scarce and hard to secure. The instructions from Washington demanding a regulation of prices to the consumer have been the chief topic of conversation. The prices quoted in Philadelphia per gross ton, f.o.b. cars at mines for line shipment, are as follow:—Broken, 4.55 dols.; egg, 4.45 dols.; stove, 4.70 dols.; nut, 4.80 dols.; pea, 3.40 dols.; buck, 2.90 dols.; rice, 2.40 dols.; boiler, 2.20 dols.; barley, 1.90 dols.

Offerings of furnace coke in the open market, for spot shipment, have been slowly increasing. The offerings, while increasing somewhat, are much less than the demand. The price is fixed at 6 dols. per net ton at mine. Practically nothing has been done in foundry coke, as the differential price has not been fixed, and consequently at present it could not be sold above the general fixed rate of 6 dols.

THE BY-PRODUCTS TRADE.

Tar Products.—Pitch quotations are maintained, and holders incline to the view that the market level is bound to be a higher one in consequence of inevitable demands. On the other hand, the existence of considerable stocks must be regarded as a factor in the case. Government control determines most of the business in by-products now, so that the position admits of very little change. The enquiry for solvent naphtha continues, and consequently sellers are not disposed to make concessions. On the contrary, they look for an advance. Since the Ministry of Munitions took over all tar oils of or above 1,000 specific gravity, dealings have been severely restricted. A licence is necessary for any monthly supply exceeding 5 gals. Under this scheme, maximum prices have been fixed for oils alone and for creosote and pitch according to the percentage of admixture. Current quotations are:—Coal tar, 27s. to 31s. Pitch, east coast, 20s. to 25s.; west coast, Manchester, 17s. 6d. to 18s. 6d.; Liverpool, 17s. 6d. to 18s. 6d.; Clyde, 18s. to 19s. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. 1d. to 3s. 3d. Heavy naphtha, north, 1s. 8d. to 1s. 10d. Heavy oils, in bulk, north, 4½d. to 4½d. Creosote, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s., in bags. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The larger output in this country is still utilised for farming and other purposes, and consequently the export business remains at a standstill under the official arrangement. The fixed price continues to give rise to complaints. The output in the United States is bound to increase very largely, with the result that the prices there incline to a lower level.

Low-Grade Fuels.—The *Electrical Times* calls attention to the effect the flat additional 2s. 6d. per ton has on the users of low-grade fuels for steam raising purposes. The Coal Controller has urged the electricity supply industry to instal stokers capable of utilising low-grade fuels; and those who have complied have to pay the extra 2s. 6d. per ton, the same as those who use the better class coals. The result in the case of one station is that the 2s. 6d. increase is equivalent to 28 per cent. on 9s. 4d. per ton, as against 11 per cent. on nuts costing 22s. That is described as a most prejudicial matter for those undertakings which now use the lower grade fuels; the proportion in one case approximating to 90 per cent. of the total fuel consumed.

PYROMETERS AND PYROMETRY.

An important general discussion on the subject of pyrometric measurement of temperature took place at a meeting of the Faraday Society, on November 7, in the rooms of the Royal Society of Arts, the chair being occupied by Sir RICHARD GLAZEBOOK, (B.), who opened with a general review of the development of the subject.

The first communication was from Dr. E. F. NORTHROP (Trenton, N.J.), on "Production of High Temperature and its Measurement." The author pictured the ideal melting furnace as consisting of a cylindrical crucible with minimum radiating surface compared with volume, containing the product to be melted—by induction as far as practicable—and with little loss of heat by outward conduction and radiation. A completely successful 20-kw. crucible furnace, heated with high-frequency currents in an inductor coil surrounding the crucible, has been made and tested, the induction being obtained by electro-magnetic induction without the use of any iron. It is impossible to destroy this type of furnace by burning out, as only the crucible with its contents and the immediate layers of refractory lining get very hot, a layer of "silox" about 1 cm. thick surrounding the crucible being sufficient to keep the inductor coil below a red heat when the crucible and contents are above 1,400 degs. Cent. An instrument called the "Northrup pyrovolt," devised for measuring temperatures in factories up to about 1,300 degs. Cent. with the aid of platinum-rhodium thermo-couples was described, and also a resistometer (depending on the increased resistivity of tin with temperature) for temperatures from above 1,600 down to the solidification point of tin. A tin-pyrometer has also been developed, somewhat resembling a very large mercury thermometer, for temperatures up to 1,800 or higher.

Dr. EZER GRIFFITHS communicated a paper by himself and Mr. F. H. SCHOFIELD, B.A., B.Sc., on "Pyrometer Standardisations," reference being made to the various fixed points available for attaining a practical or working scale of temperature, and to the calibration of and sources of error in various pyrometers.

Mr. R. S. WHIPPLE, M.I.E.E., read a short paper on "The Advantage of Burying the Cold-junction of a Thermo-couple as a Means of Maintaining it at a Constant Temperature." It was stated that the buried couple has proved successful in works practice, and was even easier of application in the case of base-metal couples.

Mr. R. P. BROWN (Philadelphia) communicated a paper on "The Automatic Control and Measurement of High Temperatures," describing, as applicable for industrial services, the nitrogen gas expansion instrument (for use up to 425 degs. Cent.), thermo-electric pyrometers (with thermo-couples of base metals up to 1,100 degs. Cent., and platinum-rhodium thermo-couples above 1,100 degs. to 1,500 degs. Cent.), and radiation pyrometers (for temperatures above 1,500 degs. Cent.). For measuring the voltage produced by a thermo couple, high-resistance milli-voltmeters (of 1,000 ohms or more) are used, and these have been made extremely light with the aid of an enamelled wire of aluminium alloy, 0.003 in. in diameter. Portable and wall-type indicating pyrometers, and recording pyrometers, are available. For even greater precision in temperature measurements, the high-resistance milli-voltmeter has been replaced by the Brown heat meter, in which the defects of the milli-voltmeter are claimed to be eliminated. Means for automatically controlling the temperature of electric furnaces by means of switches were briefly described, and it is stated that the same form of switch can be used to operate a valve to control a gas or oil furnace.

Contributions relating to the application of pyrometers to various metallurgical processes, more especially in connection with the iron and steel industry, were made by Prof. J. O. Arnold, F.R.S., Prof. Donnan, F.R.S., Mr. Cosmo Johns, F.G.S., &c., and Dr. W. H. Hatfield.

The foregoing papers gave rise to an interesting discussion, which mainly turned on problems concerning the steel industry.

Mr. H. WATKIN followed with a communication on "The Measurement of High Temperature by means of Pottery Materials." In this paper reference was made to the use of various contrivances in which the heating effect is indicated by the amount of contraction, by the more or less complete vitrification of the material, by the fusion of a superficial layer of glaze to produce a smooth glassy surface, and by the fusion of certain colouring materials upon the glazed surface. Indications are also afforded by the appearance of the flames, by the changes of colour produced in clays by heating, by the feel of the fired object, and by the sound given by a fired piece when struck. The principal methods still in use were briefly described in the paper, including Wedgwood's pyrometer, Buller's rings, Seger cones, Holdcroft's thermoscope bars, Watkins' heat recorders, and certain gold and colour trials.

Mr. C. R. DARLING, A.R.C.S., F.I.C., communicated a short paper on "Base Metal Thermo-electric Pyrometers," in which the opinion is expressed that it might be possible to employ such pyrometers up to 1,500 degs. Cent., or higher, by using fused couples, as in many cases there is no discontinuity of the thermo-electric properties of the melting point.

OBITUARY.

Mr. Roger Banks, manager of the Princess Colliery, Haydock, belonging to Messrs. Richard Evans and Company, was killed in the mine on Sunday afternoon. He tried to get on the wrong deck of the cage, and was badly crushed that he died before he could be removed to the surface.

The death occurred at Bournemouth on Saturday, of Isaac Butler, an ex-High Sheriff of Monmouthshire, a well-known South Wales steel magnate. He was associated with Siemens in his experiments at Swansea. Deceased, who was 80 years of age, retired from the directorship of Baldwins Limited five years ago.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.—November 7.

Industrial Councils.

Mr. WARDLE announced that the Government had decided to take immediate action in the scheme of establishing industrial councils, as proposed in the Whitley Report. Accordingly, a new Department of the Ministry was now at work trying to get industrial councils established as quickly as possible in the leading industries. He commended this new departure to the country as the most hopeful that he could remember in the great field of social reform.

HOUSE OF COMMONS.—November 5.

Durham Collieries.

Mr. WING asked whether the President of the Board of Trade would make a statement as to the uneven working of collieries in Durham and the remedying of the unemployment in Durham.

Mr. WARDLE answered that differences between the amounts of time lost at different pits in the same district were not peculiar to Durham, and were due mainly to the fact that with a restricted supply of shipping at their disposal, purchasers abroad limited their demands to certain qualities of coal. Certain steps were being taken which should afford a substantial measure of relief. He proposed to readjust supplies.

November 6.

Wages in Durham.

Mr. A. WILLIAMS asked whether the President of the Board of Trade was aware that in the county of Durham men working at the surface of coal mines were in many cases only earning 6s. 1½d. per shift; whether in many cases these men were only getting about 27s. a week, including the war bonus recently granted, owing to the pits only working three shifts a week; and whether he would guarantee every man who works all the shifts open to him at a coal mine controlled by the State a minimum wage of 30s. at least.

Mr. WARDLE said he was aware that short time was being worked at some collieries in the county of Durham, as well as at other districts hitherto dependent on the export trade. For that reason the recently granted war wage of 1s. 6d. per day was made payable for days on which a colliery did not work owing to lack of trade. The Controller of Coal Mines was endeavouring to carry out a scheme of distribution of mine labour, with a view to securing to all mine workers full time. He was in negotiation with the Minister of National Service and the Miners' Federation of Great Britain.

Mr. WILLIAMS pressed for an answer to the question whether not less than 30s. would be guaranteed if a man worked all the shifts available.

Mr. WARDLE said that if short time were worked the workman would receive 1s. 6d. per day allowance. They had their trade union to fall back upon.

November 7.

Irish Coal.

Mr. O'DOWD asked the Chief Secretary whether he was aware that the coal and iron field of Arigna, extending into the counties of Sligo, Leitrim, and Roscommon, could only be properly developed through the construction of a short line of railway to Collooney; and whether he was aware that a company awaited an Order in Council in order to construct the line.

Mr. DUKE referred the hon. member to an answer in the Official Report of October 29.

November 8.

The Coal Mines Control Agreement.

On the order for the second reading of the Coal Mines Control Agreement (Confirmation) Bill.

Mr. RUNCIMAN asked for the ruling of the Speaker on a point of order. The Bill, he said, was a measure to enact an agreement entered into by the Coal Controller, the president of the Mining Association of Great Britain, and the secretary of the Consultative Committee. The agreement was, in effect, an amendment of eight or more clauses of the Finance Act, to the extent that if it were legalised by Parliament, those coal owners who had excess profits would be faced with a deduction of 95 per cent. instead of 80 per cent. of those profits. He submitted that the Bill should be founded upon a resolution in Committee.

The SPEAKER held that the Bill contained no grant or charge upon the public revenue or out of money to be provided by Parliament. There would be no money available for the State, and therefore there was no taxation. He did not see that the Bill was a Bill that ought to originate in Committee. It was like a treaty made between two negotiating nations, and the House was asked to assent to it. It could either accept or reject it.

Sir ALBERT STANLEY (President of the Board of Trade), moving the second reading of the Bill, said that the Coal Controller estimated that by bringing the consumption of coal as nearly as possible to the source, it was possible to save, roughly, 700 million ton-miles per annum. Already very considerable savings had been made in locomotives, wagons, and staff. One other result of the control was that more coal was being brought into London and distributed in London this year than was the case two years ago, and larger stocks were also available. (An Hon. Member: "Who gets it?") With the possible exception of the United States, this country was better off for coal for domestic consumption than any other belligerent. He did not pretend to say that everybody got the coal they desired, but cases of real hardship had been prevented, and so far as he could see now, providing people exercised reasonable economy, there was no doubt we should get through next winter successfully. It was a great advantage not having to set up an entirely new organisation to operate an agreement affecting an interest of such magnitude. The Inland Revenue authorities would be used for the purpose of determining the profits and assessing the tax in the event of excess profits. In the event of such a tax, it was proposed that the Coal Controller's Office would be empowered to make the agreement, which was necessary, provided, in the first place, that the right during the period of the agreement should be given to the Coal Controller if during the period the profits were less than for the

standard period. If, for instance, they took a colliery with an output of 10,000 tons during a standard or pre-war period, and it made a profit during that period of £1,000, at the rate of 2s. per ton, and if during an accounting period—or the period of control—the output fell to 9,000 tons, the owner would be entitled to have his profit made up to him on the basis of 9,250 tons, which at the same rate of 2s. per ton would be £925. If the decision of the Coal Controller was not acceptable to the mine owner, he might appeal to the Board of Referees. If, on the other hand, the profits of the undertaking during the accounting period were in excess of the standard period, then 15 per cent. of the 20 per cent. which the mine owner was allowed to retain under the Finance Act was paid over to the Inland Revenue authorities. In other words, the mine owner in these circumstances was permitted to retain only 5 per cent. of his excess profits, instead of 20 per cent. This 15 per cent. was to be used for the purpose of compensating those mine owners whose profits had fallen below the standard which had been allowed, and it was expected that the sum received from the excess profits would be at least sufficient to compensate those whose profits had fallen. If the amount was not sufficient, it would be necessary for the Government to come to Parliament and ask that the deficiency should be made good. If, on the other hand, which was not unlikely, there was a surplus, it would be for Parliament at the time the control came to an end to determine what disposition was to be made of the surplus. As regards collieries that might be closed by order of the Coal Controller, the modified guarantee as provided by the agreement would continue in force. He could not say that the agreement had been accepted by all the mine owners, but it had been accepted by a majority, and he considered it in all the circumstances a fair agreement.

Sir S. ROBERTS appealed to the small minority of mine owners who were opposed to it not to press for a better bargain.

Sir J. WALTON, who moved the rejection of the Bill, contended that the conditions imposed by the agreement must unfairly penalise the coal trade. He protested against the coal trade being singled out and penalised in this matter, as it had been in other matters, for exceptional treatment. The Government had abrogated the principle of the equal incidence of taxation.

Sir C. CORY, who seconded the rejection, contended that so far as getting coal for carrying on the war was concerned, it was quite unnecessary for the Government to take control of the collieries. Coal owners were ready to make any sacrifices that were necessary to win the war, but they complained that they should be singled out as a class for specially heavy taxation. He denied that the Bill was an agreed Bill. The Mining Association had no power to sign any agreement.

Mr. FINNEY said the miners accepted the principle of the Bill. They had advocated for years the bringing of the mines under national control.

Sir J. S. HARMOOD-BANNER thought the Bill was unduly hard on coal owners, but as a coal owner he was prepared to support it on the patriotic ground that it would help in the successful prosecution of the war.

Brig.-Gen. HICKMAN complained that the Bill would set up very severe penalties of which nothing was said in the agreement, to which he was in some measure a party.

Mr. WARDLE (Parliamentary Secretary of the Board of Trade) said that much of the criticism of the Bill was entirely beside the mark. The Bill had nothing to do with the State control of mines. That control had already been established. All the Bill had to do with was the ratification of an agreement entered into between the Coal Controller and the association representative of the coal owners. There was nothing in that agreement in the slightest degree disadvantageous to the general community. The coal trade was not treated unfairly.

Mr. PRINGLE was speaking against the Bill when the debate stood adjourned.

Petroleum Bill.

Mr. BONAR LAW, in answer to a question, said he would not be in a position to make any statement regarding the Petroleum Bill or petroleum royalties.

MINERS AND RECRUITING.

Our mining correspondent reports that the returns of the "down tools" ballot at the collieries of the South Wales coal field show a largely increased majority against the pacifists. The official figures last night were: For "down tools," 24,836; against, 83,047—majority against, 58,211. The overwhelming majority which is now assured against the pacifist agitation has been received with great satisfaction throughout the coal field. So far, the minority vote is smaller than was anticipated, as the number of men who have come into the mines from other industries since the beginning of the war is about 40,000.

Mr. J. E. Dobson, late Scottish representative of Bruce Peebles and Company Limited, Edinburgh, has been appointed London office manager to the company, in place of the late Mr. R. W. Gauntlett.

Andrew Smith, a collier, of Thornton, was fined £5 at Market Bosworth on Wednesday for using motor spirit contrary to the Regulations. Superintendent Smith said that several local colliers since the war had bought motor-cars.

Proposed Nationalisation of Austrian Coal Mines.—The Austrian Premier announced the forthcoming presentation of a Bill which will reserve to the State the right to prospect for and extract coal in Austria. The State may alienate its mining rights under certain legally defined conditions. Other provisions of the Bill aim at accelerating the opening up of mines. Privately-owned concessions not being worked are to become the property of the State after a certain period of grace.

Coal Owners and Control Bill.—Coal owners from all parts of the country had a full discussion with the President of the Board of Trade on Wednesday concerning the Coal Control Bill. They indicated to Sir Albert Stanley the changes they would accept as satisfactory, and received from him an assurance that their representations would be sympathetically considered. It is understood that the coal owners will table a series of amendments to cover their points, some of which are likely to be accepted. The President was accompanied at the interview by the Coal Controller (Mr. Guy Calthrop).

LABOUR AND WAGES.

South Wales and Monmouthshire.

The men employed in the Great Western Company's collieries in the Rhondda and at Llantwit met on Sunday and discussed the circumstances of a dispute at the Maritime Colliery concerning payment of the minimum wage. The meeting decided to support the Joint Committee.

Owing to a mishap to the winding engine, the Gwellan Colliery, Mon., was partially idle on Tuesday, the shifts affected being the morning and afternoon.

At a recent meeting of a section of the Monmouthshire miners, which had acceded to the request of colliery examiners who desired to explain their position, one of the leading representatives of the examiners made allegations regarding certain inducements held out to examiners to break away from their association or withdraw their notices.

At Pontypool, on Sunday, a special meeting of the Eastern Valleys Colliery Examiners' Association was held, when it was decided to adopt the resolutions passed at the Cardiff conference on Saturday, and to express disappointment at the result of the negotiations between the executive committee and Mr. W. Brace, M.P., in respect of the agitation for "recognition."

An official report of a mass meeting of the workmen employed at the Varteg Collieries, Mon., states that the business was "the question of blackleg deputy firemen who made such an examination of the collieries as to enable a certain number of men to work on Friday." The report adds that a deputation appointed to visit the colliery that morning found the report books in a very unsatisfactory state, and "a resolution was carried condemning the action of the men who had acted as firemen and protesting against the employers for employing them."

A meeting of colliery weighers took place in Pontypridd on Saturday, and had an address from the chairman of the South Wales Colliery Weighers' Association upon organisation. The meeting decided to form a branch of that body for Pontypridd and district.

Workmen at the Cardiff Navigation Colliery, Llantrissant, struck because they objected to the conduct of a fireman, and about 200 men have been idle because the management refuse to act in accordance with their wish in removing the man objected to.

North of England.

Mass meetings arranged by the executive committee of the Durham Miners' Association were held at various parts of the county last Saturday afternoon to consider certain matters appertaining to the men's industrial position. At the South Shields meeting, Mr. Joseph Batey, a member of the executive, recalled the fact that an arrangement was entered into with the owners at the beginning of the war by which it was agreed, on patriotic grounds, that nothing should be done that would restrict the output of coal. He alleged that, whilst the men had tried to be loyal to that agreement, there had not been the same loyalty on the part of the owners. At present the hewer's minimum was 7s. 8½d., as compared with the county average of 9s. 6½d. The association was now asking for an additional 1s. for hewers and fillers and 4d. per day for some of the lower paid men. The owners had made two offers, neither of which was acceptable and, in view of the unrest in the county on this question, it had been decided that, unless the owners were prepared to concede the advance asked for, the members would be asked to take a ballot. As to female labour, unless the owners could satisfy them that men could not be got for the work, female labour must not be introduced. Asked whether the executive had consulted the Industrial Commissioners and the Coal Controller before deciding to take a ballot on the question of a strike, Mr. Batey said they had been before the Coal Controller, and the latter was not inclined to deal with the matter.

The executive committee of the Northumberland Miners' Association has decided, in view of the fact that the Netherton Hall Pit miners have receded from their claim to the right to tender for bargains in the Howard Pit, not to penalise the members of the Hall Pit lodge, as had been resolved, and had agreed, also, to place those men who took the Howard Pit bargains but were idle owing to the strike there, on the same footing as to financial benefits as the Howard Pit men.

New Shildon Colliery has been closed down, after the notices to the men have been extended by a week. Some of the displaced miners have got work at Shildon Lodge and Eldon collieries.

Mr. Wm. Straker, corresponding secretary to the Northumberland Miners' Association, has reported to the members on a deputation from the association who waited on Mr. Guy Calthrop, Coal Controller, recently, to press for a more equitable distribution of the available trade among the pits of the county and a better share of the country's export coal trade for Northumberland. Mr. Straker reports: "While some of the coal owners were in favour of some scheme under which the available trade might be more equally shared, others were against such a scheme; but none of them seemed to regard such a scheme as impossible, notwithstanding the difficulties there might have to be overcome. We suggested that each of our pits producing coal for export should have allotted to it, per week, per fortnight or per month, a share of the available trade in proportion to its normal output. Also, that a Trade Distribution Committee of experts in the coal trade should be appointed to operate the scheme in conjunction with the Admiralty and the present system of licences. The Coal Controller expressed considerable sympathy with us. He did not promise to adopt the scheme we had suggested, but promised to give the whole position his most careful consideration, with a view to doing what he could to relieve the serious state of things existing at the collieries referred to."

A meeting of the Durham Coal Trade Conciliation Board for the regulation of wages of miners in the county, held last week, Mr. W. B. Charlton presiding decided that wages should remain unaltered at 107½ per cent. above the basis of 1879, at which percentage they have stood since November 1916.

During October, 40 steam coal collieries in Northumberland worked an average of 5·03 days per week, as compared with 5·09 days weekly in September and 4·04 days in August. Twenty household coal collieries worked an average of 5·01 days, as compared with 5·04 days in September and 4·6 days in August. The general average was 5·02 days per week, as compared with 5·07 days in September and 4·23 days in August.

A strike of 1,200 men and boys at East Hetton, or Kelloe, Colliery, whereby the pit was laid idle for a fortnight, was

settled last week. The stoppage arose over a dispute as to the payment for "dirty" coal of a number of men working in the Busty seam.

The executive committee of the Northumberland Miners' Association has interviewed a deputation from the British Medical Association with reference to the payment of colliery doctors' fees. The doctors did not ask for any increase on the 9d. per fortnight now paid, but requested that, when members got into arrears with the payment of these fees, through strikes, stoppages, sickness or any other cause, the arrears should be paid up afterwards at the rate of 4d. per fortnight. It has decided to communicate with the Government, urging the provision of State-aided medical attendance.

The Follonsby lodge of the Durham Miners' Association has passed a resolution strongly protesting against the stipulation that miners working at shipyards and similar places when pits are idle, shall be debarred from receiving the 1s. 6d. war-wage for all days so worked.

The quarterly meeting of the council of the Cumberland Miners' Association was held at Workington last week, Mr. J. Dickinson presiding. The balance-sheet showed a heavy expenditure for the quarter, owing to the fire, which laid Wellington Pit, Whitehaven, idle. The secretary reported a loss of about £700 on the quarter's working. Several of the various matters in dispute are to be submitted to the Coal Controller. It was resolved to increase the support pay to men out of work from 15s. to 20s. per week, and the allowance per child from 1s. 6d. to 2s. 6d., but the question of putting it into operation was left in abeyance. The meeting deferred the question of asking the lodges whether they would agree to higher contributions. It was resolved to ask the Miners' Federation to apply for a general advance on the standard wages of all colliery surface workers, including men employed at by-product coke ovens and brickworks.

Federated Area.

A dispute concerning non-union labour has led to a strike of 1,500 miners in the employ of the Blackwell Colliery Company, at the Briery Hill Colliery, near Sutton-in-Ashfield. The company has in its employ a few men who are not members of the union, and this is the source of the trouble, the unionists declining to work with them. A meeting was held last Saturday with a view to the adjustment of matters. This was addressed by Mr. J. T. Todd, general manager for the Blackwell Colliery Company, who made a strong appeal to the men to return to work. The men declined to do so, and passed a resolution pledging them not to resume labour until a settlement of the matter satisfactory to themselves has been brought about.

Scotland.

A dispute cropped up at Forti-sat Colliery, Salsburgh, Shotts, regarding low wages paid to a number of the workmen there. As the outcome of negotiations between Mr. Paul McKenna, of the Lanarkshire Miners' Union, and the management, a satisfactory settlement has been arrived at.

At Kippisbyre Colliery, Airdrie, there is a dispute in regard to tonnage rates. Mr. James Murdoch, of the Lanarkshire Miners' Union, has the subject in hand, and is endeavouring to secure an adjustment without incurring idle time to the men.

It is feared that there may be a recurrence of the unfortunate dispute at Bedlay Colliery, Lanarkshire, which caused several hundreds of men to be idle for some months during the course of the year. The executive committee of the National Union of Mine Workers have decided that in the event of the owners refusing the terms put forward on behalf of the workmen, a strike would be authorised.

At Nos. 2 and 5 Pits, Quarter Colliery, Hamilton, the tonnage rates have formed the subject of a meeting between representatives of the owners and the workmen. An adjustment has been arrived at, which guarantees a fair wage to the men when deficiency occurs.

Work is proceeding fairly steadily at most of the collieries in West Lothian. The wage question raised by the oncost workers employed in Woodend Colliery is still unsettled.

The new officials of the Stirlingshire Miners' Union have been elected as follows:—President, Mr. David Weir, Redding; vice-presidents, Messrs. William Webster, Carronhall; Thomas Valleley, Redding; and James Docherty, Kilsyth; treasurer, Mr. Colin Myles, Maddiston; secretary, Mr. John Barr, Bannockburn.

At Nackerty Collieries, in the Uddingston district of Lanarkshire, a number of the workmen contend that they have been unable to earn fair wages because of the want of facilities for taking away their output. The National Executive of Scottish Mineworkers have appointed Mr. James Cook to act along with the local agents in the matter.

Through the instrumentality of the Ayrshire Miners' Union, the boy pit workers at Messrs. Kyle's pits in Galston have been advanced 4d. per day; while at Gauchalland Colliery, in the same district, an advance of 8d. per day has been secured.

At Littlemill Colliery, Rankinston, Ayrshire, the miners have claimed an extra payment for abnormal work. The regular rate is 4s. per ton, but it has now been agreed that 6d. per ton be added to that for a period of three months.

The non-union question at Gardrum Colliery is again giving trouble, and at a meeting of the Council Board it was agreed to ask liberty to cease work until the non-union men had joined up.

The question of tare in empty hutches at Letham Colliery, Canonhill, has been settled, the management having given the men a satisfactory concession.

At several of the Fife collieries the war bonus was not paid for September 17, and the matter was brought before the Coal Controller, who has now issued instructions for it to be paid for that date.

At a meeting of the standing committee of the Fife and Kinross miners at Dunfermline, arrangements were made for sending another draft of 100 men from Fife to work in the iron ore mines at Cumberland. Six of the men are Townhill men, and the others are drawn from the eastern part of the county. The men who have already gone are satisfied with the conditions prevailing there.

Representatives of the shale miners, at a meeting held in Edinburgh on Saturday, reported that no settlement had been come to with regard to their claim to have the Coal Controller's award to coal miners made applicable to them. It was agreed, in consequence of the refusal, that notices be lodged of all persons employed about the mines, and to take effect on November 10.

From Plean Colliery, Stirlingshire, it is announced that the owners have no objection to the miners reverting to eleven days per fortnight, the system in operation prior to the war. They, however, stipulate that the miners should give steady attendance at their work.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

"Down Tools" Ballot Delegates' Conference Colliery Examiners' Three Days Strike Serious Effect on Steel Works—Miners Call for Examiners to Become State Officials—Swansea's Progress.

Two events of outstanding importance during the past few days which have attracted such widespread attention, have been so represented in some quarters as to lead to serious misunderstanding.

Taking first the "down tools" ballot of the men—as to which the vote shows that there has been very heavy abstention, and also that a substantial minority has voted against carrying out the Miners' Federation of Great Britain agreement with the Government on the question of recruiting—it has to be pointed out: first, that abstentions are not indicative of indifference or hostility, and also that the minority is largely composed of those whose personal interests are involved. For example, the miners in the Risca Collieries, employing 1,300 men, though they decided to take no part in the ballot, decided also to continue working, "whatever the result may be"; and this has been the position of other bodies of men who did not vote. They were adverse to down tools. Over 3,000 men at Tylorstown took up the same position as those at Risca. Dealing now with the votes recorded, it is to be pointed out that, on the average, over 82 per cent. were against stoppage of work, and less than 18 per cent. in favour; and when it is borne in mind that in the minority will be found practically every man who ran the risk of being called up, as well as many of his relatives who would vote in his protection, the weight of the minority itself has to be hugely discounted. It is not too much to say that the vote of the coal field has been a vote of distinct loyalty both to the Government and to the officials of the Federation who made the agreement on behalf of the men.

One striking feature is that less than half the employees of the coal field even took the trouble to vote; and when this fact is fully realised, with the contrary one that the pacifists and malcontents polled their last man, the relative weakness of the latter would be properly appreciated.

Nor is this the only point, though its national importance in a time of crisis like the present can hardly be exaggerated. An even more striking feature, viewed from the standpoint of the permanent conduct of colliery affairs, is the exposure which the ballot makes as to the utter untrustworthiness of delegates' conferences. It was a conference of delegates that initiated the "down tools" movement, and now the body of workmen have overwhelmed them with a contrary vote. These conferences are not truly representative of the men, for delegates are chosen in ridiculously small lodge meetings, the great majority of the men taking no trouble about the matter and rarely attending the gatherings, with the result that an active minority secure a lodge vote which enables them to speak as though in the name of hundreds, or even thousands.

There has been contrast of opinion between the districts, although they have all given a majority against "down tools," certain areas—the anthracite conspicuously—showing more readiness than others to follow that course of action. Not more than a dozen collieries, and these small ones in the anthracite area, gave majorities "for" down tools.

Upon the other great issue which has been raised—that of the colliery examiners who went on strike—public controversy has been carried on as to the action of the employers in refusing recognition; and Mr. Gibson, secretary of the Coal Owners' Association, writing on their behalf, emphasised the fact that the South Wales coal owners were the first of the great bodies of employers in this country to agree to the principle of collective bargaining, a principle which has governed their relations with the miners for 40 or 50 years, their opinion being that "it is more practicable and more satisfactory to conclude agreements with responsible representatives of workmen than with individuals." Mr. Gibson deals with the reason which actuated the employers in refusing recognition to the Colliery Examiners' Association. These men are really the firemen who examine the pits before the workmen enter, in order to decide upon safety. He states that firemen are not treated as ordinary workmen, but are certificated employees engaged to discharge certain duties imposed by the State for the protection of the lives of the workmen employed below ground and of the property involved; and for this reason they have been treated as colliery officials belonging to the same category as managers and under-managers. Accordingly, the colliery companies have always considered terms and conditions of employing firemen to be matters of private arrangement between them and the firemen, and have never allowed even the Coal Owners' Association itself to intervene in such matters.

Mr. Gibson lays stress upon the representatives of the examiners having accepted the coal owners' terms and undertaken to recommend them to the general body of their delegates in conference, and points out that, the delegates having rejected these terms, representatives of both sides met Sir Richard Redmayne, on behalf of the Coal Controller, with the result that in Sir Richard's proposition of compromise the employers were to give "recognition," and that there should be immediately established a Joint Board; also that, as an independent representative of the Government, he considered it desirable to reserve to the owners, at their request, the right to cease recognition if at any time the operations of the Examiners' Association were not in accord with the conditions of October 16.

The colliery examiners were on strike for three days, commencing November 1, and during Saturday there were meetings, Mr. W. Brace, M.P., Secretary for the Home Office (formerly miners' leader in South Wales), acting as mediator between the employers and the strikers. The examiners' executive had a conference which lasted four hours, and their decision to adhere to their demands was made known to the Coal Owners' Association and also to the executive of the Miners' Federation, both of these latter being in attendance at their respective offices in Cardiff. Mr. Brace was in consultation with the coal owners' representatives, and he submitted to the colliery examiners' conference the terms upon which the owners were prepared to "recognise" the examiners' trade union. These terms were practically a repetition of those which previously had been put forward. The employers, after Mr. Brace urged the objection of the examiners to certain points, re-considered the matter, and, with a view to facilitate a settlement, decided to make fresh suggestions. Mr. Brace conveyed these terms to the examiners' meeting; but this further effort proved to be ineffectual, the examiners' representatives declaring that the conditions were such that they had "no alternative but to reject them." They reiterated a claim for unconditional recognition of their

association, but decided that "rather than resume work in these days of stress and difficulty," they would continue war, we agree to resume work forthwith, and to continue negotiations while at work." The secretary of the Federation to convey their resolution to the Coal Owners' Association, and request an early interview, so that, as the representative of the Government, he might have laid before him the reasons why the conditions of the coal owners could not be accepted. It was further decided to seek an interview with the executive of the Miners' Federation, in order to place before them the claims of the Examiners' Association for recognition without conditions, and to ask for the miners' co-operation in securing it.

The examiners intend to push forward energetically their demand for unconditional recognition of their union, and on Tuesday some members of the executive of the Joint Federation of Colliery Deputies of Great Britain attended in Cardiff to consult with the representatives of the local organisation.

According to reports obtained by the Coal Owners' Association, out of 321 collieries, 210 were idle and 111 at work. More than half the Admiralty collieries were idle, namely—93 out of 183.

It is estimated that the loss of output on account of the strike will approximate 300,000 tons of coal; and more serious still is the stoppage of steel output which has been occasioned at more than one works through shortage of coal.

The decision of the examiners to lay their case before the Miners' Federation, opens up an interesting question, as to which Mr. Frank Hodges, one of the miners' leaders, made a definite statement on Saturday evening. It has been recognised that the examiners have been acting without the cordial sympathy of the miners' leaders; but few of them have been so outspoken as Mr. Hodges, who, at a meeting of miners held in the Garw Valley on Sunday, said he was absolutely opposed to a sympathetic strike of miners in support of the examiners' effort to get recognition for their trade union, and that he had sound reason for his opposition. There should be only one union in the mining industry, he said, and the resolution of the Federation at Southport, that all men in and about the mines should be members of one organisation should be supported. If the firemen (examiners) wanted recognition as trade unionists, they could get all they required in the Miners' Federation, and obtain a status they did not hold at present. Mr. Hodges criticised the firemen for acting as officials in their conduct towards the workmen, and said that a miners' conference some time ago rejected a proposal to admit firemen to membership, because at that time they suspected the firemen of officialdom; but the latest revelations may have compelled the firemen to realise that they were wage earners after all, and that they had nothing to lose but everything to gain by partnership with the men.

In connection with this strike, the old suggestion has been revived as to their being made quite independent of the colliery owners. Mr. Hubert Jenkins, miners' agent, in the course of a meeting at Abertridwr, described the strike as an object lesson in support of the plea that colliery firms should be controlled and paid by the State. The meeting passed a resolution unanimously desiring that the Government would employ the firm, and copies of the resolution will be sent to Mr. Lloyd George and the Home Secretary. Similar decisions have been arrived at in other miners' meetings.

At a mass meeting at Varteg, near Pontypool, on Saturday, the action of men who had examined the collieries so as to permit of work being carried on during the strike was criticised, and a resolution was passed condemning those who had discharged the duties of firemen in the crisis. The meeting also passed a resolution that all colliery firemen should be employed and governed by the State. A similar resolution was passed at Ynysybwl Colliery.

Notwithstanding the difficulties that have faced the Swansea Harbour Trustees, there is locally a genuine feeling of optimism based upon the fact that the after-war outlook is very favourable. There is the great development which will be occasioned by the Anglo-Persian Oil Company taking a large area of land, and utilising part for their business, which will bring tens of thousands of pounds into the coffers of the Trustees, as well as provide much additional labour.

The arrangement in Cardiff with regard to pooling Italian business is that firms carrying out the shipments will be substituted by others every three months. The original suggestion was six months, but a shorter period has been decided on. The pooling arrangement will date back for 12 months, becoming operative as from Nov. 1, 1916, including all shipments on and after that date, and it will continue for the duration of the war. The local committee will allocate orders to any six firms appointed to carry out the business, and at the end of the specified period these firms will be substituted by six others, so that the business will be fairly distributed. The firms effecting the shipments will be allowed 1d. per ton; and the exporters' commission, with the one-third of 5 per cent. brokerage, will be paid into a common fund. Distribution from the pool will be made quarterly upon a percentage basis, the standard being the shipments of the individual firms to Italy during 1913, and onward to October 31, 1916.

The scheme regarding Italy operates at Swansea as well as at Cardiff; and the Swansea exporters are also considering a further scheme regarding exports to France, one reason being that, importers across the Channel having been grouped, the exporters on this side cannot deal individually with the French importer, and therefore special arrangements have to be devised.

The irregularity of work in the tin-plate industry has been very marked of late, and it is hoped that the extra grant of steel will improve matters considerably. Some works have been fully occupied, and, indeed, could probably have engaged extra assistance; while in other places the men have had not more than two to three shifts per week. The great desirability is for ready transfer of men from one district to another, according to the demand for manufacture. Unfortunately, the grant of extra steel cannot confidently be regarded as permanent, although it is hoped that this will be the case.

At a meeting of the Institute of Shipbrokers held in Cardiff on Tuesday, Mr. F. Hansen in the chair, some discussion took place as to the alleged inadequate agency and bunkering charges; and one of the speakers said that it would become the first duty after the war to put these upon a fair and reasonable basis.

Maj. Gilbert, from the Coal Controller's Department, attended a meeting on Monday of the Coal Owners' Association, Swansea and district, and discussed with them local matters of difference. The retailers in Swansea are charged 1s. 3d. more than those outside, and therefore those in the district declined to sell, because they could obtain

be the prices by coming into the borough. Maj. Gilbert stated that the prices fixed by the various committees had adhered to, and that the retailers must sell where they had before the Orders were made. If not, they would be cutting off of their coal supplies.

At the Northumberland and Durham Assizes at the Northumberland Assizes on Tuesday, a collier was summoned for causing damage to a safety lamp in the Windsor Colliery, and also with failing to extinguish the light of the lamp. It was stated, for the prosecution, that the man was working with the lamp on his belt instead of, according to Regulations, at least 2 ft. from the swing of the mandril; but he was not charged with this offence. He was seen working with the lamp on his belt, the glass having a hole in it large enough to put a finger through; and one of his workmates shouted to him to put the lamp out, which he did by jerking it, this being in itself an offence. He was fined £5 for not reporting the damage, and £2 for failing to extinguish the light. The chairman stated that they considered it one of the most serious cases which had come before them, and that they had considered whether the defendant should not have been sent to prison.

The shipments of coal and patent fuel at Swansea last week totalled over 59,000 tons, of which 50,000 were coal. The patent fuel shipments were less than in the preceding week, but the general return of business was more favourable.

Northumberland and Durham.

Honouring Mr. Thos. Burt—Coal Prices in Blyth—River Wear Tolls—Fatality Through Stopped Valve.

On Monday next, the Right Hon. Thomas Burt, M.P., attains the 80th anniversary of his birth. To mark the occasion, the Northumberland Miners' Association has decided to entertain him at a social gathering in Newcastle and to present him with a book of his own selection, suitably inscribed.

Retail prices for household coal in the Blyth district have been fixed as follow:—Sales of one ton or more in bulk: (a) delivered into coal house per ton, best selected, 25s. 3d.; seconds, 22s. 9d.; nuts, 22s. (b) Delivered at entrance per ton, best selected, 24s. 6d.; seconds, 22s.; nuts, 21s. 2d. Sales of quantities less than one ton: (a) 16 cwt. delivered into coal house, best selected, 21s.; seconds, 19s.; nuts, 18s. 9d. (b) 16 cwt. delivered at entrance, best selected, 20s. 3d.; seconds, 18s. 3d.; nuts, 18s. 9d. Quantities of less than one ton sold from cart or store, per cwt.: best selected, 1s. 8d.; seconds, 1s. 6d.; nuts, 1s. 6d.

The River Wear Commissioners, who increased their rates, tolls, dues, and charges by 33½ per cent. as from July 1, have now revised the increase, and made it 50 per cent. as from Nov. 1, on which date also the 50 per cent. increase in the Tyne Commissioners' dues, etc., came into operation.

The substantial manner in which those associated with the Northumberland and Durham coal trade are backing the appeal on behalf of the Italian Red Cross Society is shown by the following list of donations of £50 and over: £500 each, the Right Hon. Lord Joicey and the Holmside and Southmoor Collieries; £210, Union des Gaz; £105 each, Messrs. H. A. Brightman and Company, Messrs. Marchbank and Bainbridge, Messrs. Cory's Trading Company, Messrs. U. A. Ritson and Sons, Messrs. Bessler, Waechter and Company, Messrs. Wm. Mathwin and Son, Messrs. John Bowes and Partners Limited, and Messrs. Scott Brothers Limited; £100, the Ashington Coal Company (Red Cross); £52 10s. each, Messrs. E. S. Dunford and Company, Messrs. Harper, Seed and Company Limited, Messrs. Worms and Company, and Messrs. Dance, Son and Hunter; and £50 each, Messrs. Tabb and Burletson and Messrs. Wm. Milburn and Company.

The following resolution was unanimously agreed to at Wednesday's meeting of the council of the Newcastle Chamber of Commerce: "That this Chamber, having done everything in its power since the outbreak of war to assist the Government in making arrangements for the export of coal to France and Italy, and also having done its utmost to protect the interests of all firms engaged in the export trade with the object of securing equality of treatment for all, would view with apprehension any scheme that might place the bulk of the export trade in coal to France and Italy after the war into the hands of one firm or group of firms, thus creating a monopoly, with serious loss to exporters, colliery owners, ship owners, and colliers, and assures the Government that any such scheme will meet with the most strenuous opposition of the Chamber."

In view of the fact that the Tees Conservancy Commissioners' operations during the past year have shown a loss on the revenue account of £5,300, and that the losses for the current year will probably be about £12,800, the Commissioners have decided that as from November 21 the present allowance of rebates on certain goods shall be withdrawn. Thus far, the Tees is the only port on the north-east coast at which some alteration in dues has not been made since war broke out. The abolition of the rebates is expected to increase the revenue by about £7,800 per annum.

Mr. R. S. Gardiner (managing director), Mr. T. Robinson (fitter), and Mr. W. Foreman (secretary) have resigned their connection with the Framwellgate Coal and Coke Company Limited. Mr. W. Nimmo has been appointed managing director, and Mr. Richard Bailes fitter and secretary.

Consequent upon the increase in the price of coal, the Sunderland Gas Company has decided upon an early increase, by 2d. per 1,000 cu. ft., in the price of gas, making it 2s. per 1,000 cu. ft. This is the first advance in gas prices in Sunderland since the war started. At Darlington, the Municipal Gas Works Committee proposed an increase of 6d. per 1,000 cu. ft., but withdrew the recommendation for some reason not stated.

The inquest regarding the death of David Gray, miner at the Western pit, South Moor, revealed the fact that the accident which occurred on October 16, and resulted in the fatality, was of a somewhat extraordinary nature. A cage laden with men—deceased amongst the number—coming to bank, went into the bell bank, where it was held by the clips. The cage gates were thrown off, and some of the men were precipitated on to the pit heap. The engine-wright at the colliery stated that the winding engine was of the vertical type, and fitted with an apparatus to prevent overwinding. On going to the engine house on the morning of October 16, he found the brakesman lying on a form in a dazed condition. He appeared to have had a sudden illness. He asked him what was the matter, and he became faint, and did not remember anything. The engine-wright met half-way up the shaft. Witness found the cage, and found that the shut-off valve for the cage was only partly closed, owing to a fault in the mechanism. It was likely that the stone had fallen through a hole in the wall while some new work was being fitted in Easter week, and had been

carried into the valve. He tested the apparatus after the pipes were put in, and it worked all right. It also came into action on August 15 of its own accord, when the cage went a little over its usual height. Questioned by the mines inspector, witness said the apparatus and valves could be tested and were tested periodically, but the test only assured them that things were right then, as an accident from any obstruction might occur immediately afterwards. The valves were removed and cleaned from time to time. The accident was due to the brakesman losing control and the safety apparatus failing to work through the stone in the valve. When he examined the engine, the safety lock was in, and the foot brake on. That stopped the engine, and the brakesman must have done that while in a semi-conscious condition. The colliery agent, Mr. T. Y. Greenér, intimated that he would have a consultation with the inspector of mines as to the best method of testing the apparatus, with a view to reducing the possibility of such accidents to a minimum. The jury agreed that the death was due to accident, and attached no blame to anyone.

Hurry on the part of two boys to get out by the close of their shifts may have been responsible for the death of Wm. Tones, 27, hewer at St. Helen's Colliery, Bishop Auckland. At the inquest it was stated that, a tub having been filled, Tones fastened it to the rope which took the set up the incline. Later, it "ran amain" back, and caught him, inflicting fatal injuries. Exactly what happened was told by the hauler boy, Robt. Wilson Williams, who stated that his duty was to pull the tubs up when signalled. It was an electric hauler. On this occasion, the tub was half-way up the cross-cut, when he received the signal "Hold," and stopped the tub. He then went out by the shaft with John Fletcher, the boy who looked after the switches at the top of the cross-cut. He left the tub half-way up the cross-cut, hanging on the rope. The tub was the finish of the shift. The boy who had to take his place was not due in for half-an-hour. Witness expected that the tub would stand, because he pinned the brake down. The pumpman had been down at the cross-cut, and told him he should get the tub out because it was not safe. Witness went back and began to pull the tub up the cross-cut, but when it was at the top he found that his mark on the rope was missing, having been knocked off. The rope jerked, and he thought the tub was over the bank head, because the rope slackened. He switched the power off, in the belief that the tub was up, and went home. Replying to the mines inspector, he said it was the first time he had ever left a tub in a heavy bank like that, and the first time he had ever moved a tub without proper authority. Fletcher stated that he rapped "Hold" because the rope had got under the drum sheaves and had torn them up, and lifted a pipe out of its place, and the water was running down the cross-cut. The pumpman informed the corner that he put the pipe right, adjusted the rope on the sheaves, and warned the hauler boy that he would get into trouble if he left the tub there. He did not notice whether the "cow" was fixed on the tub or not. Had it been, it was highly improbable that the tub could have travelled back to the fall. One of the local inspectors expressed the opinion that it had been a pure accident, but agreed that the lads should not have left the tubs there. A verdict of "Accidental death" was returned, and Coroner Proud marked his disapprobation of the boys' conduct by withholding their expenses for attendance at the inquest.

Cleveland.

The November issue of the *Middlesbrough Monthly Circular* of Messrs. Hanson, Brown and Company Limited, states:—"The question of pig iron prices has been raised in a rather acute form during the month by the advance of 2s. 6d. per ton on the price of coal. This hits the iron master not only through the price of coke, but also in respect of his ore, for it will be noticed that the Cleveland ironstone miners are to share in the rise of 1s. 6d. per day granted to the colliers. The question is one of very great importance, for the existing maximum rates, according to the makers, afford but a narrow margin, having regard to the constant upward tendency in the cost of production. The matter is one of extraordinary complexity, for it is obvious that, if coke and pig iron prices are to be advanced, corresponding advances will have to be made for all descriptions of manufactured iron and steel. The authorities may well shrink from such a prospect, having regard to the disturbance caused and to the fact that, in the present condition of things, there can be no finality in such a process. It might, perhaps, have been better in the long run, and it would not have been ultimately more costly to the nation, if the Government had shouldered directly the whole burden occasioned by the advance in the price of coal. Indirectly, the loss to the iron and steel trades could be made the subject of adjustments between the Ministry of Munitions and the makers. What course the authorities will decide to take is not yet known, but if the makers can be equitably indemnified otherwise, it would be to the general advantage that there should not be another wholesale revision of prices."

Yorkshire.

Development of South Yorkshire Coal Field—Horse Racing in Pits—Bradford Coal Merchants' Meeting.

At last week's meeting of the Doncaster Royal Infirmary, which institution has had its work doubled and trebled through the development of the South Yorkshire coal field, it was reported that with respect to the projected new hospital, the committee appointed a small deputation to meet representatives of the principal local coal interests. Although the colliery owners were fully sensible of their obligations, they suggested the scheme be deferred till after the war. With this the committee agreed. It is stated that £80,000 will be required for the new building.

Horse racing in the pits is becoming more frequent, and the colliery companies are doing their best to put a stop to the practice. The Doncaster magistrates, last Saturday, had eight pony boys of Bentley Colliery before them for riding and driving their ponies. It was stated they were going full gallop down a road of the mine, in which miners were walking. The colliery company put a man in one of the levels with a whitewash brush and some wash, so as to mark the defendants as they dashed by, but the scheme failed, as the leading horse knocked the man down, sent the brush flying from his hand, and the whiting went all over one of the defendants. One lad was fined 30s., six others 25s. each, and the eighth was ordered to pay costs.

A meeting of the Coal Merchants' Section of the Bradford Chamber of Trade was held last week, Mr. B. Galloway presiding. Mr. L. Armitage, the Yorkshire representative of the Coal Control Department, in a letter to the town clerk, asked that coal merchants in Bradford should lay down stocks of coal out of current receipts, on a 25 per cent. basis, on weekly return of house coal, as emergency stocks; giving instructions as to how to arrive

at the reserve tonnage; and stating that if emergency coal has been allotted to the local Control Committee (as is the case in Bradford), such tonnage should be deducted from this total. In the course of discussion, in which it was held that the Bradford merchants have not 25 per cent. to spare, that a number of the merchants' yards cannot stock surplus coal at all, in view of lack of accommodation or protection, and that in the case of small merchants to put down 25 per cent. of stock would only have the effect of exhausting their capital, so that they could not carry on, the secretary was instructed to put these views before the Coal Control authorities. The town clerk intimated that the West Yorkshire Coal Supplies Committee were pressing for the names of West Yorkshire collieries supplying Bradford merchants, together with the quantities of coal received by each merchant during, say, the past six months. The secretary was instructed to reply, suggesting that the West Yorkshire Supplies Committee should get this information direct from the colliery representatives on that committee. Mr. Galloway reported upon negotiations between the section and the local Coal Control Committee on the matter of local distribution prices, and said it had been pointed out to the Control Committee that they had no power to fix prices except in agreement with the merchants. The matter had been referred to the Controller in London.

Lancashire and Cheshire.

A Manchester correspondent learns that the Co-operative Wholesale Society (Manchester) has purchased the Shilbottle Colliery, near Alnwick, Northumberland, and will sink a new shaft which should yield 500 tons per day. This extension must wait until after the war.

Notts and Derbyshire.

An extension of the benefits of the Midland District Miners' Fatal Accident Relief Society was sanctioned by the board of management at their quarterly meeting at Derby on Tuesday. The proposal was to provide during the war, by means of higher contributions from the members, an addition to the weekly allowance to widows and children of deceased members. Four schemes were suggested, and by that adopted widows will be paid an extra 2s. 6d. and children an extra 6d. per week. The total cost will be £2,856, and this will be met, except for £20 on the year, by a levy upon each member of 1d. every four weeks. From the quarterly statement presented by the chairman (Lieut.-Col. R. E. Martin), it appeared that there were 52,560 members on the roll, an increase of 3,565 when compared with the total a year ago; 22, an increase of five, had died during the quarter; there were at present 364 widows and 452 children in receipt of benefit, or 29 more in each case than a year ago. Members' contributions amounted to £2,833, an advance of £184. The sum carried to the credit of the benefit fund was £2,293, and the present bank balance £3,834.

The Midlands.

The engineers' monthly reports to the South Staffordshire Mines Drainage Commissioners show a considerable decrease in the quantity of water raised. Mr. Edmund Howl states that the rainfall for the month was 4.08 in. The pumping had been 11,179,600 gals. per 24 hours, as compared with 12,036,400 gals. for September, and 11,917,800 gals. in the corresponding period last year. At the Moat Pound the quantity of water was about the same as last year, while the Moat old engine was being worked on day turns, and Gospel Oak Mond gas-driven plant full time, to assist the Moat new engine. At the Bradley engine the water was being kept down with the engine working at slightly over two-thirds full speed. At Deepfields the new engine alone was keeping the water down to bottom coal level; while at Stowheath and Herberts Park the engines continued working at full speed. There was no change to report at the Mond gas-driven plants. The underground level men had been engaged repairing Gospel Oak engine pit and No. 8 Gospel Oak shaft. With regard to surface drainage, Mr. S. B. Priest reports that the electrically-driven surface pumps had been maintained in good order, and that at Hop Yards was working very satisfactorily. Clearing had been done in the Willenhall and Darlaston brooks. Bentley flume had been cleared from its junction with the River Tame, while mining damage had been repaired on the Coneygre course. Cleansing had also been done on various streams in Oldbury, Kingswinford, and Old Hill districts. Mr. W. B. Collis, in respect of Old Hill district, reports that the underground water in the northern portion of his district continued at its average of six strokes a minute upon the Windmill End pumping engine, and was kept down.

The Birmingham coal factors and merchants have called the attention of the Retail Coal Prices Committee of the Corporation to the fact that the present margin of profit allowed on retail prices is not sufficient to enable dealers in a small way to make a living. After considerable discussion, the committee decided to draw the attention of the Coal Controller to the matter, and to ask that some discretion shall be given to them to deal with the difficulty. It has also been decided to inform the Controller upon the representation of the local factors that there is a shortage of coal in the city at the present time for the working classes whose purchases are of 1 cwt. or less, and to request that a further quantity of coal may be allocated to the city.

Kent.

From the Tilmanstone Colliery nearly 3,000 tons of coal was raised last week; and the Snowdown Colliery output was within a hundred or so tons of the same amount.

In connection with the Tilmanstone Miners' Dwellings Company, which was formed for the purpose of building miners' houses near the colliery (and has two of the Tilmanstone Colliery directors on its board), it is reported that very fair progress is now being made with the raising of the capital.

Scotland.

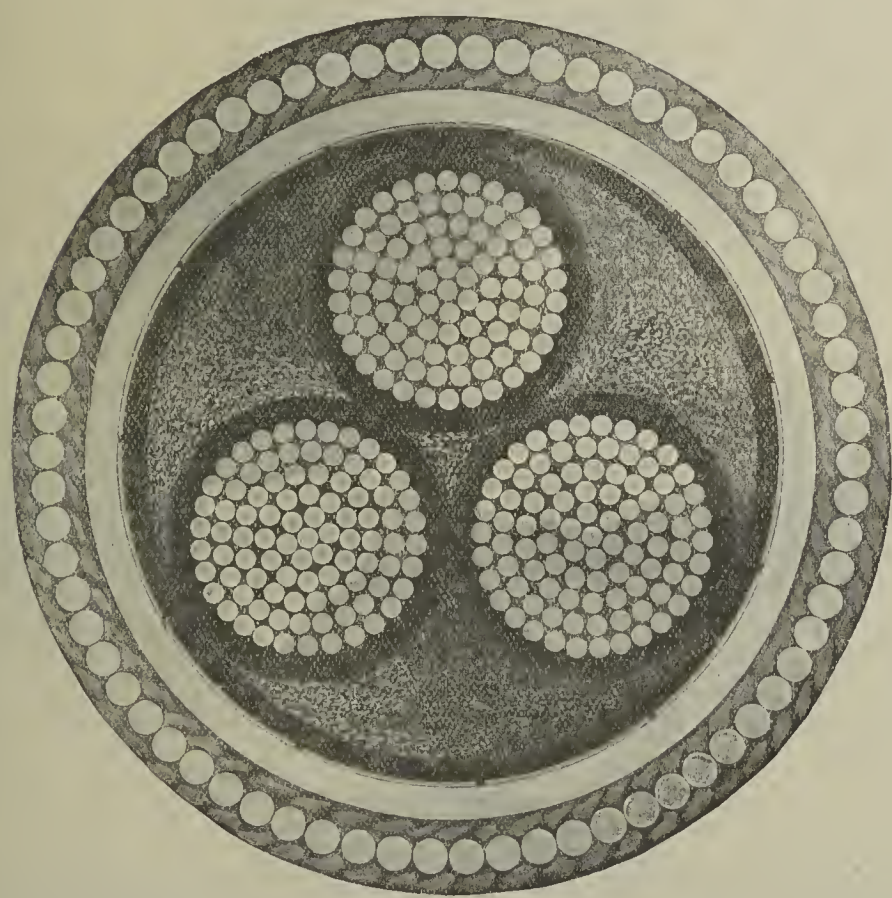
Capt. H. Humphreys, who has been awarded the D.S.O., was formerly inspector of mines in Dunfermline.

The shipments from Burtisland for the past month were 45,537 tons, 37,943 tons of which went coastwise. For the week ended November 3, 7,500 tons were sent out, as against 24,380 tons in the corresponding week of last year. Methil shipments show a shrinkage, 16,400 tons last week, as against 23,846 tons in the previous week.

Large sums of money have been collected by the Lanarkshire miners to various war charities. It is believed that the total will approximate £100,000. In Lanarkshire, for the Belgian Relief Fund alone a sum of £20,000 has been raised. Part of this money has been forwarded through the Miners' Federation for relief in Belgium, and part for the relief of the Belgians in Scotland.

In connection with the claim by the Scottish miners for further abatement in the income tax, it has been agreed that the miners shall be allowed £1 18s. as an abatement for checkweighers' dues, and £4 for pit boots and pit clothes.

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30, Mosley Street, Newcastle-upon-Tyne.
247/9, Deansgate, Manchester.
91, Whitechapel, Liverpool.

165/7, Edmund Street, Birmingham.
88, Albion Street, Leeds.
56, Victoria Street, Bristol.
20, West Bute Street, Cardiff.

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

London, Mond and Company Limited.—The directors have declared an interim dividend on the ordinary shares for the six months ended September 30 at the rate of 25 per cent. less income tax. The dividend is the same for the corresponding period, and compares with 10 per cent. in 1915, and 20 per cent. in 1914.

Dick, Kerr and Company Limited.—The directors have declared a dividend of 10 per cent. on ordinary shares for the year, against 6 per cent. for 1915-16.

London Foundry Company Limited.—The directors have declared an interim dividend on the preference shares at the rate of 7 per cent. per annum.

Nantyglo and Blairston Works Company Limited.—Dividend of £4 per share, less tax, on account of arrears. In April, £3 per share was paid on account of arrears.

Niddrie and Benhar Coal Company Limited.—Dividend of 5 per cent. per annum (6d. per share), free of income tax, for half-year (interim). Last year, 1s. 3d. per share.

Tredogor Iron and Coal Company Limited.—The directors announce an interim dividend of 7½ per cent. (free of income tax), being at the rate of 15 per cent. per annum, on the "A" and "B" shares for the half-year ended September 30.

NEW COMPANIES.

Dalton (A. L.) Limited.—Private company. Registered October 30. To acquire the business of machinery merchants and engineers, and dealers in gas engines, etc. Nominal capital, £5,000 in £1 shares. Subscribers: A. L. Dalton (Nottingham), and H. C. Sands.

Hannay and Clarke Limited.—Private company. Registered October 31. To acquire the business of an iron broker and commission merchant. Nominal capital, £10,000 in £1 shares. Directors: J. E. H. Clarke (Haverthwaite), and Sarah Ann Clarke. Qualification, £100.

Kwykfire Limited.—Private company. Registered office, Brownlow House, 51, High Holborn, W.C. Registered October 27. To carry on business as mechanical engineers, manufacturers of fuel of all kinds, etc. Nominal capital, £650 in £1 shares. Directors to be appointed by the subscribers. Qualification, £25. Subscribers: H. B. F. Lucan (Ealing), and G. M. Wickens.

McBain Brothers Limited.—Private company. Registered November 1. To carry on the business of mechanical, electrical, marine, constructional, and general engineers, etc. Nominal capital, £5,000 in £1 shares. Directors: W. J. McBain (Tweedmouth), and A. McBain.

Medway Steel Company Limited.—Private company. Registered office, Pelican Wharf, Strood, Kent. Registered October 26. To carry on the business of steel converters, and refiners, engineers, etc. Nominal capital, £100 in £1 shares. Subscribers: W. H. D. Roundhay (Cobham), and C. E. D. Medway.

Weyburn Engineering Company Limited.—Private company. Registered October 31. To carry on the business of mechanical engineers and tool makers, machinists, fitters, etc. Nominal capital, £15,000 in £1 shares. Directors to be appointed by the subscribers. Subscribers: H. Jordon and C. Farrar.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ALTRINCHAM.—2,000 tons of screened gas coal (nine months) for Gas Company. Tenders, from areas sanctioned by the Coal Transport Regulation Scheme, to the Gas Offices, Altrincham.

BECKENHAM. NOVEMBER 12.—Midland small coal (three months) for the Urban District Council. Forms from the resident engineer, Electricity Offices, 45, High-street, Beckenham.

CARDIFF. NOVEMBER 13.—About 2,330 tons of large screened house coal, 930 tons of large screened smokeless steam coal, 460 tons of through-and-through smokeless steam coal, 1,450 tons of washed steam peas, 1,950 tons of washed steam beans, 1,650 tons of washed steam nuts, 231 tons of washed anthracite nuts, 40 tons of Forest of Dean nuts or other similar coal, 75 tons of smiths' coal, and 30 tons of small coal; also 642 tons of gas coke, to be delivered one truck at a time, or as otherwise ordered (12 months), for the Corporation. Alternative quotations also required for about half the above quantities for six months. Forms from the town clerk.

WAKEFIELD. NOVEMBER 17.—Coal (12 months) for the Electricity Works. Forms from the city electrical engineer, Old Town Hall.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

ABERDEEN. NOVEMBER 22.—Stores.—Castings, fireclay, signal wire, packing, bar iron, springs, tubes, wagons, etc., for the Great North of Scotland Railway. Forms (1s.) from the Stores Superintendent, 80, Guild-street, Aberdeen.

BRADFORD. NOVEMBER 24.—Stores.—Nails, pipes, insulating materials, drivers' alarm bells, iron, steel, etc. (six or 12 months). Forms (£1 1s., returnable) from the Tramway Offices, Bradford.

DUBLIN. NOVEMBER 13.—Stores.—Bolts, forgings, castings, rail fastenings, Staffordshire and Yorkshire iron, wire, steel, springs, etc. (12 months), for the Midland Great Western Railway, Ireland. Forms (6d. P.O.) from the storekeeper, General Stores, Broadstone Station, Dublin.

DUBLIN. NOVEMBER 14.—Stores.—Fittings, castings, fireclay, foundry requisites, galvanised sheets, tubes, wire, etc. (12 months), for the Southern and Western Railway. Forms (6d.) from the storekeeper, General Stores, Inchicore, Dublin.

DUBLIN. NOVEMBER 13.—Stores.—Iron and steel, castings, fittings, oils, etc., for the Dublin and Wick Railway. Forms (6d.) from the secretary, Dublin.

ENNISKILLEN. DECEMBER 1.—Stores.—Tubes, wire, copper plates, spelter, cement, castings, galvanised sheets, wire, iron, oils, tin-plates, etc., for the Sligo, Leitrim and Northern Counties Railway. Forms (1s.) from the secretary, Enniskillen.

NOTTINGHAM. NOVEMBER 29.—Stores.—Refined tar, pitch, creosote, etc. (12 months), for the Works and Ways Committee. Forms (5s., returnable) from the city engineer, Guildhall.

SHEERNESS. NOVEMBER 19.—Boiler.—Lancashire boiler, superheater, etc., for the pumping stations. Forms (21s.) from the clerk, Council Offices, Sheerness.

THE FREIGHT MARKET.

The "eternal lack" of tonnage continues to act as a barrier to business, so far as British coal shipments are concerned. On the north-east coast this week, exceedingly little chartering has been done. Coasting fixtures are absent, but London continues quoted at 20s. 6d. A small amount of tonnage has been taken up for the shipment of pitch and coke to French Atlantic ports, at the scheduled figures. Swedish rates are rallying, Gothenburg having been done for Tync loading at 190 kr., and Stockholm at the even 200 kr. There is a large amount of enquiry for tonnage for Scandinavian destinations, but this cannot be satisfied at present. The Spanish Bay ports are firm, at 160s. to Bilbao or Santander. Portugal is quoted at 95s. to Lisbon, and 105s. to Oporto. Gibraltar is firmly held at 100s. Barcelona has been done for Middlesbrough loading at 262s. Excepting for a fixture to Gibraltar at 100s. from Cardiff, the South Wales market has been wholly occupied in chartering vessels for French Atlantic ports. The Bristol Channel enquiry for vessels, especially for Spanish directions, is strong, but unavailing. The same is true of other coal shipping centres throughout the country.

Homewards, the River Plate is slow, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. American coal freights are unaltered, at 125s. from Virginia to the Plate, with 33 dols. for Rio discharge. On net form, 200s. is the ruling indication for Northern Range to the United Kingdom, with 250s. for French Atlantic discharge. On account of the Wheat Committee, heavy grain is workable at 30s. from Northern Range to France, and 32s. 6d. to West Italy, with 2s. 6d. more for Gulf loading. The American demand for tonnage is very brisk. At the Far East, the enquiry for boats is very good, and high figures are quoted. Bombay-Kurrachee to the United Kingdom on scale is firm, at 250s. Bombay to the United Kingdom on d.w. basis is steady, at the same price, with 400s. quoted for West Italian delivery. Saigon-Haiphong to French ports with rice is well maintained, at 500s., which rate is also quoted for Madras Coast to Marseilles with kernels. Mediterranean ore and phosphate ports are enquiring freely for suitable boats, at firm rates.

Tyne to Dunkirk or Boulogne, 280, 100s., sail; Pecamp, option Honfleur, 1,250 and 750, 62s. 6d., pitch; Gothenburg, 2,500, 190 kr.; Northern French Range, 200 and 300, 46s., coke; and Stockholm, 2,100, 200 kr.

Cardiff to Bordeaux, 2,000, 69s., neutral; Bayonne, 1,200, 36s.; Brest, 1,400, 45s., neutral; Gibraltar, 6,000, 100s.; Rouen, 1,000, 49s. 6d., patent fuel, neutral; 1,400 and 1,500, 48s. 9d., neutral; St. Nazaire, 3,200 and 5,000, 61s. 6d., neutral; and St. Malo, 1,200, 21s.; 500, 46s., neutral; 600, 45s., neutral; and 300, 22s.

Swansea to Rouen, 1,600, 48s. 9d., neutral; 3,000, 47s. 6d., neutral; and 800, 50s. 3d., neutral.

Port Talbot to Rochefort, 1,600, 61s. 6d., neutral.

Tees or Wear to Rouen, 450, 67s. 6d., pitch.

Middlesbrough to Barcelona, 3,100, 262s. 6d.

LATER.—Since the above was written, the following fixtures have been reported:—

Tyne to Gothenburg, 2,200, 185 kr.; and 1,800, 190 kr.; and Stockholm, 2,700, 200 kr.

LETTERS TO THE EDITORS.

The Editors are not responsible either for the statements made, or the opinions expressed by correspondents.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

As replies to questions are only given by way of published answers to correspondents, and not by letter, stamped addressed envelopes are not required to be sent.

ROPE HAULAGE IN MINES.

SIRS.—The difficulties in working an endless rope haulage in a road dipping 1 in 3, with sharp turns in it, are so great that I strongly advise your correspondent to give up any idea of such arrangement.

If there is sufficient area of coal to warrant the cost, it will be much cheaper for him to drive a new straight road rather than risk the trouble and cost he would have in installing and working the crooked road.

November 5.

W.

SIRS.—Will you allow me a short space to say a few words to "Under-manager," who appears to have some difficulty in the transit of his coal? I quite agree with your answer. There is no practical difficulty, even where the road is dipping 1 in 3, with sharp turns in it.

If "Under-manager" will send me on a rough sketch of his roadway, showing the curves, also state his present output and system of haulage, it will give me much pleasure to afford him the benefit of my 24 years' experience in haulage in all its branches.

WILLIAM LEEBETTER, A.I.M.E.,

Under-manager.

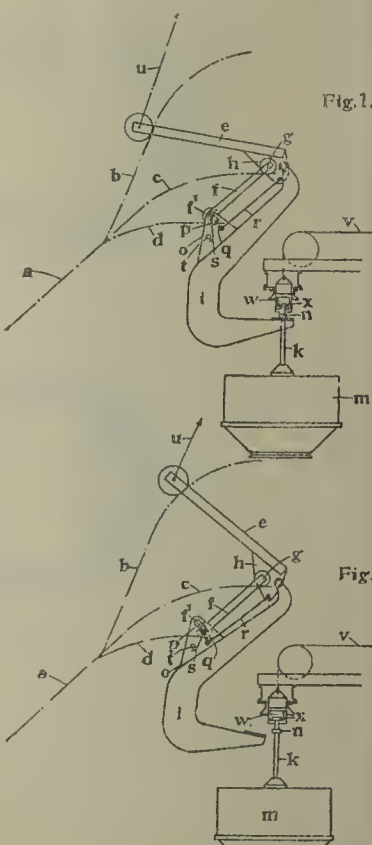
77, Edith-avenue, Hsworth Colliery,
co. Durham, Nov. 6.

Partnership Dissolved.—The *London Gazette* announces dissolution of the partnership of A. J. Balls, G. H. Stansfield, and G. H. Stansfield, junr., trading as Balls and Stansfield, steamship managers, coal exporters, etc., Tyne-street, North Shields, and Quayside, Newcastle.

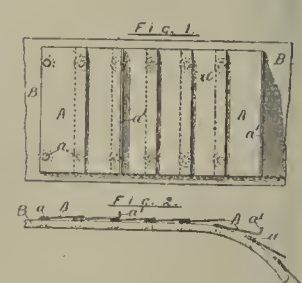
Hull Coal Trade.—The coal brought to Hull from English collieries in October amounted to 260,358 tons (243,273 tons by rail and 17,085 tons by river), a considerable reduction on the quantity, 292,364 tons, in the corresponding period last year. In the 10 months the quantity totalled 2,432,096 tons, compared with 2,821,563 tons last year.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

106507. *Improvements Relating to Inclined Hoists for Charging Buckets.*—Deutsche Maschinenfabrik A.G., Duisburg, Germany.—According to the present invention, the bucket is automatically transferred from one hoist to the other. Fig. 1 shows the apparatus in the position in which the bucket is still suspended from the hoisting crab or trolley, but has been guided into the lifting member of the second hoist or carrier. In fig. 2 the lifting member of the second hoist or carrier has taken the bucket, and the hook of the crab or trolley is disengaged. *a* is the inclined path taken by the hoist, which path at its upper end divides out into three branches *b*, *c*, and *d*. In the illustration, the crab or trolley consists of the two parts *e* and *f*, which are pivotally connected at *g*, *g* forming the common axis of the two parts *e* and *f*. As shown, *e* is provided at its forward extremity with a projecting part *h*, from which the lifting member *i* of the crab or trolley *e*, *f* is pivotally suspended. The hook *i* is forked at its lower end, so that it can engage and lift the supporting flange *n* provided on the carrying stem *k* of the bucket *m*. In addition to being attached to the projection *h*, the hook *i* is disposed on the rear axle *f* of the part *f* of the crab or trolley by means of the slot *p* provided in the projecting part *o*. The lever *q* is fixedly keyed to the axle *f*, to which lever is pivotally connected the rod *r*, the other end of which is attached to the projecting part *h*. The lever *s* is likewise keyed to the axle *f*, and opposite to it is fastened the pin *t* in the projecting part *o*. The hoisting rope for the crab or trolley is designated *u*. The only important parts shown of the second hoist or carrier which removes the bucket *m* from the hook *i* are the rope *v* and the lifting members *w*, which receives the bucket *m* by means of the second supporting flange or head *x* provided on the stem *k*. The method of operation is as follows: When the crab or trolley *e*, *f*, reaches the upper end of the inclined path *a* the wheels on the axle *g* travel along the middle branch *c*, the wheels of the axle *f* along the lowermost branch *d*, and the rear end of the part *e* of the crab or trolley, to which the rope *u* is connected, along the upper branch *b*. In the position of the crab or trolley *e*, *f*, illustrated in fig. 1, the bucket *m* has reached its highest position, that is to say, it does not receive any further upward movement, even if the crab or trolley *e*, *f*, continues to move forward. The conditions are such that upon the bucket *m* reaching its highest position the part *x* of the stem *k* is automatically guided into the lifting member *w* of the second hoist or carrier, which is there ready to receive it. As the crab or trolley *e*, *f*, continues its forward movement, the hook *i*, and with it the bucket *m*, are lowered a little, and consequently come to lie upon the lifting member *w*; the rod *r* thereupon presses the lever *q* to the left, and simultaneously with it the lever *s*. The latter strikes against the pin *t*, and moves the projecting part *o* and the hook *i* into the position illustrated in fig. 2, the hook being out of engagement with the stem *k*. The bucket *m* is then carried by the second hoist or carrier to the place where it is to be emptied. When the bucket has been emptied it is returned to the position to be replaced on the hook *i*, whereupon the operation of the crab or trolley *e*, *f*, is reversed. The hook *i* first returns to the position shown in fig. 1, in which it engages the part *n* of the stem *k*. The crab or trolley then carries the bucket *m* down. (Three claims.)



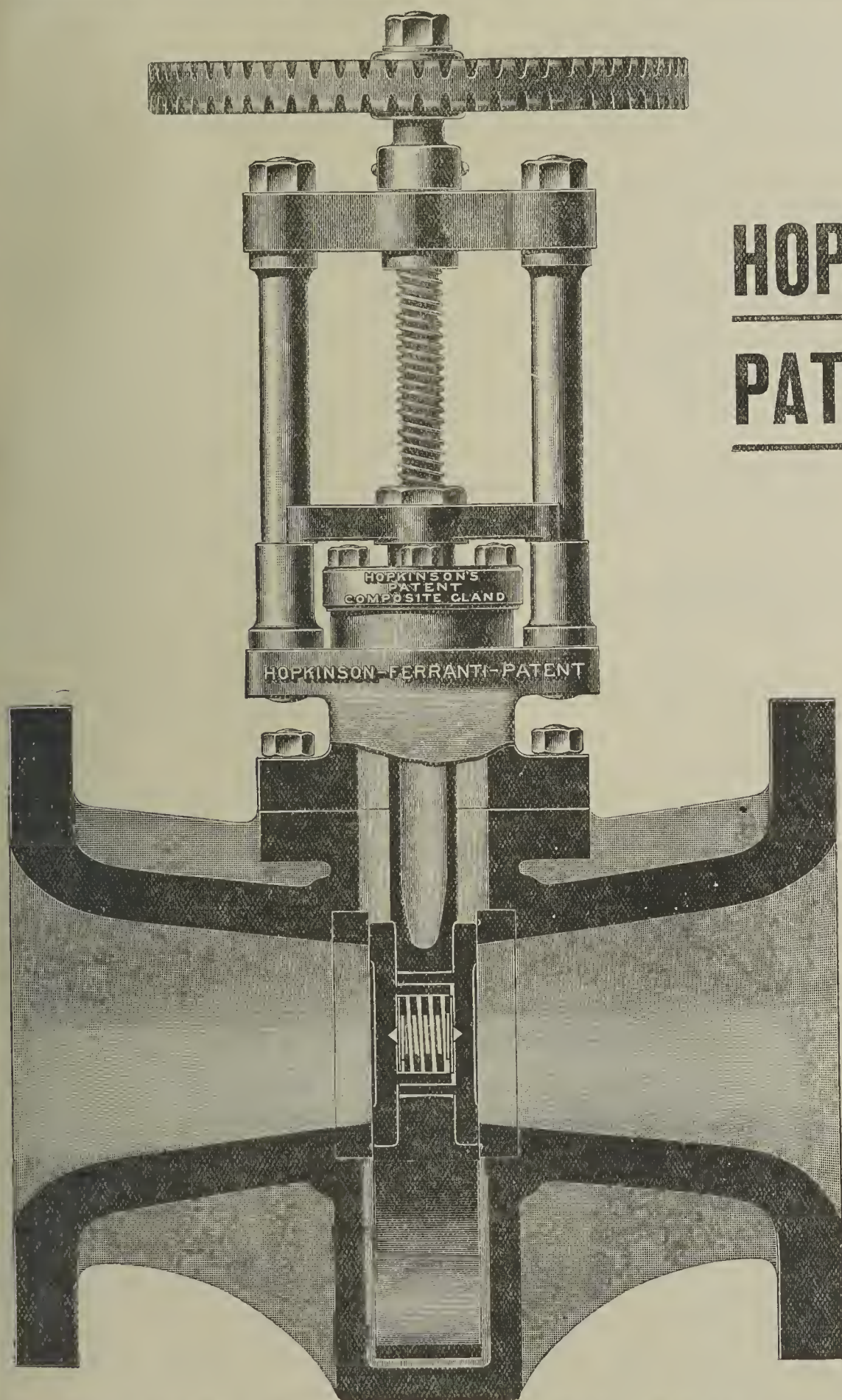
108936. *Improvements in Belts for Conveyors.* H. Bibby, Central Leather Works, Manchester-road, Preston.—This invention relates to conveyor and like belts in which the operating surface of the belt is covered with overlapping plates or scales of metallic or other protecting substance, riveted or otherwise attached to the belt in such manner as not to interfere with the flexibility of the latter in a longitudinal direction. According to this invention, each plate is attached at or near its front edge to the belt by a fastening device, which is protected from wear by an overlapping portion of the preceding plate. Fig. 1 is a plan of a belt constructed in accordance with this invention; fig. 2 is an edge view of the belt. Referring to the belt shown in figs. 1 and 2, which is particularly applicable to a charging machine of the endless belt type, such, for example, as that which is used for charging gas retorts or coke ovens with powdered or finely broken coal. The operative surface of the belt is covered with a number of transversely arranged metal laths or plates *A*, each of which is attached at or near its front edge to the belt *B* conveniently by copper rivets *a* passing through the belt and plate. The rear edge of the plate overlaps the front edge of the succeeding one to an extent that covers the rivets or other forms of attachment, and that will continue to do so when the belt has received its maximum amount of stretch, so that the rivet heads are at all times protected from wear. The front edge of each plate faces the direction of travel of the belt, and the under surface of one plate rests on the upper edge or surface of its neighbour. The plates may be flat, or if it is desired to increase their propelling action they may be curved or otherwise shaped in cross section, or be embossed or formed with a roughened or toothed



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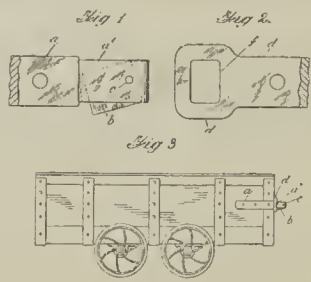
HOPKINSON-FERRANTI STOP VALVE
FIGURE NO. 2028 (CAST IRON BODY)
FIGURE NO. 2029 (CAST STEEL BODY).

J. HOPKINSON & CO. L^D. HUDDERSFIELD.

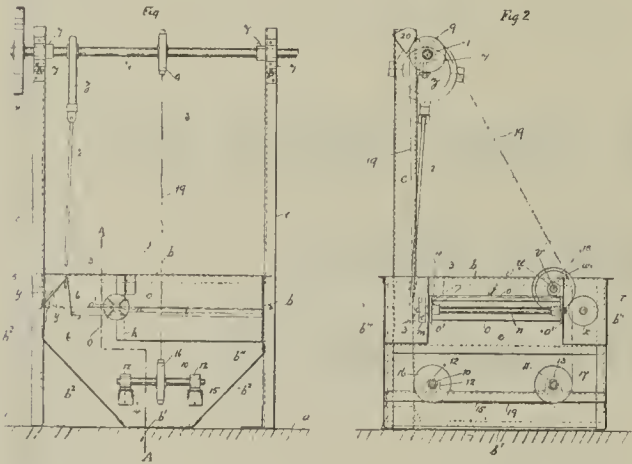
LONDON - GLASGOW - EDINBURGH - PARIS
CARDIFF - OLDHAM - BLACKPOOL - PETROGRAD

In the example shown, certain of the plates at have their rear edges turned up, as at a^1 in figs. for effecting the aforesaid purpose. In applying to a conveyor, flat overlapping plates may be used, and such plates may extend completely across the surface of the conveyor, or if it is required the conveyor should be capable of bending transversely, a number of plates may be arranged in each row, with their ends lying adjacent to one another, or instead of this construction the plates may be made and arranged somewhat after the manner of fish scales. (Two claims.)

108979. *A New Door Fastener for Colliery Trams.* J. Chivers, 41, Clyd-street, Pontymistir; W. Roberts, 12, Exchange-road, Risca; and D. Lewis, 1, Llanarth-villas, Cross Keys, Mon.—This invention relates to automatic fastening devices of the kind in which the movable member of the two elements to be fastened together is passed over a projecting part of the fixed or stationary member, and in which the fastening, when the two members are thus in contact, is effected by means of a dog or tongue pivotally mounted in a slot formed in the projecting part of the fixed member. Fig. 1, in side elevation, shows the bracket portion of the fastener for attachment to the wall of a truck, and which carries the locking latch part of the fastening device; fig. 2, in similar view, shows the locking bar of the fastener which is attached to the truck, and which is suitably slotted to engage with the latch on the truck wall; fig. 3 is, to a smaller scale, a side elevational view of a tram truck fitted with the door fastening forming the subject of this invention. a is the bracket portion of the device to be attached to the side of a truck, so as to project therefrom. The projecting end a^1 is in the form of a loop, and the plate or tumbler b , which acts as a latch, is pivoted eccentrically, as at c , in such loop a^1 . d is the flat bar or plate fitted on the free edge of the hinged door c . The end of this bar or plate d extends beyond the edge of the door, and is formed with an aperture f corresponding in shape to that of the latch b , and of a size to fit over the loop a^1 . (One claim.)



108955. *Improvements in Apparatus for Washing Coke, Breeze, etc.* A. L. Jennings, Northfield, Snelsins-lane, Cleckheaton.—This invention relates to improvements in machinery or apparatus for washing coke, breeze, and the like for removing the scale, dross, and other impurities therefrom. Fig. 1 is a part sectional elevation, with the ejector plate operated by means of a double-ended lever; and fig. 2 is a sectional elevation on the irregular line A-A, fig. 1. On the ground, or on a suitably prepared foundation or base a is mounted and fixed by any suitable means a tank b of any convenient and desired shape. The tank is made of wrought or cast iron in one or more parts. In the drawings the tank b is shown placed between two vertical uprights or standards hereinafter termed "frame work c ," and when required—though not necessarily so—may be made a fixture thereto. The tank is provided with a flat bottom b^1 , and the lower portion of two of its sides are arranged to taper inwards at b^2 , or, if so required, the tank is provided with a curved bottom instead of a flat one with tapering sides as shown. The tank is employed for receiving the coke, breeze, or other material to be washed and the cleansing water or other liquid. In tanks made as shown in the drawings, the upper portions of two of the sides b^3 are made vertical and parallel with each other for a portion of their depth, and they are connected at their lower ends to the tapering portions b^2 , which are inclined inwards towards the flat bottom b^1 . The other two sides or ends b^4 of the tank b are made parallel for the whole of their length. The upper part of the tank is



divided into four compartments by vertical plates, three of the said compartments being in a line with each other and of different sizes, the central compartment, in which the coke is washed, being the widest of the three. In one of the sides or walls b^3 is provided an opening 5 for the exit of the washed coke. The bottom of the opening 5 is level with the water in the tank b . To the inner portion of the side b^3 is hinged or otherwise jointed an ejector plate g for removing the floating coke from the outlet compartment g of the tank which receives the coke after being washed. Motion is imparted to the said ejector plate g either directly from an eccentric z mounted upon the driving shaft 1, or from an eccentric z and connecting rod 2 and a double-ended lever 3 mounted upon a fulcrum 4 fixed to the side b^3 of the tank b . The inner edge of the ejector plate g is provided with a fixed or jointed guard plate 6 for preventing the coke that floats on the water, after being washed, from impeding the movement of the said plate g . Coke or other material to be washed is placed by any convenient means in the central compartment, and motion is imparted to the driving shaft 1, and from thence to the endless chain 19 and elevator buckets through sprocket wheel or wheels 9 mounted and fixed upon the shaft 1, the sprocket wheel 18 over which the chain 19 is secured to the shaft r , and gearing wheels w , x , with the shaft r —as previously described. Motion is transmitted at the required points to the driving shaft 19 and shaft r through bevel gears y , z , for causing the vanes or blades of the said vanes or blades rotate, the coke is washed in the water, and is caused to pass through division j into the outlet compartment g ,

whilst the dirt and other heavy material sinks to the bottom of the tank. As the washed coke floats on the water in the outlet compartment g , it is caught by the ejector plate g , to which an oscillating motion is imparted by means of the double-ended lever 3, as previously described, and the coke is removed from the tank through the opening 5. The ejector plate g is arranged to fall to its lowest position—shown in dotted lines at fig. 1—by gravity whenever the end of the double-ended lever descends to its lowest position. Simultaneously with the movement of the ejector plate g and removal of the coke, the ejector buckets 20 will pass over the bottom b^1 of the tank, and the dirt, *débris*, or other refuse will enter the buckets and be carried upwards so as to be deposited in the hopper or chute 21 provided for the purpose. By the means described, the coke, breeze, or other materials can be thoroughly cleansed from their impurities and separated the one from the other, and thereby increased in their commercial value. (Five claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Balston, R. M. Rotary internal combustion engines. (15948)
 Berry, F. E. Electrical transformers. (15837)
 Binks, H. Internal combustion engines. (15853)
 Bloxam, A. G. (Stabilimenti Biak—Ing. A. Pouchain). Electric furnaces for melting metals. (15745)
 Blythe, F. C. Destructive distillation of bituminous coal. (15728)
 Bowen, J., and Britten, D. M. Spragging device for colliery tubs, etc. (15939)
 Burrows, R. Visual signal indicator. (15920)
 Champeney, C. C. Two-stroke internal combustion engines. (15875)
 Constantinesco, G. Means for transmitting impulsive forces. (15941)
 Cook, S. S., Douglas, L. M., and Parsons, Sir C. A. Geared turbine systems. (15959)
 Copsey, E. L. Rotary pumps. (15714)
 Deguide, C., and Marbais, D. Process for fractional distillation of benzols. (15923)
 Delin, F. B. (Lee Loader and Body Company). Truck with three-way hopper. (15758)
 Dehn, F. B. (Lee Loader and Body Company). Truck with rolling hopper. (15759)
 Electromotors Limited. Dynamo electric machinery. (15978)
 Forth Engine and Motor Works. Means for heating steam generator, boiler, etc. (15947)
 Francis, C. E. Mechanism for converting motion. (15749)
 Greenhalgh, E. Dynamo electric machinery. (15978)
 Hamer, J. D. Apparatus for distillation or carbonisation of coal, etc. (15922)
 Hill, H. Rotary engines. (15706)
 Hirst, H. Coal-cutting, etc., machines. (15826)
 Jarvis, J. Internal combustion engines. (15712)
 Kamax Heater Company, Kay, A., and Lomax, F. Fuel economisers and fire backs for domestic firegrates, etc. (15692)
 Keightley, A. P. Steam boilers. (15951)
 Longbottom, B. Dynamo electric machinery. (15978)
 Lyon, F. Rotary pressure blowers, exhausters, pumps, etc. (15700)
 Macgregor, C., and McKellar, A. Driving gear. (15872)
 Merturi, G. Jakova. Reducing iron ore. (15768)
 Paynter, W. L., and Roxburgh, A. B. Means for heating steam generator, boiler, etc. (15947)
 Peterson, J. Power generating and transmitting mechanism. (15789)
 Porter, W. H. Two-stroke valveless internal combustion engines. (15698)
 Ransomes, Sims and Jefferies. Steam boilers. (15951)
 Seott, W. J. Internal combustion rotary engine. (15979)
 Smallwood, A. Furnaces. (15974)
 (Stabilimenti Biak—Ing. A. Pouchain). Electric furnaces for melting metals. (15745)
 Stoneham, J. A. Liquid hydrocarbon fuels for internal combustion engines. (15955)
 Surface Combustion Company. Apparatus for burning explosive gaseous mixtures. (15938)
 Turner, W. L. Manufacture of steel or ferro-alloys. (15858)
 Walker, C. T. Internal combustion engines. (15884)
 Walker, H. Visual signal indicator. (15920)
 Watson, C. F. H. Internal combustion engine. (15981)
 Widner, G. H. Process for producing a water softening material. (15744)
 (Wolf Akt.-Ges., R.). Method of mounting a reciprocating steam engine. (15747)

Complete Specifications Accepted.

(To be published on November 22.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 7667. Reavell and Company, and Reavell, W. Air compressors. (110557)
 10167. Fregoso, S. C. Internal combustion engines. (110559)
 15176. Reekie, R. Signal indicator for mines. (110591)
 15187. British Electric Transformer Company, and Renfree, T. R. Electric transformers. (110594)
 15291. Bell, G. G. Apparatus for transporting coal and other material. (110608)
 15292. Bell, G. G. Transport of coal and other material. (110609)
 15559. Schueler, G. R. Centrifugal pumps, blowers, and exhausters. (110617)
 16556. Sheard, J. T. Obtaining valuable products from waste hydrocarbonaceous residues produced in the rectification of crude benzol and homologous hydrocarbons. (110638)
 17015. Pulsometer Engineering Company, and Bjornstad, J. Turbine centrifugal pumps. (110641)
 18360. Garner, H., and Parker, W. J. Internal combustion engines. (110657)
 1917.
 1178. Gould, W. H. Furnace back bridges. (110675)
 2815. Robutti, A. P. Water tube steam generators. (104508)
 3260. Cass, G. W. Attachable and detachable bar for firegrates. (110690)

3316. Deutsch-Luxemburgische Bergwerks- und Hütten-Akt.-Ges., and Klinkenberg, A. Manufacture of ingot iron and steel. (105548)
 3397. Deutsch-Luxemburgische Bergwerks- und Hütten-Akt.-Ges., and Klinkenberg, A. Manufacture of ingot iron and steel. (105902)
 7066. Simon-Carves Limited, and Gracie, W. Apparatus for tipping wagons. (110708)
 7067. Simon-Carves Limited, and Gracie, W. Apparatus for tipping wagons. (110709)
 8495. Thomas, J. L. Coupling or shackle for colliery and like wagons. (110721)
 9314. McDonald, G. Means for conveying coal or other minerals along a long wall face underground. (110723)
 11479. Rayner, G. H. T., and Rayner, P. Percussive rock drills and like fluid pressure operated tools. (110731)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
 16939. Soc. C. M. Stein et Cie. Rocking devices for mixers for cast iron. (110739)
 1917.
 13789. Westinghouse Machine Company. Steam turbine installations. (110744)
 15083. Marelli and Company, E. High-speed rotary compressors. (110751)
 15326. Dawe, G. S. Rotary gas engine. (110752)
 15409. Leffler, A. Power transmission devices. (110755)
 15420. Canhae, G. E. Water tube generators. (110756)

GOVERNMENT PUBLICATIONS.

*. Any of the following publications may be obtained on application at this office at the price named **post free**.

Colonial Reports (Annual): (No. 935), Malta, Report for 1916-1917. (London: Published by H.M. Stationery Office). Price 1s. 6d.

Special Report, with Relative Specifications and Plans, Prepared by Mr. John Wilson, F.R.I.B.A., Architectural Inspector of the Local Government Board for Scotland, on the Design, Construction, and Materials of Various Types of Small Dwelling Houses in Scotland. (Edinburgh: Published by H.M. Stationery Office). Price 1s. 2d.

PUBLICATIONS RECEIVED.

"Links with the Past: A Brief Chronicle of the Public Service of a Notable Institution," by A. F. Shepherd (London: Published by the Eagle and British Dominions Insurance Company Limited, at British Dominions House, Royal Exchange-avenue, E.C. 3); "A Thousand and One Uses for Gas" (Vol. 5, No. 49), October 1917 (published by the British Commercial Gas Association, 47, Victoria-street, Westminster, S.W. 1); "Cheap Steam, with which is incorporated Cheap Transport" (Vol. 1, No. 9), November 1917 (published by Ed. Bennis and Company Limited, 28, Victoria-street, S.W. 1); "Industrial Management—The Engineering Magazine," edited by John R. Dunlop (Vol. 54, No. 1), October 1917, price 25c.; "Cassier's Engineering Monthly" (Vol. 52, No. 5), November 1917, price 1s.; "Employees Magazine" (Vol. 4, No. 3), October 1917; "The Naturalist," edited by T. Sheppard and T. W. Woodhead (No. 730), November 1917; "Bulletin of the American Institute of Mining Engineers" (No. 130), October 1917; "Journal of the American Waterworks Association," with three supplements (Vol. 4, No. 3), September (published quarterly by the American Waterworks Association, Baltimore, Maryland); "The Mining Congress Journal" (Vol. 3, No. 10), October 1917, 20c. per copy.

United States Export Trade.—The removal of the export embargo from a long list of articles if sent to countries other than the European neutral and Central Powers will permit the exportation without licence of approximately 700,000,000 dols. worth of merchandise per annum. The more important of the articles which the Exports Administrative Board has removed from the general embargo includes steel bars, steel rails, locomotives, wire, nails, iron pipe, sheets and plates under $\frac{1}{8}$ in. thickness, and many manufactures of iron and steel.

Increased Production of Coke.—The *Neue Freie Presse* states that the production of coke in Austria has assumed a much greater importance than in ordinary times, owing to the great value of the by-products in the manufacture of munitions. But the value of coke has risen greatly in late years because many industries use it as fuel instead of coal, and as a consequence of the increased demand the Austrian coke furnaces have been enlarged, and produced last year nearly 2,800,000 metric tons, exceeding the output of 1913, namely, 2,584,000 metric tons—the highest output hitherto reached. This year the output has again greatly increased, the output for the first seven months of 1917 having exceeded the output of the corresponding period in 1916 by 35,000 metric tons, though the production of coal has considerably diminished.

Refractory Materials.—A new department has been established at Sheffield University, one which will be of the greatest importance to Sheffield and district. It is a department of refractory materials, and the university authorities have been fortunate in securing Mr. W. J. Rees, F.I.C. (late chief chemist in the Birmingham works of Messrs. Chance Brothers Limited), to act as research chemist. He will be attached to the department of geology, and will devote his whole time to research work upon refractory materials. The movement for establishing this new department has been in hand for some time. Thanks to the generosity of friends of the applied science department of the university, and of those specially interested in refractory materials in the district, financial support is forthcoming to an extent which assures that the stipend of Mr. Rees will not be a charge on existing university endowments. Moreover, about half the sum required for equipment has already been received. For a couple of years Prof. Fearnside, the Sorby Professor of Geology at the university, has been collecting information and securing interest in this new movement. It is not intended in any way to encroach upon or overlap work already in progress in London, Leeds, Stoke, or elsewhere, but it is hoped in the new department to be able to usefully tackle problems which arise, or have arisen, in connection with the coke ovens of the South Yorkshire, Derbyshire, and Nottinghamshire districts.

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COAL AND SHIPPING.

By F. J. WARDEN-STEVENS,
M.I.M.E., A.M.I.E.E., &c.

XXIII.—Bunkers and Reservoirs for Storing Coal.

The storage of coal in bunkers is doubtless the most convenient and suitable system to adopt when the conditions justify the necessary expenditure. This form of storage offers the advantage of automatic discharge by gravity with the aid of a gate valve controlled by a lever, and, if the elevation permits, delivery can be effected not only directly beneath or at the side, but also craft, or a railway, alongside, can be served by means of a chute. In the case of bunkers of small capacity, up to, say, about 250 to 400 tons, timber construction has been frequently adopted in the past, and examples of timber bunkers are in evidence at collieries, locomotive coaling depôts, coal merchants' wharves, &c. Creosoted fir timber is frequently used for the construction of bunkers; and, notwithstanding the combustible nature of such constructions, there are records of timber bunkers with a life of over 25 years. Timber bunkers are usually supported or elevated on either brick or iron columns, and are of rectangular form, having either flat or hopper-shaped floors, which latter provide sloping surfaces towards the discharge outlets or chutes, and therefore reduce trimming. In the United States timber bunkers, or pockets, as they are termed, are frequently used for coaling locomotives, and a steel-framed timber construction is often adopted. Bunkers of larger capacity, however, are usually constructed entirely of steel, or reinforced concrete, and even for small bunkers this form of construction is now generally considered advantageous.

Steel Bunker Construction.

Fig. 1 illustrates an example of steel construction. These bunkers have a total storage capacity of no less than 10,000 tons of coal, the individual capacity of the bins being 1,000, 500 and 250 tons respectively. They are of special design, being suspended from steel lattice columns, and are provided with sliding roof coverings for loading. The bin is semi-circular at the base, and delivery is effected by means of hopper gate valves. A construction (fig. 2), comprising a steel framework, with reinforced concrete floors and sides, meets with some favour, and it will be of interest to describe in detail large storage bunkers of this construction. The steel framework is supported by steel columns on concrete bases which limit the pressure on the ground to about 2 tons per square foot. The floors have an incline of about 45 degs., and the walls and partitions are formed of concrete slabs about 4 ft. square and 4 in. in thickness, reinforced with welded steel wire netting (4 in. by 4 in.

which are about 9 in. apart, and each is controlled by a separate lever operated by the right and left hand of the attendant respectively. One gate is opened before the other, and can be kept automatically either open or shut, as its crank and connecting rod pass "dead" centres in the course of its motion, but the second gate must be either open or shut due to its weight, and is closed first. After the first gate is opened and the coal starts to flow, the pressure on the second one is found to be released. To notify any overheating of the coal, galvanised pipes, 4 in. diam., are fixed vertically throughout these bunkers, and have suspended thermostats, which are electrically connected with a warning indicator. Incidentally, it may be mentioned that little, if any, damage can result to the structure of the bunkers in the event of the coal becoming heated, as the steel is protected by the concrete covering. Numerous fire hydrants are available, and an ample supply of water at a pressure sufficient to carry a stream from a 2½ in. hose right over the bunkers.

Reinforced Concrete Bunkers.

Owing to the considerable lateral pressure involved in the retention of large storages of coal, the design

supported by beams 20 in. by 9 in. transversely and 12 in. by 8 in. longitudinally. The roof, which is 3½ in. in thickness and is provided with openings to allow of delivery of the coal, is 3½ in. thick, with 17 in. by 18 in. and 14 in. by 9 in. transverse and longitudinal beams respectively.

Another construction of ferro-concrete (fig. 3) provides storage for 700 tons. It is 54 ft. long, 19 ft. wide, and 56 ft. in height, and is divided into 12 sections or bins. This structure is supported by 14 columns 12 in. square, each of which carries a load of 85 tons, the footings being spread (6 ft. by 4 ft.) to limit the ground pressure to 3½ tons per sq. ft. These footings are tied by horizontal beams 9 in. sq. longitudinally and 12 in. by 8 in. transversely, and the columns are braced both horizontally and diagonally. The division walls are 5 in. thick, and are 12 ft. 6 in. deep, the floor sloping therefrom at an angle of 45 degs. The discharge outlets are 26 in. square. A cantilever, also of ferro-concrete construction, projects from one end of the structure and supports an elevator which is served from a hopper, at ground level, into which the coal is delivered from railway wagons. A conveyor extends along the centre of the roof and transfers the coal from the elevator to the several divisions of the bunker.

Handling of Bunker Storage.

The handling of coal to bunkers can be effected in various ways, as indicated in previous articles of this series. Tower or bridge type transporters provide for discharging vessels and can be situated at ground level

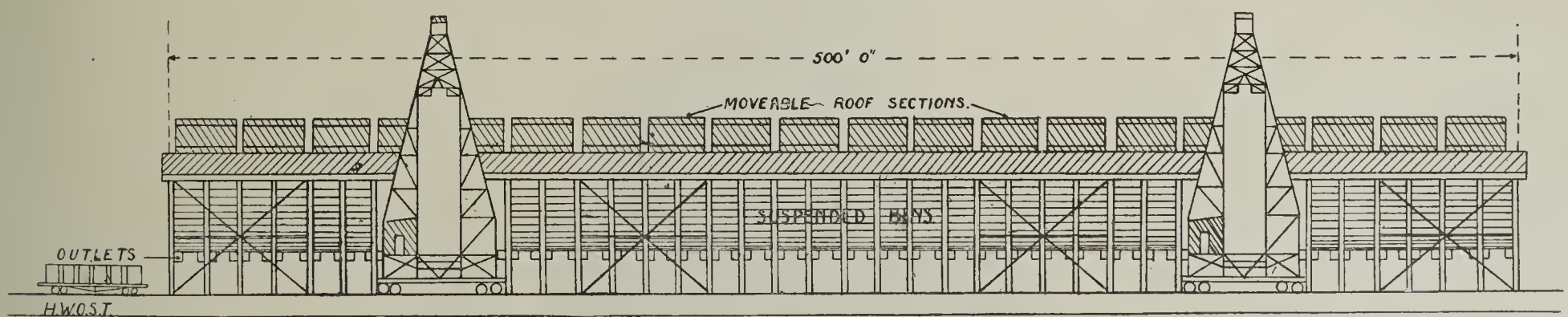


FIG. 1.—STEEL SUSPENDED BINS FOR COAL STORAGE.

mesh), the slabs being fixed to the steel framework by hook bolts. The walls are 15 ft. in height, which allows about 12 ft. depth of storage relative to the angle of the floor, and the total bunker capacity is 40,000 tons. The columns are protected by steel cylinders filled with concrete, those from ground level to the base of the bunkers being 15 in. in diameter, whilst the columns which pass through the coal space have protecting cylinders 11 in. diameter. The roofing is of galvanised corrugated iron.

The bunkers are constructed in two bays, and are served by a cable-car track extending along the gables of the roof. The coal is withdrawn by means of vertical chutes with gate valves, these chutes being situated along the sloping floors of the two bays. A cable-car system is also adopted at ground level for withdrawal from storage, the tracks extending along both sides of each bay. Additional storage, to the extent of about 20,000 tons, if required in case of emergency, can be effected at ground level, which is paved with concrete beneath the floors of the bunkers. The latter deliver to this ground storage by means of the inner discharge chutes, whilst re-handling is effected by means of trolley tracks.

The type of gate valve adopted for withdrawal from bunker storage is certainly an important consideration, the essential features being that it can be easily worked, and that the flow of coal shall be well under control. The type of valve used in connection with the bunkers just described consists of double gates, the edges of

and construction of bunkers is an important matter. Brickwork requires a considerable wall thickness, whilst steel, unless protected, has the disadvantage of a high maintenance charge due to corrosion, and also its capacity for conducting heat is an objectionable feature. Thus we find that reinforced concrete construction has met with considerable favour for coal storage bunkers, even of comparatively small size, on account of its fire- and heat-resisting properties, low maintenance costs, and moderate outlay, combined with great strength and ability to withstand the variations of pressure due to the full and empty condition of different sections of the bunkers. A special feature of reinforced concrete is the monolithic nature of the construction, the floor and walls all being interconnected without joints, forming, as it were, a casting. We obtain, by such construction, the combined values of the tensile strength of the steel and the compressive resistance possessed by concrete; and there is practically no limit to the form or design. Numerous interesting examples of coal bunkers constructed of reinforced concrete could be given, but it must suffice here to indicate only two or three of such examples.

A service bunker 48 ft. long by 14 ft. wide and 28 ft. deep, which is loaded direct from railway wagons that pass over it on tracks supported by the bunker, is elevated on columns 28 in. by 14 in. in section, the end columns being 24 in. sq., tied by beams 12 in. by 14 in. in section. The sides are 4½ in. thick, strengthened by horizontal ribs, the sloping floors being 7 in. thick,

or surmounting the bunkers; examples of these are indicated in fig. 1, whilst fig. 2 of No. 14* of this series illustrates discharging equipment surmounting the bunkers. Then there are systems which call for an intermediary equipment between the discharging plant and the bunkers, such as cable cars on inclined or elevated tracks, conveyors and elevators, inclined skip haulage, etc., and with all such systems automatic delivery is provided for. The gravity-bucket type of conveyor serves the dual purpose of both conveyance and elevation. The cable car and the gravity-bucket conveyor are perhaps the most frequently adopted of these systems, the former being employed in the case of the bunkers illustrated in fig. 2, and the latter is in evidence in the example shown in fig. 4. When the coal is delivered by railway, an inclined embankment or trestle track is often adopted to allow of the direct discharge of the wagons into the bunkers, conditions of space and elevation permitting. If, however, the height of the bunkers is considerable, an inclined track without an excessive gradient would occupy a large ground area, and it is found more practicable to discharge the wagons into a ground-level hopper and to elevate to the bunkers. Direct discharge from railway wagons into bunkers is also a considerable item of expense if large quantities of coal are dealt with frequently—on account of the shunting and shunting necessary. In the case of most elevated bunkers, when the coal cannot be lowered into them, as

* Colliery Guardian, March 16, 1917, p. 527.

the fall and therefore breakage must be prevented, which is certainly an objection. Another objection of bunker storage is that of the depth of the bunker, when large capacity is necessary with a small ground area; the liability of coal to overheating and spontaneous ignition being greater in a deep bed of coal, as previously indicated. To overcome this latter objection, horizontal division of the bunkers has been adopted in a few instances, the bunkers being constructed more in the form of a grain silo. By this means the depth of the individual mass of coal is reduced, and provision can be made for transfer or turning over of the coal from one level to another, transfer to a lower level being effected by means of controlled discharge outlets or chutes, and elevation to a higher section by means of, say, a gravity-bucket conveyor. Turning over the coal is certainly advantageous from the point of view of

In the bunker storage of coal a rough measurement of supplies and deliveries can be made by gauging the cubical content of the bins. The percentage error with such a method, however, is liable to be high, and amount to a considerable sum where large quantities are dealt with. Other methods of recording the quantities handled include measuring chambers, or valves attached to the outlets of the bunkers; these can be provided with a counter to record the number of measures delivered. They are, however, only suitable for small coal, since with large coal the weight per measured volume would vary. It may also be mentioned that slack or fine coal is liable to clog when damp and, therefore, to result in incomplete filling or discharge of the chamber. Automatic continuous weighing apparatus is adaptable to gravity-bucket conveyors, used either for supplies to or delivery from bunkers, and, with careful

dealt with, and involved a decision whether open stacking should be adopted, or whether a reservoir should be constructed. Open stacking would have necessitated extensive work in levelling a suitable site and in conveying ballast to the site, the construction of a solid floor and the erection of an enclosing fence. On the other hand, a reservoir called for a large expenditure, but the risk of overheating would be eliminated, and the deterioration of the coal would be considerably reduced. The coal to be dealt with was large Durham, but with about 60 per cent. of slack, and it was delivered about six days after reaching the pit head. (This point is mentioned because coal is more liable to heating by oxidation when stored almost directly after being mined than if weathered for a time before delivery.) A reservoir of reinforced concrete construction was finally decided upon, having an area of 43,000 sq. ft., a depth of 19½ ft., and a capacity of 847,500 cu. ft.—or about 20,000 tons—when filled to a depth of 16 ft. The nature of the ground forming the foundation of the base or floor being unsatisfactory, the pressure was limited to 24½ lb. per sq. in. The floor is constructed of concrete 8 in. in thickness, which is reinforced on the under side. The walls are 8 in. thick at the base, tapering to 3½ in. at the top, and are supported by pillars 16 in. in width and 5 ft. thick at the base, tapering to 20 in. in thickness at the top. These pillars are situated at 40 in. centres, and have a foundation 8½ ft. wide which extends partly under the floor of the reservoir. The cost of the earthworks, including excavating and banking, amounted to £1,200, and the cost of the construction to £3,800, or a total of £5,000; whereas the cost of a stacking ground would have been about £2,350. The coal-handling equipment comprises two discharging bridges, which operate on parallel tracks, each being provided with a belt conveyor and a jib crane. With this equipment, the coal being transferred to the conveyors, which deliver to any part of the reservoir. Withdrawal from storage is also effected by the jib cranes on the bridges, working with grabs, which transfer to a conveyor, situated at the shore end of the bridges, and serving to drain and deliver the coal. The cost of the conveyor was £3,500, against £1,850 which would have been expended on a ropeway for delivery from stack; but £250 was saved on the bridges, owing to the reduced height possible by reason of the reservoir being below ground level. Therefore, the total capital outlay incurred on the reservoir system exceeded the cost of a stacking system by about £4,000. In comparing the working costs, which amount to about £420 per annum, including interest and depreciation charges, it should be noted that the cost of working the conveyor exceeded the estimated cost of working a ropeway (for an open storage system) by about £135 per annum, but the expense of replacing the water in the reservoir was small compared with the expense that would have been incurred on account of a watchman and loss by theft in the case of an open storage system. A comparison has also been made to indicate the difference in the quantity of gas yielded by an equal tonnage of coal stored under water and in open stacks, with the result that 43,300 tons stored under water produced the same quantity of gas as 45,000 tons stored in the open, whilst the amounts of coke and by-products recovered were also noted to be larger in the former case. The final result was a net annual saving of £950 by underwater storage. Investigations made with similar coal stored in the open to ascertain the losses during a period of one month and eight months, indicated that after one month the quantity of gas produced from the coal was 3 per cent. less, sulphate of ammonia 5 per cent., and tar 5 per cent. less, whilst after eight months these losses increased to: gas 8 per cent., sulphate of ammonia 30 per cent., and tar 20 per cent., which shows a very appreciable loss of by-products recoverable from the coal after prolonged storage in the open. This comparative example has been referred to in detail because it certainly is of great interest and value, and it shows that, although the capital outlay incurred by the construction of a reservoir for storage of coal under water was considerably in excess of what would have been incurred by open stacking, the annual saving was appreciably higher, not by reason of lower working costs but by preventing the deterioration of the coal.

Another example of reservoir storage for 10,000 tons, which involved an expenditure of about £6,000, will be of interest, more particularly on account of the foundations necessary. The floor is supported on piles, which were driven at 5 ft. centres to a depth varying from 25 ft. to 35 ft., in order to reach a bed of rock. On these piles, concrete blocks 30 in. sq. and 12 in. thick were constructed. The depth of the reservoir is 22 ft., of which 14 ft. is below ground level; the walls taper from 4 ft. 6 in. in thickness at the base to 2 ft. at the top, and the floor is specially protected against damage by the grab when withdrawing the coal, rails being embedded in the concrete. The coal is handled to and from storage by means of a grab transporter, the track of which is about 26 ft. above the ground level. The coal is received from railway wagons and deposited into two hoppers, from which it is grabbed and transported to the storage reservoir.

Yet another example of a reservoir for the underwater storage of coal may be referred to because, to the writer's knowledge, it is the largest in existence so far, with the exception of the underwater storage at one of the coaling stations of the Panama Canal. This reservoir provides for no less than 100,000 tons of coal, and measures at the surface 791 ft. in length, with a width of 153 ft., the depth being 25½ ft. It is constructed of concrete, the floor being 15 in. thick, reinforced with two layers of expanded metal sheeting, and the sides, which are inclined at an angle of 45 degs., are 20 in. thick at the base and 8 in. at the top. Water is supplied to the reservoir through four 12 in. cast iron pipes, delivering at a level about 6 ft. below the top of the reservoir, and situated about 160 ft. apart. There are also four 18 in. pipes, which are provided with check valves to admit water from the river, the level of which rises in flood time. This prevents pressure under the floor of the reservoir, which would otherwise occur on

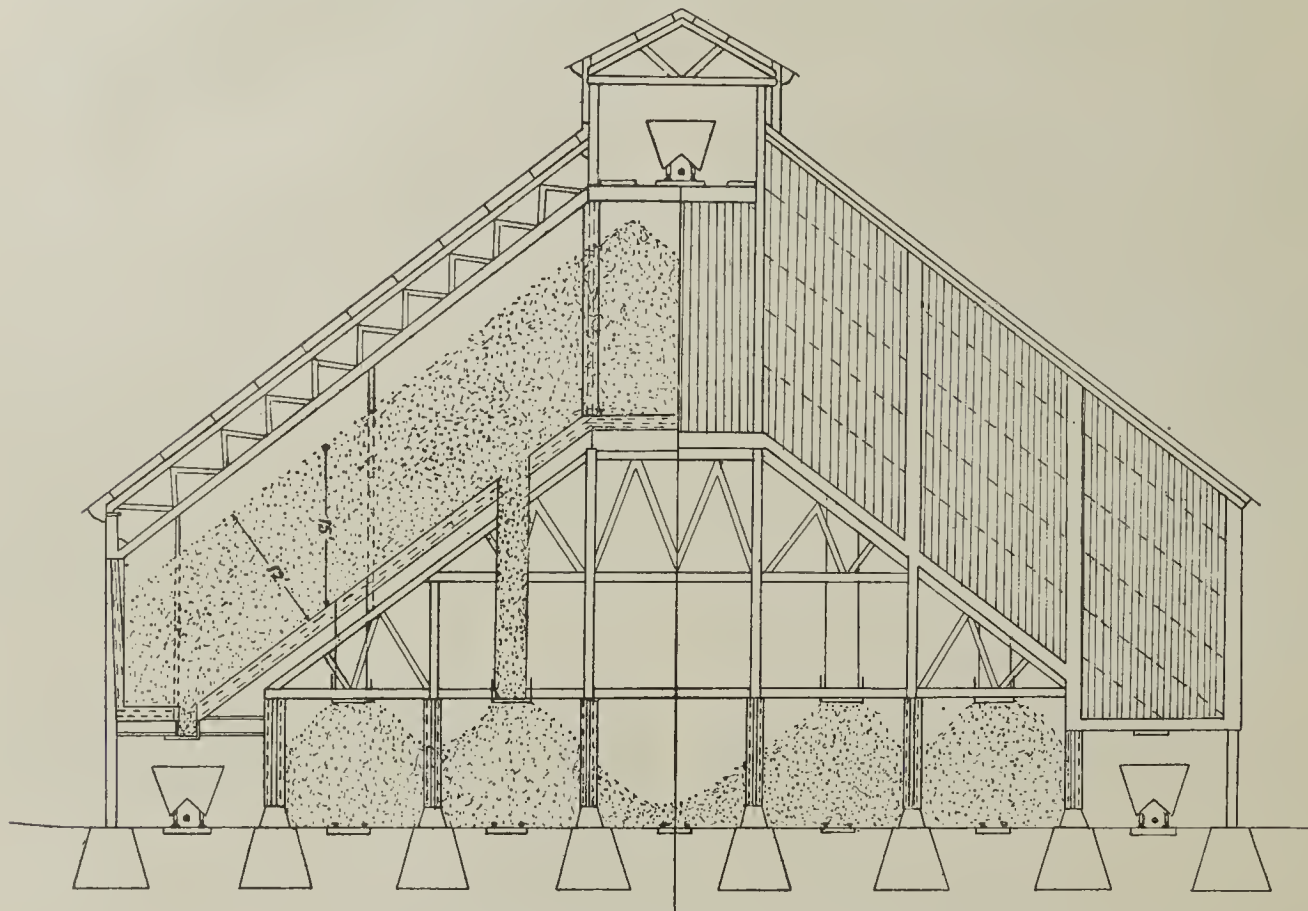


FIG. 2.—BUNKERS OF SPECIAL CONSTRUCTION.

lessening overheating, but rehandling adds to the cost of storage as well as to loss by breakage. Also, bunkers can be so planned and arranged as to facilitate mixing of different classes of coal—especially, perhaps, when rehandling is effected by means of a conveyor or cable-car system, as alternative numbers of buckets or cars can be filled from the chutes of different bins.

The outlets of bunkers should be designed of ample size to prevent "arching" of the coal, and be provided with gate valves selected with discrimination from the point of view of strength, leverage, the avoidance of "jamming," and so as to permit of easy flow and stoppage of the coal. It is preferable for the outlets from bunkers to be directly at the bottom, but the design or conditions may require delivery from the side.

A sliding form of valve is not satisfactory, being difficult to operate, owing to the pressure of the coal against it, and closing may be prevented by the obstruction of a large lump. The valve should be able to cut through the coal in closing, or to push aside large lumps. The different forms of valves include the single or double gate pattern and the hinged flap, of each of which there are, of course, many modifications, adaptable to different conditions. A double gate pattern valve has already been described; a flap valve may be either of the single or double pattern, and is suitable for outlets situated at the side of a bunker, the flap or flaps being lowered and raised respectively to allow and stop the flow of coal. Chutes can also be provided of various form adaptable to the conditions, and either of circular or rectangular section, open or closed, extendable, adjustable, and, if required, to allow of screening.

One method of dealing with spontaneous ignition in closed bunkers is that of forcing inert gas through the coal. This can be effected by providing a system of main and branch pipes throughout the bunker space. After the bunkers have been made airtight by battening down the inlets, the hot air in the bunkers is drawn off through one of the main pipes into a generator, into which a mixture of sulphur dioxide and nitrogen is formed. The gas from the generator is then passed through a cooler and forced through the bunker by way of the other main pipe; when the fire has been extinguished, the heat is removed from the bunkers by a circulation of air. Another somewhat similar system provides for the use of flue gas, and does not necessitate the use of a special generator. The apparatus comprises a blower and a cooler—which washes the gases—whilst the first-named system also requires a generator in which the oxygen in the hot air is combined with sulphur to form the special gas.

A note may here be made concerning gravity-bucket conveyors, as it is sometimes thought such equipment entails considerable expense for maintenance and renewals. Insufficient attention to lubrication is probably often the cause of complaints in that direction. The axles and bushes are the parts most liable to wear, but the life of these need not be less than five years, and almost continuous use, provided the proper attention is given to lubrication. Automatic lubrication is applied to gravity-bucket conveyors, and it has been found that, if the equipment is properly maintained, regular work, insufficient lubricant is not a problem. The writer has in mind a gravity-bucket conveyor, totalling 1,000 ft. in length, which handle not far short of a million tons a year at a cost of just over 3d. per ton.

attention, provides a means of obtaining fairly accurate records of the quantities dealt with. Again, weigh-bridges can be applied to handling with car systems; but as No. 20* of this series referred specially to the question of weighing, that subject need not be gone into here.

Storage in Reservoirs.

The question of storing coal under water has become prominent during recent years, and the adoption of that system is evidently destined to develop. Bunkers of

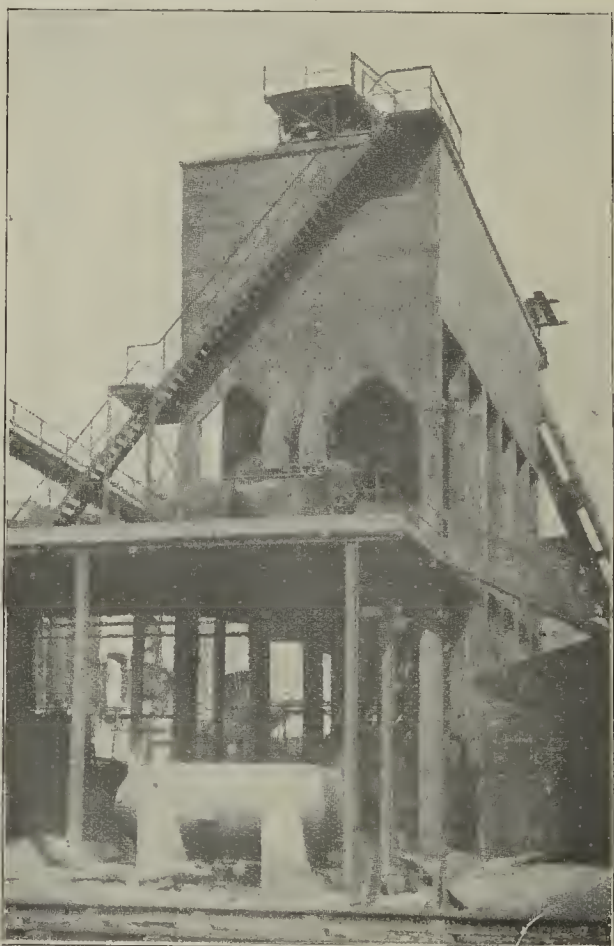


FIG. 3.—FERRO-CONCRETE BUNKERS.

large capacity certainly involve a considerable capital expenditure in excess of that necessary where open-stack storage is resorted to, and the same applies to the construction of underground reservoirs, yet the relative advantages of both systems may more than justify their adoption. The United States and Germany are the two countries which have given the greatest attention to the underwater storage of coal, doubtless on account of the large storages of coal kept in those countries as well as the inflammable and deteriorative nature of some of the coals stored. Alternatives for a project considered a few years back will be of interest to refer to; a storage of gas coal to the extent of about 20,000 tons had to be

* Colliery Guardian, August 17, 1917, p. 299.

such occasions, as the normal water level of the river is equal to the floor level of the reservoir.

In connection with the underground storage of coal, the extensive coaling stations at each end of the Panama Canal, have already been described in detail in Nos. 8 and 9 of this series.*

Examples of under-water storage of coal in Great Britain are not numerous as yet, but owing to the advantages of the system it will doubtless extend. The first instance in England of storage of coal in water was, the author believes, at the power station of the Underground Railways, where a steel tank was provided for an auxiliary or reserve storage of 15,000 tons capacity. The main storage arrangements consist of elevated bunkers, and the coal-handling equipment used therewith is also utilised in connection with the tank storage.

It has already been indicated in previous articles of this series, and shown by an example above, that the advantage of storing coal in water is in the direction of retarding the deterioration of the chemical properties and physical condition of the coal, as well as eliminating the liability to overheating or spontaneous ignition. These advantages more than counterbalance the additional outlay necessary for the construction of a reservoir. Stacking accommodation for large storages of coal involves extensive ground areas owing to the limit of height possible, or at least advisable; for example, presuming the height of stacking is limited to 15 ft., an acre of ground will only accommodate about 12,000 tons. The cost of handling to and from reservoir storage need not usually exceed that of handling to and from stock piles, taking into account both capital outlay of the equipment and working costs. With reservoirs, however, there is the additional charge attached to the provision and working of pumping plant for the purpose of emptying and filling; but again this is somewhat balanced by the extra expense entailed, in the case of pile storage, for supervision, watching, transfer handling, &c. The greatest objection would appear to be that of con-

form a suction sump for the pump. An 8 in. pipe line, which is capable of dealing with coal up to about 7 in. in size, extends from this sump to the reception tanks. There are five separate steel tanks, each having a storage capacity of about 1,500 tons, the object of having divided storage rather than one tank only of the full capacity being to enable different classes of coal to be separated, and also to facilitate the examination and maintenance of the tanks without disturbing the whole stock. Three of the tanks are loaded to full capacity for reserve storage, whilst the remaining two serve for the working stock. The last-named service tanks are used intermittently, the water being drained away from one at a time, and returned by a separate pipe line to the sump at the wharf side. After the coal has been standing about 18 hours it is found suitable for use in steam boilers. The five tanks are of similar size and construction, being 55 ft. in diameter and about 28 ft. deep. The base or floor, which is about 14 ft. below ground level, is supported on a bed of concrete, and is also floated on the inside with concrete about 8 in. thick, whilst the steel walls of the tanks below ground level have a backing of concrete 2 ft. thick. The coal is discharged from the barges by grab cranes, and is similarly handled from the storage tanks. It has been found that the coal can also be pumped direct to the service bunkers, and as the water, being drained off immediately, is not in contact with the coal long enough to penetrate it, the coal can be used almost at once. This scheme has been found to result in a considerable saving in the cost of handling, which was previously effected by cartage; and also the barges can be dealt with more expeditiously, the rate of discharge not being dependent on the rate at which the coal could be carted away. The cost of cartage amounted to about 9½d. per ton against about 4½d. per ton with this hydraulic conveyance system.

A pneumatic system of handling coal has also been adopted in a few instances, the method being on the lines of handling grain. The problem of coal handling in this manner is certainly a more difficult one than

MANCHESTER GEOLOGICAL AND MINING SOCIETY.

The monthly meeting of the members of this society was held on Tuesday, November 13, at Manchester, Mr. WILLIAM PICKUP (president) in the chair.

MINING EDUCATION AND RESEARCH.

The PRESIDENT said he had taken as the subject of his presidential address, "Mining Education and Research," particularly as it applied to the county of Lancashire. It was an appeal for wider interest and greater support. Before the first Education Act of 1870, England had been, it was now generally admitted, entirely outstripped in elementary education by Germany and America. With that Act a tremendous step forward was taken, and it was further accentuated by the Technical Instruction Act, 1889. Very valuable work had been done since, but the leeway had not been nearly made up: and at the present moment the matter was receiving wide attention throughout the country. Substantial advances had already been made in technical education in mining in various districts, including South Wales, but no advance had been made in Lancashire. His sole object in raising the question at the present juncture was to create interest, stimulate thought, excite discussion, and, if possible, obtain much greater support for these two vital subjects than they had hitherto obtained in Lancashire. He did not wish to dogmatise, but rather to suggest. In the past, the people of this country had been occupied by their own prosperity, obsessed by admiration of their own achievements, too confident of the sufficiency of their limited knowledge, contemptuous of the few who tried to throw the light of science in their path, too eager for wealth, and too careless of the needs and aspirations of their workpeople. The product of the technical school was too often held to be useless. Hitherto mining engineers had generally been trained in the pits, and theoretical knowledge had not been called for; it

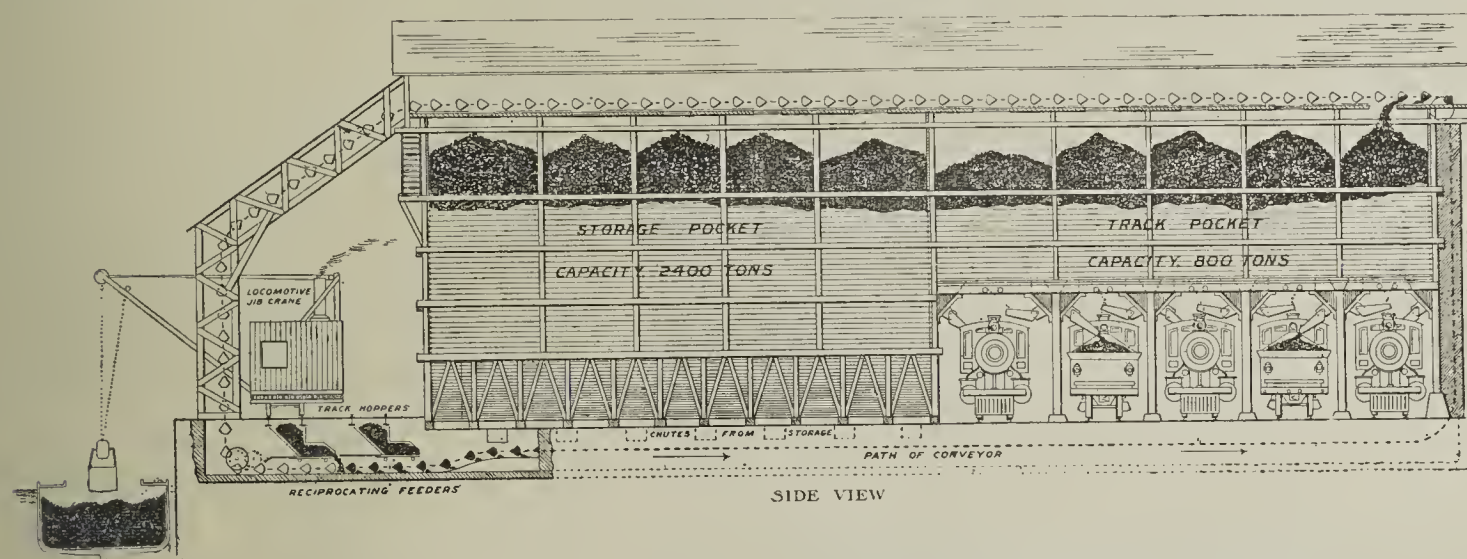
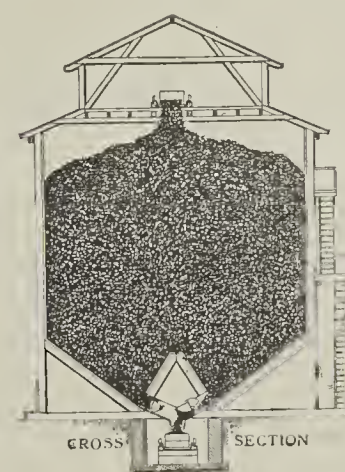


FIG. 4.—CONVEYOR SYSTEM OF STORAGE IN BUNKERS.



ditioning or drying the coal after removal from the water, and making it suitable for use; but arrangements can usually be made for sufficient time to elapse for natural drying. The draining away of the water by emptying the reservoir will not usually, it may be said, eliminate all the surface moisture, but exposure to a dry or warm atmosphere will assist this—at all events, as regards the surface layer of the coal. A deep body of coal will, however, not be appreciably affected by atmospheric conditions, and the question then arises whether the coal shall be re-handled—that is, taken from the reservoir and transferred to intermediate bunkers—before use or loading for transport. No general opinion can be expressed on such a procedure, everything depending on the particular conditions; but it may be stated that the disadvantages in using a damp coal are less than is frequently imagined. The principal objection has probably been from the gas industry, an increase in impurities having been stated to result when the coal is delivered to the retorts in a damp state. That effect, however, has been proved to be exaggerated, and modern gasworks practice has indicated that a coal which has been stored under water gives better results, when carbonised, than coal which has been exposed in stacks. The example already mentioned shows this.

The problem of reservoir, stack or bunker storage can, perhaps, best be met by a combination of two methods; that is, only coal required to be stored for a considerable period, for a reserve or auxiliary supply, need be stored under water, what may be called the working stock being kept in stacks or bunkers according to the conditions. If the working stock amounts to a large tonnage, then the reservoir can also accommodate part of it, the dry storage being kept to the definite minimum by supplies at regular intervals from the reservoir.

Hydraulic Conveyance of Coal.

In connection with under-water storage brief reference may perhaps be made to the hydraulic conveyance or pumping of coal. An interesting scheme introduced two or three years back is proving so successful that extensions are being made, the defects in detail, which occur in every new problem, having, it is stated, been overcome; and there is every prospect of the system receiving consideration for certain cases where it would appear to offer advantages. Pumping coal is, of course, somewhat comparable with hydraulic dredging or water conveyance of dredged material, and consists in mixing the coal with a considerable proportion of water. The example under consideration provides a sump or tank at the wharf side where barges are discharged. This tank is of quite small dimensions, being only about 6 ft. each way, and serves mixing the coal with the water to

that of grain, as, of course, the former has a much greater relative weight. The principal disadvantage is the high power necessary; and also the wear and tear of the ducts, owing to friction, has been a source of trouble; however, there are possibilities in this direction, although, so far, the pneumatic system, of which there are several examples in America, has only been applied to small coal.

COAL GAS AS MOTOR FUEL.

According to Mr. F. W. Goodenough, who spoke at the British Commercial Gas Association's meeting, coal gas at 3d. per 100 cu. ft. is equivalent to petrol at 7½d. to 9d. per gal.; and at 8d. per 100 cu. ft. it is equivalent to petrol at 20d. to 24d. per gal. Regarding the storage problem, he pointed out that there were materials which would absorb hydrogen to the extent of about 400 to 500 times their volume. Coal gas, however, was a complex and not a simple gas, and a good deal of research would be required before we should find a complex absorbent that could be satisfactorily used for the purpose suggested. In addition to the possibilities of containers and cylinders, a method which deserved some consideration was the liquefaction of gas. One might hope that a liquefied gas in a vacuum-jacketed bottle would present considerable features of attraction, coupled with very light weight for conveyance. Compression on a large scale, he agreed, was an after-the-war problem. Another speaker said he did not take an unhelpful view of the weight question. If they took it that 1,000 cu. ft. involved 14 cwt. of dead weight of metal and connections using even mild steel, on which the calculations were based, they must admit that when the time came that they could use high tensile steel or Siemens-Martin 7 per cent. chrome steel, they ought to get the corresponding weight down by at least 60 or 70 per cent. It had been proved that 80 to 85 per cent. efficiency compared with petrol was obtained with coal gas, and with adjustment in the admission of the gas and air this would be improved as time went on.

Allied Control of Metals.—A French company has been formed, entitled the Société Minerais et Metaux, with a capital of 10,000,000 fr. (£400,000), for the purpose of fostering and protecting the metal industries of France. The company, which is representative of existing interests, will seek to improve and extend the methods of distribution, treatment, and marketing of the metals produced in France and her colonies, and will also provide financial facilities for their development. It will not be a profit-making enterprise so much as an organisation for securing the economic development and control of the country's mineral and metal industries.

had even been considered antagonistic to practical success. There had not been a supply of trained mining engineers, partly because there had been no demand, partly because the places where a man could study the theoretical side of his profession were few and far between.

The importance of technical education in mining had not been sufficiently realised in the past, but had been neglected, with the result that the industry, as compared with various other industries, was distinctly behind in the march of progress. In various directions, however, during recent years a gradual convergence of industrial activity and scientific training could be observed; and history was giving us now, as never before, and perhaps never again, the opportunity for re-shaping the forms, institutions, and customs of education.

The principal difficulty we had to overcome was the apathy of Englishmen with regard to the whole subject of education. But a significant change had come over the whole spirit of our educational thinking since the outbreak of war. There was a feeling that the wonderful and resourceful efficiency which we were meeting in our enemies was due to an educational system which had been much superior to ours; and that if we were to hold our own during the war or after we should have to provide our people with an educational equipment and mental power not only equal, but superior to that of the Germans. Wherever we found ability, let us give that ability free scope. The student became a pioneer, thinking of the difficulties ahead; and this mental habit strengthened and developed the imaginative faculty.

The day of unscientific mining was passing, and the industry of the future would be of much greater complexity and difficulty than in the past. The day when the qualifications of a principal were that he had been brought up underground or in the works, and had, therefore, the most complete equipment, was all but over. Years of study and preparation would be required of any man who aspired to assume the direction of the complex and difficult industries of the future. We could not face the industrial problem to-morrow equipped only with good intentions and the ideas of last century.

In this connection the position of technical education was of prime importance. If we were to hold our own in the face of the coming competition of America, Japan, and Germany, we must supply the industry with the requisite number of scientifically trained university graduates. The training of those young men with a broad general and scientific training and a specialised knowledge of some one branch of a science, would necessitate the expansion in size, personnel, and available funds of most of our colleges and universities. The appalling calamity

* Colliery Guardian, October 20, 1916, p. 745, and November 10, 1916, p. 899.

vastated the world during the past three years, give us pause, as it was not unconnected with which experimental science and engineering had been systematically treated in the past century. The war found our large industries unprepared for the heavy drafts which were to be made on their resources; but the fact that this country had been able to improvise an organisation, to establish huge chemical works, to provide raw materials, and to instal operatives under an efficient control in such a manner that, within two years, Great Britain had surpassed the Central Powers in the production of explosives, proved that our country really possessed potentialities superior to those at the command of Germany. The events of the last three years have, in fact, given us a confidence in our own powers which previously we could not feel.

The Coming Economic War.

With the close of the present war, another struggle would be forced upon us. Industrial competition far more intense than formerly would set in as each nation entered upon the attempt to recover its lost markets and to create new ones. What was to come after the war? Unless we were to continue fighting hard, courageously, and intelligently in the economic war, unless we had the energy and enterprise to make ourselves fit and equipped for whatever commercial competition might ensue, we should have a grievously heavy reckoning to pay for our national carelessness. The German people were united in a deliberately calculated national plan for destroying British commercial and political power. If it had to be done on the battlefield, they were ready as a nation in arms; if it could be done in the market place and the workshop, they were a nation in business. We had never been either. We did have a small private military force, but in business we had only a mob of unorganised private adventurers in competition with—in Germany—a highly organised and highly disciplined army of industry. Many who knew Germany still wondered why she appealed to the sword, when the office pen was being wielded with such mighty results. Ten years more at the same rate of progress would perhaps have achieved her object. With lower costs of production, with a closer study of mechanical efficiency, with banking, shipping, and Government support always ready, Germany seemed to have found a formula for doing rapidly increasing business as a communal rather than as an individual form of enterprise. Her commercial system was working to-day for the future, in spite of the blockade, and the same formula would be again applied. What were we doing to defend ourselves against it? We were passing excellent resolutions, but if the war were to collapse suddenly, next week, Germany would be off the mark in a commercial race quicker than any of her competitors. While there was more readiness to discuss this most absorbing question, there were still far too many people who evaded and put off the duty of making timely preparation. Therefore, it behoved us to take a firm grasp of the capital facts, and endeavour to make practical inferences from them.

One of them was that a higher technical education of the brain power controlling the mining industry would be required to deal with the greater and more complex problems which would arise. What was required was that the men in charge of mining to-day should have courage and energy, and lead the way. We wanted to assure that the many millions who rejoiced in their British citizenship should have a decent living, and that our Allies should remain our Allies and our partners in the peaceful development after the war. The case he advanced was a simple business proposition, particularly suitable for discussion by business men, viz.: that if we were to hold our own in the keener commercial struggle of the future, it behoved us to set our house in order, and realise that a higher standard of education all round would be necessary, and that the heads controlling the mining industry would require to attain the highest possible technical standard. It was absolutely essential to our future prosperity and power that Britain should be pre-eminent. Our Dominions and our Allies expected it of us. The chief asset of our Empire in the near future would be educated technically trained men—men of probity and broad and considerable outlook—if we were to make a success of industries which hitherto had been carried on at a low efficiency. The industry should give proof of its belief in the value of highly-trained men by adequate support—moral, financial, and by encouraging students in sufficient numbers. The men required in the future were men of character and ripened experience, gifted with business ability, and masters of technical detail, such as could be found by the dozen in German industries before the war. We had played at technical education during the past 30 years. It was now incumbent upon us to treat the subject seriously, and make provision for the training of real men of affairs.

Mining Education.

The interest of broad-minded employers would manifest itself not only in the proper housing of their workpeople, but also in their educational and social welfare. As a national question, the better education of our young workers should occupy the first place in any scheme of reconstruction. It was proposed, by a Bill now before Parliament, to extend the elementary school life of children in all industries to the age of 14, and to abolish the half-time system. The most striking provision, however, was that which, after the regular school life was finished, demanded compulsory attendance at a secondary school up to the age of 18. A change of attitude of mining employers towards technical education was needed. They must produce a sufficient number of men for each of the different grades of employment, not only to meet the demand, but to give the industry. Persons engaged in mining should be divided into two principal classes: manual workers and technical thinkers. How best to train the future manual workers, and how best to train the future members of

the staff in the control of the industry, were each problems of the first importance.

The Training of Workmen, Under-Officials, etc.

The system of education for the workman should aim at making him a good citizen, satisfied with the work on which he was spending his life, and sufficiently informed concerning economic and social problems to take an intelligent part in national affairs. His first school life would be in a public elementary school. He should be transferred from this school at 12 years of age, and spend the next three years in a junior technical school. In such a school it was usual to give one-third of the week to mathematics, drawing, and elementary science; one-third to literature and other general subjects; and the remaining one-third to manual work. The function of this manual work was not merely to make a more skilled operative, but also to stimulate the boy's interest in his future occupation. At the age of 14 or 15 he should enter upon his work, and throughout the first years he might attend evening classes for, say, four or six hours a week while under 18 years of age. Employers should grant the necessary facilities. The scholarships offered by the local education authorities and other bodies should be increased in number and value until it was no longer possible for a boy to be prevented solely by financial reasons from receiving a university training. From the first it should be made clear to everyone that there was no position to which he might not aspire.

Under-managers with first- or second-class certificates, surveyors, mechanical and electrical engineers would generally follow the same educational course as the workmen, and, with the firemen, obtain their certificates under the Coal Mines Act at the mining classes of the present technical schools and colleges; or they might conveniently conclude their education in a higher technical school. Provision should be made so that the best students of these lower classes who had left the elementary school at, say, 16 years, and, after one year's work in the mine, desired to proceed further, could enter the day courses at a senior technical school, and have facilities for passing finally to a university course.

Inspectors of Mines, Mining Engineers, Agents, and Managers.

It was to the university and to the technical college of university rank that we must look for the adequate training of future members of this class—the men with creative minds, inventors of new appliances and processes, men who would not merely be able to follow existing practice, but also to cope with new problems and lead in new lines of advance. One was immediately impressed by the inadequacy of the present provision for their training. The manager of large collieries had often responsibilities far outside his own concern. He must be able to initiate, consider, and decide upon proposals for working seams that had hitherto been neglected as unprofitable: proposals for generating power and distributing it electrically to distant districts; for the installing of plant; for the distillation of coal, and the recovery of by-products, etc. In fact, the successful development of the coal mining industry demands not only the expert in the various branches of engineering or of chemistry, but the manager with a large outlook, a wide knowledge, and a far-reaching policy. The control of an industry of this importance not only justified, but demanded an adequate training, since any failure to make the best use of our mineral deposits could never afterwards be remedied; and also because an improvement in mining methods might give so large a proportionate return. The future member of this class should remain at a senior technical school until 18, leaving after passing the matriculation or an equivalent examination. He should then spend six to nine months in a coal mine, say, from January until October, and then enter a university or technical college of university rank. The full-time course should embrace mining, mechanical, electrical, and chemical engineering. The greater part of each long vacation during his university course he should spend underground on various kinds of work. He should return to the colliery immediately upon obtaining his degree, or, if he possessed exceptional ability and remained at college for another year of specialised post-graduate work, then he should return as soon as this advanced study was complete. Fifteen months at the colliery subsequent to graduation would bring his age to 23, and would complete his qualifications to sit for the first-class colliery manager's certificate.

The interest of employers in employees should commence immediately they began to work, and it should be well understood from the outset that promising boys attending classes in any subject directly or indirectly connected with mining would have their fees, and, if need be, their railway fares refunded on passing the examination satisfactorily at the end of the session. This brought out at once those youths who were desirous of improving themselves. The same practice should prevail in the encouragement of the most promising of these youths to go forward and obtain the fireman's certificate, and later the second-class certificate as under-manager. The most promising of these youths, as they qualified, should be awarded places as firemen and under-managers when vacancies occurred. A system of this kind provided the lower technical schools with pupils, the colliery with promising officials, and it enabled the pupils to realise that not only did they get their education free, but that the best and most promising would eventually get the best positions. Another desirable practice, and abundantly worth while, was to make the qualification for each official position at a colliery one step in advance of that required by the law, i.e., firemen must generally be holders of second-class certificates, and under-managers holders of first-class certificates. This would be a further incentive and reward of merit.

Without attempting to draw any hard and fast lines, it would be advisable to let the first-class certi-

ficate as a manager avail up to the supervision of 1,000 men; over this number and for assistant inspectorships a diploma in mining should be required; and, for the larger collieries, a degree in mining should be deemed essential for the holder of the position. Another thing to be aimed at was the co-ordination and linking-up of all the existing means of training in mining in such a way that the capable student would be led up to the diploma and finally to the degree courses in the university.

The foregoing suggestions were not only educationally desirable, but commercially possible. Employers should appreciate more fully the value of technical training, and realise that the young man possessing practical experience and a knowledge of mining science—bringing to his work a trained mind capable of working out the most difficult problems likely to arise in his career—was an asset of national importance, who was entitled to be rewarded for his ability in a manner commensurate to his worth in the mining industry. Collieries would do well to take an interest, as subscribers, in the institution of mining for their own district, and through that in the Institution of Mining Engineers, encouraging their officials to attend the local meetings, take part in the discussions, and contribute papers. The founding of scholarships and bursaries, bequests for the endowment of a mining chair in Lancashire—which was much needed—and for the carrying on of research work in subjects connected with mining, were all suitable ways of assisting in the educational and industrial progress of the district. A wider outlook was necessary in connection with the higher education of university students in mining, the most progressive collieries offering facilities for degree students to obtain practical experience at their collieries during the vacation period, whilst a regular levy of a very small fraction of a penny per ton on the output of the area would place all schemes in connection with both education and research in mining upon a thoroughly sound basis. The South Wales School of Mines was a praiseworthy example of what had been done in that district. It was founded and supported by over 30 colliery companies, having a combined output of over 30 million tons per annum, which, on a levy of 0.10d. per ton, produces £12,000 annually. After meeting all charges, they were able to assist deserving students by providing scholarships—two every year—of the value of £40, tenable for four years. This was the only instance where a direct levy on the coal industry had been made for the benefit of education in this country, but it was an example worthy of being followed. The coal owners of Westphalia, by a levy of one-sixteenth of a penny per ton on their output, contributed over £20,000 per annum to the maintenance of the Bochum Mining School, and maintained, in addition, between 20 and 30 preparatory schools throughout the district. There was good reason for believing that the Government would shortly introduce a scheme of additional scholarships recommended by the Consultative Committee of the Board of Education, allocating £100,000 to that object in State-aided secondary schools, and a further £100,000 for increasing the number of scholarships at the university; also recommending the granting of scholarships for research work at the universities.

Industry and Research.

Industrial research was an important factor in ensuring commercial prosperity. Though no immediate return could be expected from the capital invested, industrial research, if wisely organised and efficiently conducted, would in the end pay the industry and the community abundantly. In Germany, the step which did more than anything else to bring about the wonderful development of organic chemistry in that country was the provision that research must be an essential part in the training of every student of chemistry.

The importance of research as an essential part of the training of the man who intended to take up a technical career had not until quite recently been appreciated in this country. In Germany, far more than in any other country, the value of close contact between the industries and the universities had been recognised. The majority of the professors were in close touch with the large works, and spent part of their time in solving technical questions which they initiated themselves or had had submitted to them. This connection between works and universities was of advantage to both. It resulted in the industry taking a keen interest in and subscribing liberally to the department with which it was associated, and the university laboratories were stimulated by the problems arising from the industry. In England, in 1902, the National Physical Laboratory was established with a grant from the Treasury, and was almost the first instance of the State taking part in scientific research. The Imperial Institute also undertook scientific research in relation to industries. But they were neither burdened with work nor heavily subsidised. In May 1915, the Presidents of the Boards of Trade and Education received a deputation from the Royal Society and other learned societies, urging Government assistance for "scientific research for industrial purposes," etc. On July 28, an Order in Council was issued which established the Committee of the Privy Council for Scientific and Industrial Research and the Advisory Council, which met for the first time on August 17, 1915. The next step was to hold conferences with important societies throughout Great Britain, not only of the Royal Society and the Chemical Society, but of all the principal engineering societies.

The engineering trade had long been alive to the need and value of scientific research. At an early date the Council realised that they must at once set up a series of strong standing committees to assist them in surveying the field of research, in constructing panels of referees, and in dealing with applications for grants. In the first year of the Council's existence three standing committees were set up: one for engineering, one on metallurgy, and one on mining.

Each committee consists of about 15 members, of whom approximately half have been nominated by the professional societies concerned, the remainder being appointed directly by the Council. These committees advised the Council on researches relating to engineering, or mining, or metallurgy, as the case might be, and on such matters as might be referred to the committee by the Advisory Council. Gradually, the number and scope of these committees would extend. The Government had placed a fund of a million sterling at the disposal of the new Research Department to enable it to encourage the industries to undertake research. Two members of the Institution of Mechanical Engineers had already made a substantial gift for investigation in mechanical engineering. Money set apart by firms for research would be exempt from taxation. A series of researches under the Coal Conservation Committee were also proposed, to introduce systematic economy in the use of fuel. The Council thought that the best results would be obtained by the formation of trade associations for research. A firm belonging to such an organisation would have the right to recommend specific subjects for research, and if the committee or board of the research organisation of that industry considered the recommendation of sufficient general interest and importance, that research would be carried out without further cost to the firm. The results would be available to all firms in the organisation. A firm would also have the right to ask for a specific piece of research to be undertaken, for its sole benefit, at cost price. The subscription or levy from the firm towards the cost of research would be in proportion to its size, and the Government subsidy providing the balance would be promised for a period of years not exceeding five. This period might be extended if the conditions of the industry called for it. The policy of the Research Department was therefore to delegate industrial research to the industries themselves under carefully selected committees of direction, consisting of leaders of the particular industry, men of science, and representatives of the skilled workers, the State providing assistance for a period—at least, at first.

So far, in connection with mining, the coal owners of South Yorkshire had established a station for research at Doncaster which was already doing valuable work; and the Institution of Mining Engineers, with the various federated institutes, were now engaged on a research on "The control of atmospheric conditions in hot and deep mines." They had in view other investigations, and financial assistance was needed for carrying them out. The speaker would make an earnest appeal to our mining institutions, and to the coal owners' associations throughout the country to realise the need and take an immediate and active part in this national movement, for providing that the highest education necessary in mining should be available, and that research should become a regular and increasing feature, and that both should be systematically endowed with adequate funds.

Prof. BOYD DAWKINS, as senior vice-president, in moving a vote of thanks to the president, remarked that he was sure the members, while listening to the interesting address, could not fail to realise the full force of the effect of the war upon them all. Mr. Pickup had done them a good turn in bringing before them, as he had done, the way in which Manchester, as the centre of the mining interests in that part of the country, could help the national cause in the matter of higher education. If this country were to maintain its position in the world after the war, it was essential that the present system of education should be improved, and, as a mining society, it was their bounden duty to do their little bit towards the general good of the country by making the industry of mining as efficient and complete as it possibly could be. The president had impressed upon them the result of education and organisation in Germany, and he reached the root of the matter when he told them that education must be extended not merely to the leaders, but to the workers as well. The workmen of this country had not, as yet, had their fair share in the educational system, and if the best results were to be obtained, it could only be done by the most intelligent work and the most thoroughly organised work from the very highest position to the very lowest rank of employee. It was absolutely necessary for us to wake up from that Victorian apathy which seemed to have been brought about by prosperity; and he was glad to find there were signs that the war had had the effect of arousing the country.

Mr. A. J. A. ORCHARD, in seconding, said the instinct of self-preservation ought to be sufficient in itself to induce the people at large to take an interest in the subject of education. Reference had been made to the educational facilities in Germany; if we could get to the rock bottom of the German industrial success he believed that the organisation of their mining industry would be found to have played a great part in that success. If it was possible to ascertain the method by which the industry had been organised from the bottom to the top, he had no doubt they would obtain information which would be very instructive.

The resolution was carried with acclamation.

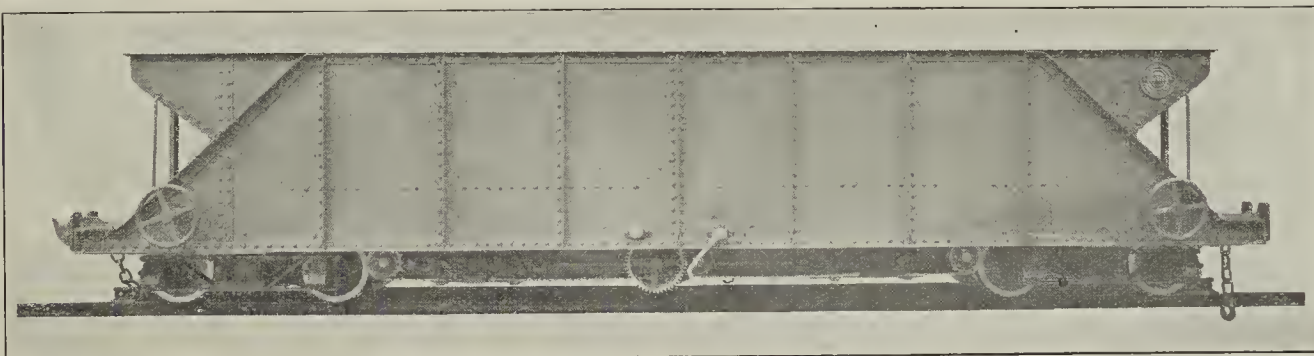
The PRESIDENT, in reply, said he decided to deal with the subject of education because within the last six months or so he had been impressed with the great amount of inertia which appeared to exist in the mining community in Lancashire on the question, and the difficulty there seemed to be in making a move in the direction of an improvement. Not only were there indications of more or less actual opposition, but a feeling existed that education in mining was after all not necessary. In some cases it was thought that the Government requirements relating to certificates for firemen and under-managers went quite far enough, if not a bit too far, and that the Government needed holding back rather than encouraging. That was a great mistake, and he hoped a wider and broader view of the question would be taken.

HIGH-CAPACITY FREIGHT WAGONS FOR THE BURMA MINES.

One of the most interesting of the many narrow-gauge railways of India is the line which connects the main system of the Burma Railways Company, at Namyo station, with Bawdin, where is situated the property of the Burma Mines Company Limited. This railway is about 51 miles in length and is of 2 ft. gauge. The ruling gradient is 1 in 25, the minimum curvature is of 90 ft. radius, and flat-bottomed rails, weighing 41 lb. to the yard, are used. The principal outward traffic consists of lead, silver, zinc ore and lead bullion, whilst the inward traffic comprises machinery and general stores for the requirements of the mines, including 6,000 to 7,000 tons of coke per annum for use at the mine smelters. At Namtu, the headquarters of the company's operations, a large marshalling yard and concentration sidings have lately been established for the accommodation of the traffic and its distribution to the various branches of the company's mines and works. During the past two years the railway has been well ballasted, sharp curves have been improved, and wherever possible the grades have been flattened, whilst additional stations and crossing places have been put in. The trains are now being worked under a "traffic control" system, and, with night working, the railway is handling 900 to 1,000 tons of traffic daily, and arrangements are in hand for increasing this capacity to 2,000 tons daily. This development of the traffic has called for the adoption of more powerful locomotives and larger freight wagons. Several heavy tank locomotives, built by the North British Locomotive Company Limited, of Glasgow, are on order, and some three years ago a number of all-steel coke wagons, of 18 tons capacity, were introduced from Great Britain, whilst other wagons were ordered in India. In addition to the foregoing, several all-steel double hopper self-discharging wagons of 18 to 20 tons carrying capacity, designed by Mr. G. H. Sheffield, consulting engineer, of 38, Victoria-street, and supplied by Messrs. F. R. Rand and Company Limited, of Westminster, have been delivered, and are now in successful service. These wagons, one of which is here illustrated, were built by the Blake Boiler, Wagon and Engineering Company Limited, of Darlington, according to the Sheffield-Twinberrow system, and the following is a table of the leading dimensions:—

Length over headstocks	25 ft.
Length over buffers and couplings ..	28 ft. 8 in.
Width inside	5 ft. 6 in.
Width over side frames	5 ft. 11½ in.
Centres of bogies	19 ft.
Bogie wheel base	3 ft. 6 in.
Diameter of wheels on tread	1 ft. 6 in.
Size of journals	6 in. × 3 in.
Centres of journals	4 ft.
Tare weight of wagon complete	5 tons 18 cwt.
Carrying capacity	18 to 20 tons.

The inclination of the sides and ends of the hoppers is set at 36 degs., the openings are horizontally placed



HIGH-CAPACITY WAGON FOR BURMA MINES.

at 7 in. below the sill, and two horizontal doors cover the bottoms of the hoppers, with a combined area of about 10 sq. ft. Each door runs upon four rollers carried on angle-bar guides, which are riveted to the framing of the hoppers. The horizontal flange of the angle is turned outwards so that no dust or part of the load can fall on the guide rail. At each side of the door a channel-bar sill is arranged so that the web passes beneath the rail, while the pins of the rollers are fixed to the outer vertical flange. The sliding doors are connected independently to a single reduction winch by means of pitch chains and sprockets. The winches are actuated from either side of the wagon by means of short handles which fit on the square nuts at each end of the turning shafts. A single operator can work the doors standing clear of the wagons, and the opening or closing of the hoppers may be regulated to any degree, or may be cut off entirely when any desired portion of the load has been run out of the wagon. The hopping, which acts as a bracing for the lower flanges of the sides, is of ¼ in. thickness, and the door plates are of a similar thickness. Throughout the general structure of the wagon, including the door arrangement, only five British standard sections are employed, and this compares favourably with some recent examples of double hopper bogie wagons having as many as 17 British standard sections. As these wagons operate over steep gradients, powerful either-side screw brakes are provided at each end of the wagon, and brake blocks act on all wheels. The standard coupler in use on the rolling stock of the Burma Railways Company is also employed upon these hopper wagons. The bogies are designed to permit of the eventual conversion from 2 ft. to 2 ft. 6 in. gauge. For this purpose, all that will be necessary is for the wheels to be renewed, as the axles are designed sufficiently long for the new wheel centres to be spaced out 3 in. further upon each side towards the bearings. The brake hangers and brake beams are fitted with ferrules which will be transferred from the outside of the brake blocks and hangers to the inside to the extent required for the increase in the gauge. The leading feature of these bogies is that the weight of the wagon is not carried upon the centre, but is distributed through

groups of coil springs at a transverse distance of 17 in. from each side of the centre. The bending moment upon the main transoms are thus considerably reduced, and the effect is to add materially to the reduction in weight of the structure. The springs are compounded to act efficiently when the wagon is either loaded or empty. They rest in cast steel boxes, the lower parts of which are attached to and between the bogie transoms, or bolsters. The upper, or loose, portions of the boxes have large rubbing surfaces, which have a sliding contact, with corresponding rubbing pieces upon the wagon main transoms. Although tilting action alone is allowed for to the extent of the clearance between the centre pins and pivot casting, and the spring boxes and side checks on the bolster frames of the bogies, there is ample provision for lateral and end movement to suit inequalities in the rails or super-elevation. An advantage in dispensing with the customary swing bolster is the fact that there is no vertical movement of the brake blocks whether the wagon is empty or loaded, thus ensuring a uniform wear of the brake blocks and the same range of brake levers under either loaded or empty conditions. Rolled steel axles, 34 to 36 tons tensile, are employed, along with chilled iron wheels. The wheels are fixed on to the axles at a pressure of not less than 40 tons. Cast steel axleboxes are provided with key plates above the brasses, and they are suitable for either pad or waste packing lubrication.

GEOLOGICAL RESEARCH ON REFRACTORIES DURING 1916.

In his introduction to the "Summary of Progress of the Geological Survey and Museum for 1916," Dr. A. Strahan, the Director, states that the continuance of the war and an increase in the number of special investigations in connection with it and with industrial policy after it is over, necessitated a temporary suspension in all districts of the normal work of the Survey.

On the other hand, the field work connected with the wide subject of refractory materials was completed, an extensive series of specimens was collected, and the petrological and chemical examination of them was put in hand. These materials include quartzites, quartzitic sandstones, ganisters, sands, and siliceous clays (fireclays). All occur as beds in the series of sedimentary formations, and are accessible at their outcrops for determination of their characters, thickness, and range. They exist in great quantity and variety in Britain, several of them in one part or another of the carboniferous system. With the exception of dolomite, they all fall under the description of acid refractories. Dolomite is abundant in this country, but other basic refractories are imported.

The silica brick was first manufactured in 1822 at Dinas, in South Wales, though the raw material had been used in furnaces in copper works several years

before. The method, which was long kept secret, consisted of mixing silica rock, crushed or naturally disintegrated, with about 1 per cent. of lime, enough water to make it coherent, moulding, drying, and firing. The Dinas silica rock is obtained from the basal grit of the millstone grit.

In Yorkshire, the outcrops of the sandstones and shales which compose the millstone grit were laid down upon the 6 in. maps many years ago. These maps have now become the chief guide to the laying-out of works for the production of silica rock.

Refractory sand of high silica percentage, used in large quantities for furnace hearths and other purposes in the steel industry, was obtained before the war principally from Holland and Belgium. Some British sands occurring mainly in the lower greensand and oolitic formations are found to be suitable for the purposes. The chief resources have been investigated during the year in East Yorkshire, Norfolk, Bedfordshire, and Buckinghamshire.

In Scotland, the silica brick industry was started about the year 1876. Flints from Antrim, from the Thames, and from the North of France were used, with a bonding material of plastic clay from South Wales, and until recently little enquiry had been made for Scottish materials. Ganisters and fireclays are now worked extensively, especially in the Central Valley, but it is doubtful whether any of these are equal in quality to the best English ganister. Several rocks not now worked, including sandstones and ganisters in the lower carboniferous groups and quartzites in the older formations, have been examined, and appear likely to give good results.

For hearth sand, material imported from Belgium was used in Scotland almost exclusively, but various sandstones are now ground, and, in addition to Dutch sand, are serving as substitutes for the Belgian material. The results of the investigations in various parts of the country are given below:—

Northumberland, Durham, and North Yorkshire.

Silica and ganister bricks are manufactured somewhat extensively. Fireclay bricks are produced in large quantity, but they are not, as a rule, of a highly

character. Some clays, however, furnish suitable for the outer parts of furnaces. Brick is made in comparatively small quantities from imported material, and chrome brick in still smaller quantity. Several refractory sands for the purpose of iron and steel works are obtained in the district; but those most used are brought from distant parts of England or imported from abroad.

Ganister and Silica Rocks.—About 15 different beds of ganister and silica rock are used for making refractory bricks. These beds range from the upper part of the carboniferous limestone series (calcareous group) upwards into the lower coal measures, while one or two are worked in the oolites of North Cleveland. None are associated with workable coal seams.

There is an abundant supply of these materials, but limited for practical purposes to such areas as afford transport facilities, Weardale being the chief source. At present, however, dearth of labour tends to counteract this abundance.

Few of these rock beds are worked at more than one or two localities, and other beds of silica rock could doubtless be found in the district.

Fireclays.—Firebrick is made from several good fireclays in the lower coal measures below the Brockwell coal and in the lower part of the middle coal measures, the clays for the most part being associated with coals raised at the collieries. Some fireclay is obtained also from the upper part of the carboniferous limestone series.

Firebrick is often made only for the sake of utilising a waste product of coal mining. An abundant supply of clay is assured so long as the associated coal seams are worked, and it is likely that other fireclays might be used.

Several moulding sands of permian, oolitic, and glacial ages are obtained in this district.

The dolomite used is obtained from a small area near Coxhoe. Its occurrence in the permian limestone of co. Durham is capricious.

Yorkshire (West Riding).

For variety and maximum of output of refractory goods, the West Riding of Yorkshire stands pre-eminent. The bulk of the raw material is obtained from the lower part (ganister group) of the local lower coal measures. Sheffield may be regarded as the centre of the silica brick industry, and Leeds, Huddersfield, and Halifax of firebrick.

Not only are there ample reserves in the areas at present worked, but there are many others still untouched. It should be borne in mind, however, that in passing northwards from Sheffield, the ganister below the Hard mine coal gradually changes its character, and over the northern part of the coal field is more often a siliceous clay than a ganister of the Sheffield type. On the other hand, the clays of the lower coal measures become more regular in composition, and the sandstone bands more siliceous and less felspathic. The bunter beds furnish moulding sands, notably near Heck.

Derbyshire.

No great quantity of ganister and silica rock is raised in Derbyshire. The few rocks of these types that are used are of coal measure, or rarely of millstone grit age. The Sheffield ganister (below the Hard mine coal of Yorkshire and Alton coal of Derbyshire) is worked at wide intervals, and could probably be worked more extensively as far south as Ambergate, southward of which it passes into fireclay. It is present in the north-west of the county, but seems not to have been tried. No other ganisters or silica rocks are worked south of the neighbourhood of Ambergate.

Comparatively little fireclay is used for refractory purposes. A bed underlying the Sheffield ganister is used locally in the manufacture of ganister brick, as is the under-clay of the Deep Hard coal (middle coal measures), with admixture of ganister sand, for making coke oven bricks, and alone for "botting" blast furnaces.

The pockets of sand and clay which occur in the carboniferous limestone at numerous points in the elevated tract between Alsop Moor, Brassington, and Parsley Hay, are being actively worked mainly for the production of siliceous firebrick. The white or pale grey argillaceous sands are also distributed in bulk to steel works. Occasionally some of the more plastic white sandy clays are picked out and supplied to makers of stoneware and similar goods. In normal times it might be worth while to pay more attention to these clays for special purposes. There are large reserves of the sand and clay in this district. The material in similar pockets on the Weaver Hills in Staffordshire exhibits clearer evidence of triassic origin than that on the Derbyshire side; it is used for the manufacture of siliceous firebricks at Oakmoor.

Preparations are being made to work the large mass of dolomitised carboniferous limestone at Harboro' Rocks (near Brassington), and in the immediate neighbourhood, as a source of dolomite. The reserves are very large, and the quality is reported to be good.

Nottinghamshire.

Although the dolomitic part of the permian formation forms a broad and continuous outcrop from near Nottingham northwards, it is only in a few places, as at Steetley, near the northern border, that it is used as a refractory material. The lower part of the bunter formation is a well-known source of moulding sands at Worksop, Mansfield, and near Nottingham; the upper part is used at Retford.

Leicestershire, Warwickshire.

Refractory material in Leicestershire is obtained from the upper part of the middle coal measures, which is associated with fireclay, which is associated with refractory purposes, provides both fireclay and crucible clay. The crucible clay is of better quality when mined. Both firebrick and the raw crucible clay are extensively used to the Sheffield, the northern, and other districts. Reserves are abundant.

The Hartshill quartzites of the Nuneaton district were examined as a possible source of a silica rock.

Lincolnshire.

Sandy clays of the upper estuarine series are employed at Stamford as a basis for the manufacture of general fireclay goods and gas retorts.

Cumberland.

Certain fireclays in the lower and middle coal measures are mined by several firms for making firebricks, furnace blocks and stove bricks, tuyeres for Bessemer converters, sleeves, stoppers, nozzles, and bricks for coke ovens. The output is chiefly absorbed by steel and iron firms in Cumberland and Lancashire.

Highly siliceous fireclay, ganister, and millstone grit is made up into ganister compound. No silica brick is produced in this coal field.

Pig bed and casting sands are dug from local glacial and sea sands at Harrington and Workington.

Yorkshire (Ingleton Coal Field).

No fireclays are raised in this field for making refractory goods; but certain under-clays are suitable for the manufacture of stone jars and flower pots.

At Benthams, a soft millstone grit is crushed for pig bed sand, and a glacial deposit is dug for moulding.

Lancashire (Furness).

In the Furness district, steel moulding sand, occurring in pockets of hematite at the Park mine, near Askham, was examined and sampled. Its value lies in the fact that it comes clean away from the casting, and can be used for intricate work. Similar sand, occurring under slightly different conditions, is used for lining steel converters. Reserves are large, and the output could be easily increased.

The sand is described as occurring in pockets in the surface of a platform of carboniferous limestone, which is thickly covered by boulder clay. The limestone is faulted against Skiddaw slate on the east, and towards the south forms a steep face, against which the St. Bees sandstone (trias) is banked. It dips south-westwards, and the pockets are more or less arranged in lines in the direction of dip.

The pockets are oval to circular in plan, and steep-sided. Downwards, they diminish in size, often to sharp, funnel-like terminations. Their outlines, however, are most irregular, both in plan and section. A large pocket would measure about 80 fms. in depth and 150 fms. in greatest diameter.

They contain an outer layer of hematite, which shows an obvious relationship in form to the walls of the pocket. Within this layer there occurs an almost continuous lining of reddish clay, varying from 6 in. to 6 ft. in thickness. The central part of the pocket is filled with loose sand, with small rounded fragments or large irregular lumps of pale grey friable stratified sandstone, all mixed confusedly together. The fragments contain occasional ferruginous, micaceous, or loamy layers and galls of clay. Near the silurian area the pockets contain no sand; but farther from it, and nearer to the red sandstone area, sand gradually comes to occupy a larger part of the pocket than the ore. Both the sand and the lumps of sandstone are such as may have been derived from the St. Bees sandstone; no other materials occur. Within 30 ft. of the limestone face referred to above, the St. Bees sandstone is in the same fragmentary state as the material in the pockets.

The sand and the lumps of sandstone, but not the clay lining, are crushed and mixed for use.

Pig bed sand is obtained from glacial deposits at Parrock Hall, north of Barrow-in-Furness; and crushed red sand from Hawcoat is used for foundry work.

Lancashire (cont.), Cheshire, and North Staffordshire.

Fireclays in the millstone grit, and in the lower, middle, and upper coal measures, are used for the manufacture of fire-resisting goods. The industry is not centralised about any one town, but is carried on at a number of widely separated localities. Works have been visited in the following districts: Macclesfield, Stockport, Ashton-under-Lyne, Oldham, and Bury; Bolton, Wigan, and St. Helens; Blackburn and Burnley. The Lower Mountain (or ganister) mine fireclay in the lower coal measures is the bed chiefly used for fire-resisting goods. Other clays in the coal measures, and some in the millstone grit, have proved, as a rule, to be more suitable for sanitary, glazed, and acid-resisting wares. The so-called ganister frequently associated with the Lower Mountain mine fireclay is a siliceous fireclay, and not a true ganister.

The reserves of fireclay are ample for present requirements and prospective developments, though a recent extension of the longwall method of mining the coal has somewhat curtailed the output of the underclays.

The goods produced are common firebricks, and all kinds of boiler seatings, furnace blocks, destructor blocks, cupola blocks, linings for oil furnaces, coke oven bricks, hot blast stove bricks, sleeves, stoppers and nozzles, ladle bricks, acid-resisting goods, and gas retorts. Ground ganister is supplied to the local iron and steel works.

Moulding sand and sand for forge furnaces is obtained by crushing some of the siliceous sandstones in the millstone grit and coal measures; while finer varieties are obtained from the bunter sandstones and from the glacial and recent deposits. Of all these there are large reserves.

Between Mow Cop and the northern end of Congleton Edge, on the Cheshire side, the siliceous sandstones or "crowstones" of the Pendleside series crop out from beneath the millstone grit, and are being worked with the accompanying shales for ground ganister; the rock is also exported to other parts of the country for making silica brick. The same sandstone is worked at Gun Hill, near Leek, for making silica brick at Burslem. The reserves are considerable in both areas, and there are large supplies available farther north about Bosley Minn and Sutton Common, south of Macclesfield.

The clays extensively dug in the upper part of the middle coal measures of North Staffordshire are used chiefly in connection with the pottery industry.

Denbighshire and Flintshire.

At the southern end of this coal district the dolomite deposits of Porth-y-waen, near Oswestry, were investigated. The rock belongs to the carboniferous limestone series, and is largely worked as a source of dolomite for use in the basic process of steel making.

Farther north, near Ruabon and Wrexham, fire-resisting goods are manufactured from fireclays in the coal measures. The chief output, before the war, was in sanitary ware and glazed goods.

Silica bricks are being made by an increasing number of firms from the quartzites and sandstones of the Cefn-y-fedw series (millstone grit) and from a ganister in the coal measures.

At Buckley, some peculiar and variable fireclays at the top of the middle coal measures are used mainly for acid-resisting bricks; but there is now almost as great an output of "brindled" and white fire-resisting goods, of high strength and resistance to abrasion.

Silica bricks are now made by one firm from siliceous beds in the Buckley group.

Anglesey.

In Anglesey, siliceous refractory materials are raised at Holyhead Mountain and at Ty-du, near Porth-ven (2½ miles west-north-west of Amlwch). The rock at Holyhead Mountain is a quartzite, probably of pre-cambrian age, and is capable of yielding inexhaustible supplies of the raw material. The best quality is used for the manufacture of silica bricks; other grades are ground for ganister compound, for steel moulding sand and hearth sand, and for steel moulder's paint.

The quartzite at Ty-du is to be used for similar products.

Shropshire.

In Coalbrookdale, the fireclay, which is the chief refractory material, is obtained from several beds in the middle or productive coal measures, and is raised by about 10 firms, mainly for the manufacture of common firebricks and saggars for use in the local potteries. Several firms engaged in the iron and steel industries make their own refractory goods. There is apparently no shortage of raw material.

One steel and iron firm manufacture silica bricks for their own use from a local sandstone.

Moulding sand is obtained from the bunter and from glacial deposits.

Quarries in the Stiperstones quartzite (Arenig) at Pontesbury and Granham's Moor were sampled, with a view of ascertaining whether the stone can be used as a source of refractory sand. There is no lack of the raw material.

Worcestershire.

The Lickey quartzite of cambrian age was sampled, as this stone has been used as a source of silica in the manufacture of certain firebricks in the Stourbridge district. There are ample reserves between Barnt Green and Rubery, where the rock is largely quarried for road stone.

South Staffordshire.

The chief refractory material raised is fireclay, and the manufacture of fireclay goods is concentrated in the Stourbridge district, on the borders of Staffordshire and Worcestershire. There are about six beds of fireclay of first quality, and several others of inferior grade, all of which occur in the middle or productive coal measures. From these clays are produced all varieties of fireclay goods, such as firebricks of various shapes and sizes, gas retorts, blast furnace lining blocks, bricks for hot blast stoves, boiler seating blocks, flue covers, bricks for muffle kilns, coke oven bricks, glasshouse tank blocks, and glasshouse pots. Clay for crucibles is sold.

There appears to be no shortage of the raw material, though in some parts of the district the underground water is rising and flooding the deeper workings, and unless some comprehensive drainage scheme is adopted there is a prospect of some of the mines being soon forced to close down.

Common red moulding sand is extensively raised from the upper mottled sandstone (bunter) between Stourbridge and Wolverhampton, but no highly refractory sand was met with.

Forest of Dean.

Only one firm is engaged in the manufacture of firebrick goods. These are produced from some sandstones at the top of the millstone grit near Coleford, and appear to be intermediate between firebrick and silica brick.

Though the carboniferous limestone that surrounds the coal basin appears to be considerably dolomitic, especially on the eastern side, no dolomite for the basic steel process is produced. In one locality, the limestone has been proved by analyses to be too siliceous for this purpose. Other quarries have been sampled with a view to ascertaining whether the same siliceous character prevails elsewhere.

South Wales and Monmouthshire.

In this district silica bricks are the chief refractory product, firebricks being less important.

The silica bricks are made from the quartzites of the millstone grit, the stone being raised at or near Dowlais, Hirwaun, the Vale of Neath, the Vale of Tawe, the Black Mountain (near Brynamman), Llandybie (near Llandilo), Kidwelly, and Templeton (near Narberth). The same formation yields also materials for ground ganister and hearth sands for steel furnaces. There are inexhaustible reserves.

The fireclays occur in the lower coal series and Pennant series of the coal measures. They are manufactured into ordinary firebricks, blast furnace blocks, blocks for steel and zinc furnaces, cupola linings, boiler seatings, coke oven bricks, hot blast stove bricks, flue covers, ladle bricks, sleeves, stoppers and nozzles, tuyeres, etc., etc. Ground fireclay is supplied for ladle linings and for use in copper, zinc, and tin works.

Though much of the carboniferous limestone on the eastern and south-eastern margins of the coal field is dolomitic, none of it is yet worked for use in the steel furnace hearths or converters. It remains to be proved whether it is sufficiently rich in magnesia and free from silica. A local development of dolomite at Clydach, near Abergavenny, promises to be suitable for this purpose, though the reserves are limited.

There are no important deposits of moulding sand in South Wales, but suitable material is manufactured from the disintegrated quartzites and sandstones of the millstone grit, or imported from the bunter districts of Staffordshire and Worcestershire.

Hearth sands are obtained from the disintegrated quartzites and sandstones of the millstone grit, and in one case from quartzites in the old red sandstone.

Cornwall and Devon.

Firebricks are made from disintegrated granite.

Scotland.

The general results of the investigations in Scotland may be stated briefly as follow:—

Hearth Sands.—The holding up of the supply of natural Belgian sand, used almost universally before the war for open-hearth acid steel furnaces and linings of converters in the Bessemer process, has created a large demand for sand suitable for this purpose. This has been met by the importation of a limited amount of Dutch sand, and by the use of ground sandstone from different localities in the South of Scotland. These sandstones, which are chiefly of millstone grit and carboniferous limestone age, have a high silica content, but apart from their chemical composition produce, when ground, a sand inferior in physical characters to the round, even-grained, natural Belgian product.

It is, indeed, believed by the users that no Scottish sand, hitherto produced, can compete, either in quality or price, with the Belgian sand as obtained under pre-war conditions; it is thus probable that these sandstones may have only a temporary value as a source of hearth sand.

Ganister and Other Material for Silica Bricks.—There is a constant and increasing demand for bricks equal in quality to the best Sheffield and Welsh silica bricks for use in steel and other high-temperature furnaces; those at present made from Scottish ganisters being for the most part not sufficiently resistant to be used in the vital parts of such furnaces.

Silica bricks were at one time manufactured by the Eglinton Silica Brick Company Limited, Glasgow, from chalk flints brought from Antrim, the Thames, and the northern coast of France. The material for silica bricks now being made in Scotland is chiefly derived from the ganisters or siliceous sandstones associated with the upper and lower fireclays of the millstone grit of Lanarkshire and Stirlingshire, and also, to a small extent, from sandstone of carboniferous limestone age. A ganister lying near the base of the limestone series along the borders of Edinburghshire and Peeblesshire has lately been analysed and tested, and seems likely to yield refractory material of high quality, the silica content of some of the samples being up to 98.8 and 99.4 per cent. This ganister is about to be opened up between Carllops and Machiehill, Peeblesshire.

Certain highly siliceous quartzites on the coasts of Islay and Jura; on the north shore of Loch Leven, east of Ballachulish; and in the neighbourhood of Dalmally, Argyllshire, have been examined by the Survey, and are suggested as potential sources of material for silica bricks. Specimens from different localities in these areas have been submitted for analysis and testing.

Samples of some of these quartzites have been tested by the Eglinton Silica Brick Company, Glasgow, and the rock from Loch Leven is regarded by them as the best suited for the manufacture of silica bricks.

The amount of rock available at the localities mentioned is large. It lies at or close to the surface, and, in the case of the first two areas, conveniently for transport by sea.

The radiolarian cherts of lower silurian age at Abington, in the Clyde Valley, and on the Ayrshire coast near Ballantrae, have been sampled for analysis, with a view to their suitability for refractory material, and to these potentialities may be added a number of siliceous sandstones in the neighbourhood of Edinburgh, in Lanarkshire, Ayrshire, and the Sanquhar coal field, Dumfriesshire.

Fireclay.—The fireclays in the millstone grit of Lanarkshire and Stirlingshire have long been known as a source of material for high-class refractory products. These include bricks and blocks for use in the crowns and linings of steel, glass, and chemical furnaces; for coke ovens, gas retorts, kilns, oil furnaces (locomotive and marine); nozzles and stoppers, and other fireclay goods.

The clays are derived from two horizons in the millstone grit—the lower fireclay near the base, and the upper fireclay in the upper part of the series.

There are ample reserves of material in sight to meet all present demands, while large fields, especially of the lower fireclay, are as yet almost untouched.

Clays of secondary quality at the base of the coal measures near Falkirk; in the calciferous sandstone of Renfrewshire; and beneath the coal seams in several localities in the Central Valley, Ayrshire, and Fife, are also used in the production of ordinary fireclay goods. The fireclays of North Ayrshire have been the subject of recent investigation by the Survey, and seem likely to yield material of high refractory value. The Ayrshire clays also occur at two horizons—above and below the millstone grit lavas. The lower fireclay is mined at Monkcastle, Dalry, and provides bricks and blocks for local use in steel, iron, and zinc furnaces; the more varied shapes are sent to London for special purposes.

The upper fireclay of Ayrshire, which has been traced from the shore at South Bay, Saltoats, eastwards towards Kilmarnock, is peculiar in being very

hard and well jointed, and having a conchoidal fracture. It also contains an unusual proportion of alumina, sometimes as high as 47.5 per cent. oxide of titanium, usually in the form of rutile, and is also abundant. This clay has been analysed and tested, but is not yet worked. It is worthy of consideration as a clay with a high percentage of alumina.

Dolomite.—The dolomite at present used in basic steel processes in Scotland is chiefly derived from the magnesian limestone of the North of England. Considerable areas of dolomite of cambrian age are found in West Sutherland, West Ross, and near Broadford, in Skye; but the quality of the stone does not appear to be high enough to meet the cost of carriage from these remote regions.

A dolomite band of the Appin limestone, one of the members of the Lochaber series of metamorphic rocks, has recently been opened up at Duror, in Appin, North Argyllshire. Hand samples of the rock have been analysed and reported on as likely to give quite a good dolomite after burning. A large demand and output would, however, be necessary to cover the cost of production and carriage, and to allow the material to be put on the market at a price approaching that of North of England dolomite.

Magnesite bricks are now being made on a large scale to meet present demands by the Eglinton Silica Brick Company, Glasgow, but entirely from imported material.

SCOTTISH MINERS' CONFERENCE.

At the conference of the National Union of Scottish Mine Workers in Edinburgh on November 8, the first resolution was concerned with bathing accommodation at mines. The conference was asked to welcome the regulation order issued by the Home Office, and to instruct the executive committee to take steps to secure whatever advantages may accrue from this voluntary measure, and, further, that the claim be pressed for a whole-hearted measure for compulsory bathing at all mines in the British coal field.

Mr. A. N. McNULTY (Lanarkshire), in moving the resolution, said that they had some rights as the law stood at the present time, and that they had failed to exercise these. That did not preclude them from calling for a larger measure and desiring that the thing should be universal. What he wanted to press on the conference was the need for more propaganda so that things might be established immediately after the war.

The CHAIRMAN (Mr. Robert Smillie) said that employers had done everything to kill the measure by laying it down that if the cost was more than 6d. per week—3d. from employers and workmen—they would not be bound to erect the baths. At the present time it was absolutely impossible to erect and maintain the baths for anything like 6d. If the employers could cease to be capitalists, and be human, then they would have the baths. Bathing ought to be compulsory, and was second only to housing.

The resolution was carried.

The Rights of Officials.

Mr. DOONAN (West Lothian) moved a resolution which asked for an amendment of the law to secure the rights of miners' officials and checkweighers in their duties. He said that what they asked was practically statutory rights to attend all meetings and examination of books. Equal rights were asked for checkweighers.

The resolution was passed.

Compensation Amendment.

An amendment to the Workmen's Compensation Act was moved by Mr. McNULTY, who stated that he was not satisfied with the resolution as it was drafted. The resolution asked that a man should have the right to re-open his claim upon being able to prove that he still suffered, and that the maximum weekly payment be increased to 30s. per week. He said that there were two methods to get a man back to work. The first was that he did not get enough money, and the second was that he was under experts who either crushed him to death or sent him back to his work. The better plan would be to have a medical board of three or four experts.

Mr. JAMES BROWN (Ayrshire) said that in their county they were practically on the point of rebellion on the unsympathetic treatment they were getting from their compensating bodies.

The resolution was passed.

The Case for Nationalisation.

Mr. McKENNA (Lanarkshire) moved a resolution in favour of the nationalisation of mines, which was adopted.

Affairs at Raasay.

A resolution brought forward by the Business Committee was proposed by the CHAIRMAN. It asked the conference to express its strongest condemnation of the use of German prisoners "to keep down the wages of native workers at Raasay," and pledging every assistance in the event of the men being forced to stop work.

Mr. SMITH (Ayrshire) seconded, and the resolution was agreed to.

Mr. McROBERT (Lanarkshire) moved, seconded by Mr. McNULTY, that the conference agree to agitate for the consolidation of the incidence of taxation relative to all local, county, and national administration, and this, along with a resolution on State-paid firemen, was adopted.

The Political Fund.

At the private sitting in the afternoon, the question of the political fund was raised by Lanarkshire. The matter was remitted to the executive.

The office-bearers were re-elected, with Mr. Smillie president, and delegates were appointed to various conferences.

In addition to the resolutions mentioned above, the conference at its sittings last week passed resolutions

calling upon the Government to deal with pit closures and to assist local authorities with funds for housing difficulty. The conference instructed the executive to take steps towards abolishing the system of contracting for ordinary coal-getting, and adopted a resolution in favour of any workman receiving £150 compensation for the loss of an eye. A resolution by Fife and Kinross, that the executive be instructed to make an immediate demand for 3s. per day increase, was withdrawn.

SOUTH WALES MINING TIMBER TRADE.

Before the war the South Wales and Monmouthshire district depended practically wholly upon foreign supplies of pitwood. To-day, owing to Government restrictions, nearly 50 per cent. of the timber utilised is home-grown. The following table shows the coal output of the South Wales and Monmouthshire district during the years 1913 to 1916 inclusive, together with the quantity of foreign mining timber imported into the district in the same periods:—

Years.	Coal output.		Foreign pitwood imported.	
	Tons.		Loads.	
1913	56,830,000	1,759,658		
1914	53,880,000	1,485,397		
1915	50,453,000	1,391,171		
1916	51,909,000	1,374,855		

The bulk of the foreign supplies is now received from France. Since July the Controller of Import Restrictions made licences necessary to import supplies, and at the same time limited the quantity. For the first 10 months of this year, therefore, there has been a sharp decline in the quantity of foreign mining timber received, as will be seen by the following table:—

IMPORTS OF MINING TIMBER INTO SOUTH WALES PORTS DURING 1917.

	Cardiff.	Newport.	Swansea.	Port Talbot.	Total.
Month.	Loads.	Loads.	Loads.	Loads.	Loads.
January ...	55,968 ...	9,307 ...	4,342 ...	4,767 ...	74,384 ...
February ...	57,592 ...	9,632 ...	3 187 ...	3,071 ...	73,482 ...
March	64,214 ...	9,252 ...	4,954 ...	3,008 ...	81,428 ...
April	70,568 ...	6,300 ...	3,630 ...	2,599 ...	83,097 ...
May	61,258 ...	11,432 ...	5,399 ...	2,211 ...	80,500 ...
June	70,109 ...	9,732 ...	838 ...	1,725 ...	82,704 ...
July	68,494 ...	5,092 ...	2,735 ...	— ...	76,321 ...
August	51,498 ...	144 ...	2,025 ...	920 ...	54,587 ...
September...	42,371 ...	4,203 ...	7,431 ...	— ...	54,005 ...
October ...	38,621 ...	288 ...	— ...	— ...	38,909 ...

Totals580,993 ... 65,382 ...34,541 ...18,301 ...699,217

Greater Utilisation of Home-Grown Timber.

Pitwood merchants took time by the forelock, and commenced to interest themselves in the home-grown trade. Large tracts of woodland area were purchased and exploited. The Monmouthshire and South Wales Coal Owners' Association also made efforts to neutralise the anticipated falling off in the supplies of foreign mining timber by the creation of the South Wales and Monmouthshire Colliery Owners' Pitwood Association. This association purchased woodland tracts, and engaged themselves in the felling and distribution of home-grown timber to its members, and after successfully emerging from a barrage of Government regulations and restrictions, now supply a regular and considerable quantity of pitwood to the collieries associated with this war-born company. From July to October the imports of foreign timber show a sharp decrease, the Controller of Import Restrictions having planned the importations to decrease each month by 10,000 tons until October was reached with 40,000 tons allowed to be imported. As will be noticed, only 38,909 loads or 31,128 tons were imported, which is below the quantity allowed to be received by the district. This was due to tonnage difficulties. Nevertheless, the decline in foreign imports was neutralised by the increased utilisation of home-grown timber, the deliveries of which to collieries were much increased. The average monthly imports of foreign mining timber into South Wales during 1913 amounted to 146,638 loads (117,311 tons). Last month the total imports were but one-third of that average. The coal output, however, has dropped by 5,000,000 to 6,000,000 tons, and consequently less pit wood was consumed. If the year 1915 is taken as the probable output this year, and 1,400,000 loads as the amount of pitwood consumed in winning such coal, then the average monthly consumption of wood is represented by 116,000 loads, or 93,000 tons. The Controller of Import Restrictions allowed 40,000 tons of foreign wood to be imported in October, and the same amount per month for the rest of the year. Therefore, it may be intelligently estimated that quite one-half the timber now utilised by collieries in the South Wales district is home grown.

Market Prices Strongly Held.

Quotations for best French fir were strongly maintained on the Cardiff market at 75s. per ton ex ship. For the week ending November 9 the imports of foreign timber were poor, a total of 3,758 tons being recorded, the following being the particulars:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Nov. 3	Morgan and Cadogan	140
" 3	Morgan and Cadogan	84
" 3	Morgan and Cadogan	84
" 8	Morgan and Cadogan	480
" 8	Morgan and Cadogan	60
" 8	Budd and Company Limited	390

Total..... 1,238

Newport:—

Nov. 5	E. Marcesche and Company	360
" 8	Franklin Thomas and Company	2,160

Total..... 2,520

Swansea and Port Talbot:—

No imports reported.

Home-grown timber was in great request, and was very strongly maintained at 75s. per ton for the best sorts. The general range of values is wide, owing to the different species of wood offered. Buyers, however, are not so particular as to form and girth, owing to the general scarcity of wood, and larch and pine pitwood may be taken as ruling from 65s. to 75s. per ton on rail, with mixed hardwood from 55s. to 65s. per ton. Prices are expected to remain strong in view of the limited amount of foreign pitwood allowed to be received.

CONTENTS.

CLASSES:—	PAGE
Control Bill	939
Letter of the House	939
Letter of Colliery Officials	940
ARTICLES:—	
Coal and Shipping	931
Coal Gas as Motor Fuel	933
High-capacity Freight Wagons for the Burma Mines	935
Geological Research on Refractories during 1916	937
South Wales Mining Timber Trade	940
Mobility of Mining Labour	941
The American Coal Trade	944
Merit Rating of Coal Mines under Workmen's Compensation Insurance	944
An Improved Modified Pitot Tube	945
Labour and Wages	947
Open Contracts	948
The Freight Market	948
Abstracts of Patent Specifications Recently Accepted	950
New Patents Connected with the Coal and Iron Trades	952
Publications Received	952
Catalogues and Price Lists Received	952
Government Publications	952
REPORTS OF MEETINGS:—	
Manchester Geological and Mining Society	933
Scottish Miners' Conference	937
THE COAL AND IRON TRADES	940-943
The London Coal Trade	943
The By-Products Trade	944
The Tin-plate Trade	944
PARLIAMENTARY INTELLIGENCE	943
NOTES FROM THE COAL FIELDS	946
COAL, IRON AND ENGINEERING COMPANIES	948
MISCELLANEA:—	
Allied Control of Metals	933
Lancashire and Cheshire Colliery Under-Managers' Association—Imports and Exports in October	940
Alberta's Coal Output—Institution of Petroleum Technologists	942
Miners' "Down Tools" Ballot	943
Miners and Housing—Proposal to Secure Coal Output	944
Partnership Dissolved—Huts for Women's Auxiliary Army Corps—Excess Profits on Mining Shale	945
A Coal Famine in Spain—Protest Against Retail Price	947
Irish Demurrage Action	948
Ammonite	952

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The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, NOVEMBER 16, 1917.

The supply coming forward into the London market has shown a marked falling off lately, and merchants are unable to conform to the Controller's instructions to put down at least a three weeks stock of coal for the winter. "Controlled" coal has been coming forward very slowly.

Business on the Tyne and Wear is still greatly hampered by tonnage scarcity. Steam coals and gas

coals are plentiful at minimum figures. Smithies for shipment to neutrals are dearer. Steam coal requirements in Lancashire fluctuate through the convoy system at sea, causing an alternate glut and scarcity of tonnage. Less complaint regarding supplies of house coal is mentioned in reports from Yorkshire, but the gas coal position is becoming acute, some of the contracts failing to cover the increased use of gas by the public. Stocks are again accumulating in South Wales in consequence of inadequate transport facilities. Bituminous and gas coals for inland consumption are in brisk demand. Anthracite in Swansea is in strong request. Since the falling off in shipments the local requirements have been easily met by the collieries in Scotland.

A very limited business is passing in the freight market. Humber to London is in strong demand at 20s. to 20s. 6d. Almost all the business in South Wales is confined to charters for French Atlantic ports at schedule rates. High rates are offered for Spanish and South American destinations.

The Board of Trade returns state that 1,823 tons of coal, coke and manufactured fuel were imported into the United Kingdom during the 10 months ended October 31, a decrease of 5,069 tons compared with 1916. The month's exports amounted to 3,180,822 tons, value £4,463,028, compared with 3,708,300 tons, valued at £4,875,733, in October last year. The 10 months exports totalled 32,619,757 tons, valued at £43,948,383, compared with 35,151,172 tons in the corresponding period last year.

The Coal Mines Control Agreement (Confirmation) Bill was read a second time and referred to a committee of the House of Commons.

The Central Executive Committee of Great Britain for dealing with the supply of coal to France and Italy, met on November 9. Intimations were received from several of the local committees that their exporting sections were considering the question of pooling business among the qualified exporters in those particular districts.

The South Wales ballot on the "down tools" policy in opposition to the taking of more miners for military service resulted in a majority of over 70,000 against the proposal.

Negotiations are said to be in progress for an allocation scheme for pitwood supplies in South Wales. Maximum prices are proposed in the scheme, which indicates the order of preference in allocating the supplies.

The Coke Oven Managers' Association (Midland Section), will hold the first meeting of the session at the Grand Hotel, Sheffield, on November 24, commencing at 3 p.m. The chairman, Mr. J. W. Lee, will deliver his inaugural address.

The Miners' Conference in Edinburgh, passed resolutions in favour of compulsory bathing arrangements at all British collieries, legislation to secure the rights of miners' officials and checkweighers in their duties, amendment of the provisions regarding compensation, and the nationalisation of mines. Another resolution opposed the employment of German prisoners at Raasay.

The executive of the Miners' Federation of Great Britain and the Coal Controller have agreed upon a scheme for the better distribution of labour among coal and other mines.

The Coal Control Bill.

THE discussion in the House of Commons, on December 8, upon the order for the second reading of the Coal Mines Control Agreement (Confirmation) Bill revealed a somewhat hypercritical attitude on the part of some of the members, and a want of appreciation of the great difficulties involved in working out a satisfactory scheme of financial adjustment acceptable to all concerned. The principle of the Bill was lucidly explained by the PRESIDENT OF THE BOARD OF TRADE. Sir A. STANLEY showed that, having the control of the coal mines, it was essential that the Government should enter into some arrangement with the mine owners in order that they might know exactly what their position was under the arbitrary powers possessed by the Coal Controller, whose action must necessarily be dictated rather by the national interest than by that of the coal owner. That these should often appear to be in conflict must clearly be unavoidable. It is true that the coal owners already possess a means of obtaining compensation for losses by an appeal to the Woodhouse Commission, set up in March 1915

for the investigation of claims for damages arising from the operation of the Defence of the Realm Act. But this machinery is obviously inconvenient for the purpose in question, because each individual claim would require to be separately investigated. The object of the Bill, therefore, is to provide a common basis applicable to all collieries alike, so that every coal owner might know automatically what is his financial position under existing conditions. After much laborious negotiation, therefore, an agreement has been arrived at between the Coal Controller on the one hand and the Mining Association of Great Britain, as representing practically the whole of the mine owners, on the other. The Bill not only gives statutory effect to this agreement, but also provides for any modification that may be subsequently effected.

Sir A. STANLEY gave three reasons why it was deemed necessary to get legal sanction for this agreement. In the first place its successful operation requires that it should be binding upon every mine owner. In the second place it is necessary to consider the position of trustees, who, however willing they might be to accept the agreement, might believe themselves precluded by their fiduciary responsibilities from doing so. Thirdly, a fundamental part of the scheme involves the use of the services of the Inland Revenue authorities, which could not legally be utilised without the authority of Parliament. These considerations, therefore, at once dispose of the question why the Bill was introduced.

With regard to the agreement itself, the details are too complex to set out in full, but its main provisions can be briefly outlined. It provides that every mine owner has a right, during the period of control, to make a claim upon the Coal Controller if, during any accounting period, his profits are less than they were during the standard period, provided that the output during that period is not less than 65 per cent. of that of the standard period. In this case the difference is to be made up by the Coal Controller to the extent of the equivalent of one fourth of the reduction in output. Thus a colliery with an output of 10,000 tons in the pre-war standard period might be presumed to have made a profit of £1,000, equivalent to 2s. per ton. If now, under Government control, the output falls to 9,000 tons, the coal owner would be entitled to have his profits made up to him on the basis of an output of 9,250 tons, at the same rate of profit. That is, his profit would be increased by £25. Cases where the output falls to less than 65 per cent. of the pre-war output would become special cases for the consideration of the Coal Controller, with a right of appeal to the Board of Referees under the Finance Act. If, on the other hand, the profits exceed that of the pre-war standard period, in which case under the Finance (No. 2) Act, 1915, after certain deductions, 80 per cent. is payable as excess profits tax leaving only 20 per cent. for the mine owner, then 15 per cent. of that residual amount is to be paid over to the Inland Revenue authorities to provide a fund for the compensation of the less fortunate mine owners as described above. Thus the essence of the scheme is that those collieries which increase their profits, instead of keeping 20 per cent., retain only 5 per cent. of the increase, and give 15 per cent. to a compensation fund called coal mines excess payments. If, however, an owner can show that the profits so resulting are reduced below the pre-war standard by reason of these excess payments, the latter are to be refunded, with the proviso that in no case may the retained profits exceed six-fifths of the standard plus the addition mentioned in sect. 38 (1) of the Finance (No. 2) Act 1915.

In addition to this there is a special provision for the case of collieries which may be closed by order of the Controller. The owner would not only be entitled to his pre-war profits less the amount due to the falling off in output at the time the mine was closed, but he may also, by consent, receive a special contribution from a levy made upon all the collieries in the district. The Coal Controller, also, agrees to pay 40 per cent. of the cost of closing down the mine, provided that the compensation fund permits. If, on the other hand, the mine owner wants to close a colliery which the Controller requires to be kept working, he is to receive compensation for the special loss incurred. There are also other provisions for special cases, and it is clear that every effort has been made to secure a reasonable agreement. One great point in its favour is the simplification brought

about by computing all profits in the same manner, and by the same machinery, as in the Finance Act, thus avoiding a large amount of additional labour in accountancy.

The agreement has been accepted by the coal owners in the majority of cases, and has been passed by the several local associations. There is, of course, as was to be expected, opposition in some instances. Absolute unanimity could scarcely have been expected. But a number of producers, stated in Parliament to represent an output of 100,000,000 tons out of the annual production of 250,000,000 tons, do not wholly approve of the Bill. Some see an injustice in treating the coal trade in a different manner from other industries, especially at a time when the cost of working has so greatly increased. Undoubtedly, the result might involve a certain amount of hardship in some circumstances. Thus, as was pointed out by Sir J. WALTON in the course of the debate, there is no provision for the case in which a colliery is closed by the owner because it has become unprofitable, unless the Controller decides that its continued working is demanded in the national interest. Perhaps a more general grievance arises from the unequal incidence of the Price of Coal (Limitation) Act in exporting areas, as compared with those depending on home consumption. A doubt was also expressed whether the coal mines excess payments will be sufficient for the purpose in view, and questions were asked both as to guarantees to provide for such a contingency, as well as to the disposal of any surplus that might exist after the period of control. A large part of the debate, however, turned upon the disadvantages of Government control in general, most of which may be freely admitted, but are scarcely relevant to the question at issue.

It would be idle to imagine that coal owners are enamoured of the drastic interference with long accustomed practices that the edicts of the Controller have caused. The whole scheme has been accepted rather from a patriotic determination to support the Government in their great task of carrying on the war than from a belief in the inherent virtues of State management. Furthermore, the House of Commons is scarcely the place for the discussion of such complex technical matters. From the very start of the debate some of the members seem to have got it into their heads that this was a Money Bill, and, therefore, irregular from the point of view of procedure; and it was clear that some of the speakers had a somewhat imperfect grasp of the principles of the Bill, and appeared to resent the necessity imposed upon them of abstaining from amending an agreement which it has taken four months of delicate negotiation to secure.

ON Monday last Mr. THOMAS BURT, "the Father of the House of Commons," reached the honourable age of fourscore years, and we offer him our sincere congratulations upon that event.

Mr. BURT not only possesses the distinction of being the first Labour member to be returned to Parliament, but holds the still prouder honour of having, for an uninterrupted period of 43 years, as member for Morpeth, preserved with rare consistency the respect of every party in the House. Much has happened in the mining industry during that interval.

When only 10 years old Mr. BURT began working in the pits. But for the legislation initiated by the Earl of SHAFTESBURY he would probably have commenced his career as a miner at a still earlier age. In those days the nominal daily hours of work for pit boys were 12, but in reality the bank-to-bank hours were 13. The daily wages of coal getters were at that time 4s., and under the conditions then prevailing the Miners' Union had a hard struggle for existence, and its relations with employers were marked by mutual hostility and distrust. One of Mr. BURT's first activities was directed towards shortening the hours of labour of the pit boys, and in 1878—partly by legislation and partly by agreement—they were reduced to 54 a week, with a maximum of 10 on any one day. From the beginning of the Northumberland Mining Union, Mr. BURT was a member of the executive committee, and soon became general secretary and agent. It was in no small measure due to his influence that the relations between the miners and the employers gradually improved, and after the setting

committees and conciliation boards acute and almost entirely disappeared. Local strikes of wages or conditions of work, which have hitherto been frequent, were now almost wholly confined to collieries not connected with the Coal Owners' Association. Mr. BURT has always been a strong advocate of a closer co-operation between Capital and Labour. He favours a system which would give the men a more direct interest in the wealth they have assisted to produce. He has been equally opposed to class representation and class legislation, and his maiden speech in the House was in support of Sir GEORGE TREVELYAN'S Bill for household suffrage. He is a firm believer in our Parliamentary system, and is thoroughly sound upon questions more directly affecting Labour interests. He has consistently urged the Labour movement in this country along constitutional lines, and has never held narrow views upon trade union pledges. He is one of the few members of Parliament who have refused to be bound by any obligation to vote for party alone. Although a sincere lover of peace, and for 35 years president of the International Arbitration League, Mr. BURT candidly supports the war, and on its outbreak his three sons came home from abroad to offer their services to their country.

Throughout nearly half a century of active life, in the midst of violent political conflict, Mr. BURT'S career stands as a shining example of political candour and straightforward conduct. Every party in the country will wish him many more years of active life, and will regret his decision not to seek re-election after the present Parliament.

Education of Colliery Officials.

In the discussion on Mr. G. L. KERR'S paper on the "Higher Education of Colliery Managers," read recently before the Mining Institute of Scotland, some pertinent remarks were made by Mr. G. BLAKE WALKER upon a cognate subject, the education of colliery officials. In his view the education of the deputy staff is even more important than that of the manager; and this is undoubtedly true, in the sense that no amount of competency on the part of the manager will be of any avail without loyal and adequate support from the staff. Mr. BLAKE WALKER finds reason to believe that the position of the deputy is undergoing an undesirable change. He complains that the officials are ceasing to regard themselves as part of the management, and no longer consider themselves as masters' men.

If this tendency is widespread it will be indeed regrettable. As Mr. BLAKE WALKER says, a good staff of deputies has more influence with the men than the manager can hope to have. The task of colliery management is getting daily more difficult, and is making ever greater demands upon the intelligence and knowledge of the officials. It is essential, therefore, that greater attention should be paid to the selection of deputies, from whose ranks the managers and under-managers of the future will be drawn. A further effort is even now on foot to secure a higher standard of education for this class. In this movement Mr. F. J. JONES, chairman of the South Yorkshire Coal Owners' Association, is taking a prominent part; and the colliery owners throughout this district are believed to be in sympathy with the scheme, and to be willing to give it financial support. The object is to secure means for promoting the education of promising youths, from whose ranks it may be possible to select a band of officials more highly trained and better equipped than is the case at present—with knowledge which will enable them to grapple successfully with the problems of the future.

For the success of this object, however, it is essential that the officials themselves should thoroughly realise their responsibilities, and should recognise their proper position as officers of the colliery crew. Besides education, what is required of them is *esprit de corps* and due appreciation of what is expected from them. It may be that the position of the deputy is not sufficiently attractive

to the collier can command such high wages. That, however, is a small matter, which will the more readily be made up to the confidence the men have in their trustworthiness and ability. It is certain that nothing can be accomplished by attempting to run with the hare and hunt

with the hounds. It is complained that many of the young men do not appear to think it worth while to give their time and energies to higher education. This attitude, if general, would be indeed a calamity of the first order, and would denote a decadent spirit which can scarcely be imagined to exist among any class of British youths. If there is any widespread feeling of dissatisfaction to account for this alleged apathy on the part of the younger men, it would be well to state it openly, and have it discussed upon its merits. What the colliery manager requires is the absolute loyalty of his staff, and a true recognition of the obligations and responsibilities of the official status.

This has long been a subject of discussion amongst mining bodies, and it is generally conceded on all sides that a new type of deputy is needed. But there is a difference of opinion as to how this is to be secured. The Miners' Federation is in favour of State payment, with full control by the miners' associations both of appointment and control. This would be, however, completely to ignore some of the most important functions of the deputy. The result would be to create a class of State-paid police, charged solely with inspection duties. We cannot believe that the deputies as a class would condescend to such a lowering of the dignity of their position as this would entail. The duties of the colliery official are of a higher order than the mere carrying out of the duties imposed upon him by the Coal Mines Act. The method suggested by Mr. BLAKE WALKER to secure increased efficiency in education, character and loyalty, seems to promise better results, because it elevates the office of deputy and allows full scope for the recognition of individual intelligence.

As to the views of the deputies themselves, we gather from letters in the daily Press that a section of them see salvation in organisation, and are forming a Deputies' Federation, designed, as far as can be judged, to oppose the responsible management of the pit. This section complains that the average deputy is under-valued and under-paid, seldom seen by the manager, and buried under the heel of subordinates—viz., under-managers, overmen and surveyors. In a word, this party is dissatisfied with the general management and organisation of the pits.

Amidst these divergent claims the most promising course seems to be evident. The mine owners have shown their willingness to assist in providing the necessary facilities for raising the status of the deputies, and with it will follow, as a natural sequence, that fuller appreciation for which they are anxious.

MOBILITY OF MINING LABOUR.

The executive of the Miners' Federation of Great Britain, at their meeting with the Coal Controller on Thursday, came to an agreement to secure the greater mobility of labour employed in the coal mines of Great Britain during the war.

It is proposed that the Federation shall establish bureaux in the various mining districts of the country for the purpose of facilitating the removal of miners from districts where the pits are overcrowded, and from those places where there is irregular work. Men in such districts are to be asked to work in other districts, will be paid the wage of the district from which they go, or the wage of the district to which they remove, whichever is the highest, and, in addition, will receive a subsistence allowance, including the payment of the railway fares in all cases and varying scales for married and single workers.

The miners' scheme will be entirely restricted to the mining occupation. The Federation will take part in the transfer of men from coal mines to iron ore, stone or ganister mines.

The mobility bureaux will be administered by the miners under the scheme as drafted by the Coal Controller.

Lancashire and Cheshire Colliery Under-Managers' Association.—At a meeting at Wigan on November 10, it was stated that application had been made to the Coal Controller for 40 per cent. above the wage paid to firemen for six days, with free house and coal, 10 days' holiday each year, one suit of clothes per year, 14 days' notice to be given by either side to terminate employment, and full pay when sick.

Imports and Exports in October.—Coal products (not dyes) imported in October amounted to 2,181 cwt., valued at £47,391, compared with 1,692 cwt., valued at £16,256, in October last year. The exports (quantity not specified) were valued at £297,580, an increase on the £212,760 of October 1916. British imports of mining machinery in October aggregated 86 tons, valued £8,989. The exports were 970 tons, valued at £53,531. The prime movers (except electrical) imported amounted to 2,975 tons, valued at £259,012 (last year 673 tons, valued at £44,088). We exported 2,715 tons, valued at £220,371, compared with 4,091 tons, valued at £289,394, a year ago. The pit prop imports, 61,260 loads, valued at £350,004, showed a considerable decrease from the 129,723 loads, valued at £476,560, a year ago.

THE COAL AND IRON TRADES.

THURSDAY, NOVEMBER 15.

Scotland.—Western District.

COAL.

The Scotch coal trade generally continues in a dull and featureless condition. In the west the industrial demand is still comparatively good, and household requirements are on a large scale, but, nevertheless, the collieries are having difficulty in maintaining employment. Small stuffs in particular are inclined to accumulate. Shipments from this district amounted to 95,114 tons against 95,466 in the preceding week and 95,049 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	23/-27/
Ell	26/6-28/	26/6-28/	25/6-27/
Splint	28/-30/	28/-30/	25/-32/6
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

While the various branches of the Scotch iron trade are as active as ever, and makers have orders sufficient to ensure employment for many months ahead, a feeling of uncertainty with regard to future operations is very prevalent. This is in a large measure due to the enhanced cost of fuel. Manufacturers are of the opinion that either a new basis of charges must be fixed, or that the Government shall make good the increased costs of production. In the meantime markets are unsettled. Of course, where prices are unfixed, values are considerably firmer. Conditions in the pig iron trade are unchanged. Outputs of hematite continue to be wholly absorbed by local users, while transactions in iron-making brands is chiefly confined to forge qualities. Monkland and Carnbroe are quoted f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. These prices are now from 2s. 6d. to 5s. per ton higher. Malleable iron makers are still practically confining their attention to home orders, chiefly on Government account. Supplies for ordinary consumption are almost unobtainable at any price. The heavier gauges of black sheets are constantly asked for, and producers have great difficulty in meeting requirements. The engineering trades are particularly well placed at present.

Scotland.—Eastern District.

COAL.

The coal trade in the east of Scotland is far from satisfactory. In the Lothians district shipments have fallen to a minimum, while local wants are easily met, and broken time is frequent. Clearances amounted to 15,750 tons against 19,031 in the preceding week, and 21,728 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	30/-32/
Secondary qualities.....	25/6	25/6	29/-30/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Conditions in Fifeshire are very unsettled. Best navigations and steams are in moderate demand, but third class qualities and smalls are extremely plentiful. Owing to a lack of steady business, idle time is very prevalent. Shipments were 38,083 tons against 24,165 in the previous week and 52,655 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	30/-40/
Unscreened do.....	24/-25/	24/-25/	28/-35/
First-class steam coal.....	28/	28/	28/-33/
Third-class do.	24/	24/	22/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Quotations are all subject to an extra charge of 2s. 6d. per ton, except for shipments to France and Italy.

The aggregate shipments from Scottish ports during the past week amounted to 148,947 tons, compared with 138,662 in the preceding week and 169,432 tons in the corresponding week last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The prompt market has been dull and devoid of much feature for comment during the past week. Since the week-end, tonnage, which had earlier been so scarce as to embarrass regular colliery working very seriously, has come to hand in rather better volume, although supplies are still far from adequate. As a result, the pits in the two counties are working much better at the time of writing. Lost time is by no means entirely obviated by these arrivals. The outlook as to employment towards the end of this week is not cheering, because of the incertitude regarding collier vessels. At the moment, official requirements of fuel are not pressing, and, consequently, requisitioned vessels are not coming forward to any great extent—a fact which adds to the general depression. Steams, gas coals and bunkers are all offering excessively at the bare minimum figures. Smithies and coking sorts are well taken up on home account. Special smithies have positively "boomed"

during the last few days for shipment to neutrals, and prices have advanced by 3s. per ton, this class of fuel being now quoted at 33s. 6d. There is a very good market for coke, the demand easily exceeding the output. Gas coke is particularly strong, and has been advanced in quotation by 2s. 6d., selling now at from 35s. to 37s. 6d.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/-35/
Do. Tynes (Bowers, &c.)	29/6-32/	29/6-32/	30/-32/6
Secondary, Blyths	25/6-28/	25/6-28/	27/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	27/6
Unscreened	23/6-27/6	23/6-27/6	20/-25/
Small, Blyths	20/-22/6	20/-22/6	20/-22/6
Do. Tynes.....	18/6-21/	18/6-21/	17/6-20/
Do. specials.....	20/6-23/	20/6-23/	21/-22/6
Other sorts:—			
Smithies.....	25/-33/6	25/-30/6	20/-22/6
Best gas coals (New Pelton or Holmside)	25/-27/6	25/-27/6	27/6-30/
Secondary gas coals (Pelaw Main or similar)	23/6-26/	23/6-26/	21/-23/
Special gas coals	26/6-29/	26/6-29/	30/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	18/-20/
Do. do. Northumbrians	26/6-27/6	26/6-27/6	20/
Coking coals	24/-27/6	24/-27/6	20/
Do. smalls	24/-27/6	24/-27/6	18/-20/
House coals	28/6-32/	28/6-32/6	30/-35/
Coke, foundry	42/6-45/	42/6-45/	40/-45/
Do. blast-furnace	42/6-45/	42/6-45/	36/-39/
Do. gas	35/-37/6	32/6-35/	33/-35/

Sunderland. COAL.

The coal market prospects for this week are unfavourable. The supply of tonnage is quite inadequate, and in the freight market practically non-existent. Most of the regular boats on which the collieries rely are behindhand, and the pits which depend mainly on export business find themselves in a very unsatisfactory position. Official requisitioning of steam coal is slow, and it is only the home demand that is responsible for keeping many of the pits in work. Gas and manufacturing coals, as well as smithies, peas and nuts, are all moving away steadily. Bunkers are extremely dull, while steam smalls remain an incubus on coal owners' hands, of which they cannot rid themselves. The home demand for coke is good, but exports are disappointingly small. There is no movement in prices, which are simply quoted at the schedule figures, with extremely little business obtainable.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	30/
Secondary do.	25/-27/6	25/-27/6	26/
House coals:—			
Best house coals	32/6	32/6	30/
Ordinary do.	30/6	30/6	25/
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	28/6
South Hetton do.	31/-32/6	31/-32/6	28/6
Lambton unscreened ...	26/6	26/6	20/
South Hetton do.	26/6	26/6	19/
Do. treble nuts	22/6	22/6	23/
Coking coals unscreened	27/6	27/6	21/
Do. smalls	27/6	27/6	18/
Smithies.....	27/6	27/6	19/
Peas and nuts	27/-28/6	27/-28/6	24/6
Best bunkers.....	27/6	27/6	19/-20/
Ordinary bunkers.....	26/6	26/6	18/
Coke:—			
Foundry coke	42/6-45/	42/6-45/	37/
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke.....	32/6-35/	32/6	31/

Middlesbrough-on-Tees.

COAL.

No alteration of moment has occurred regarding coal. The market is dull, and collieries' positions are stated to be most unsatisfactory, with a good deal of time idle in many quarters. Demand for gas coals and household kinds is quite keen, as also is that for special manufacturing fuel, but trade is limited to possibilities of railway facilities. There is no change for the better in steam smalls, nor is there any improvement in the bunker trade. General enquiry for fuel for neutrals is slack, and only occasionally are odd orders received from customers abroad apart from the Allies. Best Durham gas coals are 27s. 6d., and seconds 26s.; whilst Wear specials are 29s. Steam smalls range from 21s. to 23s. Unscreened Durham bunkers run from 26s. 6d. to 27s. 6d. Coke is in very good demand on home account, and local consumption is heavy. Average blastfurnace kinds are 33s. at the ovens, and qualities low in phosphorus 35s. 6d.; whilst foundry coke is 38s. For shipment to neutrals both beehive and patent oven stand at 45s., and gas-house product is in good demand at round about 35s.

IRON.

A temporary reduction in the output of pig iron has occurred, by a spiegel furnace going out of operation. This leaves the number in blast in this district 75, of which 34 are making Cleveland pig, 28 are producing hæmatite, and 13 are manufacturing special kinds of iron. Business is hampered by an uncertain feeling as to whether the fixed maximum prices of pig iron will be advanced to cover cost of increased production, or the position will be adjusted by other means, and traders are anxious for an authoritative announcement on the question. Meanwhile, quotations are the same as have ruled for some time past. Complaints are still heard of delay in delivery, due to shortage of trucks. For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; whilst for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. In the east coast hæmatite branch home deliveries are maintained on a scale sufficient to meet minimum needs of consumers, but very little surplus iron is left for despatch to customers abroad. Nos. 1, 2 and 3 are 122s. 6d. for home use, and 141s. for export to the Allies. Supplies of foreign ore are said to be coming to hand fairly well, but there are still considerable arrears to overtake. There are no new features of importance in the finished iron and steel industries.

Cumberland.

Maryport.

COAL.

The Cumberland coal trade is easier, and in some of the branches business is much quieter, owing to the scarcity of tonnage, weather and other causes. Slacker working of the collieries may be expected. Gales during the past fortnight caused great inconvenience, and the big accumulation of coal on the dock sidings has been responsible for some loss of time at one or two of the collieries. Production is very much below normal, but it is quite sufficient for all requirements, for the present at any rate, and local manufacturing needs are now scarcely large enough to absorb all the output. The export trade is well maintained. The home market is much easier, and for the present the supply is slightly in excess of the demand. There is a good enquiry for best steam coal for local consumption, and some of the collieries have still enough to be going on with, but very little new business is offered. The demand for house coal is gradually improving, orders are coming in freely. The cross-channel trade has improved considerably. Quite a number of vessels held up by bad weather for over a fortnight were able to sail during the week-end. During the week 12 vessels have sailed with coals, all for Irish ports, and the shipments have amounted to 3,610 tons, compared with 2,010 tons at the corresponding period of last year, or an increase of 2,505 tons compared with the previous week. No alteration is reported in local or coastwise quotations. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls „	19/2	19/2	16/8
Do. peas „	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit.....	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	30/
Best works fuel.....	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	21/6	21/6	19/

IRON.

The Cumberland hæmatite pig iron trade continues exceedingly brisk. There is a very strong market for hæmatite pig iron. So far there has been no change in quotations. Makers, not only in Cumberland but on the east coast, are said to be losing heavily on the present official prices. Steel billets are in very keen request, but ordinary commercial sorts are quiet. There is a much better demand for plates. Imports of foreign iron ore last week amounted to 8,000 tons.

South-West Lancashire.

COAL.

Although in the household trade it is quite impossible to expect the prompt fulfilment of orders, there is undoubtedly a little less vehemence in the demands from the customer, and this is some relief to the harassed merchant. Requirements of steam coal for bunkering and export, fluctuate on account of the convoy system, which causes an alternate glut and scarcity of shipping tonnage. Moreover, the recent gales have naturally made arrivals more irregular. Taken as a whole, the available supplies of coal are not too plentiful, and in fact there is very little spare fuel about. Prices are according to schedule with the 2s. 6d. per ton added to all cases where it applies. In the coastwise and cross-channel trade, fair shipments of household coal are being made, but not enough to keep pace with the demands of the buyer. Slack is all practically taken up, and the best qualities are with difficulty procured in the necessary tonnage.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net)	27/ upwds.	27/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/-20/
Do. (f.o.b. Garston, net)	26/ upwds.	26/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net)	25/	25/	24/ upwds
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	23/-24/
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

There was a fair attendance on the Manchester Coal Exchange on Tuesday. There is no change in the situation. All qualities of house, steam, and furnace coal are difficult to obtain, and coal that is being shipped is mostly on contract account.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

There is nothing new to report, all prices and deliveries being controlled by the Government. All works are fully occupied on war material.

Yorkshire and Derbyshire.

Leeds.

COAL.

Very few transactions were effected on Tuesday, because no one has any coal to offer. The position is less intense than it was a few weeks ago, in regard to screened coal at any rate, although the ease at best is only slight. Official pressure on the collieries to give extra deliveries of house coal for the London area is hardly so keen, although there were London factors and merchants on the markets anxious to place orders with which to augment their supplies, which they found impossible of achievement. There is a feeling that the London deliveries are likely to fall to normal dimensions within the next few weeks, and thus relieve nearer markets. Very little beyond contract coal is being shipped coastwise. In the West Riding rather better deliveries are reaching the merchants, and the restriction of the supplies to consumers already holding stocks equal to a month's consumption to ease the situation, but not enough in the majority of instances to enable the Coal Controller's requirements in regard to the acquirement of depot stocks to be carried into effect. Gas coal is very scarce, and anxiety as to the future increases as stocks at the works are on the decline. The market is absolutely bare of supplies of all gas-making coal. In a relative sense, manufacturing fuel is satisfactory. All the industrial centres of the West Riding are working with the maximum of activity, with a correspondingly heavy consumption of fuel, and while supplies are far from plentiful, deliveries appear to be regular and reliable, thus minimising complaints of shortage. Washed nuts, which are set apart mainly for works engaged on Government requirements, are scarcer than ever, and there is a firm market for slacks. Of coking slacks there is a serious shortage, and only with great difficulty do many coke makers keep their ovens at full work. The increase in the price of furnace coke to 32s. at the ovens is now officially announced, and is retrospective to September 17.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallend & London best	21/-21/6	21/-21/6	19/-20/
Silkstone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkstone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/6	20/6-22/	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal.....	17/6-18/6	17/6-18/6	16/-17/
Gas nuts.....	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts.....	18/6-19/6	18/6-19/6	17/-18/
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts.....	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal.....	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks.....	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens:			
Furnace coke	32/	32/	25/8

Barnsley.

COAL.

The demand continues to be strong in all directions, and business, generally speaking, provides no new feature. There is practically no surplus fuel offering on the market, and, as a consequence, the attendance at the usual market is of a meagre description. There still appears to be great difficulty on the part of the collieries to cover the contract requirements, though, of course, they are still subjected to special orders which involves a considerable tonnage which is required for war purposes. The position in regard to the shipment of hards shows very little change, a large proportion of the tonnage being required for the Allied countries, whilst Admiralty needs are also extensively supplied by district collieries. There is no decrease in the quantity required for home consumption; and, as formerly, steam nuts, apart from use in munition factories, are very scarce. The position in regard to supplies of gas coal is becoming more acute owing to the fact that in a great number of cases the tonnage arranged for is insufficient to produce the increased public demand for gas. It is still, however, a very difficult matter to procure supplemental lots, though the problem is being dealt with by the district sub-committees in a fairly effectual manner. To obtain an adequate supply of slacks suitable for coke making, continues to require a big effort, though ordinary slacks are more freely obtainable. Less complaint is heard respecting

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	22/6-24/6	22/6-24/6	20/-22/
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/
Secondary do.	18/-18/6	18/-18/6	15/6-16/
Steam coals:—			
Best hard coals.....	20/-21/	20/-21/	17/6-18/6
Secondary do.	19/-20/	19/-20/	16/6-17/6
Best washed nuts.....	18/9-19/	18/9-19/	15/6-16/
Secondary do.	18/-18/9	18/-18/9	15/6-16/
Best slack	15/-15/6	15/-15/6	12/-13/
Secondary do.	13/-13/6	13/-13/6	10/-11/
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/
Gas nuts.....	18/9	18/9	16/
Furnace coke.....	32/	32/	25/8

house coal, and evidently the reduced supplies of London and the south is permitting a more distribution to the normal markets. The furnace coke is readily cleared, with heavy till existing for bigger supplies.

COAL.

There is little or no change to record in the market position here, except, perhaps, that the demand for export is not so strong, owing to the increasing difficulty in securing shipping tonnage. Sailing vessels are now largely employed in the French trade, and in relation to these weather is an important factor often militating against speedy shipment. A little neutral business continues, chiefly in large steams, best South Yorkshire hards being quoted up to 35s. for accommodation lots for prompt shipment. The official return shows that the arrivals at Hull from the collieries during October amounted to 260,358 tons, as compared with 292,364 tons in October last year, a decrease of 32,000 tons, equal to 10.9 per cent. For the 10 months, January-October, the total is 2,432,092 tons, against 2,821,563 tons, a difference of 389,467 tons, equal to 13.8 per cent. Figures of foreign exports are withheld, but it may be stated that the bulk sent abroad is under the arrangement of fixed prices and freights to France, and some to Italy and the Mediterranean. There is also a proportion to neutrals, but the licensing regulations are extremely strict in respect of Yorkshire coal owing to the great preference given to it by the Admiralty, and the enormous industrial demands made upon it.

Chesterfield.**COAL.**

All classes of coal continue in great demand, consumers on all sides being eager to secure supplies of the particular kind they require. Unfortunately the output is such as to render it impossible to satisfy customers' requirements in full. Cobbles and nuts continue to be the class of fuel most urgently wanted. Slack for boiler firing is in good demand but there is less difficulty in obtaining supplies of this fuel than the other kinds of coal. Gas coal is in great request, but much difficulty is experienced in securing adequate supplies. Steam coal for locomotive purposes is also in pressing demand. There is no change in the export trade, which is at a complete standstill so far as this district is concerned. The authorities still decline to grant licences for the shipment of Derbyshire coal. The coke market maintains its steady character, all qualities of coke going steadily into consumption. Coal prices are firm and unchanged.

IRON.

The iron trade of the district is in a state of great activity. Pig iron is in good demand and the finished iron department is very busy. This state of things applies equally to engineering works and foundries.

Nottingham.**COAL.**

While an active tone pervades all branches of the trade in this county, business has assumed an easier tendency in the retail section during the past week, thus affording local merchants an opportunity of carrying out over-standing orders. Supplies of household fuel are coming to hand fairly satisfactorily, and with the falling off in orders by the public, merchants are anticipating being able to replenish their stocks to some extent for the winter. There is still an insistent demand for all kinds of households from the collieries, but the distribution is being proceeded with as evenly as possible. Although the output of steams is maintained at a satisfactory level, the tonnage is not sufficient to allow scarcely any open market dealings. In fact, most collieries have a difficulty to comply fully with contract requirements. Gas coal is in increasing demand, while coke is disposed of as rapidly as the ovens can produce it. Slacks of nearly all descriptions continue in good request, with coking sorts still being inadequate to meet the needs of all customers.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/-	21/-22/-	19/-20/-
Good house coals	20/-21/-	20/-21/-	18/-18/6
Secondary do.	19/6-20/-	19/6-20/-	17/-18/-
Best hard coals	18/6-19/6	18/6-19/6	17/-18/-
Secondary do.	17/9-18/3	17/9-18/3	16/-17/-
Slacks (best hards)	14/6-15/-	14/6-15/-	12/-13/-
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/-	13/-	11/-

Leicestershire.**COAL.**

The reduction in the number of wagons necessitated by the changes in the military situation is becoming more and more in evidence at all the collieries. Railway-owned wagons are now strictly reserved for military purposes and railway working, and this has again brought an advantage to merchants, who keep collieries well supplied with empties ready for loading with any coal that may be available. The general conditions become more stringent, and after military establishments have been supplied, there has to be a very rigid subdivision in order that domestic needs in large centres of population may be kept covered. There is still an enormous demand for London and district, and the deliveries are again quite up to the maximum. All classes

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/-
Second, hand picked	19/-20/-	19/-20/-	15/6-17/-
Deep screened cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/-
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/-
Small nuts	17/-18/-	17/-18/-	14/6-15/6
Do.	15/3-16/6	15/3-16/6	12/9-13/6
Do.	14/6-14/9	14/6-14/9	12/-12/3
Do.	8/6-9/6	8/6-9/6	6/-7/-
Do.	16/-17/6	16/-17/6	14/-15/-
Do.	16/6-17/6	16/6-17/6	14/6-15/6
Do.	15/6-17/-	15/6-17/-	13/6-15/-
Do.	16/-17/6	16/-17/6	14/-15/-
Do.	14/9-15/6	14/9-15/6	12/6-13/6

of household are taken up with the utmost freedom, while deep and main cobbles and nuts are cleared off day by day. Small nuts for mechanical stokers are in very full request, and there seems every prospect of the big London demand being maintained right through the winter. Country coal merchants are labouring under many difficulties, but there are again larger and more regular supplies. There is, however, a great shortage of horses and men for transport, and there seems little chance of any accumulation of reserves being made at present. Civic authorities are demanding coal to hold as special reserves to meet possible emergencies, but for the moment there is no coal available for this purpose. There are no reserves at country stations or at the collieries.

South Staffordshire, North Worcestershire and Warwickshire.**Birmingham.****COAL.**

Merchants are working under the Order issued by the Controller for regulating the distribution of coal. One or two cases have been recorded of people attempting to evade the Order, but they have received no encouragement from the merchants, who rather welcome the Order. They have no stocks on hand, and although supplies have recently been a little better there is an immediate market for them. All descriptions of industrial fuel are much in request, and after meeting the demands of munition works there is little left for the open market.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	24/6	24/6	22/-
Do. seconds deep	22/6	22/6	20/-
Do. best shallow	21/6	21/6	19/-
Do. seconds do.	20/6	20/6	18/-
Best hard	21/-	21/-	18/6
Forge coal	18/6	18/6	16/-
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/-
Do. hand-picked			
cobs	20/6	20/6	18/-
Best hard spires	22/6	22/6	20/-
Forge (steam)	18/6	18/6	16/-
D.S. nuts (steam)	17/-	17/-	14/6
Small (do.)	17/-	17/-	14/6

IRON.

Business continues to be hung up to a large extent owing to the absence of the anxiously awaited decision regarding the adjustment of the official maxima. Something is certainly expected to compensate ironmasters for the increased cost of production, of which the advance in coke is only one, if a large item. New business in both crude and finished branches is confined to the narrowest limits, and lack of material for general trade is being more and more emphasised. Outside market activities, of course, the works are kept going at full pressure on essential orders, of which there is a heavy accumulation. Recently facilities have been offered for heavier shipments of small rounds, squares and flats, more especially the thin gauges, down to three-sixteenths. For these high prices are paid, and one maker mentions that he got as much as £21 for steel rounds, though this was described as an outside figure. A more general price would be £19 to £20. Iron rounds are on the basis of £16 10s. for three-eighths sizes. Makers of merchant bars are heavily booked, and are concentrating their activities on home requirements. The controlled price of £13 15s. net at makers' works prevails, but people fortunate enough to get small quantities outside have to pay about 10s. a ton additional. In the sheet trade business is confined to black descriptions, flat or corrugated, spelter having become so precious that its use for galvanising has practically ceased for the time being. Black sheets are retained at £17, and although makers could book a fair number of orders for small lots under 2 tons, for which they would be entitled to charge £19, they prefer to work on official orders, for which they have a chance of getting supplies of sheet bars. Steel makers are practically flooded with war orders. In addition to wire rods, some American billets have recently been on offer, but at the very high price of £14 a ton, which consumers hesitate to pay.

Forest of Dean.**Lydney.****COAL.**

The market for house coal has continued very firm, and the collieries, though kept fully at work, are still a few weeks in arrears with many of their orders. Substantial quantities are leaving the collieries daily for the railborne districts, the demand being still very urgent. Stems at the docks are heavy, vessels having a waiting turn of more than a week. Consumers are experiencing great difficulty in procuring adequate supplies of all qualities of steam coals, and the pits are having a difficult time endeavouring to satisfy the heavy calls from buyers.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/-
Forest	25/6	25/6	23/-
Rubble	25/9	25/9	23/3
Nuts	24/-	24/-	21/6
Rough slack	16/-	16/-	13/-
Steam coal —			
Large	23/-23/6	22/6-23/6	20/-
Small	18/6-19/6	18/6-19/-	16/-17/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

Alberta's Coal Output.—A cablegram from the Minister of the Interior, Ottawa, states that the total output of coal in Alberta during the third quarter of the current year is 1,324,452 tons, an increase over the same period last year of 305,384 tons.

Institution of Petroleum Technologists.—A meeting of the institution will be held on Tuesday evening, Nov. 20, at the House of the Royal Society of Arts, John-street, Adelphi, London, W.C. A paper on "The Oil Prospects of the British Isles," by Mr. W. H. Dalton, will be read.

THE WELSH COAL AND IRON TRADES.

THURSDAY, NOVEMBER 15.

Monmouthshire, South Wales, &c.**Newport.****COAL.**

The coal market of this district has been very quiet during the past week. Prices are strictly those fixed by the Coal Controller, though for some classes, notably house and gas coals, a higher rate could otherwise be obtained considering the question of supply and demand. There has been a scarcity of coke, as makers have not been able to produce enough for home and Allied requirements. There is again a large amount of coal in stock, particularly of small, and work at some of the collieries has been intermittent. The arrival of tonnage of late has not been sufficient to meet the requirements of shippers, though it has shown an improvement. There was no change in the position of patent fuel, which was in ample supply to meet all demands.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	33/6	32/6	32/-33/-
Western-valleys, ordin'y	32/6	31/6	30/-31/-
Best Eastern-valleys ...	31/6	31/6	29/-30/-
Secondary do.	31/6	30/6	25/-27/6
Best small coals	30/6	23/6	20/-22/-
Secondary do.	24/-	22/6	19/-20/-
Inferior do.	22/6	20/6	17/-19/-
Screenings	25/6	25/6	21/-22/-
Through coals	29/6	29/6	23/-25/-
Best washed nuts	32/6	32/6	26/-28/-
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	24/-26/6
Secondary do. do. ...	33/3	33/3	22/-24/-
Patent fuel	35/-	32/6	37/6-40/-
Furnace coke	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	57/6-60/-

IRON.

The output from all the works in the district has now fully recovered from the adverse conditions which formerly existed, and there is a steady maximum yield all round. Prices are purely nominal, as most of the work is on Government account. The tin-plate trade is gradually re-establishing itself in a more favourable position. Though the demand for pitwood has been scarcely as great as in the past few weeks, the market kept steady, and sellers were still asking 75s. for best French fir.

Cardiff.**COAL.**

There is no improvement in the tonnage position, and, although sailings about balance arrivals, the number of vessels available are much below the requirements of the trade. Stocks are again accumulating, especially smalls, and frequent stoppages are reported from different parts of the coalfield. This irregularity of working is becoming a recognised feature in these times, and when the pits are running the men are putting forth increased efforts to enhance their output so as to make up for the lost time. The resultant aggregate falling off, owing to the occasional periods of idleness, is, therefore, not so much as might be expected, and if figures were available it would be seen that the total output from the coal field is little less than in the corresponding weeks of last year. There are practically no new features. The miners' ballot on the "down-tools" policy in respect of the military coming-out scheme has now been practically concluded, and the figures show that the pacifist element is in a hopeless minority of over 70,000. This is satisfactory so far as it goes, but everybody is asking where the money came from to carry out pacifist propaganda. The suggested pooling arrangement in connection with Italian shipments is hanging fire, and difficulties have been raised which will probably have the effect of making the scheme impracticable. So far as business generally is concerned, there is no lack of orders, and many exporters have sufficient transactions on hand to last them several months. The only difficulty is transport.

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/-	33/-	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	30/-31/-
Ordinary	30/-	30/-	29/-30/-
Steam smalls No. 1	21/6	21/6	20/-22/-
Do. 2	21/-	21/-	20/-21/-
Do. 3	20/6	20/6	20/-21/-
Do. 4	20/-	20/-	18/-20/-
Do. 5	19/6	19/6	18/-20/-
Do. 6	19/-	19/-	17/-18/-
Do. 7	18/6	18/6	17/-18/-
Do. 8	18/-	18/-	17/-18/-
Best dry coals	30/-	30/-	30/-31/-
Ordinary drys	28/6	28/6	28/-30/-
Best washed nuts	30/-	30/-	30/-32/-
Seconds	28/6	28/6	30/-31/-
Best washed peas	27/6	27/6	30/-31/-
Seconds	26/6	26/6	29/-30/-
Monmouthshire:—			
Black Veins	30/-	30/-	30/-31/-
Western-valleys	29/-	29/-	29/-30/-
Eastern-valleys	29/-	29/-	28/-29/-
Inferior do.	28/-	28/-	27/-28/-
Bituminous coals:—			
Best house coals (at pit)	33/-	33/-	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda:—			
Bituminous large	30/9	30/9	30/-31/-
Small	26/-	26/-	25/-26/-
No. 2 Rhondda:—			
Large	27/-	27/-	29/-30/-
Through-and-through	22/-23/6	22/-23/6	22/-24/6
Small	17/-19/-	17/-19/-	19/-20/-
Best patent fuel	30/-	30/-	41/-42/6
Seconds	30/-	30/-	40/-41/-
Special foundry coke	47/6	47/6	64/6-67/6
Ordinary do.	47/6	47/6	55/-60/-
Furnace coke	47/6	47/6	50/-55/-
Pitwood (ex-ship)	72/6-75/-	75/-	46/-47

* Nominal.

For official export little trouble is experienced, but for ordinary business tonnage is scarce. Chartering last week was not so good as in the preceding six days, the fixtures only amounting to 19,500 tons, compared with 21,450 tons, and the total for the year is less than a fourth of the amount of tonnage taken up in the same period of 1916. The week commenced well, no less than 9,400 tons being arranged on Monday, but Tuesday was a blank day, and the spurt is not likely to be maintained. Whilst stocks of inferior steams and small coals are accumulating, there is a pronounced scarcity of bituminous and gas-making coals. The demand for coke also exceeds the supply, and an advance of 2s. 6d. per ton at the ovens has been authorised in respect of sales for home consumption, making foundry 50s. 6d., and furnace cokes 37s. 6d. This is following the advance recently made in coal prices in order to meet the decrease in miners' wages. Patent fuel is plentiful. Pitwood arrivals are scanty, and it was reported on 'Change on Tuesday that negotiations were in progress for an allocation scheme, with fixed maximum prices, under which all essential requirements will be first supplied. This means that collieries on the Admiralty list, and others supplying high-grade coals, will have the first call on the quantities that are available. The position for some time has given rise to considerable anxiety, and with a complete scheme of co-ordination it is hoped that much benefit will accrue to the trade. Current prices for best French fir are on the basis of 72s. 6d. to 75s. per ton. It is stated that considerable stocks are available at Portuguese ports if facilities could only be granted for transport.

IRON.

There is no change to report in the tin-plate trade. Urgent demands for plates are being made by the canning industry, and it is suggested that the heavy stocks of wasters which have accumulated during the last four weeks might with advantage be released in order to meet these requirements. It is contended that if the Food Controller were approached, and the urgency of the matter pointed out, it might result in a considerable relaxation of the existing instructions. Shipments last week amounted to 17,480 boxes, but receipts from works showed a substantial increase, amounting to 33,399 boxes. Stocks in the dock warehouses and vans now total 74,055 boxes, compared with 58,136 boxes in the preceding week and 127,619 boxes a year ago. Prices are still on the basis of 30s. per box for standard sizes, but it is urged that an increase should be allowed owing to the advance in the price of coal, and the high figure which is demanded for block tin, which now exceeds £273 per ton. The Committee on Production has issued the award in connection with the application of tin-plate employees for an increase of 100 per cent. war bonus, and also for payment for idle time from excess profits. The award states that the scale of percentage bonus shall continue, and in the case of the maintenance men and shift men the percentage war bonus is to be payable on the time rates in respect of maintenance men, and on the shift rates (six shifts per week) in the case of the shift men. Those aged over 18 years will receive an advance of 5s. per full ordinary week, as from October 22, and boys and apprentices under 18 half that sum. A similar award has been made in respect of iron and steel workers. In the general iron and steel trade there is no easing off in the pressure for war purposes, and outputs are being maintained at their maximum. Rail and bar mills are exceedingly busy on Government orders, and ordinary commercial business is practically neglected. In the galvanised sheet trade there is no change, and the few mills operating are engaged on black sheets and trench plates. Spelter works are exceedingly busy, but full advantage cannot yet be taken of recent extensions owing to shortage of ore. Current prices remain at £54 per ton. There is no change in the iron ore market, and supplies continue to be satisfactory. Scrap metals are steady at maximum prices, with a demand in excess of supplies.

Llanelli.

COAL.

There is not much business doing on the local market. Anthracite large qualities are very firm, and as sellers have in most cases disposed of their outputs for some time ahead, it is very difficult to secure anything like substantial quantities for current business. This applies in particular to the better grades of anthracite large, for which there is a strong demand. Cobbles are also very active, and not many "spot" lots available. There is no easing off in the position of nuts and beans, and buyers are finding it difficult to cover their requirements. Peas are inclined to be easy, and there is no difficulty in securing supplies. Culm and duff are still very sluggish, and stocks at collieries and also in trucks are heavy. The steam coal market is not very active. Large kinds of practically all grades are on

offer. Throughs and smalls are both slow, and buyers able to secure all their requirements. The lower grades are in poor demand, and stocks on hand very heavy. House coals are very firm, with collieries busy coping with the demand. Manufacturing coals are also well enquired for, but practically all supplies are taken by local works.

The prices in list are subject to an increase of 2s. 6d. per ton to meet the war wages increase, except in the case of shipments to France and Italy and coal for the manufacture of patent fuel for shipment thereto.

Swansea.

COAL.

There was a capital attendance on 'Change, and the anthracite coal market continued to display a very strong tone. Large cobbles, nuts and beans were very tightly held, but peas were easy. For rubbly culm and duff there was no market. In the steam coal market there was practically no demand.

THE LONDON COAL TRADE.

THURSDAY, NOVEMBER 15

The main problem of the Lond n trade has been the manipulation of the schedules and requisition forms for the necessary supplies for the Metropolis. Although the market continues exceedingly active, the reports from all the depots show that the tonnage coming forward is much below the average. Very few merchants find themselves in a position to fulfil the Controller's requirements to put down a sufficient stock for winter needs. The loaders and carmen are working very regularly, but the shortage of men is everywhere noticeable. Steam coals are very scarce, and the quantities coming forward to London are shorter than ever. Many of the City councils, acting on the suggestion of the Coal Controller, have been making very pressing efforts during the past week to arrange for a suitable quantity to be stored in some way or other to meet the needs of the smaller houses and tenements in the various districts. Some of the trolley men in the London districts have taken an unfair advantage of the new requisition forms by compelling would-be customers to sign the form before delivering any of the coal. These forms bind the customer to obtain all his coal from the same firms for the whole year. Quantities of 2 cwt. of coal or 3 cwt. of coko in any week can be purchased from trolley men without any formalities. The house coal supply in London has been largely be efited by the Coal Transport Reorganisation Scheme instituted by the Controller some little time ago, but supplies are falling off considerably now, and the prospects for the additional winter supply are not so favourable as during the summer months. Many of the districts which suffered from the shortage during the summer have appealed against the scheme, and certain modifications have been made. In the seaborne market the supplies are fairly maintained, but nearly all the cargoes arriving are gas coals; 38 vessels were returned on Monday's market as arriving in the River Thames and three for Wednesday, but all were contract cargoes.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, NOVEMBER 9.—The demand for seaborne house coal was fair, but no cargoes on offer. Cargoes, 17.

MONDAY, NOVEMBER 12.—The seaborne house coal market was firm, and the supply being limited, no fresh sales were reported. Cargoes, 38.

WEDNESDAY, NOVEMBER 14.—The demand for seaborne house coal was again firm, but, owing to the adverse weather prevailing of late, the supply was very limited, no cargoes being on offer. Cargoes, 3.

THE IRISH COAL TRADE.

THURSDAY, NOVEMBER 15.

Dublin.

Business continues to be good in all classes of fuel, but supplies are more than ever difficult to get forward from the other side, the past week's imports showing a considerable falling off. There is no further change in prices of any of the qualities. Current quotations stand as follow: Best Orrell, 48s. 6d. per ton; best Arley 47s. 6d.; best Wigan, 46s. 6d.; Pemberton Wigan, 44s 6d.; best Whitehaven, 46s. 6d.; best kitchen coal, 45s. 6d., all less 1s. per ton discount for cash; Scotch steam coal, 39s. per ton; Welsh steam, 50s.; coke, 46s. 6d. per ton delivered. Irish coal from the Wolf-hill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton—all f.o.r. Athy, on the Great Southern and Western line. Best large coal at the Castle-comer Collieries, co. Kilkenny, is 28s. 4d. per ton at the pithead. The total quantity of coal discharged upon the Dublin quays from English, Scotch and Welsh ports during the past week was only 16,730 tons, as compared with 22,105 tons the week previously. At a recent meeting of the Municipal Council of the City of Dublin, a letter was read from the secretary of the Dublin United Trades Council, conveying a resolution adopted by that body, demanding the immediate provision of a supply of coal at a reasonable price for the coming winter from Irish collieries, and asking the Corporation to contract for and to store fuel for the working classes. Something approaching a turf famine is threatened in the Midland districts, owing to the flooding of the bogs during the recent storms.

Belfast.

It is stated that tonnage is still very difficult to procure, even at good freights, and that navigation restrictions have interfered with the arrival of supplies, but the latter now having been removed it is expected merchants will soon be receiving their usual quantities. Demand is good, and prices for household coals are without further change, viz.:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Cheapest Scotch steam coal is now about 31s. 6d. per ton, while the better qualities are as high as 37s. 6d. to 40s. per ton. Gas coke is roughly 42s. 6d. to 45s. per ton, and foundry coke, 63s. 6d. to 68s. 6d. From October 13 to November 3 the total number of coal-laden vessels entering the harbour was 167.

Dr. A. S. Wilson has been appointed certifying surgeon under the Factory and Workshop Acts for Hastings; and Dr. P. Reid has been similarly appointed for Cleator.

Miners' "Down Tools" Ballot.—The official result of the South Wales miners' "down tools" ballot is as follows:—Against, 98,946; for, 28,903—majority against, 70,043.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—November 12.

Coal Mines Control Bill.

The debate on the second reading of the Coal Mines Control Agreement (Confirmation) Bill, and on Sir J. Walton's motion for its rejection, was resumed.

Mr. H. SAMUEL raised a point of order on the financial aspect of the Bill. He said there was implied in the agreement a contingent guarantee that in particular circumstances the Exchequer would make payments to coal owners. That being so, there ought to be a financial resolution authorising such expenditure before the Bill could be proceeded with.

The SPEAKER said he must leave that to the discretion of the promoters of the measure. If they thought the chances of such payments having to be made were negligible, then there was no necessity for a financial resolution.

Mr. PRINGLE said that whereas the Bill purported to be a measure confirming an agreement between certain parties which was to bind the whole industry, the agreement was signed by two persons neither of whom had any authority whatever to do so. A very large proportion of those who were interested in the industry, and were affected by the Bill, were not consulted in relation to the agreement, and were very imperfectly informed regarding it. The Bill would increase the excess profits tax of some owners by 15 per cent.; instead of being allowed to retain 20 per cent. of excess profits, they would only be able to retain 5 per cent. The representatives of the coal owners who were selected for this penal taxation were entitled to ask why, if 95 per cent. was for taxation on their excess profits, other people were exempted from the increased burden. He contended that the Bill was bound to affect adversely the Allied effort in the war, and that it would reward with a bonus the unprofitable management of mines.

Mr. S. WALSH (Parliamentary Secretary to the Local Government Board) said that in the long course of mining legislation in the past 30 years, which was greater than the world had ever known in any previous time or in any other country, the one representative authority that had spoken for the coal owners had been the Mining Association of Great Britain. And yet some hon. members who opposed this Bill were denying the representative character of this body.

Sir CLIFFORD CORY remarked that the fact that the Mining Association of Great Britain had spoken for the coal owners in the past did not empower them to negotiate for the people.

Mr. WALSH, continuing, said that, with reference to the suggestion made that new taxation was involved in the Bill, he would point out that no word of taxation was mentioned in the Bill. As to the further suggestion that a new department was being set up, he would say that the department was set up in December 1916. In considering problems affecting this great industry, they must put the national interest first. Under the circumstances, the Controller was compelled to take over the control of the mines, and, since then, greatly to the credit of that Department, there had been less trouble in that vast industry than in industries not one-hundredth part so powerful. The coal industry had worked with comparative smoothness, the men had been in a state of decent content, there had been less dissatisfaction, and there had been hardly any strikes. It was utterly impossible to get equality at this stage. But satisfaction must be given not only to the workmen, but to the owners as well, and that could not be done unless they treated the industry as a whole. It was impossible to get equality at this stage, but in time of war it was of vital necessity to keep the industry in working order, and that could only be done by dealing with it on broad and comprehensive lines, which this Bill did. The safety of the State depended upon the smooth working of the coal industry. If the Bill were rejected, there would be raised once more the cry of profiteering, which the promoters of the Bill thought they had safely laid. That cry might be right or wrong, but it might easily have a most disquieting effect on the minds of people working in the mines. He therefore appealed to the House not to adopt the suicidal policy of rejecting the Bill.

Mr. THOMAS LOUGH said the Government had taken the wrong time for this step. The agreement was *ultra vires* of the departments of State who were party to it. He saw nothing in the agreement which would tend to increase the supply. On the contrary, he said it would diminish, by reason of the difficulties which would be introduced by the attempt to work the agreement. He lately attended a meeting of merchants in the city, where all manner of industries were represented, and he found the view universal that control would bring us to the verge of famine, make commodities scarce, and make them dearer than ever. The Government were throwing dust in the eyes of the people by an endeavour to persuade them they were doing something great, and these should demand a more business-like treatment of serious questions. The Bill provided that no dividends on shares might be paid, or any loans refunded without the consent of this precious Coal Controller. On what ground of equity should gentlemen who had established the machinery and provided the capital go cap in hand to the Coal Controller and ask leave to pay a dividend? It was the most monstrous provision he had ever seen embodied in a Bill.

Col. FRED HALL, opposing the Bill, said it was the most Socialistic measure ever brought into the House of Commons.

Mr. JOHN HENDERSON protested against the method by which the Bill had been introduced, and said he regarded it as an unnecessary measure.

The SOLICITOR-GENERAL (Sir Gordon Hewart) said the real subject before the House was not the merits or demerits of State control, on which a decision was taken long ago. By March of this year all the coal mines of the United Kingdom were under the control of the Board of Trade, and the problem which remained to be settled was how the coal owners should be compensated. To have left them, as had been suggested, to seek their remedies individually before the Losses Commission or Courts of Law would have been productive of delay, expense, and lack of uniformity. The alternative of negotiating an agreement with the coal owners had been adopted. It was months of careful negotiation that the agreement arrived at. There was, however, a dissentient number of coal owners, and the question was whether by force of law they should also be required to accept the agreement. He protested against Mr. Lough's suggestion that the Bill was a "political fraud." The Bill was necessarily a temporary one, and that the power which lay behind it was derived from the Defence of the Realm Regulation, which was limited by the Defence of the Realm Act to the period of

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/ -30/
Thirds	27/6	27/6	—
Red Vein large...	25/6	25/6	26/ -28/6
Machine-made cobbles.....	42/6	42/6	39/6-42/
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	28/6-29/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/ -22/
Rubbly culm.....	13/	13/	13/ -13/6
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/ - 6/6
Steam:—			
Best large steam	30/	30/	31/6-32/6
Seconds	27/	27/	—
Cargo through	23/6	23/6	24/6-28/
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Smalls	19/	19/	18/ -20/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	18/6-21/
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

the scheme of agreement, it was the view of the Board of Trade, but, to its credit, of the fact that the coal trade should in this matter. It was never suggested that the mine coal was not got in such quantities as might have been the case, should be compensated out of the public purse. With regard to the form of the agreement, how could the House have been asked to make an agreement which involved the hearing of all the parties concerned? It might be that some minor points required adjustment, but the only persons who could make a new agreement were the parties who made the old agreement. To say that there was no provision in the agreement that the payments made to the Inland Revenue should be under the control of the Coal Controller was to ignore a large part of the Bill. It could not be shown more clearly that the payments were to form a fund from which the Coal Controller might draw to pay, if need be, moneys under the guarantees mentioned in the Bill. It was said the effect of the Bill and the agreement embodied in it must be to diminish the production of coal. The agreement was made on July 20. There had been since then a steady increase in the output, and all the evidence accessible to the President of the Board of Trade went to show that the effect of the agreement would be to increase still further the production of coal. A curious combination was to be seen in the House against the Bill. There were the coal owners who were asking for more. Other parties in the combination were land reformers and those interested in minute and doubtful points of constitutional law. The agreement was designed to meet an exceptional emergency. He did not pretend to say it was specially favourable to the mining interest. But it represented an honest and laborious effort to dispose of an unexampled problem, and the objections to it appeared to him to be largely fanciful.

Mr. RUNCIMAN pointed out that the Solicitor-General had missed the important constitutional point which weighed on the minds of members of Parliament—the absence of the financial resolution—and said the Government had reduced *pro tanto* the control of this House over great financial transactions in which the State was concerned. The President of the Board of Trade said that when the time came for a charge, if any, to be borne by the Exchequer, then would be the time to ask Parliament to sanction it. But by that time Parliament would have been committed, the payment would have been made by the Coal Controller, and the power of Parliament to deal with the charge would be taken away from them. He asked the Government to take the necessary steps, before the Bill passed through Committee, to regularise in the Bill itself the whole of the transactions which were in contemplation and all the liabilities which the State might have to incur. They should also explain more clearly the position and responsibilities of the Commissioners of Inland Revenue in the matter. The power to withhold dividends had led to considerable inconvenience in many quarters and to many cases of hardship, while the proposed limitation on the repayment for loans seriously concerned finance companies and banks which financed colliery concerns, and who knew nothing whatever about this agreement. For the first time in the whole history of banking the terms upon which, and the time within which, loans might be repaid passed away from the two parties, the borrower and the lender, and were to go under the control of an official who was not a member of the Treasury or even a member of the House. The guarantee affected the non-prosperous colliery rendered non-prosperous by the action of the Controller, but they were not the only persons concerned. It was a curious step to give them a guarantee of their profits and at the same time to leave miners, who were working two days a week and were in poverty owing to the scheme of distribution and the shortage of wagons, entirely unprovided for. He denied that there was justification for saying that control meant no labour trouble, and that the absence of control did. The real reason for this Bill was the difficulty of railway transport, and he was prepared to support the President of the Board of Trade in such measures as he thought necessary in order to carry out the proper administration of the railway lines and the coal mines. That did not mean that he supported all the provisions of the Bill. When they came to the Committee stage it would be necessary to object to clause 2, because they could not agree to go so far as to say that they would now give Parliamentary sanction to an agreement which they had never seen, which might never come into force, and which had been described in colloquial language as a pig in a poke; and the only safeguard left to them to modify its conditions was that the agreement was to be laid on the table. That sort of legislation would not be palatable to the House.

The CHANCELLOR OF THE EXCHEQUER said that there was less likelihood of trouble when the miners knew that there was State control, and that they were being dealt with from the point of view not of the interests of the employers but in the interests of the State as a whole. He was not convinced that the advice which was given to the Government that a financial resolution for the Bill was not necessary was not correct. But both as a member of the Cabinet and as the Chancellor of the Exchequer, he had made it perfectly plain that, whatever the arrangement was to be, it must be an arrangement which would not mean a demand on the Exchequer in order to carry it out. If, however, on further consideration, the Cabinet had any reason to believe that a financial resolution was proper in the circumstances, they would not hesitate for a moment to ask the House of Commons in Committee to pass such a resolution. He asked the House to consider the Bill on its merits. He had heard a good deal about treating everybody with equality. It was absolutely impossible at a time like this to secure equality of treatment all round. Could any Government have come down to the House and suggested that to a trade like the coal trade, which on the whole had profited by the war when so many others had suffered, the State should make an allowance in order to carry out the arrangements the Government thought necessary? It could not be done. Although, of course, this inflicted hardship upon particular owners, all of them get at least their pre-war profits. The matter was becoming very grave. He did not think the country had much or any sympathy with sectional interests which felt that they were hurt.

The Bill was read a second time, and committed to a Committee of the whole House.

November 13.

Accidents in Mines.

Mr. D. MILLAR, stated that he had reported to the inspectors of mines that there had been 10 accidents in mines during the week ending October 31 last and the three years 1914-15 were as follow:—

	1917.	1916.	1915.	1914.
England—				
Killed	673	819	836	703
Injured	2,618	2,948	3,203	3,282
Scotland—				
Killed	151	195	150	161
Injured	497	660	612	728
Wales*—				
Killed	271	322	332	379
Injured	878	1,034	1,105	1,240

* The figures given for Wales are those for South Wales and Monmouthshire; those for North Wales are included in the figures for England. Separate figures are not available.

November 14.

Coal Prices in Isle of Wight.

Mr. WARDLE, in answer to Capt. D. HALL, said that the retail prices of coal in the Isle of Wight had been brought to his notice by the Coal Controller. The question was one of sea freight, and the Minister of Shipping had been asked to deal with it. The Controller of Coal Mines had endeavoured to arrange that more coal should be railborne to ports serving the Isle of Wight, but owing to the absence of facilities at these ports for shipping coal, it had not been possible to achieve this object. Representations had also been made to the Admiralty.

Sir CHARLES SEELEY asked whether it was not a fact that the price of coal in the island had gone up 10s. or 14s. a ton since the Coal Controller was appointed, although the rise received by colliers and owners came to only about 2s. 6d.

Mr. ANDERSON gave notice of a question regarding the stoppage of labour through the price of coal (63s. to 66s. per ton).

THE AMERICAN COAL TRADE.

Bituminous is so scarce that temporary stoppages are common among steam users. Some unauthorised strikes in Illinois and Indiana upset the market.

Boston reports unparalleled conditions. At Hampton Roads the loading situation is deplorable. The difficulty seems to lie in the matter of berth room (says the *Coal Age*, October 27).

A feature of the market which is most pronounced by its absence is spot coal. There is none for application upon the Government price, and all shipments are being confined to contract commitments.

The condition of the marine freight market, irrespective of Government regulation of steamer tonnage, remains fairly strong.

The anthracite situation is becoming alarming.

In Philadelphia the bituminous position is not classed as serious, and the anthracite trade is comparatively calm. The prices per gross ton f.o.b. cars at the mines for line shipment are as follow:—Broken 4.55 dols., egg 4.45, stove 4.70, nut 4.80, pea 3.40, buck 2.90, rice 2.40, boiler 2.20, and barley 1.90 dols.

THE BY-PRODUCTS TRADE.

Tar Products.—Pitch is still in request, and quotations are well maintained. As exports are likely to continue, even with tonnage restricted as it is, holders are disposed to keep up their prices. Hence there is little or no change to record. No particular business has come under notice relative to the new Order specifying the mixing of tar oils and pitch. As the demand for solvent naphtha continues good, the quotations for the small supplies available are bound to be firm. Both spot and forward enquiries are good. Current quotations are: Coal tar, 27s. to 31s. Pitch, east coast, 20s. to 25s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 18s. 6d. to 19s. 6d.; Clyde, 18s. 6d. to 19s. 6d. nominal. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. 1d. to 3s. 3d. Heavy naphtha, north, 1s. 8d. to 1s. 10d. Heavy oils, in bulk, north, 4½d. to 4½d. Creosote, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s. to 85s., in bags. Anthracene. "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—A rather better enquiry is evident, and business is passing at scheduled prices. The anticipation that the United States will soon be in a position to export must be considered in relation to shipping difficulties.

THE TIN-PLATE TRADE.

Liverpool.

The official maximum for tin-plates is firmly adhered to by makers, who are all fully booked up for two to three months to come. Merchants complain that very little trade is coming their way, the bulk of the orders being for Government and Allied account, and these are placed direct with the manufacturers. The rise in the price of tin enables tin-plate makers to advance their basis price of 30s. net by 1½d. a box for every £5 rise in tin over £240 per ton. Coke wasters in 28 × 20 IC are scarce, the French Government taking all arising against their orders for primers. Other sizes of wasters are accumulating, however, owing to the tardiness with which permits are being granted.

Miners and Housing.—The executive of the Miners' Federation of Great Britain met on Thursday, and appointed Mr. J. Winstone and Mr. J. Robertson to attend the deputation to the President of the Local Government Board on Tuesday next on the question of housing.

Proposal to Secure Coal Output.—Mr. George S. Rice, of the United States Bureau of Mines, at a recent meeting of the Mining and Metallurgical Society of America, proposed that United States miners should be formed into special regiments, and sent to France for employment in the mines there. It is said that there is a shortage at the present day of 6,000 or 7,000 men, and, as a result, the much-needed output of the mines is considerably less than it might be. The American Army in France will need a considerable amount of coal, and it would be more economical in every way to mine this coal in France than to send it over from the States. Mr. Rice is of opinion that the United States could spare from 5 to 10 per cent. of its miners without seriously affecting the coal industry or causing a shortage in the output.

MERIT RATING OF COAL MINES UNDER WORKMEN'S COMPENSATION INSURANCE.*

By E. C. LEE.

The safety of mine workers has received more attention from both State and Federal law-making bodies than any other industry—a fact that shows clearly the hazardous nature of the industry. The last, but by no means the least, of the measures adopted for the protection of mine workers, is workmen's compensation legislation.

This is proving to be a powerful instrument for greater safety in the industries, from the fact that special stress is laid not on how the accident happened or who may have been responsible for it, but on how badly the employee is hurt by it. The injured person does not have to employ lawyers to prove his case, because the mere fact of his employment is proof of his right to compensation. The immediate effect of such legislation is the certainty confronting the mine operator that he must pay out large sums for every accident, regardless of its cause, thus adding materially to the cost of the production of his coal.

This fact furnished to the operator the strongest incentive to reduce the causes of accidents; not that the operator has ever lacked reasonable consideration for the welfare of his employees, and a proper humane interest in their safety, but his engrossment in earning his daily livelihood has been so great that he has not felt that he had the time to devote to the safety of the operation. This time he must now find, because of the actual cash value of the prevention of accidents in his mines.

This agency alone proved inadequate to bring about a material improvement, because operators have always been willing enough to improve safety conditions when possible to do so within reasonable limits of their financial ability. The requirement in the Workmen's Compensation Laws of several of the States, that the mine operator shall insure as a guarantee of his ability to meet his compensation obligations, has furnished the needed incentive, moral and financial, necessary to the prompt and effective dissemination of a more general knowledge of the causes and the means of preventing accidents, and of the cash value and the cost of removal of each mining hazard.

This latter condition is the result of the bringing together of 10 of the largest and strongest stock casualty insurance companies for the insurance and protection of coal mines. Mining is the last of the industries to benefit by insurance protection, because it has heretofore been the belief of insurance companies that the risks in mining were so great and their causes so little known that they could not safely underwrite mines. It was to take care of this risk in a safe manner, by providing a wide spread for the catastrophe hazard, and to promote a safety engineering service which should devote itself to the improvement of the safety conditions of the mines, that the Associated Companies was formed.

The result of this undertaking has been the standardisation of inspection methods on the basis of accident causation. The activities of the Bureau of Mines in classifying and gathering statistics relative to the causes of accidents, in determining the nature of these causes, and in devising means for the prevention thereof, were a necessary preliminary to the method now taken for coal mine insurance, since without the statistical and technical data so gathered, and the scientific principles thus evolved, it would be impracticable for insurance to offer graduated premium rates for relative safety.

An analysis was made of the various accident causes with a view to fixing a numerical value on each, and applying to each safety measure a corresponding credit and to each hazard a debit value. In this work, the originators of the schedule rating system for coal mines were materially aided by the engineers of the Bureau of Mines, as well as by several State mine inspectors, mine operators, and higher officials of the mine workers' organisations, with the result that there was developed a system of inspection and rating of mines as to safety which is based on the percentage causes of accidents furnished by the statistics of each State and checked by the average for the whole United States.

Thus, for example, in Illinois falls of coal and roof cause 47.5 per cent. of the injuries, haulage accidents account for 12.5 per cent., and so on. Each of these primary causes is made up of separate hazards, and to each of these latter is given a percentage value. Thus, the frequency of accidents from falls of roof and coal is dependent on the character of the roof and rib, the amount and kind of timbering, supply of timber furnished at the working places, inspection and testing of roof, and a dozen other elements; similarly for shaft, haulage, electrical, and other accidents.

The inspection of a mine by the engineer or inspector of an insurance company, with the fixing of numerical values for relative safety of each of the elements which may produce accidents, has a marked influence in drawing the attention of mine officials to the hazards of their operations, the existence of which may not have occurred to them. Even State inspection, with its police powers, is not so influential in pressing home the nature of the risk and the value of preventive measures as is an increased insurance rate or a reduction in insurance premium under workmen's compensation legislation.

The problems of safety in mining thus become at once a matter of earning power for the mine. Instead of the operators spending large sums of money in the employment of lawyers in combating litigation, these sums may be devoted to improving the safety of his mine, thereby earning a reduction in the insurance premium which under compensation legislation he feels compelled to pay. The effect on efficient and economic operation is further felt in the improvement of appliances whereby the accident causes are reduced.

* Transactions of the American Institute of Mining Engineers.

Thus, haulage accidents are largely the result of bad road bed, light rails, bad track laying and maintenance, faulty illumination in the haulageway, a bad haulage system, and similar elements. Improvement in the character of the road bed and track, and the cars and the haulage system, will add greatly to the safety from haulage accidents, and will greatly increase the efficiency of operation by permitting the hauling of larger loads and at higher speeds for each trip. Similarly, the adoption of under-cutting as a means of preventing blown-out shots and the injuries resulting therefrom, leads under many conditions to an improvement in the size of the coal and in the efficiency of production, as will many other safety measures. And finally, the unknown financial obligation which must be met by placing a higher price per ton on the coal under uninsured liability legislation is replaced by a known and fixed obligation under compensation acts protected by stock company insurance, whereby the mine owner may figure to a nicety his liabilities on accident account.

All of these improvements in mining, in efficiency, and safety, have been the result of the employment of a higher grade of officials, largely those trained in mining engineering, and of a better trained corps of inspectors, and also of the technical experts in the service of the Bureau of Mines. The mining industry may now well look upon agencies which have heretofore seemed inimical to its welfare as fraught, on the contrary, with promise of a better future for the industry.

Considering now in detail the various causes of accidents to miners and the means that may be adopted for their prevention, an inspection of the statistics of coal mine accidents, as compiled by the Bureau of Mines from State inspectors' reports, and reduced to a comparable basis as to cause, shows that these may be divided into three main groups, viz., underground, shaft and surface. These three groups may be each again divided into 10 or more separate causes, the methods for prevention of which are coming to be fairly well known.

There is another group of accident causes differing from those enumerated, in that the foregoing involve usually the safety of only one or of a very few employees, whereas this other group may involve the safety of several or even all of the men working underground. These include, in the inverse order of their seriousness, mine fires, gas explosions, and coal dust explosions.

Whatever other means may be adopted for reducing the number of injuries to mine workers, ultimately the strongest influence for good in this regard will be through education of the owners and managers of mines concerning the value to their property of the safeguarding of the lives of the workers, when they are subject to the positive liability for injury involved under workmen's compensation Acts; the consequent necessity which the operator is under to secure insurance protection; and, finally, the tremendous influence for safety under such system which will come from the provision of skilled insurance inspection, whereby reductions are given in premium rates for safe practices, based on the relative hazard of such practices and the means of preventing injuries, as developed through the investigations of the Bureau of Mines.

The effect of this new element in the mine safety problem has been felt in some measure in all of the coal mining States in which there are workmen's compensation Acts that encourage private insurance enterprise. These are the States of Illinois, Indiana, Iowa, Maryland, Kansas, and Michigan. Under legislation more favourable to compulsory competitive compensation insurance, the effect has been most strongly felt in the States of Pennsylvania and Kentucky.

In Pennsylvania, the law has been in effect for 17 months (since January 1, 1916), and there is now no mine operator, be he insured with the State Fund or with the Associated Companies, who is not thoroughly familiar with the Mine Safety Standards of the Associated Companies, these standards having been adopted by the Pennsylvania Insurance Department for the inspection and schedule rating of all coal mines, no matter with whom they may be insured. The more than 2,000 mines in Pennsylvania under the observation and protection of the inspectors of the insurance companies have, in this time, been inspected from two to 10 times, depending on the condition of the mines themselves. A splendid co-operation has been built up between the operators, the State mine inspectors, the Federal Bureau of Mines, and the insurance inspectors, to the end that they are all working harmoniously along identical lines for the improvement of safety conditions in the mines concerned. The measure of this is to be found to some extent in an examination of the accident statistics for Pennsylvania for the years 1915 and 1916. In the anthracite mines of the State, there were 527 fatalities underground and 61 on the surface during 1915, while in 1916, the first year in which the compensation law was effective, there were 491 fatalities underground and 65 on the surface, a reduction of 32 for the year. In the bituminous mines for the same periods, there were 407 fatalities underground in 1915 and 35 on the surface, while in 1916 there were 412 fatalities underground and 21 on the surface, a reduction of nine for the year. Thus, in the combined anthracite and bituminous mines of Pennsylvania there was a reduction in the number of fatal accidents from 1,030 in 1915 to 989 in 1916, a total reduction of 41 for the year. This was in spite of the fact that the output was practically normal, and that the opening of many new mines meant the introduction of considerable unskilled labour into the mines. It is, of course, impossible to determine to whom the credit for this reduction should go, but it seems fair to assert that some credit should be given to all the agencies concerned.

The Compensation Law did not become effective in Kentucky until August 1, 1916, so that the State has been operating under the law for only a few months, but a great improvement has been made in the safety condition of the mines, and it seems reasonable to pre-

dict that there should be a reduction in the accident record for the State. No statistics are at hand to determine whether or not this prediction is being fulfilled, and it may be rash to predict that this improvement will be reflected in the statistics for the first year under this plan, but the next two or three years should show a considerable improvement in this respect.

As evidencing the attitude of the mine operators to workmen's compensation insurance thus administered by private stock insurance companies, it is well to record that for the first several months of this inspection service it was a subject of opposition and criticism. Since inspections have been completed and reduced premium rates promulgated in many cases as a result of improved conditions, a much more friendly attitude has been shown. One of the leading Pennsylvania bituminous operators says:—

The operating officials at our different properties were first inclined to be a little sceptical and critical, believing that no inspector acting under State or insurance authority could show them how to improve the condition of their mines. Since we have gone through it, however, it gives me great pleasure to say that we have found your inspection of great service to us. Your inspectors have disclosed conditions which have enabled us to remove hazards, so that our properties are in far better condition as regards safety, and the change we have made in our organisation and our methods puts us in close touch with our working force, with the result of increased efficiency and economy in operation. We will be more than repaid for the expense we have been put to in making the changes recommended.

The chief mine inspector of one of the large mining States was somewhat sceptical, as were others, as to the possibility of bringing about other improvements than were practicable through his department, as a result of workmen's compensation application and the cost of insurance thereunder, and he wrote thus:—

If all the suggestions contained in your safety standards are complied with, a marked reduction in accidents will no doubt result. I have found that saying and doing are entirely different things, and if you can succeed in forcing compliance with these rules, you will accomplish what the State Mining Department has tried to accomplish for years, without complete success, and there should be a reduction of at least 50 per cent. in the number of accidents.

A concrete example of the manner in which insurance inspection for fixing merit rates under workmen's compensation has effected improvement in the condition of mines, and the consequent safety of the workmen, will show the value of this system of rating coal mines, from the standpoint both of the operator and of the insurance company. The following are selected as representative of conditions occasionally encountered among the more dangerous gaseous and explosive districts. The following example of a typical Pennsylvania bituminous mine is printed by authority of Mr. John Whalen, general superintendent of the Pittsburg and Eastern Coal Company:—

Mine No. 1 of the Pittsburg and Eastern Coal Company.—On first inspection, reported February 1, 1916, the mine was found to be in a very hazardous condition, due to the presence of large quantities of explosive gas and fine coal dust. The mine was otherwise unsafe, because of lack of protection to the mine workers from falls of roof and coal, careless handling of explosives, bad condition of the haulageways, etc. These conditions were especially due to the mistaken belief of the mine superintendent that the management desired economy in operation and cheapest possible tonnage cost of coal, and in consequence he devoted himself to getting out coal cheaply, to the neglect of safety conditions. These facts were immediately brought to the attention of the owners, with the result that one of the higher officials and the general manager immediately went over the situation with the insurance agents and inspectors.

The premium schedule rate computed for the insurance of this mine at the time of the first inspection was 5.81 dols. During the next year several rating inspections were made, each of which disclosed improved conditions, and each of which was reported with recommendations for further improvement. All of these recommended improvements were invariably made by the owners as soon as received, with the result that on the date of the last inspection (February 23, 1917), a year later, the mine was in practically perfect safety condition, and was charged with a schedule rate of 2.82 dols. The estimated premium to be paid as a result of first inspection computed was 11,840 dols., and on last inspection 5,640 dols., or a saving on the one mine of 6,200 dols.—more than enough to pay for making all the improvements recommended.

At a typical Pennsylvania anthracite mine, that of the Buck Ridge Mining Company, the rate resulting from first inspection, made November 9, 1915, was 4.50 dols., with a total of 27.8 charge points, as against an average for the anthracite region of 30, or slightly better than average. The last inspection, made January 2, 1917, or over a year later, produced a schedule rate of 3.15 dols. and a total of 5.94 charge points, a very material improvement in conditions. The estimated cost was 9,000 dols. per annum, and on last inspection 6,700 dols., a saving of 2,300 dols.

At a typical bituminous mine in the Central States, the Barker Mine of the Federal Coal Company, near Pineville, Kentucky, the adjusted schedule rate resulting from first inspection, made August 1, 1916, was 4.86 dols., with a total of 34.1 charges, as against an average for the State of 25. On last inspection, made six months later, January 17, 1917, the schedule rate was 2.82 dols., or a total of 4.0 charges. This resulted in the reduction of the total premium paid of about 40 per cent.

Lastly, at the Oakdale mine of the Oakdale Coal Company, Colorado, on the occasion of first inspection, August 18, 1915, there was computed an adjusted schedule rate of 6.62 dols., resulting from 34.6 charges. On the occasion of the last inspection, a year later, July 27, 1916, the adjusted schedule rate was 4.70 dols., total charges 7.1. The estimated total premium on

first inspection was 15,120 dols., and on second inspection 11,280 dols., a saving to the mine of 3,840 dols. per annum.

In detail, the relative safety condition of the mine on first and on last inspection was as follows:—The rate resulting from first inspection, made August 18, 1915, was 6.62 dols., with a total of 34.62 charge points, as against an average for Colorado of 40, which is slightly better than the average. The last inspection, made June 27, 1916, produced a schedule rate of 4.70 dols., with total charge points of 7.12, a material improvement in the condition and the estimated total premium, which on first inspection was 15,120 dols., and on last inspection 11,280 dols., a saving of 3,840 dols.

For further illustration of the effects of this system, the author has taken at random several reports covering mines in Pennsylvania, Illinois, and Colorado, showing the rate produced by each inspection and the average number of men employed in each mine. The saving in insurance can readily be determined by assuming an average yearly earning per man.

PENNSYLVANIA BITUMINOUS MINES, BASE RATE, 3.83 DOLS.

No. of men.	First inspection rate. Dols.	Last inspection adjusted rate. Dols.	Reduction. Dols.
469	4.17	3.270	0.900
197	4.06	3.230	0.830
192	3.51	3.025	0.485
306	3.16	2.618	0.542
133	3.05	2.537	0.513
115	3.13	2.625	0.505
79	4.06	2.679	1.381
110	3.77	2.531	1.239
27	3.91	2.658	1.252
14	3.46	2.480	0.980
49	3.72	2.451	1.269
80	4.02	3.0.8	0.962
277	3.60	2.680	0.920
76	3.23	2.385	0.845
65	3.16	2.415	0.745
214	3.37	3.228	0.142
21	3.22	2.900	0.320
625	3.63	2.400	1.230
267	3.99	2.404	1.586
184	3.61	2.846	0.764

ILLINOIS.

No. of men.	First inspection rate. Dols.	Last inspection rate. Dols.	Reduction. Dols.
190	5.21	4.36	0.85
506	4.28	3.48	0.80
22	3.34	2.81	0.53

COLORADO, EX-MEDICAL BASE RATE, 6.30 DOLS.

No. of men.	First rate. Dols.	Second rate. Dols.	Third rate. Dols.
50	4.96	4.93	4.26
57	5.17	4.79	4.31
113	6.31	5.18	4.18
43	4.94	4.75	4.28
85	5.03	4.82	4.10

AN IMPROVED MODIFIED PITOT TUBE.

The Pitot tube has long been used as a device for measuring the flow of liquids and gases, but only when used with the utmost care have the results proved uniform. Fundamentally, the Pitot tube consists of a U-tube, one leg of which enters the stream normally to the direction of the flow, while the other leg is bent around so that the cross section of the tube faces the direction of flow. The difference in height to which the liquid rises in the legs of the U-tube represents the velocity head of the stream. The velocity computed from this head entails a variable coefficient, whose value is subject to some uncertainty.

With a view to eliminating this defect, Prof. H. A. Thomas has devised what may be termed the "hydraulic shunt-flow tube." In this device, as before, one leg of the U-tube enters the stream normally to the direction of flow, but the other leg communicates with a tube placed within the stream parallel to the direction of flow, through which discharge takes place. If this discharge be so governed that the pressure heads in both branches of the U are alike, the conditions of flow in the main stream and discharge tube are identical, and the velocity of the stream may be deduced from the quantity discharged, the area of the tip opening, and the tip coefficient. It is possible to demonstrate that turbulent flow should not affect the coefficient of this tip. Theoretically, the tip coefficient should be unity, but a series of experiments undertaken with this in view show that it varies less than 4 per cent., while the Pitot coefficient, under like conditions, varies more than 4 per cent.

Partnership Dissolved.—The *London Gazette* announces dissolution of the partnership of Mr. W. Staples and Mr. J. Lonsdale, trading as Staples and Lonsdale, coal merchants, etc., 39, King-street, and 37, Kay-street, Rawten-stall.

Huts for Women's Auxiliary Army Corps.—A deputation of ladies, representing the Y.W.C.A., visited the London Coal Exchange on Monday in order to solicit contributions towards huts needed for the Women's Auxiliary Army Corps in France and England. Mr. G. Warren publicly introduced the deputation, and announced that Messrs. William Cory and Sons Limited had given £100, Messrs. Cockerell £50, and that arrangements had been made by the Coal Merchants' Society, the Coal Factors' Society, and the Inland Colliery Owners to open subscription lists.

Excess Profits on Mining Shale.—The Board of Referees (appointed by the Treasury) considered an application made on behalf of the Scottish Mineral Oil Association and ordered that the statutory percentage of excess profits carried on or owned by a company or other body for mining shale or manufacturing products from shale. In the case of any other trade or business, there is an additional 1 per cent. for accounting periods ending prior to January 1, 1917, and 2 per cent. for accounting periods ending after December 31, 1916. A proviso deals with exceptional cases.

Notes from the Coal Fields.

LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

William Cory and Sons Limited—Colliery Assessments—Swansea Harbour Finances—Question of Medical Attendance—Coal Control Bill—Alleged Spies at Cardiff.

Reports have been published in a number of daily papers to the effect that William Cory and Sons Limited would be fused with Mann, George and Company Limited. It is now stated that no change has taken place in William Cory and Sons Limited. That company has appointed four of its directors to represent its interests in the new company of Mann, George and Company Limited.

The Glamorgan Quarter Sessions held in Cardiff on Tuesday, dealt with the question of colliery assessments, which had come up at a previous sitting in Swansea with regard to appeals from the whole of the companies in the Pontypridd district. Counsel now informed the court that the differences had been settled.

At their monthly meeting on Monday, Sir G. Thomas presiding, the Swansea Harbour Trust dealt with the financial statement for the month of September, this showing receipts of £32,336, with an expenditure of £32,477. As compared with the corresponding month of last year, the receipts are higher, September 1916 having been £27,648, whilst the expenditure was £29,199. The chairman of the Finance Committee commented upon the more favourable position, but he said they must not build upon it too much.

The Windsor Colliery workmen, in the Aber Valley, held a meeting to consider the question of medical attendance upon both the employees and their families, and the meeting was attended by all the doctors connected with the colliery. What was asked by the medical gentlemen was that the men should pay 2d. in the pound additional to the National Insurance, and that there should be free choice of doctors, in accordance with the scheme which prevails throughout the Rhymney Valley. The workmen appointed a committee to deal with the matter.

Sir Douglas Haig, to whom has been forwarded copy of a resolution passed by miners in South Wales during recent meetings, has replied to Mr. Yeo, M.P., thanking him for having transmitted the resolution, and stating: "We all know how much depends upon the self-sacrificing and untiring efforts of everyone in the Empire to bring the war to a victorious end, and it is highly encouraging to us in the field to feel that the miners are determined to support us by all means in their power."

The workmen and officials of the Cwmaman Collieries, with the residents of that locality, raised a fund of £180 wherewith to make a presentation to Mr. W. H. Heppell, who has held the position of agent to the Cwmaman Company, but has removed to take a new appointment as agent to the Ffaldau.

Sir Clifford Cory (of Cory Brothers and Company) was chief spokesman of a deputation that waited upon the President of the Board of Trade with regard to the Coal Control Bill, and with him was Mr. Beynon (Ebbw Vale Company), Mr. T. Evans (Ocean), Mr. T. J. Callaghan (Cambrian), and Mr. North Lewis (Insoles). They desired that in the Bill as drafted certain amendments should be incorporated, and they wished also to have assurances from the Government that the pre-war standard of profits should be maintained. This apparently was conceded by Sir A. Stanley, and they also wish the compensation of any mines which might be set idle should not be obtained by a levy upon the collieries which continue at work.

Capt. Edward Gill, well known in former days as one of the chief miners' leaders of Monmouthshire, representing the workmen on the Conciliation Board, has been appointed Recruiting Labour Adviser to the Controller.

The agent and manager of Messrs. Guest-Keen's Colliery at Abercynon were summoned at Mountain Ash for breach of the Mines Act. It is provided that no person other than officials or persons employed on the haulage road shall travel on the road whilst the haulage is in motion, except where a clear side space of 2 ft. exists; but it was stated that at this colliery the side space was obstructed by pipes, which, in certain places, were to some extent considered dangerous. It was admitted in court, on behalf of the prosecution, that the colliery was well managed generally; but it was also stated that great importance was attached to the condition of the haulage road. In defence, Mr. Kenshole, who appeared for the agent and manager, stated that there was considerable squeeze, calling for constant repair work, and pipes had been pushed up to the surface from where they were originally laid. The company would prohibit travelling on the road in future whilst machinery was in motion. This undertaking was accepted on behalf of the prosecution, and the summons was dismissed on payment of costs.

Considerable unrest has been aroused by the declaration of the existence of spies amongst the coal-loading vessels at Cardiff. Mr. Clatworthy, president of the Coal Trimmers' Union, was of opinion that submarine operations show considerable leakage of information as to the loading and sailing of ships. He considers that the facilities afforded to neutrals are too great, and should be rigidly curtailed.

Further combinations of shipping firms, whose vessels have been mainly engaged in the coal trade, are announced in South Wales. Messrs. Pyman, Watson and Company, coal exporters, who hitherto have been managing owners of the London and Northern Steamship Company, have parted with their interest, the purchasers being Messrs. W. R. Smith and Sons, managers of the St. Just Steamship Company, of Cardiff. Another transaction is with Messrs. Gould and Company, of Cardiff, who have purchased nine steamers from the Fargrove Steam Navigation Company, of London. These transactions make Messrs. Smith and Company now the owners of 15 steamers, their recent purchase entailing an outlay of approximately £800,000; and Messrs. Gould and Company will have 16 steamers, their latest purchase entailing an additional outlay of about £900,000.

With regard to the criticism of coal trimmers and the release of further men for the Army, Mr. Clatworthy, president of the men's union, replies that the authorities have continually urged the great importance of the utmost despatch being given to steamers, and therefore it would be ridiculous so to restrict the number of trimmers as would render them unable of dealing with the frequent emergencies which occur. He states: "We have to deal constantly with the despatch of coal to the Allies' countries, and although it may appear that our ships are idle, these apparently idle ships are coming to come under the tip."

As regards the full result of the miners' "combing out" question is not even yet disclosed, the returns being very late; but it is anticipated that the majority against "down tools" will exceed 75,000. It is understood that the Government will now proceed with the withdrawal of exemption certificates from all men of military age who have entered the mines from other trades since August 4, 1914. When all the 1914 men have been dealt with, the "combing out" of the unmarried "A" men will be proceeded with, by ballot, under the arrangement agreed to by the Miners' Federation for the securing of a definite quota of men from each district.

With regard to the arrangements for pooling business, it should be noted that the arrangements differ materially. At Swansea, the exporters will deal with shipments proportionately to their percentage of operation during 1913 and onwards to May 1916; but at Cardiff, as previously stated, six exporters will do the whole business, being replaced quarterly by another six. This applies to the Italian business. The Swansea exporters will pool their French business at the beginning of the new year. At the meeting on Monday where this was decided, 10 per cent. of the exporters did not vote; and out of 48 who did vote, as many as 13 were against the scheme.

Northumberland and Durham.

Enginemens' Secretary—Conspiracy Charge—Proposed Re-opening of Henry Pit—Claim Against a Treasurer—Conscientious Objectors—Tyne Cargoes.

Mr. John Humphrey (Gosforth) and Mr. T. Weatherly (Bedlington) have been nominated for the post of general secretary of the Northumberland Colliery Enginemens and Mechanics' Association. Mr. Humphrey was president of the organisation for over 14 years, has represented the members at the Conciliation Board meetings for 28 years, has been financial secretary to the "approved society" since 1914, and has acted as general secretary *pro tem.* since the death of the late secretary, Mr. T. Weighell. Mr. Weatherly, too, is, and has been for long, an active worker within the association. He took a prominent part in advocacy of the new Federation of Mine Workers which has been established in the county. Mr. Humphrey's nomination is endorsed by 10 out of 16 branches of the association.

Mr. Wm. Taylor, fore-overman at Clara Vale Colliery, has been appointed under-manager at New Brancepeth. During his 21 years' work at Clara Vale he has passed through the grades of hewer, deputy master shifter, and fore-overman.

Col. Fredk. G. Scott, V.D., who was convicted and sentenced at Newcastle Assizes on Saturday for having conspired with other persons to receive bribes as inducements for admitting certain men into the Royal Marine Submarine Miners, and for showing favour to those men when they had been admitted into the unit, was the son of the late Mr. Wm. Scott, well-known on Newcastle Quayside as having extensive business connections with Russia, and being agent for Messrs. Joseph Cowen and Company's collieries. Col. Scott himself was a consulting engineer, and had a fine record of military service.

The annual report of the Walkerville Residents' Association makes reference to the proposed re-opening of the Henry Pit at Walker Gate, and declares that, if the shaft be re-opened, the development of the garden city movement at that place will be for ever doomed. A sub-committee has been appointed to carry out a scheme of opposition to the re-opening.

On Monday last, the Right Hon. Thomas Burt, M.P., was the recipient of many congratulations and good wishes on the occasion of his 80th birthday. Mr. Asquith wrote: "I hope you will still be spared to us for many years, for your career and example are a national possession." Ald. Thos. Taylor, of Chipchase Castle, chairman of the Northumberland Coal Owners' Association, sent a letter in which he testified: "I have always said that the good feeling which exists between your association and that of the employers was built up by your action on behalf of the workmen, and that of the late Mr. Robert Lamb on behalf of the employers." Other well-known men sent cordial tributes.

When John Simms (47), miner, appeared before the Castle Eden magistrates to answer a claim, under the Friendly Societies Act, 1896, for £5 4s., stated to be due in his accounts as treasurer of the Wingate Grange branch of the Northumberland and Durham Miners' Permanent Relief Fund, it was stated that the committee of the fund did not suggest that there had been any dishonesty, but that he had simply made a mistake. Defendant said if there had been a mistake he could not find it out. He was as innocent as a child. He was ordered to refund the money, the magistrates' clerk informing him that he would have to make a reasonable effort to pay it.

The Hebburn miners' lodge has issued a circular to other miners' lodges in Durham county explaining the attitude of the members in declining to work with two conscientious objectors, following which the members were censured by the executive of the Durham Miners' Association for having "sacrificed" these two men. The circular states that the Hebburn miners believe that, in this great war, trade unionism and democracy are on trial, and that upon the way in which that responsibility is accepted and discharged depends the future of the democratic principle throughout the world. No application for the men to be "sacrificed" had been made by that lodge. The circular states that the executive committee has refused to give the lodge the correspondence which passed between the executive committee and the military on the matter.

A notice posted on Newcastle Commercial Exchange is to the effect that shippers of coke to Norway, Sweden, and Denmark are requested to send in to the Local Export Committee before Wednesday next a return of the quantities shipped by them to these countries in the years 1913, 1914, 1915, and 1916. Another notice states that, in regard to licences for France, all applications for alterations regarding quantities of coal, loading ports, ports of destination, and transfers to other districts, must now be made in triplicate.

Whilst Thomas McGinn (57), compressed air driller, was engaged, in the Ballarat seam of Hedleyhope Colliery, in piercing a hole in the face of the coal with a compressed air drilling machine, a shot unexpectedly fired, and he was severely injured on the head, face, and arms, and eventually succumbed. At the inquest, it was conjectured that the charge was a portion of some explosive used on the previous day in shot-firing operations, and which was thought to have been discharged at the time. The place where McGinn was working was deemed to be quite safe. A verdict of "Death from injuries accidentally received" was returned.

In October 1916, Messrs. Wm. Pearson and Company, timber merchants, West Hartlepool, purchased two cargoes of pit props from Steen Giebelhausen, of Copenhagen, to be shipped in two sailing vessels, the "Jorgan Larsen" and the "Hanna." The former duly arrived, and delivered its cargo. The "Hanna" arrived in January, and the cargo

was landed, but Messrs. Pearson were not allowed to have it. Ultimately, they were obliged to purchase other timber at enhanced prices. In respect of their loss, they claimed, at the Durham Sheriff's Court on Tuesday, £496. Mr. Mundahl stated, on their behalf, that no doubt the reason why the cargo was not delivered to the plaintiffs was that the price of pit props had gone up very considerably, and the shipper thought he should get the higher price. The jury assessed damages at £289, and judgment was entered accordingly.

It was reported to the November meeting of the Tyne Improvement Commissioners that during October 834,438 tons of coal as cargo, 91,184 tons of coal as bunkers, and 59,266 tons of coke were despatched from the Tyne, a decrease of 228,622 tons, a decrease of 28,894 tons, and an increase of 1,121 tons respectively when compared with the shipments for October 1916. Thus far this year, the shipments had amounted to 8,620,338 tons, 919,094 tons, and 575,810 tons respectively, decreases, when compared with the corresponding nine months of last year, of 2,306,461 tons, 363,646 tons, and 175,491 tons respectively.

In supporting, at the November meeting of the council of the Newcastle Chamber of Commerce, a proposal, subsequently carried unanimously, that co-operative societies should pay income tax on their profits, Mr. Clague made, as an instance of the ramifications of co-operative trading nowadays, the statement that the co-operative movement had purchased the Shillbottle Colliery for £50,000. Unless the law was altered, no income tax would accrue from the profits on the working of that colliery in the future.

The Consett Iron Company Limited is supplying coal in small quantities to the poorer people of the district at a lower price than the maximum rate which has been fixed, so that these people may obtain fuel supplies at the same figure as the large consumers.

Mr. Wm. Straker, corresponding secretary of the Northumberland Miners' Association, in his circular, states that Mr. Arthur F. Pease, in a lecture delivered to the London School of Economics, declared, according to the Press report, that the Minimum Wage Act "had tended to increase laziness amongst the miners." Mr. Straker avers that: "There is no class of men in the world works harder than the mining class. If anyone who has never seen a miner at work getting coal was taken into a working place in the mine, he would think the miner had gone mad, such is the ferocious-like way he seizes and handles pick and shovel." Mr. Straker holds that danger in the mine would be very largely decreased owing to recent legislation were the provisions of the Mines Act not neglected by owners, agents, managers, and other officials, and by workmen.

Yorkshire.

At Doncaster Police Court last week, 14 miners in the employ of the Hickleton Main Colliery Company were ordered to pay claims ranging from £2 to £10 for neglect of work. One man had only put in 13 shifts in seven weeks. It was stated the company had most trouble with the men of military age, and the chairman remarked that this seemed to be a clear case in which the man ought to be in the Army.

At last week's meeting of the Sheffield Corporation, it was stated that the chairman of the Coal Supply Committee and the town clerk are to seek an immediate interview with the Coal Controller to urge the improvement of house coal supplies. The Coal Controller, it appears, desired the committee to arrange with the coal merchants in the city for the stacking of about 25,000 tons of house coal for emergencies. The merchants are to deduct from the coal coming to them 25 per cent., and to stack this until the quantity mentioned has been secured. But it is felt that great difficulty will be caused if 25 per cent. is deducted from supplies already inadequate.

At a meeting of the Coal Merchants' section of the Bradford Chamber of Trade, the secretary reported concerning the forms which the merchants were asked to return weekly to the Local Control Committee, in which particulars were required of the amount of coal which was laid to emergency stock per week against the 25 per cent. He said that he had been informed that the forms, as sent in by the merchants, showing that it was impossible to lay in to stock, were considered satisfactory, the Control Committee being well aware that merchants were unable to secure adequate supplies to fill their present orders, and, further, that in certain yards it was out of the question to attempt to stock any coal whatever. It was mentioned that in previous summers, when the merchants had put coal to stock, they had been able to buy at summer prices for sale in winter, and thereby receive some compensation for the tying up of their capital for many months. On the recommendation of the Controller of Coal Mines Department, a further meeting between the Local Control Committee and representatives of the merchants was to be held early the following week on the matter of retail prices, and a deputation to meet the local committee was appointed by the meeting.

Lancashire and Cheshire.

Owing to increases in the prices of coal, wages, etc., over a score of municipal authorities in Central, East, and South-East Lancashire are increasing their charges for gas and electricity.

The annual balance-sheet of the Earl of Ellesmere's Colliery Employees' Relief Fund, which comprises 13 or 14 branches in Walkden, Swinton, Worsley, Mosley Common, Boothstown, and Little Hulton districts, shows receipts in contributions for the year amounting to £10,990. Grants have been made of £960 to the Swinton and Pendlebury, Worsley, Little Hulton, and Tyldesley relief funds. The amount in the bank is £1,276.

Notts and Derbyshire.

The council of the Derbyshire Miners' Association met at Chesterfield last Saturday, when it was alleged that the recent war wage addition is not being paid to certain classes of workmen at the Blackwell Company's collieries. Instructions were given Mr. Frank Hall to communicate with Mr. J. T. Todd, general manager, requesting that the addition be paid at once, and also that it be made retrospective. It was stated at the meeting that Mr. James Martin, of Staveley, is not contemplating re-election to the position of president of the Derbyshire Miners' Association, which office he had filled for 10 years, in addition to being actively identified with the association since its establishment in 1888. The council expressed sympathy with Mr. Martin on the death of his wife. Nominations are required by the association for the offices of president, vice-president, executive committee, and representatives on the disputes committee.

In a case heard at Chesterfield on Saturday, the manager of the Williamthorpe pit of the Hardwick Colliery Company, Mr. George Edmund Collis, was summoned for not providing sufficient refuge holes in haulage roads in the

mine. After hearing the evidence, the magistrates, over which Mr. C. Markham presided, imposed a fine of £5 and costs—total £13 19s. 6d.

The Midlands.

Increases in the rates which colliery proprietors are to pay to the South Staffordshire Mines Drainage Commission were foreshadowed on Friday of last week, when the arbitrators met at Dudley for the purpose of making a draft award for the Old Hill district. The general manager (Mr. Edmund Howl) presented the estimate for 1918. This had been made, he said, on the basis of last year's, but on account of the excessive cost of slack and materials, and the very high wages, the margin which would come to the bondholders would be only about £562. He would like to point out that he had been receiver for the bondholders for 29 years, and the debt had been reduced to 30 per cent. That meant there was still owing £10,896, and he must ask the arbitrators to make provision for that debt to be wiped off at a reasonable rate, say, in four or five years time. It would be necessary for them to seriously consider how to raise the rates. At the present time, he did not think colliery proprietors would feel any trouble in meeting an increased rate, because there was that most of them would have excess profits, and that they would like to see the debt paid off during this time. If they deferred it, and prices went down, and the margin of profit on coal was small, they might find an increased rate very irksome. He did not think it could be said that 29 years was a rapid rate to get rid of a debt which originally was only £36,000, and he should like, in his day, at all events, to come out of the court with a clean balance-sheet. The arbitrators deliberated in private, and subsequently the chairman (Mr. J. R. V. Marchant, barrister-at-law) said they considered it necessary to raise the rate to the different collieries which were in the schedule. Messrs. Allen, Everitt and Sons, the Cradley Colliery Company, Messrs. R. Fellows, Messrs. Hingley, 26, Saltwells, Messrs. Pitt, the Knowle, the "Sacker" Colliery, and Messrs. Alderson would be raised to pay 7d. Messrs. Hingley's Dudley Wood Colliery would pay 8d.; and Messrs. Hingley's No. 23 Saltwells would pay 6d. Messrs. Pitt, Warren's Hall, would pay 6d.; and Messrs. Garratt's Limited 3½d. A number of collieries would be taken out of the schedule and placed in the general body of the award. The appeals will be heard on December 14.

Birmingham coal merchants have been notified by the Controller that the distribution of household coal throughout the county of Warwickshire will be subject to regulations similar to those recently announced in the case of London. Private consumers, on ordering fresh supplies, must furnish a statement in writing of the amount they have in stock, and how long it is estimated to last. Where they have more than enough for a month's requirements in hand, orders for further supplies are not to be executed until the stock is reduced to a month's requirements. In case of private consumers who have habitually received truck loads, owing to residence in a country house, or owing to cartage being performed by themselves, or owing to exceptional difficulties arising out of delivery, orders for truck loads may still be executed in quantities not exceeding normal supplies. Subject to this qualification, the regulations apply to "all orders of one ton or more of household coal placed by private consumers with coal merchants, colliery representatives, or factors." Coal is now coming into Birmingham and district somewhat more freely. But it is passing into consumers' hands as soon as it is received. Merchants' wharves and the yards of the smaller distributors are no better supplied than formerly. The price restrictions are stated to be incompatible with any considerable conserving by merchants of present supplies against any emergency later.

Scotland.

Electrical Welding—Royalties on Glebe Minerals—Methil Shipments—£70,000 for Ambulances.

On Saturday, a large representation of the members of the West of Scotland branch of the Association of Mining Electrical Engineers, under the leadership of Mr. H. A. McGuffie (president), visited the works of the North British Welding Company at Finnieston. Exceptional interest was taken in a demonstration of electric welding.

At a meeting of Hamilton Established Presbytery, it was intimated that the lease for the Hamilton glebe minerals expired at Whitsunday next, and there was submitted a new offer by the Bent Colliery Company for the working of the minerals during the ensuing 16 years. Considerable alterations on the old lease are proposed. Whereas at present there was a rent of £300 and a royalty allowed of 10d. per ton of coal brought to the surface, the new offer stipulates for no rent and a reduction of the lordship from 10d. to 5d. The Presbytery decided to take legal advice on the matter.

The sum of £70,000 has been subscribed by the Scottish coal owners and workmen at the Scottish pits for the purpose of providing a fleet of motor ambulances for the wounded.

At Methil an increase of several thousand tons in the coal shipments is reported for the week. The total is 19,963 tons, compared with 16,400 tons in the previous week.

The Scottish coal shipments for last week amounted to 148,947 tons, an increase of 10,285 tons as compared with the previous week, and a decrease of 20,485 tons as compared with the corresponding week a year ago. For the year to date, the shipments amounted to 6,515,518 tons, a decrease of 2,315,564 tons as compared with the corresponding period last year. The Clyde, for the year to end of last week, shipped 4,514,490 tons; the Fife ports, 1,164,419 tons; and Forth ports, 836,609 tons.

A Coal Famine in Spain.—A telegram from Seville stated that on Saturday last the electric lighting was suspended on account of coal shortage. Factories which employ a total of 6,000 workmen ceased operations. It is said that there are great stocks of coal in the town. A report from Las Palmas states that the coal shortage threatens to paralyse industry there. A request has been sent to the Government for coals, and for permission to extract the coal which is stored at the bottom of the harbour.

Protest Against Retail Price.—The cost of coal in the Isle of Wight has led to an outcry among the islanders. It appears that the retail price has been fixed at 62s. 6d. a ton, and in small lots 3s. 2d. a cwt. Resentment at these charges is all the greater because the price at Portsmouth, hardly more than 10 miles away, is 40s. and 42s. for the two grades sold. The wholesale firms supplying the island with coal, which is seaborne in colliers coming from the North, justify the price by quoting the freightage, which is declared to be 26s. a ton.

LABOUR AND WAGES.

South Wales and Monmouthshire.

Criticism of the Controller's decision that wages shall be paid to miners when not actually employed is still keen, the new principle which is involved being regarded as of supreme importance, especially from the point of view that it will be applicable even where collieries do not prove remunerative. To pay men for idleness is regarded as an encouragement to idleness, notwithstanding the safeguards.

The tippers and hydraulic men in Cardiff and Barry met with those of Newport and Penarth on Sunday, and dealt with a report as to the demand for an increase of £1 per week in wages, and also pay for waiting time. The meeting passed a resolution against the inaction of the Government in dealing with the profiteering of food and other commodities, and instructed the executive council to demand an immediate increase of £1 per week in wages, and also that "unless this be conceded within two weeks labour should be withdrawn"; also that uniform conditions of waiting time should be established at all the local ports, and that to this end there should be a combined meeting of representatives of the railway companies of the different classes of men concerned.

Nearly 500 men have been idle owing to the flooding of the Navigation Colliery at Crumlin, which is owned by Messrs. Partridge, Jones and Company. This is one of the more modern collieries in that area, and being fully equipped with plant of most modern type. It is anticipated that work will be resumed without any great delay.

Delegates representing all the collieries in the anthracite area met in Swansea to deal with the suggestion of "down tools," in order to support the Llandeby men who are on strike against the company's weigher. A settlement had been outlined by Mr. Frank Hodges on behalf of the men, and the vote took place with this in view, the result being that 36 voted against the stoppage, whilst only eight lodged voted for, so that the majority against was 28. It was decided to advise the men to accept the terms of settlement.

Both employers' and colliery examiners' representatives had an interview on Saturday with the Coal Controller and Sir Richard Redmayne; and subsequently, at the Controller's suggestion, a joint meeting of the two sides took place at the Home Office. The proceedings are understood to have been favourable, in so far that they indicated progress towards agreement.

The executive council of the South Wales Enginemen and Stokers' Association met in Cardiff, and the secretary presented a report on negotiations with the employers regarding a special war wage for Sunday work; and also as to the payment of the war wage to men who worked a mate's shift during absence. It was decided to approach the employers and the Coal Controller; and delegates were appointed to discuss with Sir George Askwith the question of non-unionists. Another matter dealt with was the establishment of an eight hours day for all men employed about the colliery.

The Committee on Production have met representatives of several unions connected with the iron trade in South Wales—their requirement being that wages should be advanced so that they shall be 100 per cent. above the pre-war rate. Representatives of the employers were also in attendance, and stated their position and arguments upon the question.

Engineers and foundry workers at Newport have received the award of the Committee on Production upon the case submitted on their behalf during October. Men over 18 years of age will receive 5s. advance per week, boys 2s. 6d., and pieceworkers and others similar rates.

Definite steps have been taken by the Blaenavon Trades and Labour Council, Mon., to negotiate with the chief officials of the Blaenavon Company Limited for a fairer distribution of labour in the outside departments on colliery stop-days. It has been stated that when the company's collieries are laid idle through lack of tonnage, a large number of men are employed to do casual work in connection with the steel output; but for some time the same men have obtained this employment almost exclusively. A re-arrangement is reported, with which the miners are satisfied, and a grievance which threatened to lead to unpleasantness has been removed.

Mr. J. Winstone, with the management of the colliery, signed the old coal price-list of the Elled Colliery, Pontnewynydd. This list has been the subject of a long-standing dispute, and led to a stoppage of the colliery from July 1 to the end of September.

The hauliers employed by the Blaenavon Company Limited, Mon., at their Blaenavon Collieries, have requested the miners' leaders to negotiate with the company's officials with a view to securing a tonnage system of payment, instead of the prevailing system of payment on day wage rates. A resolution to this effect was passed at a mass meeting which was addressed by Mr. James Winstone, J.P., acting-president of the South Wales Miners' Federation, and Mr. W. L. Cook, J.P., deputy-agent, on Monday evening.

At a meeting on Monday evening of the No. 2 branch of the Panteg Iron and Steel Workers' Confederation, it was decided to give financial support to the Pontypool Trades and Labour Council in its litigation over house rent disputes. During the war the council has dealt with numerous cases in which landlords have illegally increased rents.

North of England.

The Marsden lodge of the Durham Miners' Association has promulgated a proposal for an increase in the miners' basis wages in the county, making the county average 6s. 3d. per shift, or 50 per cent. on the old basis of 4s. 2d. Under the new scale, men would be entitled to their present hewers' county average when the selling price of coal reached 11s. 4d. per ton.

Northumberland coal owners have arranged to meet a deputation of the county miners concerning an increase in minimum wage rates.

The executive committee of the Durham Miners' Association has passed a resolution: "That the Coal Controller be asked for an early meeting in order that something may be done to secure the better working of the pits and more equitable distribution of trade throughout the coal fields of the country, seeing that we have 27 collieries to pay 'lying idle allowance' this week. Also that Mr. W. Adamson, the chairman of the Labour Party, be communicated with, asking him to raise the question in the House of Commons, with a view to alleviating the distress and want prevailing amongst the miners and their families in the county."

The members of Washington Glebe, Washington F pit, Usworth, and North Biddick Colliery lodges of the Durham

Miners' Association, in mass meeting assembled on Saturday, unanimously passed a resolution asking the Coal Controller to regulate and share the trade more equally, so as to enable the miners to live "above the border line of starvation."

The council of the Durham Miners' Association last Saturday rejected the following offers from the coal owners:—(1) "That to the legal minimum wage as fixed by the Joint District Board there shall be added the county advances which have been given since these rates were fixed, viz., 65 per cent. calculated not upon the minimum wage but upon the basis rates of each of the various classes for whom county rates are fixed and upon the individual basis rates of those for whom there is no county basis rate, the additions to be subject to fluctuations in accordance with the county percentages." (2) "The owners are agreeable, in the case of men entitled to the minimum wage, that such shall be calculated at 10 per cent. less than the county average rate or recognised county data wage for each class, except these classes which under the present arrangements have a minimum equal to or greater than their county average or recognised county data wage, the arrangements in such cases to continue." The council decided: "That this council reaffirms the position of the executive committee in offering to accept, as a settlement, 65 per cent., calculated upon the various basis wages, and the result to be added to the minimum rates, providing the percentages in case of coal hewers and fillers is added in the manner recognised between the two associations for Joint Committee purposes, namely, ¾d. for every 1¼ per cent. alteration in wages." It was further resolved that, failing acceptance of this resolution by the coal owners, the matter should not be referred to the chairman of the District Board, but that a ballot of the members be taken with a view of giving in notices.

There is quite a formidable list of motions—31 in all—for consideration at the half-yearly meeting of the council of the Northumberland Miners' Association, which opens in Newcastle to-morrow (Saturday). The proposals include the following:—(1) Colliery owners to pay at least half the net cost of explosives and workmen not more than the other half (sent in by Shankhouse lodge). (2) Sunday night shifts in the mines to be abolished, the Monday night shift to be counted as the first and the Friday night shift as the last in the week for all night shift workmen, and all night shift workmen to be paid at the rate of six shifts for five worked (Cowpen). (3) Coal hewers having to use safety lamps in longwall to be paid 1d. per ton extra, as in whole working where safety lamps have to be used (Sleekburn). (4) Owners to be asked to grant annually a week's holiday during the Newcastle Race Week (last full week in June) after the end of the war (Hartford). (5) Owners to give a better supply of fire coal (Heddon). (6) Lord Mersey to be asked to raise the minimum wage for pieceworkers to 10s. per shift (West Sleekburn). (7) Miners' Federation to be asked to assist in raising the minimum wage to county average for coal hewers, and for other classes in proportion (Seghill). (8) A minimum wage of not less than 10s. for pieceworkers and qualified stonemen employed underground to be sought, and all county percentage on wages over 20 per cent. to be added to minimum wages (Rising Sun). (9) No students to be sent either to Ruskin College or the Central Labour College (Crofton). (10) £25 to be granted to the North of England branch of the Central Labour College towards the cost of establishing district educational classes in the mining villages (West Cramlington). (11) That the same right as the coal owners have—to send to the Joint Committee applications for the fixing or alteration of new rates and prices affecting the various grades of mining workmen—be sought (West Wylam and Eltringham). (12) That a special meeting for the revision of the association's rules be held in January next (Broomhill). (13) To seek for all classes of mine workers a 1917 basis wage, to be fixed at 100 per cent. on the 1879 basis, with a minimum percentage of 20 per cent. on the new basis (Rising Sun). (14) To empower the executive council to convene special conferences throughout the county on the question of housing reform (West Wylam). (15) To protest against the unfair treatment of miners sent back from military service, in so far as they are not given either kit allowance or allowance for lodgings when they have to commence at a colliery away from their homes, such as workmen of other trades are understood to be allowed, viz., 17s. 6d. per week (Walker). (16) Nationalisation of mines and royalties and abolition of wayleaves, so as to relieve the industry from an unjust impost and secure to the nation the value of its own natural resources (Throckley Maria and West Cramlington). (17) The following motion to be placed on the agenda of the Miners' Federation annual conference: "That we demand an eight hours day for all surface workers about the mines of Great Britain, and, in the event of our demand being refused, we take the necessary steps to enforce it" (Ellington). (18) The Miners' Federation to be asked to seek the assistance of the Triple Industrial Alliance to secure an extension of the Mines (Eight Hours) Act to all surface workers (New Delaval). (19) The Miners' Federation to be asked to take the necessary steps to secure a six hours working day for all underground workers (Ellington and New Delaval). (20) To seek, through the Miners' Federation, a further advance of 25 per cent., calculated on basis wages, applicable to all mine workers in Great Britain (Ellington). (21) To protest against the Order of the Coal Controller under which men lost two days' war wage for losing one day's work in the short week, i.e., losing the war wage for both the day on which they lie idle and the pay Saturday (Cowpen). (22) That the Miners' Federation should approach the Coal Controller with a view to his ordering that the war wage must not be given to non-unionists (Hartford). (23) To continue to press, through the Miners' Federation, for the abolition of all piecework in the mines (South Tyne). (24) To seek, through the Miners' Federation, to have the amount allowed for expenses by the income tax assessors increased (Ferney Beds). (25) To ask the Miners' Federation to approach the Government with a view to the 25 per cent. increase granted under the Compensation War (Addition) Act, 1917, being increased to 50 per cent., and payable to all men in receipt of compensation, irrespective of the date of their injury (East Holywell). (26) To endeavour, through the Miners' Federation, to have the Coal Mines Act amended so as to prevent any working place being driven further than 30 yds. without an opening through which sufficient air can travel for adequate ventilation (Seghill). (27) To ask the Miners' Federation to approach the Local Government Board with a view to old age pensions dating from the date of application in the case of applicants 70 years or over on that date, instead of from the date of settlement (New Hartley). (28) An appeal against the executive committee's decision in the case of a compensation claimant (West Sleekburn). (29) To take drastic measures, if need be, to get all non-union mine

the association, and, if necessary, to ask the association to move drastically in the matter of (Crofton). (30) To express the opinion that the present organisation is inadequate, to call for a special Committee of Enquiry on this point, the committee to draw up a scheme for the provision of immediate and adequate treatment for the workers of the whole country, and to urge the committee of the Miners' Federation to take up this matter (Executive Committee). (31) To consider the Armstrong College proposal to place within the reach of sons of working miners mining exhibitions tenable for three years at the mines of the Ebbw Vale Company, and, if the representatives agree, to place before the branches a proposal to accept the college offer (Executive Committee).

Federated Area.

Some friction is reported between the employees and proprietors of the Ormonde Colliery, which belongs to the Butterley Company. As a consequence, a large meeting of Loscoe miners was held on Saturday, which was attended by the agent of the Derbyshire Miners' Association (Mr. Frank Hall), who remarked that the council had given him a free hand to act, and if the men would support him he was prepared to demand 11s. 6d. per day. He declared that at the Ormonde Colliery there was the worst state of things existing in Derbyshire, as far as wages were concerned. There had been no adjustment on the introduction of coal cutters, and the wages paid were far too low. Whereas men at the Britain Colliery of the company were getting 16s., the Ormonde men were only getting 9s. 8d., whilst some were as low as 6s. 6d. The meeting passed a resolution pledging itself to support Mr. Hall in demanding a readjustment.

Scotland.

The tonnage rates question in the machine wall section of the Hill Colliery, Netherburn, Lanarkshire, remains unsettled.

A ballot has been taken of all the miners employed at Bedlay Colliery, Lanarkshire. By a large majority, a strike has been declared. The men are claiming for the redress of certain old grievances which were the basis of an eight weeks' strike some months ago.

The brushers employed at Dixon's Collieries, in the Wilsontown district of Lanarkshire, have put forward a claim for an advance of 1s. 6d. per shift on their wages. The executive committee of the Lanarkshire Miners' Union are putting the claim before the owners.

A strike has taken place at Knowton Colliery, Shotts, which might well have been averted. Parties had agreed to arbitration, but at the last moment an unfortunate hitch in the arrangements occurred.

In West Lothian, work at the pits continues to be fairly regular. The only exception is the Whiterigg district.

Work at Ralston Colliery, East Lothian, has been somewhat irregular of late. The owners have arranged for the men to get a fair share of employment in the seams that are kept going, and arrangements are also in progress for giving the miners occasional shifts at neighbouring pits.

Upwards of 100 miners in Mid and East Lothian have responded to the appeal from the Ministry of Labour to transfer their employment to the iron ore mines in Cumberland.

The underground workers at the Castlecary Clay Works, Stirlingshire, are now members of the Stirlingshire Miners' Union. Discontent prevails over the wages at present being paid to the drawers, and negotiations for removing the friction are being opened between the management and the union agents.

Two sections of workmen employed at Wellington pit, Hurlford, belonging to the Portland Colliery Company, Ayrshire, have put forward a demand for increased rates because of the long drawing roads and other deficiencies. The matter has been taken up by Mr. Hood, county agent, who is to act in conjunction with the local colliery committee.

After a strike lasting three days the miners employed at Kinneil Colliery, Bo'ness, resumed work on Monday. The owners have agreed to pay the facemen the bonus of 1s. 6d. per day.

Negotiations have been proceeding for some time regarding the wages and working conditions of the firemen and shot-firers in Coalburn district. The men demand an eight hours day, or, alternatively, extra payment for work beyond that period. The employers have agreed to give the men an eight hours day, but demand as an equivalent a reduction in wages.

Arrangements have been made for the Fife Miners' Union officials getting a statement of the wages and the hours worked by the mines firemen in the counties of Fife, Kinross, and Clackmannan. So far as these workmen are concerned, there is a considerable variation both as to the wages paid and the hours worked, and the men are anxious to have uniform conditions established.

Iron, Steel and Engineering Trades.

The Committee on Production issued its finding in respect of wages in tin-plate, steel, iron, and engineering industries. The award is that the present scale of percentage bonus shall continue, and that in addition the men concerned are to receive an advance of 5s. per full ordinary week as from and including October 22, and from the same date the boys, youths, and apprentices under 18 years of age, an advance of 2s. 6d. per full ordinary week. Boys, youths, and apprentices, on attaining the age of 18, will receive a further advance of 2s. 6d.

Irish Demurrage Action.—Judgment has been reserved in a motion heard last week in the King's Bench Division of the Dublin Law Courts on behalf of Mr. J. McKelvie, Edinburgh, trading as the Erin Steamers Company, for a new trial or for judgment in the action against Messrs. Wallace Brothers, coal importers, Dublin, for demurrage in connection with the transport and delivery of a cargo of coal per the s.s. "Temaire." It appeared that Messrs. Wallace bought coal from Messrs. Russell, of Glasgow, who got a steamer from the plaintiff to convey the coal, but the charter party contained terms not in the contract between Messrs. Wallace and Messrs. Russell. The bill of lading was issued by the captain, but by a member of the crew the ship had put to sea, and did not return until after the discharge of the cargo. The plaintiff contended that they adopted the bill of lading issued by the captain, and by accepting it they were bound to pay the demurrage. Justice Gibson had held that, as the cargo was not delivered until after the cargo had been loaded on the ship had left on her return voyage, the plaintiff could not be held liable under the bill of lading.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

KING'S LYNN, NOVEMBER 21.—Coal (12 months) for the Corporation. Forms from the borough surveyor, Town Hall.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

ABERDEEN, NOVEMBER 22.—Stores.—Castings, fireclay, signal wire, packing, bar iron, springs, tubes, wagons, etc., for the Great North of Scotland Railway. Forms (1s.) from the Stores Superintendent, 80, Guild-street, Aberdeen.

BARRY DOCK, NOVEMBER 19.—Stores.—Iron, steel, wire ropes (six months) for Barry Railway Company. Forms from the secretary, Barry Docks.

BRADFORD, NOVEMBER 21.—Stores.—Nails, pipes, insulating materials, drivers' alarm bells, iron, steel, etc. (six or 12 months). Forms (£1 1s., returnable) from the Tramway Offices, Bradford.

BRISTOL, NOVEMBER 19.—Stores.—Castings, etc., (local tenders), for the Sanitary Committee. Forms from the city engineer, Queen-square, Bristol.

DUBLIN, DECEMBER 3.—Stores.—Iron and steel, castings, permanent way fastenings, oils, etc., for the Dublin and South-Eastern Railway. Forms (6d.) from the secretary, Westland Row Station, Dublin.

ENNISKILLEN, DECEMBER 1.—Stores.—Tubes, wire, copper plates, spelter, cement, castings, galvanised sheets, wire, iron, oils, tin-plates, etc., for the Sligo, Leitrim and Northern Counties Railway. Forms (1s.) from the secretary, Enniskillen.

NEWCASTLE, NOVEMBER 22.—Stores.—Castings, wrought iron and steel, rivets, bolts, wrought iron tubes, asbestos, packing, etc. (six or 12 months), for Tyne Improvement Committee. Forms from the general manager, Commission Offices, Berwick-street, Newcastle.

NOTTINGHAM, NOVEMBER 29.—Stores.—Refined tar, pitch, creosote, etc. (12 months), for the Works and Ways Committee. Forms (5s., returnable) from the city engineer, Guildhall.

SHEERNESS, NOVEMBER 19.—Boiler.—Lancashire boiler, superheater, etc., for the pumping stations. Forms (21s.) from the clerk, Council Offices, Sheerness.

WARRINGTON, NOVEMBER 22.—Stores.—Telegraph materials, creosote, iron bars and plates, tubing, spouting, bolts, spikes, galvanised sheets, steel fishplates, etc. (12 months), for Cheshire Lines Committee. Forms from the Stores superintendent, Cheshire Lines, Warrington.

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

Broomhill Collieries Limited.—The report, with balance-sheet, at the end of the financial year, June 30 last, shows the profit for the year, after providing for income-tax and excess profits duty, to be £95,389, and £35,271 was brought forward. The following amounts have been apportioned: Interest on debenture stock for the year, £3,906; sinking fund instalment, £16,250; preference share dividends for the year, paid January 1 and July 1, 1917, £7,875; interim dividend at 5 per cent. on ordinary share capital, paid July 14, 1917, £6,562; to reserve fund, 10 per cent. on 20 per cent. ordinary share dividend, £2,625, leaving £92,720. It is proposed that a final dividend of 15 per cent., less tax (making 20 per cent. for the year), on the ordinary shares be declared, payable December 5; that £18,989 be placed to reserve fund (bringing it up to £100,000); and that £54,044 be carried forward. Since March 1 the collieries of the company have been under the Controller of Mines.

Coalite Company Limited.—The Low Temperature Carbonization Company has been appointed manager of the business of Coalite Company for 10 years from October 1 last, in order to develop the patents. The company will receive advances of £6,000 in each of the five years commencing on June 1 next. Such advances will be repayable only out of the net profits derivable by the Coalite Company from the sale of or dealing with their rights and interests by the Low Temperature Carbonization Company, which will be entitled to 50 per cent. of the net profits derived from this source.

Cortonwood Collieries Company Limited.—Interim dividend of 5 per cent. (actual), free of tax.

Dorman, Long and Company Limited.—The directors announce a dividend of 4 per cent., free of income tax, making 8 per cent. for the year ended September 30, and, in addition, subject to the consent of the Treasury, instead of a cash bonus, to capitalise £240,406, part of the general reserve representing accumulated profits, for distribution among shareholders in fully-paid ordinary shares, making the total issued share capital £1,500,000. The distribution would be approximately one share for every 5½ shares now held.

Ebbw Vale Steel, Iron and Coal Company Limited.—Interim dividend at the rate of 6 per cent. per annum on preference shares for half-year ended September 30, less tax.

North Wales Iron and Manganese Company Limited.—The directors have declared a dividend of 10 per cent., free of income-tax, for the year ended September 30.

South Durham Steel Company Limited.—As the company's liabilities under the Finance and Munitions of War Acts have not yet been ascertained, the accounts for the year will not be ready in time for presentation at the forthcoming meeting. The directors are satisfied that the company's profits for the year ending September 30, 1917, will admit of the payment of a final dividend of 10 per cent., less tax, making 20 per cent. for the year, against 10 per cent. last year.

South Hetton Coal Company Limited.—The directors have decided not to pay an interim dividend on the ordinary shares this time.

Walker (C. and W.) Limited.—This gas engineering firm proposes to increase its capital from £100,000 to £150,000 by the creation of 50,000 new ordinary shares of £1 each, 33,300 of which are to be issued to the ordinary shareholders in the proportion of two new for every three now owned. The shareholders are not to be asked to sub-

scribe any fresh money. The net profit last year amounted to £13,900, as compared with £14,800 in 1915-16.

Weardale Steel, Coal and Coke Company Limited.—The profits for the year ended September 30 were £152,633, and £41,824 was brought forward. Debenture interest absorbed £11,712, and dividends amounting to 6 per cent. have been paid on the preferred ordinary shares. A further distribution of 6 per cent. is proposed on those shares, making 12 per cent. for the year, and a dividend of 6 per cent. and an extra dividend of 1½ per cent. are recommended on the deferred ordinary shares; adding £40,000 to the reserve, and carrying forward £39,246.

NEW COMPANIES.

G. and S. Limited.—Private company. Registered November 5. To carry on the business of electrical, general, and mechanical engineers, founders, etc. Nominal capital, £1,200 in £1 shares. Directors shall be appointed by the subscribers. Subscribers: K. E. L. Guinness (Kingston Hill, Surrey), C. J. Smith (Bedford), H. P. Hawthorn, and Barbara Fuller.

H. A. H. Tractors Limited.—Private company. Registered November 6. To carry on the business of mechanical and general engineers, etc. Nominal capital, £1,000 in £1 shares. Directors: E. L. Morcom (Edgbaston) and H. A. Hatfield.

Latham (J. O.) and Company Limited.—Private company. Registered office, 184, Sussex-street, Lower Broughton, Manchester. Registered October 30. To carry on business as iron founders, brass founders, etc. Nominal capital, £10,000 in 5,000 £1 preference shares and 500 £10 ordinary shares. Directors (one ordinary share): R. Kinsey and G. Latham. Qualification, £100.

Low Temperature Development Trust Limited.—Private company. Registered office, 16, Regent-street, S.W. Registered November 3. To carry on as a joint stock company limited any business, undertaking, transaction, or operation commonly carried on or undertaken by financiers, bankers, etc. Nominal capital, £15,000 in 14,950 £1 ordinary shares and 1,000 1s. founders' shares. Subscribers: W. A. Vruemden, A. E. Timbrell, and J. W. Shawyer.

Neville Foundry Company Limited.—Private company. Registered office, Neville-street, Rotherham, York. Registered November 5. To carry on the business of iron and general metal founders, etc. Nominal capital, £2,000 in £1 shares. Directors: J. Hawkins and G. Rawlings.

Rustless Iron (Cowper-Coles Process) Limited.—Private company. Registered November 6. To carry on business in connection with the manufacture of rustless iron and other metals, etc. Nominal capital, £5,500 in 5,000 £1 shares and 10,000 1s. shares. Director, S. Cowper-Coles.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

THE FREIGHT MARKET.

Tonnage supplies for outward chartering have shown no improvement, and the volume of business possible has been exceedingly limited. On the north-east coast, there has been a good demand for tonnage for Swedish discharge, but only two fixtures for that direction are recorded—Gothenburg at 185 kr., and Stockholm at 195 kr., rates which show a reduction of 5 kr. in each instance. Gibraltar has again been done at the even 100s. Boats are wanted for the Spanish Atlantic and for Portuguese ports at the lately accepted rates of 160s. to Bilbao or Santander, 95s. to Lisbon, and 105s. to Oporto, but no business has been done. The Spanish Mediterranean has been arranged for at the record rate of 275s. to Barcelona, a price which is 12s. 6d. in excess of the previous best rate. At South Wales, except for a fixture to Dakar at 85s., business has been solely confined to chartering for French Atlantic ports at the scheduled figures. There is a good enquiry for other directions, especially for Spanish ports and for South America, and high rates are on offer, without attracting shipping.

Homewards, the River Plate is dull, and unchanged from recent quotations of 145s. from up-river and 140s. from down-river ports to the United Kingdom. From Virginia to Buenos Ayres with coals, the rate remains at 125s., with 33 dols. for Rio discharge. From the Northern Range of the U.S.A. to West Italy with heavy grain, up to 70s. is now quoted, with 45s. quoted for French discharge—rates which show a very considerable advance on those of recent weeks. From Gulf to Barcelona on net form, 300s. has been paid. At the Far East, rates are inclined to strengthen. Madras Coast to Marseilles with kernels has advanced by 50s., being now quoted at 550s. Rice ports are firm, at 500s. for Saigon-Haiphong loading for French ports. Kurrachec to United Kingdom is steady, at 250s. on scale, but Bombay to the United Kingdom is 25s. dearer, being listed at 275s. For West Italian discharge, Bombay is unaltered, at 400s. There is a keen request for tonnage from the Mediterranean and Spanish ore ports, and rates are strongly held and inclined to advance.

Tyne to Barcelona, 3,000, 275s.; Gothenburg, 1,800, 185 kr.; Gibraltar, 6,000, 100s.; Honfleur, option Fecamp, 800, 65s., pitch; North French Range, 700 and 650, 46s., coke; and Stockholm, 1,800, 195 kr.

Cardiff to Brest, 1,100 and 1,300, 45s., neutral; Caen, 900, 48s., neutral; Cherbourg, 1,000, 23s. 6d.; Dakar, 1,200, 85s.; Fecamp, 480 and 500, 48s. 9d., neutral; Honfleur, 700, 48s., neutral; La Pallice, 1,500, 61s. 6d., neutral; Rouen, 1,200, 74s. 3d., coke, neutral; 1,400 and 1,100, 48s. 9d., neutral; St. Nazaire, 6,470, 61s. 6d., neutral; 700, 30s., and St. Malo, 1,000, 21s.

Swansea to Rouen, 1,600 and 1,400, 48s. 9d., neutral; La Pallice, 1,450 and 1,500, 61s. 6d., neutral; St. Servan, 1,200 and 1,300, 43s. 6d., neutral; and Caen, 1,300 and 1,350, 46s. 6d., neutral.

Port Talbot to Rochefort, 1,500, 61s. 6d., neutral; and St. Servan, 1,150, 43s. 6d., neutral.

Newport to Nantes, 1,200 and 1,300, 61s. 6d., neutral; and St. Nazaire, 2,800, 61s. 6d., neutral.

Wales to Fecamp, 400, 48s. 9d., neutral.

LATER.—Since the above was written, the following additional fixtures are announced:—

Tyne to Gothenburg, 2,500, 190 kr.; and London, 700, 21s.

Cardiff to Caen, 700 and 900, 48s., neutral; and Havre, 1,350, 22s. 6d.

Hull to Dieppe, 875, 52s., neutral.

Swansea to Caen, 700, 48s., neutral; and Havre, 1,400, 22s. 6d.; and 1,450, 45s. 9d., neutral.

East Coast to Dieppe, 1,000, 51., neutral.

Leith to Stockholm, 1,800, 205 kr.

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alferton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

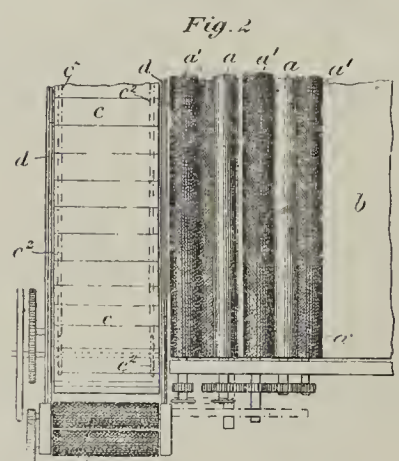
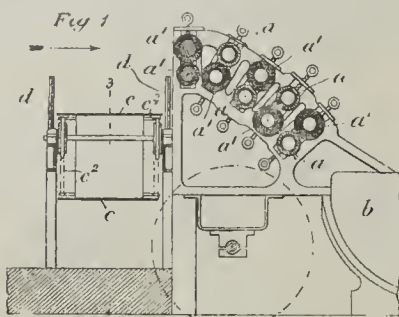
47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

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ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

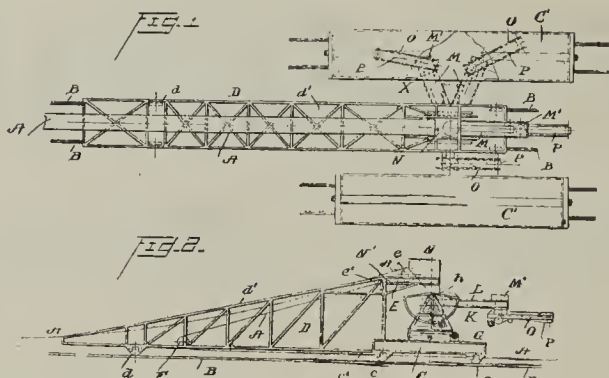
Improvements in Apparatus Employed in the Tinning of Tin-plates, etc. R. B. Thomas, The Tinning Works, Englefield Green, Surrey; H. S. Thomas, Hazelwood, Cardiff-road, Llandaff, Glamorgan; and W. R. Davies, Forest-Lyn, Heoldon, Whitchurch, Glamorgan.—This invention consists of the improvements in or additions hereinafter described to machinery or apparatus employed in the manufacture of tin-plates and sheets and other like metal-coated plates or sheets, the said improvements or additions having for their principal objects the gathering up into a single pile of the plates or sheets which have been passed in series abreast through the cleaning or dusting machine so as thereby to facilitate the conveyance of the tinned plates or sheets to the assorting and packing room, and to effect a more efficient dusting and polishing of the plates or sheets after the tinning process. Fig. 1 represents in longitudinal section a dusting or cleaning machine of a tinning apparatus provided with two sets or series of dusting rolls in accordance with this invention; fig. 2 is a plan of the machine. *a, a'* are the pairs of dusting rolls constituting the first set or series, which are arranged at the rear of the branning appliance of the tinning apparatus, as is usual, *b* being a portion of one of the troughs of the said branning appliance. At the rear of the dusting rolls *a, a'* is an endless travelling conveyor *c* of a length equal to or greater than the length of the dusting rolls *a, a'*, which usually have a length proper to take two or more plates or sheets abreast. *d, d'* are guards to prevent the plates or sheets which are delivered on to the conveyor *c* from passing over the edges of the same. The conveyor is preferably made of a series of overlapping plates *e*, the said plates being secured by rivets to ear pieces projecting from the outer sides of or connected to certain of the links of the endless chains *e'*. At the end of the conveyor *c*, towards which the plates or sheets are carried by the motion of the same, are two pairs of dusting rolls *e, e'*, by the action of which the plates or sheets are dusted or cleaned in a direction at right angles to that in which the said plates or sheets are dusted by the pairs of rolls *a, a'*. The rolls *a* of the first series are preferably rubber covered rolls, and the rolls *a'* are covered with sheep skins as is usual. The lower roll only of the first pair of the second series of rolls *e* is preferably rubber covered, the upper roll of the said first pair and both rolls of the second pair being sheep skin covered rolls. The delivery of a series of plates simultaneously into the tinning machine, and the speed of the rolls *e* and endless conveyor *c* with respect to the speed of the rolls *a, a'*, are so regulated that the removal of two or more plates or sheets simultaneously delivered on to the conveyor *c* out of the path of the succeeding plates or sheets before the latter leave the first series of dusting rolls *a, a'*, is ensured. (Five claims.)



107766. Improvements in Winding or Hauling Machinery. Siemens-Schuckertwerke, G.m.b.H., Siemensstadt, near Berlin.—This invention relates to hauling or winding machinery, and has reference more particularly to indicator and safety arrangements acting in case of slipping of the rope, the said invention being an improvement in or modification of that set forth in the specification of Patent

15 is driven, which actuates the adjustable resistance 16 in the controlling circuit. The second controlling resistance 17 of the controlling circuit is actuated through a shaft 18 by a worm 19 and worm wheel 20 from the rope pulley 3. 21 represents a source of current in the controlling circuit, which is in series with the two controlling resistances 16 and 17 and the indicating device or releasing apparatus 22 of the controlling circuit. When the winding machinery is working normally, as much resistance is always put out of circuit by the resistance 16 as is put in by the resistance 17, and *vice versa*, so that the device 22 receives constant current. If, however, the rope slips or the depth indicator is wrongly adjusted, there is a non-uniform movement of the two resistances 16 and 17, so that the total resistance of the controlling circuit varies, and therewith the strength of current in 22. The variation in the strength of current can be caused to actuate safety devices for the winding machinery, or the variation in the strength of current, and also the extent of the deviation from the proper adjustment can be read off on the instrument 22. The casing of the resistance 17 is provided with a pair of stops 23 and 24. It is rotatably mounted on the base or socket 25, but is restrained by a friction brake 26. The rheostat arm or lever 25 engages at each end of its travel one or other of the stops 23 or 24, and hence the casing of this regulating resistance is moved at each engagement, so that the well-known creeping action of the rope on the driving pulley 3 does not affect the safety device. A further improvement according to the invention consists in controlling the winding machinery from the controlling circuit in such a way that when the rope slips the speed of the machinery is automatically reduced and accidents thus prevented. A simple arrangement for this purpose consists in arranging that the indicator instrument 22 acts also as contact maker for a controlling circuit, which reduces the speed of the winding machine motor. (Three claims.)

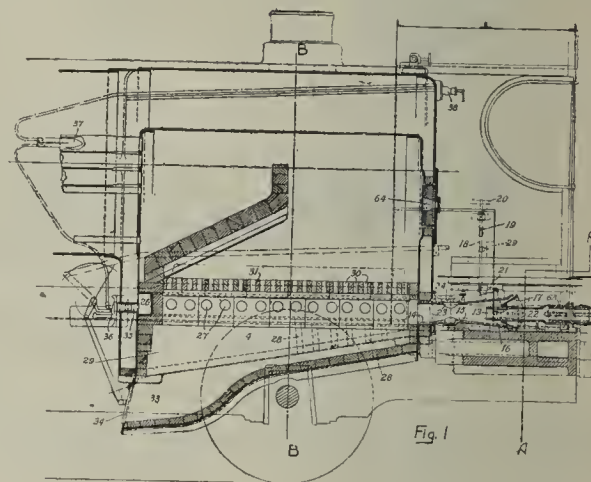
109028. Improvements in Conveying and Loading Apparatus. F. L. Stuart, Glenville-road, Greenwich, Connecticut, U.S.A.—This invention relates to apparatus for conveying coal, ore, and other such material by means of conveyor belts to apparatus which receives the material so conveyed and delivers it to storage piles, bins, cars, boats, vessels or other receivers, and the object of the invention is to provide an apparatus which may be used in connection with an ordinary conveyor belt, and which is so constructed that it may receive material from such conveyor and carry and deliver it to its destination at any desired elevation or in any desired vertical plane, and which is movable to any required place while still in operative relation with the main conveyor. In the accompanying drawings, fig. 1 is a plan view of conveying and loading apparatus embodying the improvements; fig. 2 shows a side elevation thereof. The main conveyor belt *A* is mounted and guided in any suitable way between the rails of the track *B*. The apparatus *X*, to which the main conveyor delivers, comprises a truck *C*, the wheels *c* of which traverse the track *B*, and this truck is connected as shown at *c'* with a trussed frame *D*, which at its outer end is supported by wheels *d* resting on the track. The frame *D* has an inclined part *d'* extending from the outer



end of the frame to the upper portion *E* thereof, in which is mounted a pulley *e*, over which the conveyor belt extends and from the underside of which the belt passes to a guide pulley *e'*, and thence to a pulley *F*, over which it passes and then continues in the manner clearly shown in fig. 2. In this way a tripper is provided, which causes the conveyed material to be delivered to the receiving conveyor hereinafter described. The truck *C* supports a turntable *G*, and on the turntable is mounted a frame *H*, in which is hung at *h* a box-like frame or oscillating cage *K*, which supports the frame *L* of a horizontally arranged conveyor belt *M*. The main conveyor delivers to a stationary hopper *N*, which in turn delivers to another hopper *N'*, movable with and discharging on to the conveyor *M*. This latter conveyor *M* may be called the receiving conveyor, inasmuch as it receives the material delivered by the main conveyor belt. The outer end of the frame *L* supports the frame *O* of a conveyor belt *P*, which delivers the material to any desired place or receptacle. The inner end of the frame *O* is mounted to turn about a vertical axis, so that the delivery conveyor may be adjusted to any desired angle, but it is always maintained in a plane parallel with that of the conveyor *M*. The frame *L* of the receiving conveyor is suitably mounted and guided for adjustment lengthwise, horizontally, in the frame or cage *K*, being suitably guided by rollers *m*, and the conveyor *M* carried by this frame is therefore, by reason of the construction before described, capable of being oscillated about the axis *h*, of being extended horizontally from this frame, and of also being turned about a vertical axis by reason of the fact that it is mounted on the turntable *G*. Various adjustments may thus be obtained for the receiving conveyor, the outer end of which delivers to the hopper *M'*, which feeds the discharging conveyor *P*. This conveyor is hung from a turntable on the outer end of the frame *L*, and can be turned about a vertical axis to any desired extent. The frame *H* may be turned about its vertical axis by means of a motor *Q* operatively connected with the turntable in any suitable way. The oscillating frame *K* may be swung to any desired extent by motor mechanism *R* suitably connected therewith. The receiving conveyor belt *M* may be driven by suitable motor mechanism *S*, and the delivery conveyor belt *P* may be driven by similar motor mechanism *T*. Fig. 1 indicates how the receiving conveyor and the delivery conveyor may be inserted into a box car, and how the delivery conveyor may be moved to various positions in the car to deliver thereto and distribute the material therein. One of the principal objects of the invention is to avoid, as far as possible, the breakage of material, and it will be observed that the material passes gently from the main conveyor belt to the receiving conveyor on the loading apparatus, and that it passes gently from the receiving conveyor to the delivery conveyor. The

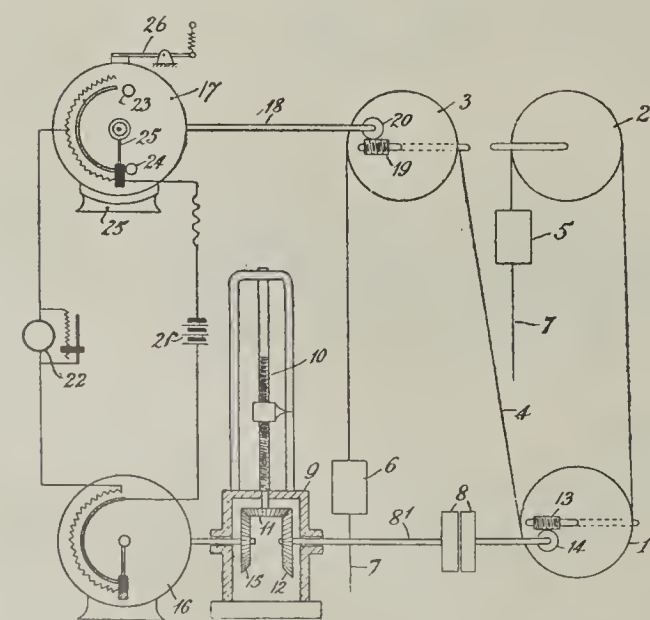
loading apparatus can be moved about a horizontal axis so as to hold the outer end of the delivery conveyor close to the pile or point of delivery in such manner that there is but little fall for material while being delivered. (Three claims.)

109063. Improvements in the Employment of Pulverised Fuel in Steam Generators. J. G. Robinson, Mere Bank, Fairfield, Manchester.—This invention relates to improvements connected with the use of pulverised fuel in the furnaces of steam generators, and has for its primary object the provision of means whereby pulverised fuel can be effectively employed in the furnaces of locomotives, although the principles and arrangements involved may be found useful for the furnaces of other steam generators. The accompanying drawing, illustrating the invention applied to a locomotive, is a section taken through the firebox. The fuel before being placed in the hopper or receptacle is ground to pass through a fine mesh screen, and is carefully dried so as to contain as little moisture as possible, to enable it to be distributed to the furnace by means of the feeding devices hereinafter referred to. These feeding devices comprise, in the present example, two horizontal, longitudinal screw or other conveyors of any well-known type, and these conveyors are driven through



suitable variable speed transmission devices by a steam turbine or other suitable means. It will be appreciated that by the provision of a variable speed gear these conveyors can be driven at any desired speed with the turbine or other prime mover running at constant speed. The variable speed gear may be of any desired form, such, for instance, as a variable stroke pump coupled to an hydraulic motor, or a variable friction gearing may be employed. The screw conveyors deliver the pulverised fuel into conical chambers, where it is picked up by a strong blast of air from a blower, this air being supplied through a regulating valve and pipes, and passes thence through the flexible pipes 12 to the inner delivery nozzles 13 of the burners 14, which inner delivery nozzles 13 are concentric with the outer burner tubes 15, leaving an annular space 16 between the nozzles 13 and outer burner tubes 15, through which air is induced, partly by the chimney blast and partly by the air blast issuing with the fuel from nozzles 13. The rear ends of the outer tubes 15 are provided with annular valves 17, which slide on the outer peripheral surfaces of the inner nozzles 13, and are fitted with hand-operating gear to enable the supply of induced air to be regulated. This hand-operated gear may consist of a slidable rod 18 having its upper end screw threaded and engaging a nut 19, which nut is rotatable by means of the hand wheel 20. The lower end of the rod 18 is coupled to the bell crank lever 21, which is in turn connected to the sliding annular valve 17 by means of the link 22. It will be clear from the foregoing that by operation of the hand wheel 20 the valve 17 will be opened more or less, and if desirable an indicator or pointer such as 29 may be provided to indicate the extent to which the valve is opened. Ports 23, closed by covers 24, are arranged in the burners 14 to enable the pulverised fuel carried by the blast issuing from nozzles 13 to be ignited initially when starting up. The fuel, together with the forced and induced air, issuing from the burners 14 enters the furnace 4, which is built of a refractory material, partly in the ashpit and partly in the lower portion of the firebox. Here the fuel is ignited when the furnace is at work, since the ignition ports 23 are closed after the flame has been once started. A further supply of air, induced by the chimney draught, may be supplied by the ducts 26 and openings 27 in the furnace lining, and the products of combustion then pass through small holes 30 in the furnace crown 3, by which means they are broken up and thoroughly mixed in contact with the hot brickwork, so that combustion is facilitated and expedited. Any unburnt fuel that escapes from the holes 30 is met by a further supply of air induced by the chimney blast through the holes 32, and its combustion is thereby completed. The furnace, which is of special construction, as shown, is formed of very highly refractory material, and owing to the very finely-divided state of the fuel and its intimate mixture with the air supply, the absence of radiation, by reason of the non-conducting nature of the furnace walls, and the high temperature of the walls and crown, combustion is extremely rapid, and is practically complete in the body and crown of the furnace. (Nine claims.)

109067. Improvements in Apparatus for Registering the Amount of Fuel Fed into a Boiler Furnace, etc. J. E. Lea, 28, Deansgate, Manchester.—This invention refers to a new arrangement of apparatus for use in registering the total quantity of fuel fed into a boiler furnace by a mechanical stoker of the reciprocating ram type, especially when the stroke of the ram is variable. In addition to registering the total quantity of fuel fed into a boiler furnace or the like, the improved apparatus may include means for affording a graphic record of any changes in the stroke of the ram, and any changes in the rate of feed. According to the invention, the improved apparatus comprises a counter, marked to indicate volume or mass. It also comprises a sliding rack bar, adapted to be moved to and fro by the ram of the stoker, a toothed pinion meshing with the rack bar, a one-way clutch or free wheel, to one part of which the pinion imparts its motion, and gear wheels through which the other part of the free wheel transmits its motion to the counter, the said pinion and gear wheels rotating the counter for a distance equal or proportionate to the movement of the ram during each working stroke, and the gear wheels and counter remaining stationary during the idle stroke of the ram. When required to produce the aforesaid graphic record, drums, carrying chart paper, are provided, the drums being driven by the ram of the stoker through the counter-operating



Application No. 101407. The accompanying diagrammatic drawing illustrates one example of an arrangement in accordance therewith. 1 is the driving pulley of the winding machinery, which is driven by a suitable motor (not shown). 2 and 3 are the rope pulleys over which the rope passes in the known manner from the driving pulley. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 are the ends of the lower rope. 9 is coupled with the driving pulley 1 by a coupling 8. The spindle 10 of the drum 9 is driven by the bevel wheels 11 and 12, which are mounted on the shaft 81, which is driven by the driving pulley 1 through the friction 13, and the worm wheel 14. From 15 of the depth indicator a further bevel wheel

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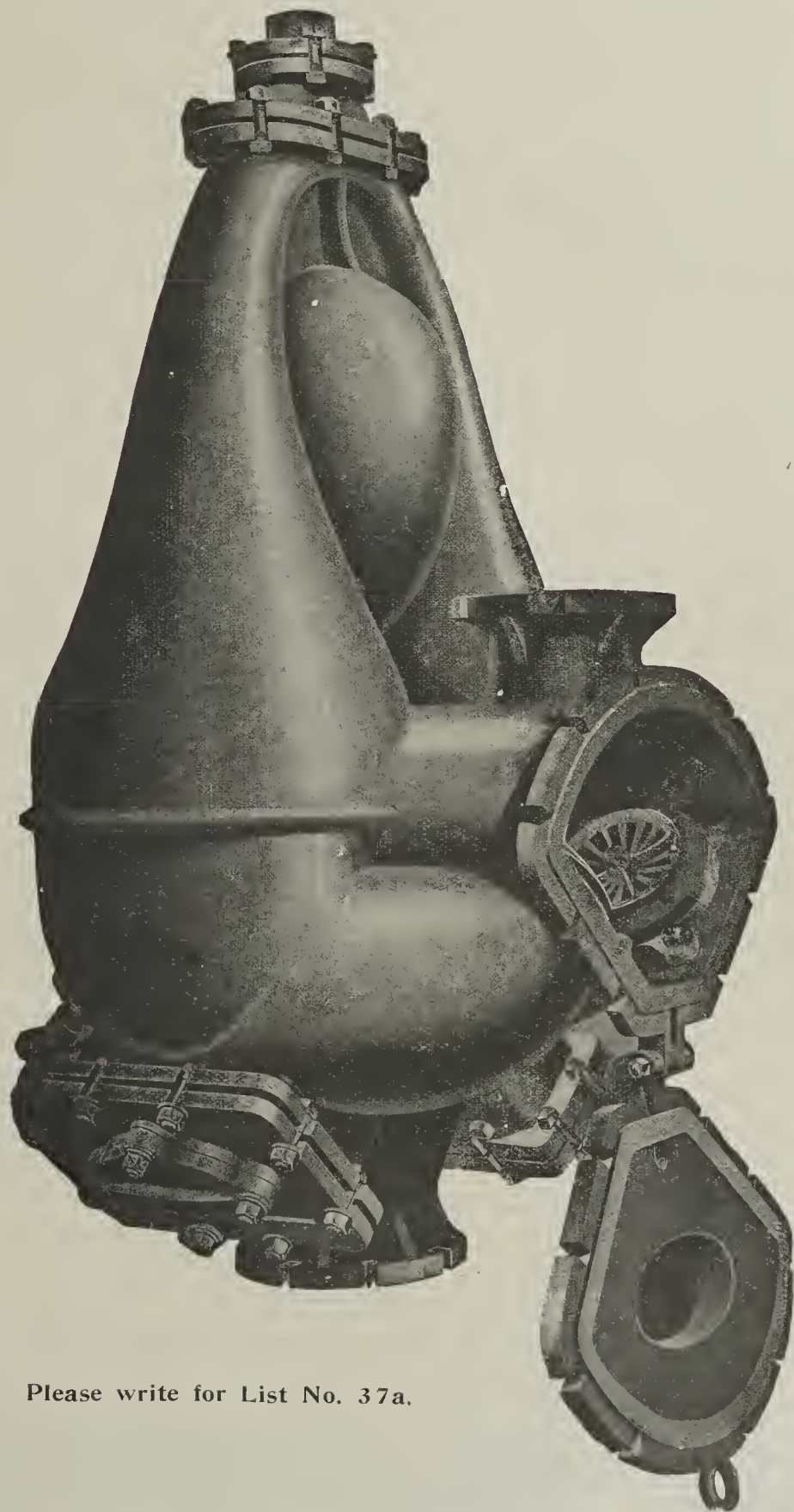
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"Egyptian, London."
Telephone—4565 Victoria.

Telegrams—"Pulsometer, Reading."
Telephone—583 Reading.

also provided, adapted to be moved across by the means used for varying the stroke or claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE. Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Abrahams, E. G., and Parker, J. W. Air compressors in connection with apparatus for producing gaseous fuel. (16309)
- Akt.-Ges. Brown, Boveri, et Cie. Regulating shunt dynamos. (16279)
- Alldays and Onions Pneumatic Engineering Company, Collins, J. N., and Lyon, F. Runners of centrifugal fans, etc. (16240)
- Axien, J. H. Rotary blowers. (16289)
- Barstow, F. A., and Mairat, F. F. Caps for rock drills, etc. (16095)
- Baur, C. H. vom. Electric furnace. (16507)
- Beeby, A. R., and Milner, H. L. Rotary pumps, blowers, engines, etc. (16260)
- (Chrisman, C. S.). Gas wash boxes. (16290)
- Cook, S. S., Douglas, L. M., and Parsons, Sir C. A. Geared turbine installations. (16119)
- Coplands, J. M. Power driven air or gas compressors. (16341)
- Coplands, J. M. Method of operating rotary compressors. (16416)
- Corthesy, J. H. Means to generate gas from coal, etc. (16085)
- Dickson, H. C., and Nicklin, J. B. Manufacture of steel. (16512)
- Edwards, F. Self-locking safety pin for tram shackles, etc. (16083)
- Fielding, J. Steam hydraulic pressure intensifiers. (16081)
- Frew, J. Storage of gas. (16360)
- Greenhalgh, E. Dynamo electric machinery. (16434)
- Hailwood, E. A. Indicating levels. (16173)
- Irminger, R. Internal combustion engines. (16481)
- Johnson, W. Air pumps, etc. (16529)
- Jones, E. Steam generators. (16210)
- Jürgens, J. Rotary blowers. (16289)
- Kayser, C. F., Kuehnrich, P. R., and Rogers, F. Pyrometers. (16096)
- Kear, E. E. Internal combustion engines. (16491)
- Keillor, D., and Macqueen, E. Automatic combination heater and feed pump for boilers. (16502)
- King, F. Brown. Apparatus for draining mines. (16380)
- Lindley, W. Portable hoisting apparatus for use in mines, tunnels, etc. (16213)
- Longbottom, B., and Lo-Thermo Patents Limited. Dynamo electric machinery. (16434)
- Luard, E. S., and Willans, G. H. Combined feed water heater and steam superheater for boilers. (16474)
- Martin, R. Gas producers. (16447)
- Morison, D. B. Steam condensing plant. (16536)
- Mottram, G. W. Method of treating silica, etc., for use in manufacture of refractory goods. (16225)
- Mottram, G. W. Process for manufacture of refractory goods. (16229)
- Neighbour, A. G. L. and H. C. W. Internal combustion engines. (16402)
- Parnall, G. G. Internal combustion engines. (16491)
- Picgat, A. J. Elastic fluid engines. (16112)
- Prentice, N. Electric furnaces. (16145)
- Rayner, G. H. T. and P. Valve apparatus for rock drills, etc. (16094)
- Ritchie, W. G. Petrol, etc., motors. (16291)
- Robertson, C. G. Steam generators. (16210)
- Robinson, W. Internal combustion engines. (16429)
- (Rogers, S. A.). Elevated railways, tramways, etc. (16184)
- Rogers, T. G. S. Appliance for domestic fire places for producing heat and economising fuel. (16212)
- Rose, J. R. Apparatus for producing combustible fuel. (16126)
- Schou, P. Pumps. (16388)
- Shamon, D. M. Apparatus for ascertaining quantity of liquid in tanks and for detecting leakage of liquids into tanks, etc. (16237)
- Skinner, G. H. Internal combustion engines. (16300)
- Soc. Franco-Belge des Fours à Coke. Horizontal coking ovens. (16469)
- Stinchcombe, T. W. Fire grates for furnaces. (16170)
- Walker, J. H. Lifting or hauling gear. (16195)
- Walker, J. H. P., and J. J., and Walker and Sons, J. W. Jigs for boring and drilling. (16385)
- Westinghouse Electric and Manufacturing Company. Geared turbine installations. (16198)
- Whitham, F. E. Machines for grinding or reducing minerals, etc. (16408)

- Whitham, F. E. Furnaces for generating heat for steam raising, etc. (16409)
- Wild, J. E. Engine installations adapted to run on gas. (16114)
- Williams, A. H. Internal combustion engines. (16332)
- Winton, A. Internal combustion motors. (16510)

Complete Specifications Accepted.

(To be published on November 29.)

[NOTE. The number following the application is that which the specification will finally bear.]

- 1916.
8705. Meyer, R. E. Explosion engines. (110762)
10411. Raymond Brothers Impact Pulverizer Company. Pulverising mills. (101962)
10768. Cammell, Laird and Company, and Carter, G. J. Oil fuel heaters, feed water heaters, and the like. (110766)
11144. Brown, R. Process for the manufacture of artificial fuel from waste products. (110707)
13826. Gallot, G. A., and Poussin, P. M. N. Apparatus for extracting dust from gases and vapours. (110774)
15263. Holgate, J. Reciprocating engines. (110779)
15376. Baumann, K. Semi-double flow steam turbines. (110785)
15377. Baumann, K. Radial flow steam turbines. (110786)
15462. Marks, E. C. R. (Ashford, J.). Reciprocating pumps. (110789)
15521. Baumann, K. Axial flow steam turbines. (110791)
15563. Hall, I. Liquid fuel burners and furnaces. (110793)
15863. Soc. J. and A. Niclausse. Feed water regulator for boilers. (103110)
16626. Skoglund, A., and Bore, J. Cleaners for the smoke tubes in steam boilers. (110814)
16906. Baker, H. Extraction of cyanides from ammoniacal liquor. (110819)
17455. Halkett, R. Natural draught regenerative ovens, and burners therefor. (110825)
- 1917.
760. Pullin, C. G. Motors. (110844)
5460. Hallback, C. A. Internal combustion engines. (105760)
7738. Akt.-Ges. Brown, Boveri et Cie. Apparatus for regulating steam or gas turbines. (106827)

ALIEN PATENTS.

The following list of patents granted to German and Austrian subjects is specially compiled for this paper by Messrs. Hughes and Young Limited, patent agents, 3, Cherry-street, Birmingham, and 55/56, Chancery-lane, London, W.C., who will furnish our readers with any further information they may require.

109451. H. Mack, 3, Bergergrasse, Hamm, Westphalia, Germany. Mining.
109572. I. Rosenberg, 35, Unter den Linden, Berlin. Mineral oils.

PUBLICATIONS RECEIVED.

"The Journal of State Medicine" (Vol. 25, No. 11), November 1917 (edited by William R. Smith, A. Corbett Smith, 37, Russell-square, London, W.C.), price 2s.; "Compressed Air Magazine" (Vol. 22, No. 10), October 1917, singles copies, 10c.; "Records of the Geological Survey of India" (Vol. 48, Part 1), 1917, also (Vol. 48, Part 2) (published by Order of the Government of India), price one rupee per part; "Sydney Chamber of Commerce (Incorporated) Journal" (Vol. 6, No. 7), Sept. 1, 1917; "Bulletin of the Imperial Institute" (Vol. 15, No. 2), April-June 1917 (London: John Murray, Albemarle-street, W.), price 2s. 6d. net; "Russia: Britain's Great Opportunity" (Vol. 1, No. 9), September 1917 (published by R. Martens and Company Limited, 149, Leadenhall-street, E.C. 3), price 6d. net; "Sir Charles W. Macara, Bart.: a Sketch of Modern Lancashire," by W. Haslam Mills (published by Sherratt and Hughes, Manchester), price 6s. net; "University of Illinois Bulletin" (Bulletin No. 97), "Effects of Storage upon the Properties of Coal," by S. W. Parr, price 20c.; "Institution of Mining and Metallurgy" (Bulletin No. 158), dated November 8, 1917 (published by the Institution of Mining and Metallurgy, 1, Finsbury-circus, London, E.C. 2); Sullivan Machinery Company (Bulletin No. 75c), "Sullivan Angle Compound Power-Driven Air Compressors," (Bulletin No. 75f), "Sullivan Tandem Compound Corless Air Compressors, Class 'WC'"; "Journal of the Franklin Institute" (Vol. 184, No. 4), October 1917, single number, 50c.

The late Mr. Francis Evan Moss, of Kilhey Court, Worthington, Lancashire, coal contractor, left estate valued at £35,134.

CATALOGUES AND PRICE LISTS RECEIVED.

David Bridge and Company Limited.—Incorporated in the handsomely illustrated catalogue of the "extra rapid" end-pressing horizontal baling presses and pumps for high density bales, are some particulars of Heywood and Bridge's patent friction clutches, complete hauling plants, and mill-gearing installations. In too many cases power is wasted through the main shafting being kept in motion when only a portion of the machinery is in use. Hence the familiar lesson of mechanical economy needs enforcing in publications of this kind. The Castleton firm's patent clutches have reached the highest standard of efficiency, embodying as they do the results of many years' practical experience. Pedestals and lubricators also are illustrated in the catalogue.

Hyatt Roller Bearings.—Messrs. Broom and Wade Limited, High Wycombe, Bucks, in their newly-issued leaflet regarding the Hyatt flexible roller bearings, draw attention to the prime importance of efficiency in reducing bearing friction to the minimum. They claim that from 60 to 70 per cent. less friction is present in a shaft of wheel where the Hyatt bearing is the supporting medium. On line shafting this would be equivalent, in horse-power, to a saving of 15 to 25 per cent. of the actual power transmitted. Calculations show that this represents a return of 100 per cent. on the initial outlay in two years. Durability is also one of the many specified advantages of these widely-used bearings. Two other types are standardised: the commercial (for ordinary commercial conditions), and the high-duty bearing (for heavy duties and high speeds). As a shock absorber, the Hyatt has justified itself during many years' experience.

Bromell Patents Company Limited.—Admittedly the salinometer will provide a good test of the existence of salt in the boiler water, but the instrument falls in the important respect of indicating the rate at which the salt enters the boiler. Hence the trouble is not fully met. The Bromell Patents Company Limited, of 62, Robertson-street, Glasgow, and 12, Bath-street, Liverpool, issue a leaflet descriptive of the Simplex patent salt detector, from which it appears that the detector is designed to give a continuous indication of salt in the feed water, as well as of any sudden increase in the saline body. This enables a remedy to be applied promptly. The simple apparatus is based on the well-known fact that the electrical resistance of pure water falls very quickly if certain compounds (for instance, salt) are added. Some of the water flows through the detector, and the indicators—voltmeter, incandescent lamp, and buzzer—respond to the presence of salt. The apparatus is used in a number of engineering works.

Simplex Conduits Limited.—The success of the Simplex system of steel conduits for encasing electric wiring cables assures one of the company's practical efficiency in other productions, of which the Plexsim hot bar fire, or fire with unbreakable bars, is an illustrated instance. The leaflet shows the design, consumption, cost, and weight of this instantaneous office or household electric heater. No. H 413, made in strong sheet iron, consumes 2,000 watts, weighs 10 lb., and is sold at £1 10s.; and No. H 416, in heavy cast iron, weighs 20 lb. The price of this is £1 14s. 6d. The heater has a highly luminous and cheerful effect, and represents economy in space as well as economy in heating. The bars (easily removed and easily replaced) are suspended on sensitive springs which absorb shock and allow for expansion. As a consequence, the fires, notwithstanding the roughest of treatment in transit, arrive and remain intact. This is a great improvement on previous designs. The electrical connections are all of the heavy busbar order, robust and generous, a great improvement on the loose wire and beads with which many electric heaters are fitted.

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named **post free**.

Board of Education: Minute of the Board of Education, October 24, 1917. Modifying Part III. of the Regulations for Technical Schools, Schools of Art, and other Forms of Provision of Further Education in England and Wales. Price 1½d.

Colonial Reports (Annual): (No. 938), Falkland Islands. Dated October 1917. (London: Published by H.M. Stationery Office). Price 1½d. (No. 936), Gambia. Price 3d. (No. 937), British Guiana. Price 3d.

Ammonite.—The Home Secretary has made an Order, dated November 5, the effect of which is to add Ammonite to the Permitted explosives mentioned in the first schedule of Explosives in the Coal Mines Order of September 1, 1913.

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THE COLLIERY GUARDIAN

AND

JOURNAL OF THE COAL AND IRON TRADES.

VOL. CXIV.

FRIDAY, NOVEMBER 23, 1917.

No. 2969.

Drying Colliery Electrical Apparatus.

By L. FOKES.

It frequently happens that colliery electricians are called upon to dry out electrical apparatus which has become damp in transit from the manufacturers, or as a result of enforced idleness due to a breakdown of machinery. It has often happened that electrical apparatus has been completely submerged for a considerable period, and the windings become so saturated that thorough drying was imperative before being again connected for service.

Not infrequently, a good deal of resourcefulness is called for, in some instances, to devise means whereby the necessary drying can be accomplished, it being sometimes difficult to find a suitable supply of current for the work. It is in such cases that the colliery electrician is able to prove his worth in turning to good account such means as happen to be at hand.

Determining the Dampness of Apparatus.

An insulation test to earth does not always indicate true conditions, for whilst a machine with windings placed in mica tubes may show a good test to the frame because of the extremely good insulating and damp resisting properties of good mica, there is always the possibility of dampness existing between successive turns of a coil or winding; and this fact is often overlooked when an insulation test to earth is good, the result being that apparatus often breaks down between turns soon after being placed in service.

The voltage which may exist between successive turns depends on the number of turns and the applied voltage. For instance, an inductive winding connected across a potential V volts will have $V/\text{number of turns}$ volts between successive turns. If $V = 1,000$ volts, and the winding consists of 2,000 turns of wire, then the voltage between turns will be $\frac{1,000}{2,000} = 0.5$ volts. If we double the pressure, we have then $\frac{2,000}{2,000} = 1$ volt between turns. It will therefore be obvious that the question of insulation between turns is of more importance in high-tension apparatus than in low, though it exists in both, and should not be overlooked.

The insulating covering of wires usually employed in winding consists of a double layer of cotton, which may or may not be impregnated. As cotton readily absorbs moisture, it is advisable to dry out all apparatus before being placed in service, unless it is certainly quite dry.

Temperature of Windings.

As insulating materials vary in construction and quality, so also do their heat-resisting properties, and it is therefore necessary when drying electrical apparatus to avoid subjecting the windings to excessive temperatures, which may permanently injure the insulation by making it brittle and easily fractured. In the case of windings insulated with cotton, silk, paper, and similar materials, when impregnated, the maximum temperature to which these may be subjected must not exceed 95 degs. Cent.

Measurement of Temperature.

This is usually the most difficult part of drying operations, as the temperature throughout the different parts of a winding may vary considerably, and unfortunately the points at which the temperature would be highest are those which are inaccessible to touch or to reach with a thermometer.

The windings confined in the slots of an induction motor will naturally attain to a higher temperature for a given current than will the end windings bridging from slot to slot.

The same applies to a transformer or field winding. The outside of a coil will not indicate the true temperature inside next the core, which is confined and subjected to the heat of the core, besides the current which it is carrying. It is therefore impossible to determine exactly the temperature of the confined portions of a winding either by thermometer or touch.

Measurement of Resistance by Change of Temperature.

This method is usually put forward as the one to adopt when thermometers cannot be inserted to ascertain the temperature of a winding.

It is by no means clear, however, that the measurement of resistance by the change of temperature gives any indication of the maximum temperature inside a winding, any more than does the application of thermometers, since the same conditions prevail, i.e., some parts of a winding are at higher temperatures than others; and the resistance test can only give an average temperature rise throughout the winding.

For instance, a motor winding which has three slots per pole, and forms the winding of a fairly high-speed machine, may have as much or even more of its windings outside the slots than inside.

The winding outside will not rise to so high a temperature as that inside the slots, and yet in the formula usually applied we assume, by taking the rise in

resistance, that it has risen uniformly throughout the coil, whereas this is not the case.

If we allow such a winding to increase in resistance, due to a rising current, until its value indicates that the maximum temperature has been attained, having regard to the class of insulation, then within the slots, the insulation is being subjected to a much higher temperature than indicated, while the end windings are considerably below the temperature indicated by the change of resistance.

Unless a coil has a uniform shape, and is shielded from surrounding air currents, ample margin should be allowed when bringing it to a given temperature by the change of resistance formula, so that excessive heating is avoided inside the coil.

The shape of a winding obviously plays an important part, together with the ratio of the portion confined in slots, or otherwise enclosed, to that which is exposed.

Limits of Temperature.

As the confined temperatures are almost impossible to arrive at without thermopiles being built into the machinery, it remains for those carrying out drying

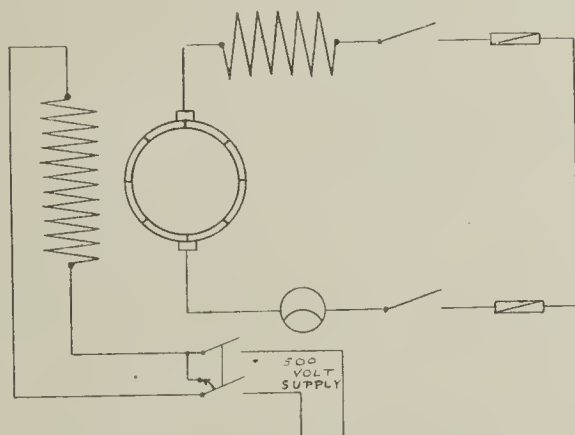


Fig 1

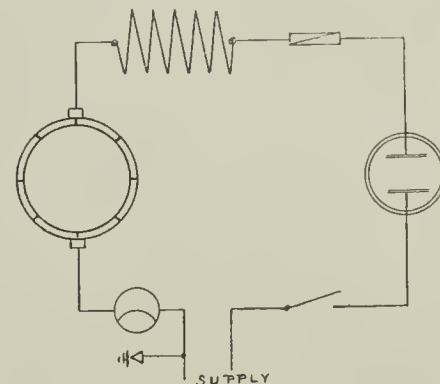


Fig 2

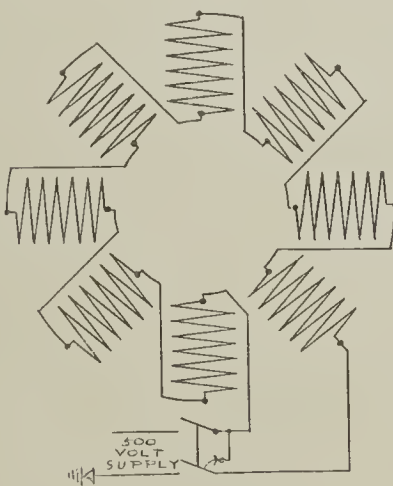


Fig 3

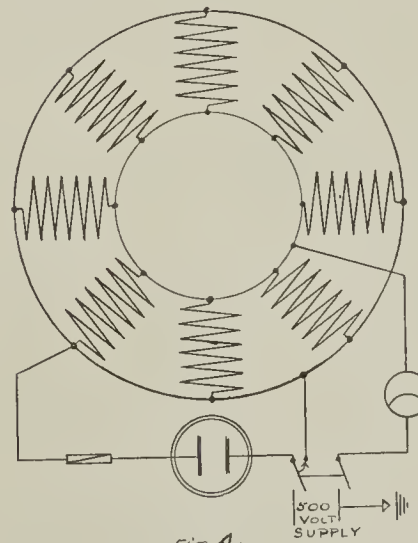


Fig 4

operations to make the best use of thermometers by inserting them as far as possible into the confined portions of windings, as a rough check, and to rely principally on ascertaining the temperature of the windings by feeling with the hand. Many objections may be raised to this method, but it is nevertheless the prevailing one.

Some little experience is necessary in order to be on the safe side, but when the practice is adopted of very slowly raising the drying current as applied to apparatus, there will be little fear of overheating internal portions of windings if the wrist can comfortably be pressed against the external layers or end windings.

It is far better to get a machine or transformer gradually up to a comparatively low temperature, and keep it so for a number of hours, rather than to force the temperature up by applying what may be calculated as the maximum permissible current.

The heat from the iron core assists a great deal in drying, and, once it is properly warm, retains the heat for a considerable time, and continues the drying even after current is switched off.

It is unwise to cease drying until the iron is really warm, as otherwise the moisture given off from the windings in the slots of a motor, or around the core of a transformer, will condense on the core, and so may not be entirely eliminated from the apparatus. In draughty places it is advisable to cover the apparatus with some clean covering to allow it to get warm, at the same time admitting some ventilation by leaving an opening at the bottom and top for air to pass.

Coverings should be removed as soon as the temperature has risen, so that no obstruction is placed in the way of the vapour which may be given off.

Insulation Tests.

According to the Report No. 72 of the Engineering Standards Committee, on the British Standardisation Rules for Electrical Machinery, the minimum insulation resistance in megohms, when the high-pressure test is applied, should be not less than—

Rated pressure in volts

$$1,000 + \text{rated output in k.v.a.}$$

with a minimum of 1 megohm, except in the case of separately excited field windings, the minimum of which may be 0.2 megohm. This formula does not apply to machines immersed in oil, as the insulation resistance of the latter is, in general, lower than given by the formula.

It will invariably be found that when apparatus is hot, the insulation test will be of a very low order, so that to enable a proper measurement to be made, some time should be allowed to enable the windings and core to cool.

Period of Drying.

Nothing definite can be said regarding the time which may be required to dry any given apparatus. This depends on the amount of moisture to be driven

out, and also on the possibility there is of that moisture finding suitable means of escape.

The properties of the insulation also play an important part, some forms of insulation being much more absorbent than others. If apparatus is known to be at all damp, the drying period should not be less than eight to 12 hours, and may possibly extend for as many days, especially when windings have become saturated as the result of immersion.

Methods of Drying.

There are quite a number of different ways in which the drying may be performed. Generators, either alternating current or direct current, may supply their own current for drying; whilst for motors or transformers, use may be made of three-phase current, single-phase or direct current, failing which, it is advisable to cover the apparatus over, providing means for air circulation, placing a number of lamps inside well clear of the windings or anything inflammable, and allowing the whole to warm up gradually. This method is very effective, although very slow, its weak point being, however, the uncertainty of drying the insulation between the turns—a point of great importance.

Direct Current Generator.

Figs. 1 and 2 represent the drying connections for a compound generator for 500-volt supply. In fig. 1, it is assumed that the generator is compound wound and coupled to the engine which is to drive it. It will be noted that a short-circuiting connection is placed across the terminals of the generator.

It will be usually found impracticable to dry out a shunt-wound generator on short circuit of its own excitation, because there cannot be a sufficient difference of potential across the armature to excite the field winding. It is necessary to excite the shunt field separately after disconnecting it from the armature, and to supply it with just sufficient current from an external source to enable full load current to be generated on short circuit at the normal speed of the generator.

Fig. 2 represents the drying connections, assuming that the generator cannot be run. The armature and compound winding are placed in series with an external circuit, and current is supplied through a water resistance.

A shunt winding, if it forms part of a multi-polar machine, and is very damp, may be split up into

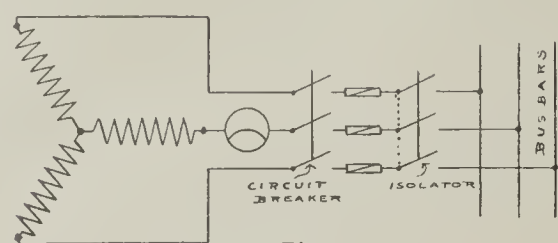


Fig 5

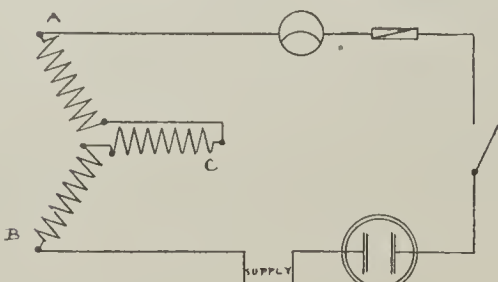


Fig 7

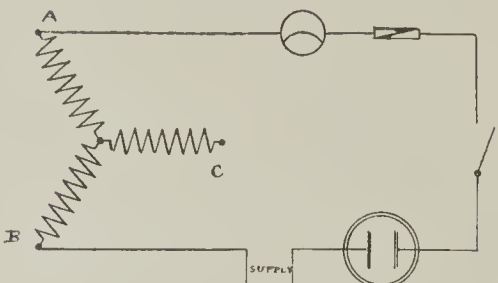


Fig 8

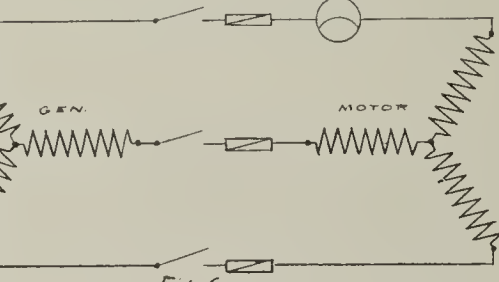


Fig 6

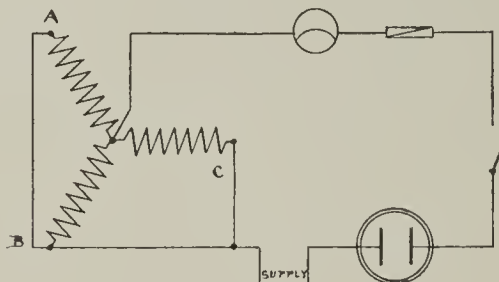


Fig 9

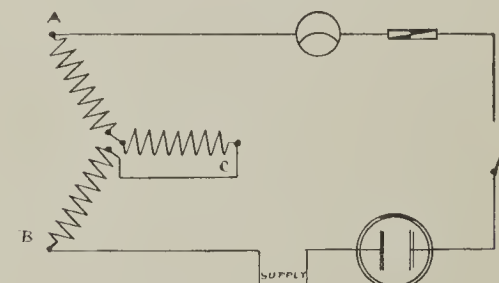


Fig 10



separate coils and connected in parallel for drying, so that a low voltage may be utilised. If the whole winding (fig. 3) is left in series, it must obviously be connected across the full voltage to enable a current to pass sufficient to raise its temperature. Should there be an earth on the system, a difference of potential to ground will exist, at one end of the field, equal to full voltage, and this may break down the insulation if the latter is in a wet condition.

Assuming a shunt winding of eight poles is normally connected across the armature of a generator, the voltage of which is 500 volts, the pressure across each coil will be $\frac{500}{8} = 62.5$ volts, so that by placing the eight coils in parallel and in series with a water resistance (fig. 4), the strain on the insulation—assuming an earth to be on the line—will be one-eighth of what it would be if the coils were connected in series across the 500 volts under the same conditions of line insulation. It may be mentioned that on many direct-current installations one pole of the system is permanently earthed.

Three-phase Generator.

The drying of a three-phase generator usually presents no difficulties, but the short-circuiting connection must be made in such a position as to leave the machine circuit breaker and ammeter in circuit. The generator should be run at normal speed throughout the period of drying, and, if separately excited, care should be taken that the exciting current is removed before the machine is allowed to slow down.

Resonance effects are liable to show themselves at certain critical speeds below normal, if a heavy current is being carried by the generator coils. A case came under the writer's notice where the generator coils were literally seen to flap on the large machine, which slowed down with the exciting current still on. The coils in such cases stand serious risk of being damaged if not well supported. Fig. 5 shows the diagram of connection and the proper position to short-circuit the generator.

Three-phase Induction Motors.

In all the following cases, the rotor is omitted from the figures, and is assumed to be short-circuited, and prevented from turning.

Drying by Three-phase Current.—This consists in supplying a low three-phase voltage to the motor to be dried out, and is represented in fig. 6.

This method can only be used where a spare generating set is available, as the voltage required to dry the motor will be comparatively small. An ammeter of suitable scale should be placed in one of the lines to check the current being supplied.

A direct-current ammeter will usually be found unsuitable, as the reading is often in the region of 50 per cent. of the value, and readings below that value cannot be relied upon to the magnetic circuit of the motor being unsaturated.

Again, the generator circuit breaker will usually be set too high to afford any protection to the motor that is being dried, and temporary fuses should be placed in circuit.

During the drying the generating set should be run at normal speed, as the governor will then keep the speed constant, which is important.

Drying of Single-phase Current.—Where a generating set is not available, a connection may be made to a low-tension supply across two phases. It is necessary to introduce a water resistance in circuit, together with fuse, ammeter, and switch.

A direct-current supply can be utilised in exactly the same way, only, of course, the rotor will not warm, and must be treated separately in a similar way to the stator.

The water resistance should consist of clean water,

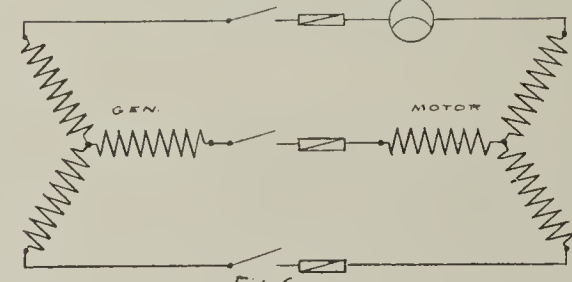


Fig 6

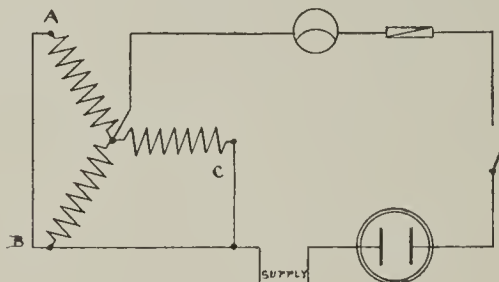


Fig 9

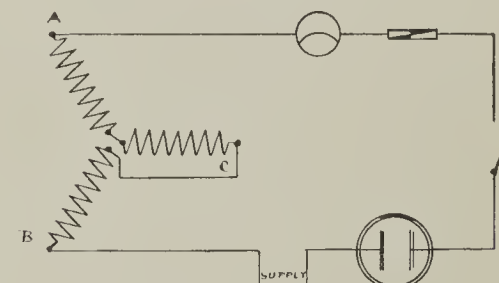


Fig 10



to which should be added a small quantity of salt to lower its resistance and allow sufficient current to pass.

Allowance must always be made for the water becoming warm, since its conductivity then increases considerably, so that in starting it is advisable to add sufficient salt to allow about half the maximum current required to pass. When the water becomes warm, the current will rise nearer to that required, and should it exceed that amount, some of the water must be changed for clean, after the current has been switched off, by lifting one of the resistance plates out of the water with a glove, and then opening the switch, reversing the order when again switching current on.

The single-phase or direct-current method of drying is the one most widely used, but the difficulties encountered in the drying of three-phase apparatus are numerous, and reference will be made to some of these, and suggestions made to overcome them.

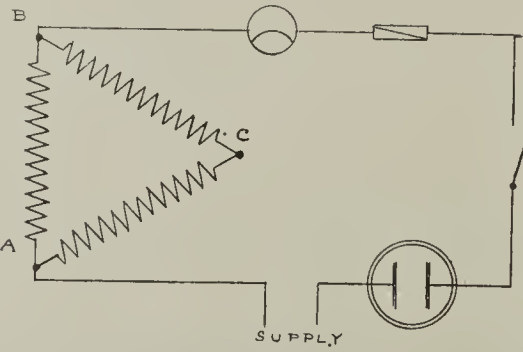


Fig 11

Example 1.—Fig. 7 represents an induction motor with its three windings separate, as usually provided when a motor is to be started by a star-delta switch. To dry such a machine it is only necessary to make temporary connections, putting all the windings in series.

Example 2.—Fig. 8 shows a motor which has its star-connected phases permanently joined together, so that a current cannot be sent through the windings in series as it is, but must be applied first to windings A and B, and when they have become warm the connection should be altered to B and C, finally running across C and A, so that each winding will have had two applications of current. This succession of connections should be continued until the motor gives a good insulation resistance test.

Example 3.—If the motor is a small one, and sufficient current is available, the windings may be dried in parallel (as shown in fig. 9).

Example 4.—Should the star connection be accessible, it will often be an advantage to disconnect one phase from the star, whereupon the windings may be placed in series, as indicated in fig. 10.

Example 5.—If a motor has its windings permanently mesh-connected, a connection may be made, as in fig. 11.

It will be noticed, however, that the current in the winding A B will be twice that in B C and C A, as the two latter are in series, and in parallel with A B. The drying may be carried out by first running on A B, then on B C, and finally C A, as already suggested in example 2. It will be noted that, in connecting across A B, the other two windings receive current as well, and may warm slightly, but care must be taken when feeling the coils that the right winding is being felt, and not B C or C A. If current is applied, for instance, until B C or C A are warmed, then A B will by that time have almost burnt out.

Example 6.—A mesh-connected motor is better dealt with if the connection between two of the phases is broken, so that the windings may be placed in series, as indicated in fig. 12. Drying can be easily accomplished in this way, and a uniform current sent through the windings altogether.

Drying Transformers.

It will be obvious that the methods of connection suggested for induction motors are equally applicable to a transformer, so there is no need to deal with this part of the subject separately.

It might, however, be maintained that, in drying a transformer, it should always be removed from its tank, as the air circulation is bad in the tank. Moreover, the vapour given off from the transformer during drying operations is liable to condense on the cool sides of the tank, and run down into the bottom, becoming mixed with the oil when the tank is filled.

In conclusion, it is suggested that when drying is being effected by direct current on a circuit with one pole earthed, the connections for drying should be so arranged that the apparatus under treatment is connected on the earth side of the water resistance. This prevents undue potential to ground existing on the windings under treatment.

COAL MINING IN VICTORIA IN 1916.

According to the annual report (1916) of the Secretary for Mines, Victoria, the output of coal amounted to 417,183 tons, valued at the pit mouth at £216,292, or 13s. per ton. The largest proportion, 354,146 tons, value £173,839, was raised at the State mine. The Jumbunna raised 31,792 tons; the Austral Company, 10,885 tons; the Powlett North and Woolamai, 14,672 tons; the Sunbeam (Coal Creek), 3,813 tons; and Cook and Company (Coal Creek), 1,875 tons. Brown coal to the extent of 2,915 tons, valued at £583, was raised at Altona by the Melbourne and Altona Colliery Company. Surveys have been made in connection with boring for coal.

A good deal of attention has been given to brown coal. By direction of the Minister of Mines, who was desirous of confirming on an approximately commercial scale the results obtained in recent years in the Geological Survey Laboratory, a carbonising plant was erected at North Fitzroy on land lent by the Railway Commissioners. Distillation was commenced in August, and by the end of the year about 30 tons of Morwell coal had passed through the retorts. A large amount of information is being tabulated. It appears that Morwell open cut coal, containing 35 per cent. of moisture, can be relied on to give per ton of 10,000 cu. ft. of gas of over 300 British thermal units per cubic foot, 5 gals. of dehydrated tar, and ammonia equal to 9 lb. of sulphate of ammonia, in an ordinary gas works plant of primitive arrangement. It is proposed later to ascertain what difference in yields of gas and by-products will result by using an exhaustor. The tar is being examined at the Geological Survey Laboratory. In conjunction with Mr. Merrin, Chief Mining Inspector, suction gas tests will shortly be conducted at a plant being erected at North Fitzroy on brown coal retort residues and raw brown coal. Other fuels in common use will also be tried in the same plant to obtain comparative results.

An important step towards brown coal utilisation was the appointment by the Institute of Victorian Industries of a sub-committee on brown coal. Boring of brown coal areas was resumed in April, since which

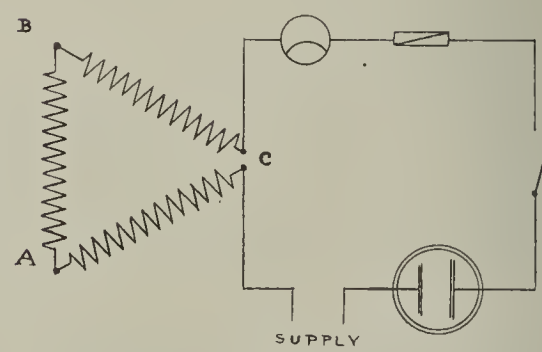


Fig 12

date a drill has been operating from Yarragon towards Trafalgar. At the end of 1915, three lines of bores were in progress at Tatyoon, south of Ararat. Boring for black coal was resumed at Fish Creek, Stony Creek, and Mirboo North.

The accidents recorded totalled 261 (including 46 minor cases not reported to Department), none of which proved fatal. On the funds were eight disabled miners, 16 children, and 10 women. Allowances paid by the Coal Miners' Accident Relief Board totalled £1,478.

The Board of Trade has sanctioned the forming of a new company—the British Barimar-Thermit Welding Company Limited—to take up and exploit the Thermit welding process, which is specially applicable for tramway welding and for the repair of heavy castings and machine parts. Mr. C. W. Brett, of Barimar Limited, intends training disabled British soldiers and sailors to carry on the work. The registered offices of the new company are at 10, Poland-street, London, W. 1.

DEEP BORINGS IN YORKSHIRE, KENT AND SUSSEX.

The "Summary of Progress" of the Geological Survey of Great Britain for 1916, contains particulars of several deep borings investigated during the year, the substance of which is given below.

Deep Boring for Coal at Pollington.

In reporting on this boring, Dr. W. Gibson draws attention to the fact that recent sinkings and borings around Doncaster have proved an extension of the middle coal measures of the Yorkshire coal field eastward under the permian and triassic formations, south of an east-and-west line joining Askern (seven miles north-north-west of Doncaster) and Thorne (12 miles north-east of Doncaster). North of this line an area to the Ouse, at Selby, has been proved recently by some widely distributed borings, of which this one at Pollington (five miles north-east of Askern) is situated eight miles east of the visible coal field at Pontefract.

The Pollington borehole was put down to search for coal half a mile north-east of Heck Station, Yorkshire, by the North Yorkshire Boring Syndicate, and traversed the following strata, the height of the surface above Ordnance datum being about 25 ft.:—Bunter, 504 ft.; upper permian marl, 96 ft.; upper permian limestone, 90 ft.; middle permian marl, 135½ ft.; lower permian limestone, 144½ ft.; and permian basal beds, 15½ ft.—the total depth being 3,003 ft.

The boring was commenced with a diameter of 20 in. The first 512 ft. through the bunter formation did not yield cores; but the permian and coal measures produced good cores, which were 9 in. diameter at 1,593 ft. and 1,920 ft., and 6 in. diameter at 2,496 ft.—that is, at those depths at which important coal horizons were entered.

The permian strata proved to be similar in character to those at Carlton, Barlow, and Selby (the concealed coal field of Yorkshire and Nottinghamshire, *Mem. Geol. Surv.*, 1913). The total thickness is 481 ft., as compared with 565 ft. at Carlton, 610 ft. at Barlow, and 624 ft. at Selby, thus showing a steady northerly increment which is in agreement with that prevailing throughout the concealed Yorks-Notts coal field. It is also known, by borings and sinkings, that the general inclination of the trias and permian formations is directed nearly due east, and at a rate per mile that brings the base of the permian deposits to a depth approaching 3,000 ft. from the surface in the region bordering the Trent north of the Askern-Thorne line. Moreover, the rate at which the permian basement bed slopes eastwards is so nearly uniform that, for this area, contours can be drawn showing its depths from the surface within extremely narrow limits of accuracy. Thus, for all practical purposes, the thickness and character of the cover to the coal measures can be estimated.

No appreciable dip of the coal measures could be determined, and since the deflection of the hole was shown to be slight, the thickness of 2,009 ft. proved in the boring may be taken as the true thickness.

The upper coal measures are absent, and the boring ended in middle coal measures about 350 ft. above the Silkstone coal.

Numerous seams of coal were proved, including the Shafton, Warren House, Dunsil, and Haigh Moor. With regard to these there can be little doubt that the seam here taken as the Shafton is the same as the Shafton of Hemsworth Colliery, and the Nostell seam of Nostell Colliery, and that the group of coals between 1,830 ft. and 2,104 ft. corresponds to that containing the Wathwood, Two-feet, Abdy, and Stanley Main coals of Yorkshire. This group of coals becomes of importance in the northern part of the coal field, and analyses show that those at 1,834 ft., 1,926 ft., 2,007 ft., and 2,602 ft. are of good quality.

That the Barnsley seam of the Doncaster region should have been found in the condition of the Warren House is in conformity with what occurs at Askern and in the visible coal field west of Pollington. The depth to the seam, however, is nearly 200 yds. greater than would have been the case if the low dip observable in the visible coal field had continued eastward to the boring. It may be here remarked that at the Brodsworth Colliery the Barnsley seam was found at a much shallower depth than was estimated from the dip observable in the nearest coal workings to the west, nor are these the only cases in which estimated and proved depths have been found to differ in a marked degree. Probably it is safe to allow for a depth ranging between 2,500 ft. and 3,000 ft. to the Barnsley coal within the area north of the Askern-Thorne line.

[NOTE.—At the present stage of operations there are reasons against breaking up the cores systematically and investigating the fossil evidence. It may be stated that the characteristic marine band, between 600 ft. and 750 ft. above the Barnsley coal, and always easily detected in other borings and sinkings, was not recognised, though a careful search was made between the depth of 1,700 ft. and 1,950 ft.]

Deep Borings at Bere Farm, Elham, and Folkestone.

These three borings were made by the Channel Collieries Trust Limited. Specimens of the cores were collected by Mr. J. Pringle from the various formations passed through during the progress of the boring, and are still under investigation. Publication of full details must therefore be deferred, but it may be mentioned that the upper carboniferous rocks penetrated at Bere Farm and Folkestone correspond in their lithological characters to the upper series of Mr. H. Bolton's classification* of Kent coal measures, while the beds which overlie the carboniferous limestone at Elham undoubtedly belong to the lower series.

The Bere Farm Boring.—This borehole was situated in a field on the east side of the Dover-Deal road, about 1½ miles north-east of Dover. In the year 1913 operations commenced in the chalk at a height of 396 ft.

above Ordnance datum, and concluded in November 1915, after reaching a depth of 3,005 ft. Considerable portions of the hole were punched through down to the base of the gault, which was reached at a level of 954 ft. from the surface, and excepting that nearly the whole of the Oxford clay was passed through by punching, a fairly continuous series of cores was made throughout the remaining portion of the section. The dip as judged by the cores is generally low, but on several levels varied between 15 and 25 degs. Below the Oxford clay the hole passed through the following strata: kelloways, cornbrash, forest marble, great oolite; and at a depth of 1,358 ft. entered the coal measures (1,647 ft.), continuing down to 3,005 ft., and revealing the following beds of coal at the depths given in parentheses: Coal, 10 in. (1,450 ft.); coal, 10 in. (1,456 ft.); coal, 3 in. (1,534 ft.); coal, 10 in. (1,590 ft.); coal, 2 ft. 4 in. (1,701 ft.); coal, 1 ft. 8 in. (1,993 ft.); coal, 4 in. (2,115 ft.); coal, 3 in. (2,407 ft.); coal, 2 in. (2,597 ft.); coal, 10 in. (2,947 ft.).

In the cretaceous group, cores were available for the lower members only, and several had crumbled down, but sufficient details were secured to determine the existence of the subdivisions mentioned. The only representatives of the Hastings beds examined were some coarse sands which lay in pockets in the corallian limestone. From the corallian limestone to the base of the great oolite the sequence appeared to be complete, and all the formations yielded characteristic fossils, excepting the Oxford clay, of which there were no cores. At the top of the great oolite the dip was 15 degs., but lower down it resumed the usual gentle angle. Lias was absent, and the great oolite rested directly on the palaeozoic floor.

A continuous series of cores was made in the coal measures, and all were available for inspection except some of the highest beds, which were examined by Dr. E. A. N. Arber. The abundance of stigmarian rootlets was notable in the argillaceous sediments, and many typical fossil plants were obtained, but no marine shells. The sandstones resembled those passed through at Folkestone, and there were also numerous courses of conglomerate with pebbles of coal, rolled fossiliferous ironstone nodules, and fragments of dark chert.

The Elham Boring.—This borehole was situated in a field on the east side of the railway, about 150 yds. north-east of Elham station. Operations were commenced early in the year 1914 at a height of 275 ft. above Ordnance datum, and ceased in June of the following year, after reaching the depth of 2,346 ft. Much of the boring was made by punching, but down from a depth of about 1,400 ft. a nearly continuous series of cores was drawn. The coal measures (691 ft.) were reached at 1,598 ft., and found to contain the following seams: Coal, 1 ft. 8 in. (1,823 ft.); coal, 4 in.; coal, 2 ft. (1,867 ft.); coal, 3 ft. 2 in. (1,929 ft.); coal, 2 ft. 8 in.; coal, 1 ft. (1,968 ft.); coal, 1 ft. 4 in. (2,014 ft.); coal, 1 ft. 10 in. (2,155 ft.); coal, 1 ft. 6 in. (2,168 ft.); coal, 1 ft. 3 in.; coal, 1 ft. 5 in. (2,207 ft.). Carboniferous limestone (57 ft.) followed, down to the bottom of the hole (2,346 ft.).

No specimens of the cretaceous rocks were available, but particulars concerning the formations between the Hastings beds and the corallian limestone, and also from a level in the great oolite limestones down to the base of the lias, were secured. A large series of characteristic fossils served to determine the horizons with precision. As at Folkestone, there was no observable discordance at the junction of the mesozoic rocks with the coal measures; the bedding of the two appeared to be parallel.

The coal measures consisted mainly of dark shales with a few beds of grey sandstone, and contained several seams of coal. The shales yielded numerous plant remains, and occasionally poorly-preserved shells of lamellibranchs, but none of marine species. Near the base a 3 ft. bed of black fine-grained limestone was passed through. It contained no fossils, but was underlain by grey and black shales, with *Alethopteris* and stigmarian rootlets. In the lowest beds of the measures there lay embedded a large irregular lump of black chert, apparently derived from the carboniferous limestone. It is surrounded by a thick coating of iron pyrites.

The carboniferous limestone was represented by dark grey bituminous limestones with smooth fine-grained beds, or "china stones." On several levels the rocks were highly fossiliferous, and contained numerous specimens of corals, poorly preserved owing to replacement by crystalline calcite. The fossils include:—*Lithostrotion martini* (Edw. and Haime), *Syringopora* sp., *Chonetes* sp. [papilionaceous form], *Productus* cf. *corrugatus* (McCoy), *Productus* sp., *Spirifer* sp., and several indeterminate species of gastropods. The rocks are of visean age, and probably represent the upper part of the seminula beds, or the lower part of the dibunophyllum zone.

The Folkestone Boring.—This borehole was situated in a disused brickyard near the southernmost Martello tower overlooking East Wear Bay. Towards the end of the year 1905 boring commenced in gault clay at a height of about 113 ft. above Ordnance datum, and ceased in December 1916, after reaching a depth of 3,400½ ft. The dip of the coal measures varied from 5 to 15 degs. Much of the boring was punched, and the thickness of the cretaceous and jurassic rocks above the lias could only be estimated. Following the lias, at a depth of 1,487 ft., the hole passed through the coal measures (1,913½ ft.) containing: Coal, 3 in. (1,635 ft.); coal, 2 ft. (1,676 ft.); coal, 1 ft. 2 in. (1,727 ft.); coal, 7 in. (2,036 ft.); coal, 8 in. (2,073 ft.); coal, 1 ft. 2 in. (2,487 ft.), the hole terminating at 3,400 ft. 6 in.

The strata between the gault clay and the lower part of the Kimmeridge clay, or those between the corallian limestone and the lias, could not be examined. Such cores as there were, however, of the jurassic rocks yielded characteristic suites of fossils. There was no obvious discordance at the junction between the mesozoic and palaeozoic rocks; the lower lias rested on a smooth irregular surface of the coal measures.

A continuous series of cores was available in the coal measures. The grey shales yielded plant remains, and on several levels lamellibranchs were abundant, but no marine forms were found. The thick group of shales which were passed through between the depths of 2,153½ ft. and 2,210 ft. are noticeable on account of the presence of thin mottled red bands at two levels. When wet, the beds were generally of an olive-green hue, and they broke into lumps with a marly cuboidal fracture. Similar rocks do not appear to have been recorded hitherto in the coal measures of Kent. Thick beds of hard grey quartzose sandstone formed a characteristic feature in the cores, and several of them contained courses of conglomerate loaded with pebbles or subangular fragments of hard bright coal. Thin bands of conglomerate also occurred in a group of sandstones at 2,420 ft. and 2,426 ft. from the surface, and yielded pebbles of quartz, black shale, chert, and jasper. Microscope sections of the chert show abundant remains of foraminifera.

The Battle Boring.—Mr. G. W. Lamplugh reports that this boring was carried out in 1907-1909 for the South-Eastern Development Syndicate Limited. The site is 1,650 yds. north-north-east of Battle Church, in a field at the south-west side of Petley Wood (6 in. Ordnance Map, Sussex, 43 S.E.; 1 in. New Series, Sheet 320) at a height of about 120 ft. above Ordnance datum. The boring reached a depth of 2,066 ft. from the surface; it is 2¾ miles east-south-east of the old "Sub-Wealden borings," one of which attained a depth of 1,905 ft.; but a fault (shown on the Geological Survey Map, Old Series, Sheet 5), with a south-westerly downthrow, runs between the two sites, and brings in at least 600 ft. of higher strata at the new boring. Therefore, although the last boring was the deeper of the two, the Sub-Wealden boring reached nearly 500 ft. lower in the stratigraphical sequence.

The cores of the recent boring ranged in diameter from 8½ in. near the top of the section to 3 in. at the bottom, and were practically continuous. When examined in 1909, most of them had been exposed to the weather, with the result that the softer clays and shales had crumbled badly, and only the bands of firmer rock had remained intact. Therefore only a comparatively incomplete set of the fossils was obtainable; but there was not much difficulty in determining the composition and sequence of the strata.

The section includes the following strata:—Wealden, Hastings beds (424 ft.), Purbeck beds (387 ft.), Portlandian (141 ft.), Kimmeridge clay (1,114 ft. proved), the total depth of the borehole being 2,071 ft. The bottom beds are probably close to the base of the Kimmeridgian series, if not actually within the upper corallian.

The particular interest of this boring is in the means it affords for comparing the upper jurassic sequence on the southern side of the Wealden dome with that which was proved by the boring at Penshurst, near Tonbridge, on the northern side.

Both borings began not far below the top of the Ashdown sand, and both, after passing through the entire Purbeck and Portland series, terminated in Kimmeridge clay. But while the Battle boring reached nearly, if not quite, to the base of the Kimmeridge series, the Penshurst boring stopped before reaching the Virgula beds, which form the lower and larger part of the Kimmeridge clay. A comparison of the thickness of the formations proved at the two places is shown in the following table:—

	Battle, 120 ft., O.D.		Penshurst, 85 ft., O.D.	
	Thick- ness.	Depth.	Thick- ness.	Depth.
Wealden, from near top	Ft.	Ft.	Ft.	Ft.
of Ashdown sand	424	...	552	...
Purbeck beds	387	...	562	...
Portland beds	141	...	131	...
Upper Kimmeridge clay	479	...	622	...
Lower Kimmeridge clay	635	...	—	...

In respect to the Wealden beds, the comparison may not carry much weight, as this series is variable, and merges insensibly downward into the Purbeck beds. But the base of the Purbeck is a sharp boundary, and the Virgula beds of the Kimmeridge clay are also definite. It is certain, therefore, that the upper jurassic formations in the aggregate are thinner at Battle than at Penshurst by at least 300 ft., and that these rocks on the southern side of the dome sink northward towards Penshurst. This structure is complementary to that on the northern side of the dome, where, as the borings in Kent have proved, there is a great southward thickening of the same rocks and of the deeper jurassic formations, accompanied by a southerly dip. The effect of this structure is that the Wealden anticline of the cretaceous rocks is superimposed upon a buried syncline of the jurassic rocks. The present boring yields confirmatory evidence for the buried syncline.

The average northerly inclination of the jurassic planes of division between Battle and Penshurst indicated by the table is locally reduced by the previously-mentioned fault; if the levels of the same planes in the Sub-Wealden borings on the upthrow side of the fault be taken for the comparison, the dip becomes accentuated.

The position of the deepest part of the buried syncline has not yet been proved; it probably lies nearer Penshurst than Battle.

If compared with the records of the same formations in the Sub-Wealden borings, the present record will be found to differ in many points of lithological detail. These discrepancies may arise mainly from the doubtful determination of some points in the Sub-Wealden section as compiled from various separate records.

Tin-plate in Rolls.—A Press report states that a power-driven automatic soldering press has been devised by a large trans-Atlantic firm of metal workers whereby sheets of metal can be joined, soldered, and wrapped into a roll. The capacity of the machine is four seams per minute, or 20 boxes of tin-plate per day.

* H. Bolton. "The Fauna and Stratigraphy of the Kent Coal Field." *Trans. Inst. M. E.*, 1915, vol. xlix., p. 643.

EFFECTS OF STORAGE UPON THE PROPERTIES OF COAL.*

By S. W. PARR.

The need of a thorough understanding of the conditions affecting the storage of bituminous coal is becoming more and more apparent. The demand for coal at certain seasons is so great that both mining and transportation facilities are taxed severely in meeting it. Provision has not been made for adequate and proper storage of bituminous coal either at the mines or at the distributing centres, and as a result of this lack there must be maintained throughout the year a sufficient number of operating mines to meet what may be termed the "peak load" which occurs during the winter months. At such times also there is often a shortage of cars, although a smaller number of cars even than is now available would be needed if the work of transportation could be more evenly distributed throughout the year. Mr. C. G. Hall, secretary of the International Railway Fuel Association, has made an estimate showing that the number of excess mines over and above those which would be normally required to meet the demand, provided their work could be distributed evenly through the year, represents an investment in the United States of 450,000,000 dols. In addition, the extra coal cars, which must be at hand when the demand is heavy, but which stand idle accumulating rust for the rest of the year, have cost the railways no less than 105,000,000 dols. more than would be necessary if the same tonnage could be hauled at an even rate. These wastes eventually affect the cost per ton of coal, which everyone must pay as a contribution toward the capital investments.

The difficulties attending these conditions are accentuated by occasional abnormal demands such as are created upon the approach of any date for readjusting the wage scale, with the accompanying possibility of a strike or lock-out. For example, in addition to the normal excess demand during the winter months of 1915-16, a compilation of the published amounts of coal being stored by the various railway systems and larger users only, in view of a possible strike in April, aggregated over 3,000,000 tons.

The industrial disturbances do not include all of the serious considerations, however. If we consider the labour distresses that are accentuated as a result of irregular employment, it at once appears that the problems involved are of great sociological as well as of economic interest.

The work here recorded is a continuation of certain studies, the results of which have been published in bulletin form by the Engineering Experiment Station under the titles of "The Weathering of Coal,"† "The Occluded Gases in Coal,"‡ and "The Spontaneous Combustion of Coal."§

The subjects treated in these publications are of fundamental importance, and a thorough understanding of the principles involved under each subject is necessary before any adequate discussion can be undertaken of the problems connected with the storage of coal. The investigations described in Bulletin 38 of the University of Illinois Engineering Experiment Station, on "The Weathering of Coal," were conducted with car-lot samples of coal stored under various conditions. The data obtained covered a period of one year. The investigation was continued for an additional period of five years more, or for a total period of six years. The coal was then turned over to the power plant for steam generation, and boiler tests were made to establish the character of the various samples. These data, together with other facts bearing upon the general subject of coal storage, have accumulated to an extent which warrants their being brought together for record and discussion in this form.

The facts established by this investigation may be briefly summarised as follow:—

(1) Freshly mined coal is chemically very active. Certain constituents have a marked affinity for oxygen, with which they enter into combination at ordinary temperatures. While the extent of this reaction depends upon the variety of the coal and the amount of these active constituents, a very important factor is the fineness of division or the sum total of the superficial areas of the particles, and accessibility of oxygen to the mass.

(2) The actual loss of heat value resulting from storage is small. It is evident that upon mining out the coal from the bed certain volatile constituents of the marsh gas variety are set free. The heat values represented by such exudations are not great. The tendency to absorb oxygen from the air is also a marked characteristic of freshly-mined coal. This is in reality a chemical process, and is accompanied by the generation of a small amount of heat, but these heat losses, compared with the total heat available in the coal, are insignificant. Indeed, it may be fairly questioned whether the heat losses are not more apparent than real, since there is an increase of weight due to the absorption of oxygen. Such increase will in itself lower to a corresponding degree the indicated heat value per pound of coal.

(3) There is an increase of "fines" or slack resulting from storage, greater with some coals than with others. This, together with the saturation of the free burning constituent with oxygen, slows up the fire and gives the appearance of being lacking in heat value. However, with an increase of draught and a correct understanding of the combustion conditions to be maintained, a most excellent over-all efficiency can be secured even from coals which have been in storage for long periods.

(4) Bituminous coal can be stocked without appreciable loss of heat values provided the temperature is not allowed to rise above 180 degs. Fahr. Any method of storage, to be successful, must either check or prevent the absorption of oxygen to such an extent that the generation of heat shall not proceed faster than the dissipation and loss of heat due to absorption or radiation.

(5) Underwater storage prevents loss of heat values, and is not accompanied by deterioration in physical properties, such as slacking. The water retained by the coal upon removal is substantially only that held by adhesion or capillarity.

(6) Dry storage is safer and more satisfactory if the fine material is screened out at the storage yard and lump only, preferably sized, is stocked.

It will be seen from this summary that the most serious part of the problem relates to the matter of spontaneous heating, and probably the least serious phase relates to deterioration and actual loss of heat values. It is certain that at the present time a better understanding of these difficulties has been reached, and there is reason for believing that this better understanding of the fundamental principles involved will lead to some practicable and safe procedure for the stocking of bituminous coal.

Heating and Spontaneous Combustion.

It is a well established fact that freshly-mined coal has a large absorptive capacity for oxygen. In Bulletin 32, "The Occluded Gases in Coal," it is made evident that this avidity for oxygen is most marked in the freshly mined coal, and after exposure to the air for four or five months an approach to the saturation point seems to be reached, after which very little oxygen is taken on. A correct interpretation of this phenomenon is essential to an understanding of the spontaneous heating of coal piles. The natural conclusion would be to the effect that the oxygen has been simply absorbed or occluded; that it was a physical rather than a chemical change. The evidence, however, of all the more recent investigations goes to show that it is in fact a chemical combination, and that it is accompanied by the generation of a small amount of heat. In Bulletin 46, "The Spontaneous Combustion of Coal," it is seen that at a temperature of from 35 to 40 degs. Cent. (95 to 104 degs. Fahr.), and with free access of air, the amount of heat generated caused a rise in temperature of from 1 to 1½ degs. Cent. per day. Porter and Ovitz* have measured the quantity of oxygen taken up by a sample of Franklin County coal, and found it to be approximately 0.8 per cent. of the weight of the coal. Moreover, there is only a very small amount of CO₂ formed. This is explained by the fact that the presence of certain unsaturated compounds allows the oxygen to enter the molecular structure of the coal, with which compounds the oxygen readily combines.

These references are a few of many that might be brought forward showing that at ordinary temperatures freshly-mined coal unites chemically with oxygen and that in the process there is generated a certain amount of heat.

Oxidation of Pyrites.—Much consideration has been given by various investigators to the rôle of iron pyrites in promoting the heating of coal. In the experiments carried out by Dennstedt and Bunz in 1908,† it appears that self-ignition may be brought about in the case of coals having only small amounts of pyritic sulphur. The conclusion is made, therefore, that the presence of iron pyrites is not an essential condition for spontaneous heating. Other investigators working along similar lines have reached the same conclusion. Still others seem to have evidence that pyritic sulphur is an active element in the case. A summary of opinions on this point is given as follows:—

"As to what part sulphur compounds, especially pyrites, play in the spontaneous ignition of coal, opinions differ greatly. Some believe pyrites to be the leading factor, while others believe it plays no part at all, or, if so, ascribe to it a position of minor importance, and believe its action to be merely a subsidiary one. The oxidising action of the air upon pyrites is, however, admitted, and the notion seems to be fairly general and well established that pyritic oxidation tends to raise the temperature of the coal. On the other hand, it is seen from the work of Fayol, Dennstedt and Bunz, Threlfall, and others, that coals containing pyrites in a quantity too insignificant to be noticed are very apt to ignite spontaneously. The Newcastle coal of New South Wales is also a very good example of this class of coals. Others, however, believe that the only influence of the pyrites is a mechanical one, in which the oxidation of the thin films of pyrites in the coal serves merely to break up the coal."

Investigations of this type, having for their object a study of the processes of oxidation which occur at normal temperatures, are extremely important, especially in that phase of the work which seems to have fully established the fact of oxidation of the organic constituents of the coal. The conclusions are somewhat at fault, however, in assuming that as a consequence the pyritic oxidation is of little importance. It is true that a coal may heat seriously, even though pyritic sulphur is absent. This does not constitute proof, however, that the presence of pyritic sulphur in coals may not be equally, or even more largely, responsible for heating than the organic constituents.

Parr and Kressmann (*loc. cit.*) stated that the presence of sulphur in the form of iron pyrites is a positive source of heat due to the reaction between sulphur and oxygen. This may be conveniently referred to as the second stage in the process of oxidation. Here, again, rapidity of oxidation is directly dependent upon fineness of division. Since coals, as a rule, have a much higher earthy or ash content in the fine duff, and

since iron pyrites is a large component of this material, it follows that the presence of dust or duff in all coals of the Illinois type is a positive source of danger.

However, in this summary the authors give first place, in time and effect, to the oxidation of the organic matter, and consider that the activity of the pyrites waits somewhat upon the rise in temperature from such organic oxidation before action with sulphur reaches a serious phase. Special emphasis was laid upon the oxidation of sulphur as a source of heat, but the experiments did not specifically give direct evidence as to the temperature at which pyritic sulphur began to oxidise.

Growth of Sulphates.—Data on the oxidation of sulphur have recently been developed in connection with the study of variations in the determination of ash values* which have a bearing in this connection. The fact appears that the oxidation of sulphur is active at ordinary temperatures, provided (a) that the pyritic iron be finely divided, and (b) that free moisture be present in sufficient amount to satisfy the reactions involved. For example, a certain series of bed samples of coal had been ground to 60-mesh, and laboratory samples taken of about 75 grms., which were placed in 4 oz. bottles with rubber stoppers. These samples were retained in the laboratory at room temperature from August 1912 to April 1913, at which time they were analysed for sulphur in the sulphate or SO₃ form. For comparison, the original samples ground only to 10-mesh were similarly analysed. The results are shown in Table 1.

TABLE 1.—GROWTH OF SULPHATE.—COMPARISON BETWEEN FINE AND COARSE LABORATORY SAMPLES.

County.	H ₂ O.	Total sulphur.	SO ₃ 60-mesh Aug. '12.	SO ₃ 60-mesh Apl. '13.	SO ₃ 60-mesh Apl. '13.
Mercer	6.33	5.29	0.95	1.46	0.86
Grundy	8.84	2.27	0.39	0.38	0.18
Mercer	4.49	4.92	0.47	0.49	0.25
Mercer	4.86	5.46	0.63	1.25	1.12
Grundy	7.66	2.73	0.61	1.12	0.86
La Salle	7.93	5.20	1.42	1.79	0.82
Sa Salle	8.05	4.83	0.62	1.20	0.81

Effect of Fineness of Division.—From the results in Table 1 it is evident that oxidation of sulphur has occurred at ordinary temperatures. Five of the seven samples have had from 30 to 40 per cent. of the total sulphur thus changed. The second and third samples in this table show no such oxidation. In the second the content of total sulphur is low, and of this the actual sulphur in the pyritic form is, of course, still lower. Data on this point were not obtained. In the third sample the water content is lower than that in the other samples of the table. Whether this affords a valid explanation is uncertain. At any rate, the point here emphasised is the fact that in the majority of the samples oxidation of the pyritic sulphur occurred in large amounts and at room temperatures. The next point was to determine what conditions were chiefly responsible in this reaction. The last column of the table affords some information. Here it is seen that with one exception the coarse or 10-mesh material had little or no indication of sulphur oxidation. To test further the effect of fineness of division, two of these original samples, about 2 lb. each, were sized and the sulphate sulphur determined for each size. The results are given in Table 2.

TABLE 2.—SULPHATE SULPHUR AS FOUND IN VARIOUS SIZES OF COAL.

10-mesh.	20-mesh.	40-mesh and over.
0.31	0.89	1.43
0.53	0.60	1.42

It is shown by this table that while substantially no increase in sulphate occurred up to the 20-mesh size, the increase was very marked in the 40-mesh sample, though it should be said that the 40-mesh sample also contained all the finer material passing through that sieve. This record further emphasises the fact that oxidation of sulphur increases in activity as the size of particles is decreased and the superficial area in any given mass correspondingly increased.

Effect of Moisture.—In seeking an explanation for the lack of uniformity in behaviour due to sizing alone, it was thought that possibly the amount of free moisture in the sample as well as the percentage of FeS₂ might play an important part. A number of samples were therefore selected in which the free moisture was low. In these cases the growth of sulphate in the laboratory sample was small, as shown in Table 3.

TABLE 3.—EFFECT OF LOW MOISTURE ON THE FORMATION OF SULPHATE.

All values on the dry coal basis.			
Moisture	1.74	2.03	
Total sulphur	3.65	3.19	
Sulphate (SO ₃) in lab. sample, 60-mesh, 75 days in sample bottle	0.214	0.218	
SO ₃ in 3 lb. gross sample. All sizes up to 4 in. after 15 days in container	0.200	0.230	
3 lb. gross sample. All sizes up to 4 in. after 75 days	0.198	0.228	
Sizing of gross sample after 75 days—			
SO ₃ in 10-mesh size	0.176	0.199	
SO ₃ in 20-mesh size	0.164	0.195	
SO ₃ in 40-mesh size	0.215	0.257	

As affording further evidence on this general proposition, 28 samples of coal were selected from the various districts of the State, and sulphate determinations made on the laboratory samples ground to 60-mesh which had been in storage from the early part of 1912 until June 1913. Unfortunately, the sulphate factors for the fresh coal are not available, but the table shows that in those samples in which both the water and the sulphur contents were high, there was a greater increase in the percentage of oxidised sulphur than in the case of samples in which water and sulphur contents were low. Note especially the last eight samples in Table 4.

Doubtless there are other circumstances connected with the oxidation of sulphur which are of interest, such as the presence of catalysers, the source of oxygen for satisfying the condition of the reaction, the merca-

* *Journal of Industrial and Engineering Chemistry*, vol. 2.

† *Zeit. für Ang. Chem.*, vol. 21, pp. 1821-35.

‡ Parr and Kressmann, *loc. cit.*

* S. W. Parr. Ill. State Geo. Survey, Co-op. Bull. 3, 1915.

Illinois Engineering Experiment Station

and W. F. Wheeler. Univ. of Ill. Eng. Bull. 3, 1909.

and Perry Barker. Univ. of Ill. Eng. Bull. 3, 1909.

and F. W. Kressmann. Univ. of Ill. Eng. Bull. 46, 1910.

TABLE 4.—SULPHATE IN LABORATORY SAMPLES, STORAGE TIME FROM MARCH 1912 TO 1913 (Showing Conditions Attending Presence of Moisture and Sulphur).

County.	Coal bed.	H ₂ O.	Total sulphur dry coal.	SO ₃ dry coal.
Vermilion	6 N	2.30	2.44	0.18
Vermilion	6 N	2.08	2.75	0.15
Vermilion	6 N	2.08	3.48	0.32
Vermilion	6 N	1.82	4.82	0.35
Vermilion	7 N	2.31	4.06	0.62
Vermilion	7 N	1.95	3.77	0.60
Vermilion	7 N	1.91	3.33	0.37
Vermilion	7 N	2.24	2.59	0.22
Vermilion	6 N	4.53	1.94	0.29
Franklin	6 S	3.88	0.52	0.02
Franklin	6 S	2.41	1.53	0.22
Saline	5 S	2.82	2.32	0.54
Williamson	6 S	3.25	1.11	0.12
Franklin	6 S	4.14	1.53	0.18
Saline	5 S	5.87	3.78	0.80
Williamson	6 S	3.73	1.42	0.11
Williamson	6 S	6.25	1.46	0.12
Williamson	6 S	6.25	1.24	0.10
Franklin	6 S	5.87	1.12	0.06
Mercer	1 N	3.21	5.66	0.93
Rock Island	1 N	4.84	6.56	2.14
Rock Island	1 N	5.74	4.56	1.08
Rock Island	1 N	4.96	5.26	1.15
Mercer	1 N	6.34	4.94	1.69
Grundy	2 N	7.08	3.04	0.59
Grundy	2 N	6.98	2.53	0.44
Grundy	2 N	7.83	4.00	1.34
La Salle	2 N	7.71	3.37	0.83

Remarks:—Sulphate was determined June 2, 1913, on pulverised samples collected February to June 1912.

site or pyrites form of the sulphide crystals, the method of distribution, whether in microscopic or massive aggregates, the character and influence of the associated material, and the segregation of sulphate crystals towards the finer materials. Indeed, the more thorough understanding of some of these points might contribute in a very practical way to our knowledge of the conditions which promote the heating of coal. Definite information along these lines depends upon further study. However, for purposes of this discussion, it is of importance to note that at least two conditions, if existing—namely, fineness of division and presence of moisture—will result in oxidation of the sulphur. Supplementary to this should be recalled the fact already developed in *Bulletin* 46, that the oxidation of 0.5 per cent. of sulphur, or approximately less than one-fifth of the amount present in the average Illinois coal, would produce sufficient heat to raise the temperature of the mass, not allowing for radiation losses, about 125 degs. Fahr. If the initial temperature were 50 degs. Fahr., an increase to 175 degs. would approach the danger point. At about 180 degs. the activity reaches a stage owing to the greater rapidity of oxidation at that temperature, at which the chemical reaction quickly proceeds to the point where it becomes autogenous.

In the discussion concerning the generation of heat from sulphur oxidation it is not intended to minimise the effect of oxidation of the organic matter as an initial source of heat, independent of the activity of the sulphur. In bituminous coals the two doubtless proceed independently, but where both activities exist together there is an acceleration of the reaction due to the rapid rise of temperature. In this manner there is a greater quantity of heat produced in a given period of time, and hence the coal mass comes more quickly and more positively to the autogenous or danger stage.

Summary on Oxidation.—Oxidation of the organic materials in freshly mined coal is active in all coals of the bituminous or lignitic type. The conditions which accelerate the action are increase of temperature and fineness of division.

Oxidation of the sulphur of iron pyrites is active provided the sulphide of iron is finely divided, and there is sufficient moisture present to satisfy the reaction. The quantity of finely divided pyritic material will, of course, be greater in screenings than in lump, and since the ash content in screenings is from one to two times as great as in the lump, the quantity of pyritic sulphur is correspondingly greater.

The conditions to be observed in stocking coal so far as oxidation is concerned, are thus fairly well outlined. The enumeration of these conditions will be taken up later.

(To be continued.)

A discovery of coal has been made at New Mills, Derbyshire. Working an old stone quarry on the Hayfield-road, men in the employ of Mr. J. W. Swindell, builder, came on a seam of considerable thickness, which is said to be several acres in extent. The coal is now being worked. This is the second pit opened through stone quarrying within the last two years.

Conservation of Natural Resources.—In the course of his presidential address to the members of the Manchester local section of the Institution of Electrical Engineers on Tuesday, Mr. C. J. Beaver referred to the question of the conservation of our natural resources. The economical utilisation of fuel, he said, obviously claimed first attention. It was closely bound up with the provision of a cheap and universally available power supply. Matters relating to the classification of coal, carbonisation and gasification processes, and other treatment bearing on the recovery and economical use of the various resultant products, were being handled by the Fuel Research Board. With regard to the generation and distribution of power, considerable steps had been taken in the direction of making the most efficient use of existing power plants, and a general linking-up scheme had been propounded whereby the power requirements of the country might be served by about 16 systems instead of something like 600. With regard to new power plant, recommendations had been made dealing with such points as the most economical sizes of generating stations and units of plants, and the most efficient transmission voltages. In fact, the whole subject, from winning the coal to distributing the power, called for the co-operation, under Government auspices, of mining, chemical, and electrical experts, as well as the organised support of the various scientific and engineering bodies.

OIL PROSPECTS OF THE BRITISH ISLES.

In his paper read before the Institution of Petroleum Technologists on the 20th inst., Mr. W. H. DALTON was not very sanguine as to the existence of stores of petroleum of commercial value lying intact within the limits of the British Islands; and he criticised at some length the various reports, that have appeared from time to time, on the alleged occurrence of oil in different parts of the country.

With regard to the inorganic origin of hydrocarbons, he contended that the vague conceptions of the hypothetical evolution of hydrocarbon compounds in volcanic centres (where they would be instantly dissociated), of their transmission alike through pervious and impervious strata, and their ultimate storage in places less favourable in many cases than those previously traversed, violate all laws of probability and deduction from observable facts, and that only where the occurrence of hydrocarbons bears no conceivable relation to organic compounds—in meteorites, for instance—is one justified in assigning to such an inorganic origin.

The graphitic material occurring in the veins of many gold fields—Mysore, West Australia, Victoria, Transvaal, Guinea, and Brazil—retains a trace of hydrocarbon oil which is, at first sight, an inorganic hydrocarbon. But it occurs in quantity, as a common veinstone, and in all cases the "country rock" which these veins traverse is a metamorphosed sedimentary deposit. Where this is a graphitic gneiss, the carboniferous matter tends to segregate into veinlets and lenticles. In short, these regions present lost oil fields, metamorphic action having largely eoked the petroleum, whilst a mere trace remains of a compound of undetermined nature except its greasiness. Presumably like action has occurred wherever graphite is found, and where simple hydrocarbon gas is discharged in mines through metamorphic rock, as in Cornwall and Wales, it is probably the result of a similar process, the decomposition of some form of organic matter in the deep-seated rocks beyond the ken of the miner's pick.

In the British Islands, the earliest example in geological sequence is the viscous tar, often consolidated into albertite, occurring in the lower old red sandstone of Dingwall, and sometimes descending into crevices in the subjacent gneiss. Petroleum is vaguely reported on the Orkney mainland, which consists of the middle division of the same series. As this has, in Caithness, sandstones cemented by bituminous matter, and on the island of Hoy veins of albertite, the conditions of deposit were evidently such as to favour the formation of hydrocarbons, some of which may have remained fluid. At Cupar, in Fife, basalt veins traversing the upper part of the series have collected, into the inter-crystalline and other spaces left by contraction in cooling, enough benzene to show wetness for a brief interval on freshly-broken surfaces. But slightly newer than these instances was the vein impregnated with mineral oil, exposed in 1874 in the foundations of a factory in Barnstaple, traversing upper devonian shales.

In the succeeding carboniferous series hydrocarbon fluids are much more frequently found, owing to the more extensive mining operations, which have revealed pockets of oil where none is seen at the surface. In the lowest member of the series, the calciferous sandstone group, occur the oil shales of the Lothians. From amongst these shales petroleum appeared at Broxburn in 1866, some 200 barrels being obtained. This Mr. Cunningham Craig regards as oil which has escaped the process of conversion into kerogen; but the report in the Geological Survey memoir on the oil shales of the Lothians points rather to its being the product of natural distillation by the heat of intruded igneous rock.

The films of oil noticed on the surface of the water of St. Catherine's Well, Liberton, some four miles south of Edinburgh, come from about the same horizon as the Dunnet shale; and the Binny sandstone at Straiton, a mile further south, is too much charged with oil to be used as a building stone. In this case, there are neither known nor suspected igneous rocks of carboniferous or later origin, but the beds are intensely crushed against the resistant mass of the Pentland Hills, volcanic rocks of the old red sandstone period, and heat may have been developed by friction to sufficient extent to break up kerogen into petroleum.

The mountain limestone in Derbyshire affords many cases of hydrocarbons of much scientific, though no economic, interest, including the elaterite or mineral indiarubber, of Windy Knoll, Castleton. Asphalt, liquid petroleum, and gaseous hydrocarbons are frequently recorded in accounts of the old lead mines about Castleton, Eyam, Stony Middleton, Ashford, Youghreave, Winstar, Ashover, and Wirksworth, but their occurrence in veins leaves their original position in doubt. In the Derbyshire region, hot springs indicate the continuance of chemical action, and would facilitate the migration of viscid hydrocarbons along the channels offered by veins. On the other hand, gas occurs in the hæmatite mines of Cleator Moor, Cumberland, and, accompanied by bitumen, in the Flintshire lead mines, and traces of oil are said to have been noticed in the Anglesey limestone.

From the carboniferous limestone at Ashwick Court, near Shepton Mallet, and from two other points within two miles from it, an oil has been obtained resembling in some respects a refined product; and from the Yoredale beds, in a boring at Norton, near Stockton-on-Tees (in 1889), black oil rose continuously after a thickness of about 750 ft. of triassic and permian beds had been penetrated. Paraffin wax was found in 1905 in a drift cut through the Yoredales in Ladysmith Colliery, Whitehaven, Cumberland. The millstone grit, which yields the unique flow of oil from the Kelham boring near Newark, is there only 240 ft. thick, with the oil sand about 80 ft. below the base of the coal measures. The only igneous rock is a

dolerite sill more than 1,300 ft. higher in the air, and one must, for the present, assume the oil to be indigenous to the rock in which it occurs.

In the coal measures, natural and artificial emanations of hydrocarbon gas are abundant. Natural gas springs, prior to mining operations, are recorded at but few points, Wigan and Broseley being mentioned in the literature of the 16th and 17th centuries. Fluid petroleum is on record in several coal mines, sometimes oozing from faults, more frequently dripping from the roof of the coal. The roof of a coal seam *ipso facto* implies a change of conditions, from terrestrial vegetation to subaqueous deposit of sediment. In the Staffordshire coal field, many such marine invasions have been detected, and several in Derbyshire and Nottinghamshire; and if petroleum is principally due to marine organisms, such invasion furnishes at once a wider area for occupation, and abundance of dead vegetation as nutriment. Consequently, the roof of a coal seam is favourable to the development of oil-making organisms, and if the deposited sands or clays are of suitable character for storage and cover, there is a chance for the formation of oil.

The following is a list of occurrences of oil in coal mines, so far as seem to have been recorded, but in many cases essential data are omitted, whilst trivial details are superabundant:—

Cumberland.—Whitehaven, Ladysmith pit.

Yorkshire.—At Manvers Main Colliery, Wath-upon-Deane, gas and oil were noticed exuding from the roof of the Parkgate seam. A mass of paraffin wax was met with in the shaft 250 ft. above that seam. At Hemsworth, oil dripped from the roof of the Haigh Moor seam, 300 ft. above the Parkgate; and oil is also reported to have been observed at Dinnington Colliery.

Derbyshire.—In the Riddings Colliery, oil flowed, and was used as a lubricant for some years, from the roof of the Kilburn seam, the roof rock of which contains abundant remains of fish. The reports of oil at Butterley and Ilkeston probably refer to similar associations with the Kilburn seam. At the Southgate Colliery, Clowne, a considerable flow of oil occurs from strata accompanying the High Hazles coal, about 1,630 ft. above the Kilburn, and 400 ft. above the Haigh Moor, whilst the Top Hard coal, the best and most extensively worked throughout the field, and nowhere exhibiting a trace of oil, lies about 240 ft. below the High Hazles.

Lancashire.—The situation of the historic gas jet at Wigan is very vaguely indicated as a mile and a half or two miles from the town, no direction being stated. In the Wigan Coal and Iron Company's Sovereign pit No. 3, sunk to the Arley seam, oil oozed from the floor at a fault. Oil is reported at West Leigh, Hulton, Worsley, and Newtown, near Swinton. In the last case, and possibly in the others, the Cannel seam is the source.

Staffordshire.—Oil exudes from the floor of the Bullhurst coal in Fairlady pit, Leycett, and from the roof of the Cockshead seam in the Longton district, some 200 ft. higher in the series. It also saturated the measures in connection with the Bowling Alley coal, 640 ft. above the Cockshead, at Meirhay Colliery, Longton. This for five years yielded about five tons of refined oil per week, produced at a small refinery at Cobridge, near Hanley. Marine fossils occur in the roof of the Bullhurst seam and in the beds below it, indicating frequent alternations of marine with terrestrial conditions. The Cockshead and Bowling Alley seams have no marine associations, but the beds above and below them have abundant remains of fish and fresh water mollusca.

Shropshire.—Springs of tarry bitumen have long been known at Coalport, on the Severn, and Pitchford, 11 miles away. These are situated at the junction of the coal measures with the older slaty rocks that hereabouts form their immediate sub-stratum. That bitumen occurs in these older rocks at rare intervals is simply explained by the former extension of the coal measures over areas now denuded of them. Instances are on record at Haughmond Hill, east of Shrewsbury, and Nills Hill, Pontesbury, south-westward; the veins of ore in the Snailbeach mine, Minsterley, and the Bog mine, Shelve, probably owe their traces of bitumen to a like source. Higher in the measures, the sandstones are frequently charged with petroleum at Coalbrookdale, Madeley, Priorslee, and Wellington.

In the other coal fields there seems to be no occurrence of oil, tar, or asphalt.

In the permian series, a boring at Seaton Carew, Durham, had traces of oil, and the water of wells at Ruabon, Denbighshire, has been contaminated by similar exudations. The character of the rock, though of the same geological series, is wholly different in the two cases—red marls at Ruabon, magnesian limestone in Durham.

In the triassic salt beds of Cheshire, emanations of gas are not infrequent; traces of oil occurred at Anderton, near Northwich, and the asphalt at Bearwood Hill, near Burton-on-Trent, is in rock of the same period.

In the liassic series, traces of oil have been found in Somersetshire and Cleveland, the clays being richly fossiliferous. A reported case at Husband's Bosworth, Leicestershire, in 1906, proved to be an escape of refined oil. A boring at Calvert, Bucks, gave off a blower of gas from the liassic clay, which just there was red, like the triassic clays.

The jurassic clays are frequently charged with bituminous matter, reducing the amount of fuel requisite for brick burning, and free oil is reported in them at many points by Dr. Forbes-Leslie, besides shales capable of rich yield by distillation. The gas, charged from the Purbeck beds, at Heathfield, and other places in Sussex and Kent, has been assumed to be indicative of subjacent stores of petroleum, but the only direct evidence was that parts of the Kimmeridge clay in the Battle borings were wet with oil, which, nevertheless, did not flow into the borehole, a sufficient condemnation of the series as a source of oil for commercial purposes.

Except for an alleged escape of gas from the lower Bassingbourn, Cambridgeshire, the cretaceous lary beds, rich yielders of petroleum in other parts of the world, are in England devoid of any trace of hydrocarbons.

In the post-tertiary formation, the oil in the peat of Down Holland moss, near Formby, in Lancashire, and in several Irish bogs, is a true native petroleum, and may be extracted with little or no alteration, whilst the remainder of the mass may, at increased temperature, be broken up into a variety of useful hydrocarbons.

Further operations will establish more precisely the position of concealed boundary lines, where, as in Kent and Yorkshire, for instance, the coal measures and older rocks present a complex of various series as an irregularly worn floor, on which rests, independently of pre-existent tectonic structure, a wide variety of secondary deposits, each member of which has, in consequence of repeated movements and erosions, its own variations in thickness and its own marginal limitations. Such data are of more value in respect of water supply and coal than of the petroleum of which they usually indicate the absence.

It is much to be doubted whether in any part of these secondary rocks or of the subjacent palaeozoic series there exists any deposit of petroleum of commercial value; yet the Kelham and Norton instances demonstrate the possible occurrence of oil in deep-seated portions of series of which the wide areas of outcrop yield no similar indications. In view of our ignorance of the tectonic structure obtaining in these older rocks to the eastward of proven points, the author considers that the search for oil is of a speculative nature; for, although the overlying rocks indicate various tectonic movements, we do not know the degree of that influence, still less the extent to which the older rocks have been brought within reach of denuding agencies to form the floor on which rest the newer rocks; an anticline in the secondaries may be "posthumously" along one of older date—it may be oblique or directly transverse to flexures that would control the accumulation of palaeozoic oil, if such exists.

SOUTH AFRICAN MINING IN 1916.

The recently issued annual report of the Department of Mines and Industries for the Union of South Africa states that the coal raised in 1916 totalled 10,007,502 tons, valued at £2,739,665, compared with 8,281,324 tons, valued at £2,142,479, in 1915. All provinces, except the Cape, show increased tonnage and price. In the Cape province the sales decreased and the price increased by a little over 2d. per ton.

Coke aggregated 10,704 tons, valued at £19,575, an increase on the previous year's output—7,279 tons, valued at £12,880.

The following table shows the sales for each province:—

Province.	1915.			Per ton.
	Tons of 2,000 lb.	Value. £	s. d.	
Transvaal	5,202,805	1,145,060	4	4'82
Cape	46,850	26,591	11	4'22
Orange Free State	727,553	188,364	5	2'54
Natal	2,304,116	782,641	6	9'50
Total	8,281,324	2,142,479	—	—
Province.	1916.			Per ton.
	Tons of 2,000 lb.	Value. £	s. d.	
Transvaal	6,136,913	1,382,680	4	6'07
Cape	41,752	24,092	11	6'49
Orange Free State	762,576	198,699	5	2'54
Natal	3,066,261	1,134,194	7	4'77
Total	10,007,502	2,739,665	—	—

Further details appear in the following table:—

OUTPUT OF COAL IN 1916. (1 ton = 2,000 lb.)				
Area and province.	Number of mines producing.	Tons mined.	Percentage of waste sorted to tons mined.	Coal sold. Tons. Value per ton.
Springs-Brakpan area	4	593,211	18'35	481,231... 4 4'93
Middelburg area	17	5,738,267	14'67	4,802,100... 4 6'83
Other areas	9	924,391	4'94	850,582... 4 2'46
Transvaal	30	7,255,869	13'73	6,136,913... 4 6'07
Cape	6	53,739	22'52	41,752... 11 6'49
Heilbron	2	845,257	3'81	733,471 5 1'82
Kroonstad	3	37,316	15'46	29,105... 6 8'62
Orange Free Ste.	5	882,573	4'30	762,576... 5 2'54
Dundee, Klip River, and Newcastle	16	3,191,630	24'31	2,411,530... 7 11'77
Utrecht and Vryheid	6	897,985	24'59	654,731... 5 2'99
Natal	22	4,089,615	24'37	3,066,261... 7 4'77
Union of South Africa	63	12,231,796	—	10,007,502... —
Year 1915	59	10,053,869	—	8,281,324... —
Year 1914	58	10,220,018	—	8,477,923... —

The higher price obtained for coal in the Cape is largely due to the absence of competition as met with in other parts of the Union, and not to any superiority of quality over the coal of the other provinces. In the Transvaal, the district of Middelburg is the principal coal area. There are, however, important mines to the east of the Witwatersrand and in Ermelo district. Coal is mined in the north of Zoutpansberg.

In the Cape is carried on in the divisions of Molteno, Wodehouse, and Engcobo, about 50 miles south of Middelburg. During the year some 100,000 tons of coal was carried on in the divisions of Middelburg and Sutherland. The coal mines of the Orange Free State are situated towards the boundary of the Heilbron district and in the

northern and north-western portion of the Kroonstad district. In Natal, the largest coal producing area is the Klip River County. This field, which extends north-west and south-west of the town of Dundee, about 40 and 30 miles respectively, shows a considerable increase in output, while the other Natal coal area—Vryheid district—continues to improve.

Bunkering and Exports.

The following figures, relating to South African ports and furnished by the Department of Customs and Excise, show the quantity of coal from mines in the Union bunkered and exported:—

Port.	1915.		1916.	
	Coal bunkered. Tons.	Coal exported. Tons.	Coal bunkered. Tons.	Coal exported. Tons.
Capetown	231,781	2,976	559,331	7,453
Port Elizabeth	15	—	124	—
East London	408	—	98	—
Durban	880,969	204,635	1,224,091	159,016
Delagoa Bay	183,703	298,928	379,313	399,167
Port Nolloth	15	—	—	—
Knysna	—	—	1,305	—
Totals	1,296,891	506,539	2,164,262	565,636

Mine Accidents.

An allocation of the separate accidents in coal mines gives the following comparisons:—

	1915.	1916.
Transvaal	100	102
Cape	3	3
Orange Free State	25	25
Natal	10	99

The subjoined table indicates the number of fatal and non-fatal accidents, and the death-rate, in coal mines:—

	Accidents.			Total average labour in service.	Total deaths in 1916.	Death rate per 1,000 in 1916.
	Total.	Fatal.	Non-fatal.			
Transvaal	102	31	71	13,253	33	2'49
Cape	3	2	1	700	3	4'28
Orange Free State	25	5	20	2,203	6	2'72
Natal	99	18	81	13,096	18	1'37
Total	229	56	173	29,252	60	2'05

Accidents at Collieries.

In the Transvaal collieries the death rate from accidents was 2'49, as compared with 1'95 in 1915. The Transvaal coal mines are, as a rule, free from marsh gas, but small accumulations do sometimes occur. While disasters due to large explosions, involving the death of considerable numbers of persons, cannot occur in these mines, accidents from gas explosions resulting in the death of one or a few persons are of occasional occurrence. It is difficult to avoid these entirely, for the small amount of gas and its infrequency do not make the provision of safety lamps expedient. At the Anglo-French Colliery four natives were burnt by a small explosion, one of them dying subsequently. At the Clydesdale Collieries a small amount of gas was exploded by the light carried by a native, who was slightly burnt, and another native was fatally burnt at the same colliery by the explosion of gas which had collected in a disused working. In the Orange Free State collieries the death rate from accidents was 2'72 per 1,000 per annum, as compared with 4'4 in 1915. It appears probable that the death rate might be reduced still further if better supervision and discipline prevailed. The Natal collieries continue to maintain a satisfactory low death rate from accidents, the figure being 1'37 per 1,000 per annum, as compared with 1'70 for 1915, and 1'3 for collieries in Great Britain. No accidents occurred through the explosion of firedamp, although gas occurs in the majority of collieries in Natal; whilst several of the largest collieries in the province had no fatalities. This is eminently satisfactory, especially in view of the unfavourable conditions sometimes found to exist, such as gob-fires and bad roofs. In the Cape collieries the death rate for accidents was 4'28 per 1,000 per annum, as compared with 1'23 in 1915. These collieries employed only 700 persons.

Mechanical Coal Cutters.

The following table shows the number of coal cutters in use in December 1916, the class of power employed, and the percentage of mining work accomplished by machines over the year:—

Province.	Number of machines.			Percentage of work done to total tonnage mined by collieries using coal-cutters.
	Elec- tricity.	Com- pressed air.	Total.	
Transvaal	3	352	355	93'15
Cape	1	—	1	0'60
Orange Free State	—	15	15	23'31
Natal	16	150	166	57'67
Union of South Africa	20	517	537	75'82
1915	16	477	493	60'13

Johannesburg Inspectorate.

Reporting on the Johannesburg district, Mr. C. J. Collopy states that the position of the coal industry is extremely satisfactory, and its expansion is noteworthy. The change over from steam to electricity at the gold mines, instead of bringing ruin to the collieries as predicted, has had quite the contrary effect, as the power stations have been equipped with boiler arrangements calling for the consumption of "fines," which previously went to the colliery waste heaps, and there has been no difficulty experienced by the collieries in disposing of the round steam coal, so displaced, in other markets. Through the presence of war conditions, a new export trade has sprung up, which has sent to South African ports many vessels that at other times took coal cargoes on board elsewhere; and there is reason to regard the year's operations with a good deal of satisfaction. As coal plays so large a part in the war, perhaps the most satisfactory feature is that the output shows such an increase.

Cape Inspectorate.

Mr. G. E. B. Frood reports that the output continues to drop steadily, amounting this year to only 41,752 tons, of a gross value of £24,092. Partly because of their seams having become exhausted, and partly, no doubt, from increasing competition, the small mines around Molteno appear to be gradually shutting down, and their owners trying their fortune elsewhere. The Indwe Company, which was for long the mainstay of this production, also appears to be dropping out of practical account. The Karoo Coal Syndicate, which was exploiting the fissure coal of the Prince Albert district, suspended operations during the year. These fissure occurrences were very interesting, being, in fact, almost unique, and it is disappointing, from the point of view of general and scientific interest, if no other, that more development was not done.

Natal Inspectorate.

Mr. J. E. Vaughan reports that in Natal the output of coal increased materially, being 3,092,996 tons, as compared with 2,319,942 tons in 1915; the output for 1916 was a record for Natal, the figures for the past five years being as follow:—

Year.	Tons.
1912	2,768,747
1913	2,922,549
1914	2,592,321
1915	2,319,942
1916	3,092,996

The price of Natal coal has risen, and in spite of the increase in the price of stores, the collieries must be benefiting considerably by the war. When the war is over it is certain that several new collieries will start; by-product works will be erected in several places, and there should be a big increase in the output of coke, so that the future for the coal and attendant industries is very hopeful.

There is a great demand for Natal coke, and it is easy to get orders for all that is produced. The coke is of excellent quality, and compares well with the imported article; and there is no reason why Natal should not supply the entire demand of South Africa, and thus do away with the imported article altogether.

The briquette factory at Durban, belonging to the Natal Navigation Colliery, continued making experiments in the manufacture of briquettes. At the end of the year it was thought a satisfactory mixture had been obtained, and it was hoped to turn out 3,000 tons a month in the coming year. The dross for the briquettes is obtained from the Natal Navigation and Glencoe collieries, and the pitch is imported from England.

Death Rate and Accidents.

The death rate from accidents on the Natal coal mines was 1'37 per annum per 1,000 persons employed; this is very satisfactory (adds the inspector), as the death rate in the collieries of Great Britain in 1915 was 1'3. The death rate per 1,000 per annum at Natal coal mines has been as under since Union:—

Coal only.	
July to Dec. 1910	3'86
1911	2'07
1912	1'95
1913	1'60
1914	1'86
1915	1'70
1916	1'37

Taking into consideration the difficulties in Natal—namely, fiery mines, presence of gob-fires and the deadly fumes resulting therefrom, bad roof at many collieries, and, owing to the war, a scarcity of skilled miners—the death rate is very satisfactory. It is almost too much to hope that the low death rate will continue, as a single act of carelessness or disregard of the Regulations on a fiery mine may result in an appalling disaster. It is only by constant supervision on the part of officials on the mines, and by their maintaining the strictest discipline, and seeing that the Regulations are closely observed, that it is hoped to get through without an explosion. Safety explosives, stone dusting, and watering all help in preventing an explosion, but the only sure way to avert a disaster is for everyone to carry out the Regulations thoroughly; if this is done the mines should be immune from explosions, except such as may occur when a fire is being built off. No accidents occurred through explosion of firedamp. None of the accidents underground call for any special comment; they were all of a type inseparable from mining operations, and none presented any unusual features.

During the year three fires occurred. At the Hatting Spruit Colliery a fire broke out due to spontaneous combustion, caused by the falling of "top" coal in heaps in an old road. The fumes were very poisonous, but the reversal of the ventilation was carried out without much trouble, and the entire district sealed off by building two stoppings. At the Cambrian Colliery in October, spontaneous heating was reported from sections two and three, where pillars are being extracted. The area was already practically enclosed within an artificial panel of brick stoppings, and only a few additional stoppings were required to completely isolate the area, which was quickly and safely accomplished. It was fortunate that it was possible to conduct large volumes of fresh air to the scene of operations, as the fumes were very deadly, analyses of several samples of the fumes showing considerable proportions of carbon monoxide. At the same colliery another serious fire broke out in November, which was isolated by the building of three stoppings. Owing to the fires which have occurred, large areas of valuable coal have been lost. There is very little hope of this coal being recovered, unless the fires can be built off close up to the goaf, and the only way to accomplish this would be to do the building in an irrespirable atmosphere. For this, a well-trained rescue team is essential, and as there is no such team trained to the use of rescue apparatus in South Africa, it would pay the coal owners to import such a team from England. Fires will occur in the future at most of the Natal collieries, and the only

way to minimise the danger and loss of coal is to build the workings off into small panels, so that a fire can be quickly and easily isolated, while the loss of coal will be small. It may seem extravagant to build numerous stoppings which may never be needed, but the cost of stoppings is small when compared with the money lost in coal shut off in a large section which has had to be abandoned owing to a fire.

Labour and Wages.

Skilled white labour has been very scarce throughout the year in Natal. Some Rand miners suffering from miners' phthisis in its early stages have come to the Natal collieries; some of these men had had previous experience in collieries, while others rapidly picked up the work. As coal mining is not bad for men in the incipient stages of miners' phthisis, such men should be encouraged to give the collieries a trial; it will enable men to earn a decent living and improve their health, and incidentally they will increase the output of coal, which is all-important nowadays. No strikes occurred during the year, but by giving a war bonus of £2 15s. per mensem to married men and £2 5s. to single, the coal owners probably averted trouble. Great difficulty in procuring suitable hoisting engine drivers was experienced, and for this, in the inspector's opinion, the collieries have themselves to blame. Now that the majority of drivers on the Rand work eight hours per diem, it is not to be expected that men will be anxious to come to Natal and work 10 hours. Now that drivers and miners are working the eight-hour shift on the Rand, the system is bound to spread throughout the Union.

The general conditions underground are satisfactory, but some of the mines will always be a source of anxiety because the mines were not laid off with a view to fires occurring, and artificial panels can never be as satisfactory as natural ones. Then, again, the explosions which have occurred in the past have wrecked the roof at one or two collieries, and where the roof on the main roads is perhaps 15 ft. or more above the floor, it is impossible to examine it thoroughly with a safety lamp. Visits by mine inspectors are all very well, but the mines can only be kept safe if the mine officials carry out their duties strictly. At several of the collieries over a mile has to be traversed before the faces are reached, and several of the collieries must have over 50 miles of workings; therefore an inspector can only visit those workings which are most likely to be dangerous, and he must rely largely on the manager and officials to play the game and tell him if there is anything peculiar or abnormal in the mine. With the extensive workings in Natal collieries, it is very easy for a manager to hide things from an inspector, and they have, therefore, to trust largely to the co-operation and assistance of the mine officials in finding out really how things are going on. When the new collieries in the Vryheid area are opened up, mine inspection in Natal will become very hard work; the seams are high up in the mountains, with the screening plants at the foot; thus at the Tendega Colliery the adits are 600 ft. vertically above the office, and no one is allowed to ride up the self-acting incline. The timbering at the majority of the collieries is excellent. St. George's Colliery is still the best timbered mine in Natal, and had only one accident (slight) from fall of roof during the year.

There is still some difficulty in getting sprags properly set when undercutting is going on, the white men being too much inclined to leave this to the natives' judgment. However, a very marked improvement in the spragging of faces has been noticed in the past year. One of the hardest things to get done underground is to get men to replace props which have been knocked out by trucks or machines; a man is careful to see that the prop is put up in the first place, but once it is knocked out he rarely replaces it; if the prop is necessary in the first instance, it is always necessary; men and some mine officials do not appear to think so.

More top seam coal is worked than formerly, but more should be worked wherever possible. There is no doubt that in the new pits to be sunk in the Dundee area, this question of mining top coal will be fully gone into, and the workings laid out with this object in view. The attempt at longwall workings at the Natal Navigation Colliery was not a success; the workings crushed in badly, and had to be abandoned. An attempt at the same method is being made at the Cambrian Colliery, but so far sufficient work has not been done to afford any indication as to whether the operations will be successful or not. Nothing has been done as regards establishing a rescue station. In view of the numerous fires which have occurred, one wonders that the coal owners do not establish one themselves. If a trained rescue team was secured from Great Britain, it would be most useful in dealing with existing fires, and could train local men in the use of rescue apparatus.

Coal at Cowes.—Capt. Douglas Hall, M.P. for the Isle of Wight, has taken steps to secure a reduction of the price of coal (about 62s. 6d. per ton) in the island. A strike occurred in consequence of the price. Capt. Hall says that the Shipping Controller has, by re-arranging the transit, guaranteed a reduction of 10s. a ton at Cowes.

Development of Brazilian Coal.—According to a recent consular report, the Central Railroad of Brazil inaugurated a series of experiments with its new coal pulverising plant at Barra do Pirahy. The plant was furnished by an American firm, was installed by one of its engineers, and is said to have cost between 2,000 and 3,000 centos of milrees (about 500,000 to 750,000 dols. U.S.A. currency). The pulveriser is described as being similar in construction to a cement plant. The coal, freed of its moisture, goes into a hopper, and is pulverised so that 80 per cent. of it can pass through a 200 mesh screen. It is then passed to the locomotive by means of a conveyor screw and blast, thus bringing the ignitable powder to the mouth of the locomotive furnace, at which point combustion takes place. The recent successful experiments were conducted under the direction of Dr. Assis Ribeiro, a well-known Brazilian engineer, who is assistant-director in charge of locomotion for the Central Railroad.

MINING EMPLOYMENT STATISTICS.

The *Labour Gazette* for October reports that employment in coal mining during last month continued good, but there was a slackness in some districts, especially Durham, owing to difficulties of transport. Compared with September there was an increase of 2,175 (or 0.4 per cent.) in the number of workpeople employed at collieries making returns, and an increase of 11,799 (or 2.2 per cent.) on a year ago. Of the 540,700 workpeople included in the returns for October, 222,383 (or 41.1 per cent.) were employed at pits working 12 days during the fortnight to which returns relate, while a further 182,386 (or 33.7 per cent.) were employed at pits working 11, but less than 12 days.

Districts.	Work-people employed in Oct. 1917.	Average No. of days worked per week by the collieries in fortnight ended			Inc. (+) or dec. (-) in Oct. 1917, on a	
		Oct. 27, 1917.	Sept. 22, 1917.	Oct. 28, 1916.	Month ago.	Year ago.
		Days.	Days.	Days.	Days.	Days.
England & Wales.						
Northumberland ..	29,892	5.27	5.23	5.41	+0.04	-0.14
Durham ..	96,808	5.21	5.10	5.55	-0.19	-0.64
Cumberland ..	6,968	5.52	5.63	5.84	-0.11	-0.32
South Yorkshire ..	60,063	5.90	5.83	5.91	+0.07	-0.01
West Yorkshire ..	26,165	5.83	5.82	5.77	+0.01	+0.06
Lancs. & Cheshire ..	52,963	5.92	5.81	5.90	+0.11	+0.02
Derbyshire ..	31,293	5.68	5.86	5.81	-0.18	-0.13
Notts and Leicester ..	31,681	5.65	5.60	5.56	+0.05	+0.09
Staffordshire ..	28,404	5.62	5.71	5.75	-0.09	-0.13
Warwick, Worcester and Salop ..	7,768	5.80	5.61	5.81	+0.19	-0.01
Glo'ster & Somerset ..	5,354	5.97	5.88	5.86	+0.09	+0.01
North Wales ..	8,794	5.96	5.95	5.98	+0.01	-0.02
South Wales & Mon.	110,887	5.30	5.36	5.91	-0.06	-0.61
Total	497,040	5.48	5.52	5.76	-0.04	-0.28
Scotland.						
West Scotland ..	20,087	5.35	5.31	5.44	+0.04	-0.09
The Lothians ..	2,238	5.46	5.71	5.43	-0.25	+0.03
Fife ..	20,823	5.11	5.13	5.41	-0.02	-0.30
Total	43,198	5.24	5.24	5.42	-	-0.18
Ireland	462	5.63	5.63	5.40	-	+0.23
Total, U.K. ...	540,700	5.46	5.50	5.74	-0.04	-0.28

† At the collieries included in the table.

The following table shows the numbers employed and the average number of days worked, distributed according to the principal kind of coal raised at pits at which the workpeople were engaged.

Description of coal.	Work-people employed in Oct. 1917.	Average No. of days worked per week by the pits in fortnight ended			Inc. (+) or dec. (-) in Oct. 1917, on a	
		Oct. 27, 1917.	Sept. 22, 1917.	Oct. 28, 1916.	Month ago.	Year ago.
		Days.	Days.	Days.	Days.	Days.
Anthracite ..	7,793	5.53	5.30	5.52	+0.17	+0.01
Coking ..	29,955	5.53	5.64	5.76	-0.11	-0.23
Gas ..	36,631	4.31	4.77	5.52	-0.46	-1.21
House ..	51,500	5.61	5.56	5.68	+0.05	-0.07
Steam ..	182,017	5.50	5.55	5.80	-0.05	-0.30
Mixed ..	232,804	5.57	5.55	5.73	+0.02	-0.16
All descriptions ...	540,700	5.46	5.50	5.74	-0.02	-0.28

† At the collieries included in the table.

Iron Mining.—Employment continued very good at iron and shale mines. Returns received for each of the three periods named below, relating to the same mines and open works in each case, show that 18,331 workpeople were employed at mines included in these returns in October 1917, an increase of 179 (or 1.0 per cent.) compared with September, and of 1,759 (or 10.6 per cent.) on a year ago.

Districts.	Work-people employed in Oct. 1917.	Average No. of days worked per week by mines in fortnight ended			Inc. (+) or dec. (-) in Oct. 1917, on a	
		Oct. 27, 1917.	Sept. 22, 1917.	Oct. 28, 1916.	Month ago.	Year ago.
		Days.	Days.	Days.	Days.	Days.
Cleveland ..	7,542	5.79	5.95	5.54	-0.16	+0.25
Cumberland and Lancashire ..	5,729	6.00	6.00	5.95	-	+0.05
Scotland ..	711	5.75	5.80	5.97	-0.05	-0.22
Other districts ..	4,349	5.86	5.85	5.78	+0.01	+0.08
Total	18,331	5.87	5.93	5.75	-0.06	+0.12

† At mines included in the returns.

Shale.—The returns show that 4,846 workpeople were employed in the fortnight ended October 27, 1917, at mines which worked on the average six days per week, compared with 5,055 workpeople in September at mines which worked six days, and with 4,779 workpeople in October 1916, at mines which worked 6.01 days per week.

Pig Iron Industry.—Employment continued good, and showed an improvement compared with a year ago. Shortages of materials and of labour were reported in several districts. Returns received show that 296 furnaces were in blast at the end of October, compared with 294 a month ago, and with 287 a year ago. During the month three furnaces were re-lit (one each in Derbyshire, Lancashire and Ayrshire). One furnace (in Derbyshire) was blown out.

Iron and Steel Works.—Employment at iron and steel works was again very good, and showed an improvement on a year ago. Labour was reported to be scarce in all districts. According to returns relating to 118,972 workpeople, the number of shifts worked during the week ended October 27, 1917, was 684,036, showing an increase of 5,950 (or 0.9 per cent.) on a month ago and of 52,127 (or 8.2 per cent.) on a year ago.

Engineering.—These trades continued to be extremely busy during October, and a great amount of overtime was worked. It is reported from various centres that the abolition of "leaving certificates" caused much less dislocation than had been anticipated. Trade unions with 303,954 members (mostly in skilled occupations) reported 0.1 per cent. unemployed at the end

of October, compared with 0.1 per cent. a month ago and 0.2 per cent. a year ago.

Tin-plate.—The number of tin-plate mills working at the end of October showed an increase of 22 compared with the previous month, and a decrease of 39 on a year ago. The improvement was due to the increased supply of steel bars for the manufacture of tin-plates. The number of mills making steel and galvanised sheets, working at the end of October, showed an increase of one compared with September, but a decrease of two on a year ago.

Miscellaneous Metal Trades.—Employment continued good in most of these trades; it showed no change from a month ago, but a slight decline compared with a year ago.

Nuts, Bolts, Nails, &c.—Nut and bolt makers continued well employed at Birmingham, Smethwick, Darlaston and on the Tyne; at Blackheath and Hales-owen employment was very good; it was also very good with shoe rivet and wire nail makers at Birmingham.

Tubes.—Employment continued good at Wednesbury and Birmingham and in South Wales and Monmouthshire.

Wire.—Employment was good, but was still hindered in some districts by shortage of labour and materials.

ALLIANCE OF EMPLOYERS AND EMPLOYED.

A representative meeting was held at the Caxton Hall, Westminster, on November 15, to consider the constitution and programme of the recently-formed National Alliance of Employers and Employed. The Right Hon. F. Huth Jackson presided.

The objects of the Alliance are:—(1) To promote active co-operation of employers and employed in the treatment of questions generally affecting labour and employment in all trades and industrial occupations; (2) to promote the welfare of the industrial workers of the country and the efficiency of its industries; (3) to promote arrangements for facilitating the reinstatement in civil employment at the end of the war of men serving with the forces and of munition workers. The Alliance will not, unless specially requested to do so, interfere with arrangements existing between employers' associations and trade unions for the settlement of questions affecting wages, hours, and conditions of labour.

The meeting decided to adopt the constitution and programme for a trial term of six months. The programme is as follows:—A living wage, regulation of hours of labour, the women to be paid at equal rates with men if work, skill, and output are equal, the improvement of the conditions under which work is generally carried on, satisfactory housing accommodation for all workers, opportunity to be given the workpeople to obtain a technical and practical knowledge of the trade, joint committees to whom information could be given as to the financial bearing where alteration of wages or hours of labour are in question, every inducement to be offered to ensure the production of the maximum output of which each individual is capable, and every worker to be allowed to receive as much as the nature of his work and capacity will enable him to earn, endeavours to be made to keep the workpeople employed during times of slack trade, association of employers and employed to be encouraged and to press locally and nationally that every child shall have the opportunity of obtaining a liberal education and the technical training required for the particular calling for which it is shown to be fitted.

Mr. HUTH JACKSON made a statement relative to the advisory committees which are to be attached to the employment exchanges in connection with the demobilisation scheme as prepared by the Ministry of Labour. The Minister of Labour had now authorised him to announce that the committees were to have certain definite administrative functions in regard to demobilisation. That would make a great difference in the attitude of a number of employers and workmen. In regard to the Whitley Committee's Report, now adopted by the Government, he said that Mr. G. H. Roberts had declared that it was the intention of the Government to appoint a Parliamentary Committee, of which Mr. Whitley would be the chairman, to consider the best means by which the recommendations of the Whitley Report should be carried into effect. What they had to aim at was the strictest economy of production, and that could be achieved without any reduction in wages. High wages had come to stay. Labour was entitled to them, and to better conditions generally. There must be shorter hours, better housing, better education.

Sir ALGERNON FIRTH said he had been an employer for 40 years, and there had never been a trade union in his works. He recognised, however, that the conditions had absolutely altered. He emphasised the necessity of close co-operation, not only between employers and employed, but between those two parties and the State.

Mr. JAMES SEXTON said that in a general sense the hearty co-operation of employers and employed had been ungrudgingly given to save the nation during the war.

Dr. C. R. Jones has been appointed certifying surgeon under the Factory and Workshop Acts for Arnesby (Leicestershire). A vacancy at Coventry is announced.

Poverty Among Durham Miners.—At a meeting of the Chester-le-Street Board of Guardians, serious complaints were made of the poverty in the Washington and Usworth districts owing to the short time worked at the local collieries. Mr. J. R. Mole (vice-chairman) said the Government had brought into the district 6,000 families, one of whom was recently paid £4 18s. for eight days' work as a bed maker and bedroom cleaner. The demand for coal all over the country could not be met, and yet the miners were starving. Mr. J. W. Renwick said the orders were not allotted to the various collieries as they should be. Idle men transferred to where there was work for them. A deputation was appointed to wait on those responsible for the working of the relief agencies.

CURRENT SCIENCE AND TECHNOLOGY.

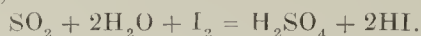
Sulphur in Coal and Coke.

According to a writer in *Cheap Steam*, the method of estimation of sulphur by ignition with sodium peroxide presents no particular advantage over other methods in use, beyond a slight gain in time. Like the other methods, moreover, it estimates the total sulphur. It is well known that sulphur exists in coal in two forms: (1) Volatile, in the form of pyrites and organic sulphur compounds; and (2) in the form of the sulphates of calcium and magnesium. So far as any heating value is concerned, it is only in the former condition that the sulphur is of any value, and it is probable that as a deleterious substance this is the only form in which it may do harm. In the form of calcium sulphate it may be regarded as harmless in firing and in metallurgical operations.

The following method by which the estimation of volatile sulphur can be made in the course of half an hour, with very great accuracy, is recommended:—A combustion tube, such as is used for the estimation of carbon and hydrogen, is taken, and two-thirds filled with granulated copper oxide only. At the exit end is placed a plug of clean copper gauze to decompose any oxides of nitrogen which may pass through the copper oxide. From $\frac{1}{2}$ grm. to 1 grm. of the finely-ground coal is placed in a porcelain combustion boat, and introduced into the front of the combustion tube, which is then connected to a supply of oxygen. To the exit end is fixed a glass tube which dips into a known quantity of $\frac{N}{10}$ iodine, contained in a flask;

from this flask another tube dips into a solution of potassium iodide, so as to make sure that no iodine is carried away. The writer, in the course of hundreds of operations, never found any trace of iodine in the potassium iodide solution.

The burners are gradually turned on under the coal, while the copper oxide is kept red-hot, and a stream of oxygen is passed through at the rate of about two bubbles per second. The heating of the coal should be slow until the volatile matter is expelled, after which full heat may be put on. In the course of about 15 minutes the whole of the coal will be burnt, and after ensuring that the products of combustion have been cleared out of the tube, the flask containing the $\frac{N}{10}$ iodine is removed. The reaction, which is reversible, is:—



Under the conditions of the test where the amount of H_2SO_4 formed is very small, the reverse operation does not take place. The excess of iodine is determined by means of $\frac{N}{10}$ sodium thiosulphate and starch paste as indicator.

A large number of tests were made on pure organic bodies containing sulphur, and very accurate results were obtained. A modification of this method, which gave concurrent results, was to pass the products of combustion into water containing an excess of bromine, whereby the SO_2 was again oxidised to H_2SO_4 . The solution was boiled to expel excess of bromine, acidified with HCl , the H_2SO_4 precipitated with BaCl_2 , and the BaSO_4 filtered off, washed, dried, and weighed in the usual way. The advantage of the iodine method is the quickness, as the excess of iodine, and consequently the amount of sulphur present, can be determined in a few minutes.

Electric Heat Storage in Boilers.

Col. Revel, of the Italian Army, has invented an electric steam generator (described in *Engineering*), the principal characteristic feature of which is that for the transformation of electric energy into heat, and thereafter the steam, use is made of the ohmic resistance of the water which has to be evaporated. The apparatus can be inserted in any alternating-current circuit of from 200 to 3,600 volts, and these are the form of current and pressures which are usually supplied for industrial purposes. In this system, moreover, the production of steam is regulated automatically and continuously as required; the apparatus is entirely automatic in its action and demands no attention. Lack of feed water would only result in a decrease or a stoppage in the production of steam until the feed water difficulty was overcome. A 97 to 98 per cent. efficiency is claimed for the Revel type of machine, since the whole of the heat generated by the electric energy is absorbed by the water, the only loss being that caused by radiation from the body of the apparatus; this compares favourably with the 90.5 per cent. efficiency stated to be that of the Swiss machine.

The Revel generators are constructed to work at any pressure up to 14 atmospheres, and can be connected up at any time with the steam pipes from the ordinary steam boilers; owing to the rapidity of their action, they take up any excess of hydro-electric energy which may be available even for a short time. They may, in fact, be considered as serviceable appliances for turning to account any superfluous hydro-electric power available, and as such they were utilised in numerous installations in Italy before the war, when the price of coal did not exceed 32s. per ton. At the present time they are also found to be practical and economical even in cases where hydro-electrical power has to be paid for at the rates now ruling.

Influence of Size of Coking Coal on Ammonia Yield.

In connection with experiments at Bearpark Colliery, Mr. C. Jones (*Gas World*) states that some of the reasons for the variation in ammonia yield are due to a breakdown of a disintegrator. The disintegrator used was 3 in. and under, and the yield of ammonia was 3 in. and under, being less than $\frac{1}{2}$ in. In the case of charging large coal they found that the yield of ammonia, though the same number of ovens per day, was equal to 5 lb. of

sulphate per ton of coal. After about four weeks' working with uncrushed coals, the disintegrators were again put into operation, with the result that the ammonia came down to the usual amount. They were doubtful at the time as to the real cause of such large variation in the sulphate yield, and by way of experiment they again stopped the disintegrators for two further periods of about 20 days. In each trial they found the same increase of ammonia. Ordinarily, the coal leaving the disintegrators was extremely fine—nothing larger than $\frac{3}{16}$ in., and 80 per cent. of $\frac{1}{8}$ in. and under. Also the coal slurry was intimately mixed with the coking coal. The mechanical properties of the coke made from the large coal was not, of course, good; but they have since arranged a screen through which all coal below $1\frac{1}{4}$ in. goes into the crusher by-pass, while all nuts over $1\frac{1}{4}$ in. are crushed. By this means they get a less percentage of very fine coal, and nothing larger than $1\frac{1}{4}$ in. delivered into the coke oven bunker. The coke made from this is quite good, and they still find an increase of 3 lb. of ammonium sulphate per ton of coal, the benzol showing no appreciable difference either way. His theory explaining the increase of ammonia is that the coal being more open in the oven allows a greater volume of the gases evolved to pass inwards through the interior of the charge, and therefore a less volume is exposed to the hot chamber walls, which undoubtedly account for a large amount of the ammonia being decomposed within the oven. He also considers that finely-ground coal is apt to absorb oxygen more rapidly than large coal.

THE PROTECTION OF INVENTIONS.

The question of the reform of our patent laws, in order to secure better protection for inventors, has recently formed the subject of discussion by the Manchester Association of Engineers and various local sections of the Society of Chemical Industry.

At the meeting of the first-named body, on November 10, Mr. V. A. B. HUGHES read a paper on "British and Foreign Systems for the Protection of Inventions and Suggestions for Reform." He remarked that uniformity in the broad principles of the systems of protection of inventions if adopted by the various countries of the world, including the members of the British Empire, could not fail to be a source of great advantage to the commercial community. It was not to be supposed that the details of a system which would serve one country, having, for example, a very large population and adequate supplies of raw materials, would be suitable for a country thinly populated or deficient in respect of natural products, but it was thought that a great measure of uniformity could be attained. Outlining the details of what might be considered a more or less ideal system for general application, he suggested certain fundamental propositions. First, that it should be the duty of the Government of each country to encourage research or scientific investigation and invention in order that it might acquire and maintain a position in the front rank of industrial nations by reason of the excellence and unique character of its manufactures. Second, one method of encouraging new manufactures based on research and invention consisted in granting to an inventor some monopoly right in his invention for a period of years, so that he might have an opportunity of deriving some benefit from his invention. Third, the obtaining of the monopoly rights for the invention should not involve the payment to the Government of any fees more than are necessary to cover the cost of the requisite work involved in enquiring into the invention and issuing the protection, for the Government should consider the invention as the probable basis of a new industry or as a means of improving an established industry, which would increase the nation's wealth and yield employment for its people. The Government's profit from the invention would thus be in proportion to that derived by the inventor. Fourth, it was not desirable that protections or patents should be granted indiscriminately for everything which a person might choose to call an invention, for a multiplicity of grants of protection for ideas not possessing the qualities entitling them to protection could only act as a drag on the wheels of progress by creating an atmosphere of uncertainty as to what one might or might not do. Fifth, as the Government, or the community it represented, must look for its profit from the invention to the establishment of a new industry, or to the improvement of an industry already established, it followed that patents should not be maintained which were being used for preventing the establishment of new industries or for creating or increasing an industry outside the country granting the patent. The encouragement of research of a useful character had always ultimately a direct bearing upon manufactures and therefore upon invention whereby new methods, processes, products and machines were devised. The making of grants by the Government for research work, both to public institutions and to private individuals and associations should be maintained and extended; the work of successful pioneers and inventors was worthy of a national recognition not less than that obtained by politicians, lawyers, scholars, poets and explorers. The profit derived by the community by reason of the invention should not be in the nature of a direct tax on the invention, which was in reality what the imposition of high patent fees amounted to, but should take the form of ordinary income tax which was levied on the profits arising from the business created by the invention. The money spent by a patentee in procuring patents should not be subject to income tax payments as at present, but should be considered as a necessary expenditure for the maintenance of business.

Lower Fees Suggested.

A comparison of the receipts from patent fees in Great Britain, France, the U.S.A. and Germany showed, in spite of the low charges of the United States Patent

Authorities, a surplus of receipts over expenditure. They received in normal times about two and one-third times the number of patent applications received by the British Patent Office, and granted a similarly large number of patents. Having regard to those facts, he thought it was not unreasonable to affirm that the British Patent Office was acting on a wrong principle in charging £100 in fees for a 14-year patent, a sum out of all proportion to the cost involved in the examination and grant of the patent. He suggested that there should be two classes of patents, both classes being subject to the same thorough examination before grant:—(1) Patents of invention having a 15 year term and costing in Government fees the sum of £6; (2) minor patents having, say, a four-year term and costing in Government fees the sum of £3. A simple but vital fact, which stood out from all others bearing on the question, was that it was vital to the industries of this country that all patents which were workable in this country should be worked here, and a suggestion made by the author was, that at the commencement of each year after the fourth from the date of his patent, every patentee should be required to file a statement in a prescribed form, setting forth what he has done to "work" his patent within the realm. If the patentee failed to file such a statement, then the patent automatically lapsed. Any person should be allowed to inspect the filed statement on payment of a small fee. If a person was of opinion that the patent was not being worked as required by the law, he may present an application to the Patent Office for revocation of the patent or for the grant of a compulsory licence thereunder. The patentee should then be called upon to amplify his annual statement, which should be in the nature of a summary of facts. The applicant for revocation or for a licence should leave his evidence also, and the case be determined by the Patent Office. The author's proposal involved the abolition of renewal fees, which were a direct tax upon the inventor, and the substitution thereof of a plain statement in a prescribed form of the steps taken by the patentee to work his patent within the realm. A further important proposal was, that instead of revoking a patent on the ground that it was being wholly worked abroad, the Patent Office should have the power of vesting the patent in a trustee, who should grant licences (with a royalty payment for the benefit of the community) on conditions ensuring the working of the invention here, and the sale of the goods at reasonable prices. The mere cancellation of the patent would leave the importer free to undercut a home manufacturer, not in the way of legitimate competition, but with a view to preventing the establishment of the industry, whilst the maintenance of the patent in the manner suggested would prevent the importation of the patented goods during the life of the patent.

Patent Law and Chemical Industry.

Before the last meeting of the London section of the Society of Chemical Industry, Dr. F. W. Hay read a paper on "Patent Law in Relation to British Chemical Industry." He said that it was in the national interest to encourage inventors, and the best way of doing so appeared to be by granting patents. The British patent system was historically the oldest, and its general principles had been adopted by almost all other countries; but it was capable of improvement in some respects. The preliminary search through British patents for the past 50 years was not sufficient to ensure novelty, and it should be extended to foreign patents and other publications, as was the case in Germany and the United States. At present the validity of British patents was made to depend on law court decisions, which was apt to deter manufacturers from taking up inventions, for fear of expensive litigations. Chemical patents presented special problems, as it was difficult to demonstrate the efficiency of the processes claimed. For this purpose Dr. Hay suggested the establishment of national testing laboratories. He also advocated the adoption of the Swiss system of granting a patent for one purpose only, and not for any general method, so as to prevent blocking and enforce full disclosure of working details. Another necessary reform was the revision of judicial procedure in cases of infringement of patent. At present the judges had to give decisions on subjects of which they were entirely ignorant, and they had no guidance but that of expert witnesses, who were usually biased on one side or the other. As a remedy for all this, Dr. Hay recommended the abolition of the expert witness and the enrolment of a technical jury to advise the judge on points which were beyond his knowledge.

In the discussion, Mr. W. F. Reid remarked that it was not desirable to put any further difficulties in the way of the inventor, and this might be done by establishing technical juries, as the experts might be unable to adopt readily a fresh point of view. The Patent Office should be made to help inventors, and not, as at present, to screw a profit of £100,000 a year out of them. He agreed that a more complete search was desirable, but doubted the practicability of the suggested testing laboratory, which would have to be of enormous extent to be of any use. He also mentioned that the council of the society had already made a recommendation to the Government that patent fees should be suspended during the war and the duration proportionately extended. The present law was obviously imperfect, as fees were paid to the end of the term on only about 4 per cent. of the British patents issued, and only 52 per cent. were kept up to the fourth year after issue.

Question of Search.

Mr. C. S. Garland remarked that this was probably because so many of the patents were found to be unworkable. Mr. A. Philip thought the fees should be reduced to a single payment on a lower scale than at present. Mr. J. W. Gordon, K.C., said a technical jury might be useful in advising a judge as to the questions to put to expert witnesses, who could only give such information as they were asked for. The difficulty in obtaining unbiased experts might be met by enrolling the jury from members of cognate industries. The extended search might prove a hardship to the applicant,

and its value was probably overrated. Any change in our patent law needed to be scrutinised for its probable effect on the 10 or 12 different patent systems of our Colonies and Dominions, and he strongly advocated their unification under a comprehensive British Imperial Patent Law. Mr. Jacques Abady, K.C., remarked that chemical patents offered especial scope for uncertainty: the simpler the subject, the less likelihood there was of litigation. He suggested that it was for the applicant to make his own extended search, and not to expect the Patent Office to do it for him. The courts could not establish the novelty of patents, which might each be attacked many times on different points; what they decided was whether the invention was duly described by the documents. Judgments could only be based on the evidence presented, and a technical jury, as proposed, even if not composed, as in Germany, of trade rivals, would not probably be better qualified for weighing that evidence than the judge himself. Mr. G. C. H. West contended that the extension of search might involve delay of three or four years. From the very extent of the survey, points of importance were often used in Germany and the United States; and in the latter country, at any rate, there had been no lessening of the number and cost of patent actions. Persons taking up any patent commercially could be relied on to make a comprehensive search if necessary. Any bias on the part of expert witnesses could be corrected in cross-examination by questions suggested by the experts on the other side. Mr. G. E. Pearson proposed that a committee of chemical manufacturers and inventors should be appointed to consider the new Patents Bill, and that their recommendations and those of similar committees for other industries should be examined and reported on by a joint Reference Committee. Other points not dealt with by Dr. Hay, which would have to be considered, were the questions of licensing and compulsory working, insufficient disclosure, blocking patents and international reprisals. Dr. F. B. Dehn supported the objection to extended search on account of the time it would occupy. He held that the judges generally knew what they were about, instancing that Mr. Justice Neville, in a case referred to by Dr. Hay, had given a really admirable definition of a catalysis.

Before the Manchester section on November 2, Mr. William Thomson, chairman, said that the English Patent Law bore with harmful effect on the inventor, who was usually poor, and yet he was one of the greatest assets of the nation. To hold a patent for 14 years necessitated the payment of upwards of £100, and the Government offered for this no protection to the patentee. It was not long since the present Patent Law was framed, but it left the position in the same way that to hold a patent for any number of years was a severe incubus to a poor inventor. The suggestion had been made that patents which had been lying dormant during and because of the war should be held for some years longer. That suggestion was very important, but it could only be put into operation by a combination of manufacturers who were interested in the subject.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—November 19. Coal Supply.

Mr. ANDERSON asked whether the President of the Board of Trade was aware that over 5,000 workers in the Isle of Wight stopped work as a protest against the price of coal, and whether any action would be taken regarding the price.

Capt. HALL asked what steps were taken to ensure steam boat communication being continued if a strike occurred in the isle, and whether arrangements would be made for cheaper and better facilities for the transport of coal.

Mr. WARDLE stated that the matter had been under discussion with the Coal Controller and the Shipping Controller, and arrangements were being made to avoid the cost of the long sea transit, and thereby to reduce the cost of coal at Cowes by about 10s. per ton.

November 20. Coal Supply.

Sir CLIFFORD CORY asked the President of the Board of Trade who was responsible for the payment of accounts for coal supplied by direction of the Coal Controller to any customer.

Mr. WARDLE said that, generally speaking, the customer was responsible for the payment of accounts. In cases where there was reason to doubt the financial position of a customer, or where a customer's position was insufficiently well known, arrangements had been made for responsibility for payment of accounts to be undertaken by local committees, or payment might be secured before delivery.

Petroleum Production.

Mr. E. G. PRETYMAN informed Mr. R. D. DENMAN that the Government had not yet begun to bore for petroleum in the United Kingdom.

Price of Coal in Italy.

Sir L. CHIOZZA MONEY, in reply to Mr. R. HOUSTON, who asked whether he could account for the price of coal in Italy, which cost private consumers £24 per ton or thereabouts, said that the cost of coal delivered at an Italian port might be taken as 50s. 6d., exclusive of war risk, which was borne by the Italian Government. The coal so sold was delivered to the Italian Government. The Ministry of Shipping had no means of accounting for the retail price of coal in Italy.

Mr. HOUSTON asked whether steps would be taken to inform the people of Italy that it was not the British Government or British ship owners or British coal owners who were responsible for the high price of coal in Italy.

Sir HENRY DALZIEL enquired whether any explanation could be offered as to who gets the difference between 50s. per ton and £24 a ton.

Sir L. CHIOZZA MONEY said he could not add anything to the answer already given.

Mr. HOUSTON asked the Parliamentary Secretary to the Shipping Controller whether British vessels had been requisitioned at Blue Book rates and carried coal from the United Kingdom to Italian ports, and immediately after

discharge of cargo had been put off hire, and owners compelled to purchase bunker coal for the return voyage at current Italian market rates, although this bunker coal had been carried in the ship; and whether the hire money paid to owners in such cases had been swallowed up, or nearly so, by the cost of the bunker coal.

Sir L. CHIOZZA MONEY said that when, under practice discontinued some time ago, an owner accepted in Italy release of his vessel from requisition, he paid the current market price for any Government bunker coal taken over, just as the Government did in taking over owners' coal at the commencement of requisition; no owner, however, was compelled to accept delivery in Italy on those terms; he always had the option of remaining under requisition, and was therefore never put in the position of earning less than the normal profit obtainable under Blue Book conditions on either the outward or homeward voyage.

November 21.

Absenteeism.

Sir JOHN LONSDALE asked the Minister of National Service if his attention had been directed to the cases of young unmarried miners brought before the courts for systematically neglecting their work; and whether, having regard to the fact that married men up to 40 years of age with families were being taken from other occupations for military service, he would take steps to withdraw the special exemption granted to miners in the case of all men who wilfully absent themselves from work.

Sir A. GEDDES, in a written reply, said he was not clear as to what was meant. In many collieries the absentee committees brought pressure to bear upon men who wilfully absented themselves, and the National Service representative, in proper cases, applied for the withdrawal of an exemption certificate, but only as a method of recruiting, not as a disciplinary measure.

November 22.

Distress Among Durham Miners.

Mr. WARDLE, in answer to questions, stated that arrangements were being made for a better distribution of orders among Durham collieries. The Government did not consider it necessary that a minimum wage should be guaranteed.

Miners' Baths.

Mr. BRACE informed Mr. D. MILLAR that he was not aware of any baths for miners having been installed under the Coal Mines Act, 1911, but in several cases baths had been provided under other arrangements.

Pit Props.

Sir L. CHIOZZA MONEY stated that certain vessels of the Russian Volunteer Fleet had reached this country with only sufficient quantities of pit props to serve as ballast. That was done in order that they should be available at once for loading outward cargoes at British ports.

SOUTH WALES MINING TIMBER TRADE.

The question of a fixed price has been precipitated by the irregular distribution of supplies, for while some collieries are well off as regards stocks of mining timber, others are running along from hand to mouth. All supplies will be placed through a committee, and no colliery will receive larger supplies than its neighbour. In addition, steps are being taken to inaugurate the introduction of fixed prices for all mining timber. Probably next month or the beginning of next year will see this system introduced. The lines upon which the system is to be carried out has apparently been borrowed from the coal trade, where exports are allocated or recommended to be allocated by the rota committees appointed by the local committees of the supply of coal to France and Italy.

Pitwood at 65s. per ton.

It is understood that the price at which foreign and home-grown mining timber will be fixed is 65s. per ton. At present foreign mining timber is quoted strongly at 75s. per ton ex ship South Wales ports, a figure which has obtained for the past two weeks or so. The demand for French fir has been so heavy, that several importers have made contracts with French owners at 72s. and 72s. 6d. per ton for delivery at Bristol Channel ports. Presumably they will be compelled to lose heavily if they are forced to sell at 65s. The matter has been brought before the attention of the Controller of Timber, but apparently there is little prospect of any redress. Last month the costs, insurance and freight value of the total quantity of pitwood imported into South Wales amounted to 66s. 1d. per ton, or 1s. 1d. per ton above the maximum price at which it is proposed collieries should receive their supplies. The figure suggested is looked upon by importers as a level under which it will be impossible for them to continue trading. It is suggested that a much more equitable method would be to ask the French Government to limit the price of French fir to a certain figure, in much the same way as is done with British coals for French markets. A fixed f.o.b. price and a fixed freight rate homewards would enable the authorities to fix a price at which wood is to be sold to the collieries, and at the same time ensure an adequate remuneration for the importers' services.

Collieries Importing Direct.

Pitwood importers in South Wales have been much perturbed at the action of a well-known colliery company in applying to be recognised as an importer of mining timber. In June, when it became incumbent upon the authorities to limit the supplies of foreign mining timber arriving in this country, it was mutually arranged between the Deputy Controller of Import Productions and the pitwood importers, that certain supplies would be permitted each month to be imported by those merchants who were recognised importers in 1914 and 1915. An association was formed in order to allocate the total quantity of mining timber allowed to be imported, amongst the merchants in proportion to their pre-war trade. A certain colliery company wished to import direct, a concession which the pitwood importers jealously guard, inasmuch as if one colliery is allowed to import direct, other collieries will seek the same privileges. For French forest owners and agents are keen business men, and the price of wood to merchants depends upon the price at which the wood is sold to the collieries. South Wales has long depended upon France for the bulk of its supplies of mining timber, and although home-grown wood has altered the position, still about 50 per cent. of the mining timber used in South Wales at the present time comes from the French ports.

Imports of Foreign Mining Timber.

The imports of foreign mining timber into South Wales ports for the week ending November 16 amount to 11,805 loads, of which 6,900 loads were received by agents supplying the Admiralty collieries. The following table shows the actual quantities imported:

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Nov. 12	W. H. Williams and Company	220
" 12	Morgan and Cadogan	480
" 12	Lysberg Limited	1,080
" 15	Lysberg Limited	600
" 15	A. Bromage and Company	1,225
" 15	A. Bromage and Company	780
" 16	Lysberg Limited	360
" 16	Lysberg Limited	840
" 16	Lysberg Limited	780
" 16	Lysberg Limited	3,240

Total..... 9,605

Newport:—

Nov. 14	Franklin Thomas and Company	1,200
" 14	Budd and Company	1,000

Total..... 2,200

Swansea and Port Talbot:—

No imports reported.

Home-Grown Timber.

South Wales collieries are now depending upon home-grown mining timber to a larger extent than was ever anticipated. Collieries have for some time deemed it prudent to assemble large stocks of foreign and home-grown wood to guard against possible contingencies. This policy has been largely responsible for the strength of market quotations. It is still being questioned as to whether it is wise to cut down the foreign imports to the extent that has been done and compel collieries to lean more and more for their supplies on foreign timber. As a result of the cutting down of French imports the small vessels engaged in coal to the French ports and back again, return now with ballast in many cases instead of a pitwood cargo. This ballast upon arrival at the coal port has to be discharged at a cost of 2s. per ton, which necessitates the employment of additional labour, leads to no efficiency and lessens the amount of wood that could be imported. Furthermore, a vessel of 5,000 tons d.w. recently arrived with a cargo of 600 tons of mining timber. Efforts could have been made to stimulate the loading of such a vessel to its full capacity, but imports must not go above the limit prescribed by the Controller of Import Restrictions.

THE GERMAN COAL AND IRON TRADES.

We give below further extracts from foreign periodicals that have reached us, showing the course of the coal and iron trades in Germany:—

The Ruhr Coal Market.

The shortage of railway wagons during October led to considerable disorganisation of the coal supply, so that even house coals—which come next to railway coal in point of urgency—could not be fully cleared away from the pits. As regards South Germany, a slight improvement was observed on the first introduction of the regulation for delivering 20 per cent. of the output to the river ports; but this improvement soon disappeared, as a result of including in the quota a quantity of coke for Lothringen ironworks and railway coal for the Upper Rhine. The favourable season for river traffic being now over, there is no prospect of ameliorating the situation. As a remedy it has been suggested that the long-distance transport of inferior fuel should be stopped, and such fuel supplied only to districts near the mines, the same measures to be applied to raw brown coal and washery sludge, thus liberating higher grade fuel for use elsewhere. The coke output has considerably diminished, the falling off of 100,000 tons in the deliveries to river ports in October being no real criterion of the decline as a whole.

The Iron Market in Upper Silesia.

The position is still one of intense activity, though the scarcity of raw materials and finished products prevents the demand from being anything like satisfied. War requirements have to be dealt with first, and in the order prescribed by the military authorities; but the situation is controlled by the shortage of rolling stock, which restricts the traffic in fuel, ore, fluxes, refractories and scrap iron, the consequence being that, *inter alia*, many of the works are unable to utilise their power plant to the full. The cost of production is still going up, and received a further impetus by the rise in fuel prices in October; whilst on the other hand maximum prices have been fixed for iron and steel products. The reduction in the output of coke has caused a decline in the production of pig iron, and as the steel makers and steel foundries have first call on the output, the iron founders are going short of material. For ordinary business there are practically no stocks of bars, strips, plates or joists available, and little prospect of any in the near future. Tool steel for lathe cutters and bits is particularly scarce. Tubes are in very short supply, and makers will not take orders for delivery under several months.

Delegates representing the Colliery Examiners' Association met in Cardiff on Monday, and took into consideration the proposal of the Coal Controller of terms to settle the dispute on the question of recognition, the men having resumed work after three days' strike, pending further negotiations. The proposal suggests an agreement by which the employers shall recognise the Examiners' Association, and shall establish a Joint Board at which the rules of procedure and regulations to deal with any question which may arise. It is proposed further that any question affecting overmen shall not be dealt with by the Joint Board, although the Owners' Association has made clear that they have no objection to overmen who are members of the association forming part of the Board. The conference voted upon a basis of representation, and the number for accepting the Controller's proposal was 3,320, against 281—a majority of 3,058 for.

CONTENTS.

ARTICLES:—	PAGE
Men's Compensation in American Coal Mines	989
Present Position of Chemists	989
Electrical Colliery Apparatus	979
Coal Mining in Victoria in 1916	980
Deep Borings in Yorkshire, Kent and Sussex	981
Effects of Storage upon the Properties of Coal	982
Oil Prospects of the British Isles	983
South African Mining in 1916	984
Mining Employment Statistics	985
Alliance of Employers and Employed	985
The Protection of Inventions	986
The German Coal and Iron Trades	987
South Wales Mining Timber Trade	987
Coastwise Shipments in October	993
Labour and Wages	994
Open Contracts	996
Disabled Workmen's War Compensation Act	996
The Freight Market	998
Obituary	998
Abstracts of Patent Specifications Recently Accepted	998
New Patents Connected with the Coal and Iron Trades	1000
Government Publications	1000
Publications Received	1000
Catalogues and Price Lists Received	1000
LETTERS TO THE EDITORS:—	
Higher Education of Colliery Officials	993
THE COAL AND IRON TRADES	990-993
The London Coal Trade	990
The Tin-plate Trade	990
The By-Products Trade	993
CURRENT SCIENCE AND TECHNOLOGY	986
PARLIAMENTARY INTELLIGENCE	987
NOTES FROM THE COAL FIELDS	995
COAL, IRON AND ENGINEERING COMPANIES	996
MISCELLANEA:—	
Tin-plate in Rolls	981
Conservation of Natural Resources	983
Coal at Cowes—Development of Brazilian Coal—	
Poverty Among Durham Miners	985
Partnerships Dissolved	990
Action by Mining Engineer	993
King's Appreciation of Miners' Patriotism	998
Fire at Kensington—Raasay Miners and Mr. Smillie—The Possibility of Coal in Tunis	1000

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The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, NOVEMBER 23, 1917.

The London market has been well supplied with seaborne coal, but railborne qualities have fallen off considerably. Stocks on the ground have improved. Hard steam coals, nuts and cobbles are difficult to obtain.

A revival of official requisitioning on the Tyne and Wear gives a sort of briskness to the market, which appears to have accumulated a heavy stock of steams and gas coals. Uneasiness is still evident in Lancashire regarding the winter supply of house coal. The best qualities of such fuel are unobtainable in the Leeds market, and coking slacks are extremely scarce. As the Derbyshire output is so greatly in

demand on home account scarcely any of it is sent to Hull for export. France is still a large buyer of the best Yorkshire varieties. Tonnage arrivals at Cardiff nearly balance sailings, with the result that stocks are excessive, especially smalls and inferior steams. Business is confined almost entirely to the better sorts. Irregularity still characterises the Scottish trade, and Fifeshire is regarded as being in a worse position than the Lothians.

Only business of small dimensions is possible in the freight market. Swedish rates have improved on the north-east coast, and coastwise freights are firm on the basis of 21s. London. Most of the business in South Wales is for French ports.

At a private meeting in London on Thursday coal owners considered the provisions of the Coal Control Bill, and various amendments were drafted. These will be brought forward in the House of Commons.

A delegates' conference of the South Wales Colliery Examiners decided to accept the Coal Controller's proposal for a settlement of the dispute with the coal owners on the question of recognition.

Prof. Henry Louis, president of the Society of Chemical Industry, will deliver an address on the "Economics of Coal Production" at a meeting of the London section of the society on December 3.

A PAPER read before the American Workmen's Compensation Institute of Mining Engineers, at St. Louis, and now being discussed by that body, calls attention to the present position of workmen's compensation in the United States, and describes some novel features in the application of the law in that country. It must be remembered that there are two distinct law-making bodies in the United States—viz., those of the separate States and the Federal authority. The Workmen's Compensation Laws now in existence are State Laws, and follow somewhat on the lines of those in force in Great Britain—that is to say, the employers pass on their liabilities to the various insurance companies. The latter had been rather shy of accepting mining business, being under the impression that the risks were too great and too hazardous for safe valuation. Now, however, 10 of the largest companies have combined for the purpose of arriving at a basis for insurance against colliery accidents.

This has been accomplished with the assistance of the engineers of the Bureau of Mines, which Department had already prepared a foundation for the scheme by the compilation of statistics relative to the causes of accidents in mines and the best means for their prevention. By means of a careful analysis of these statistics, it has been found possible to give a numerical value to each, assigning a credit value to each safety measure and a debit value to each hazard. An example will make this principle clear.

In Illinois falls of coal and roof cause 47.5 per cent. of the casualties in mines, while haulage accidents account for 12.5 per cent. Each of these primary causes is then subdivided under separate heads, to each of which a percentage value is assigned. Thus the factors controlling falls of roof and side include the character of the strata, the system of timbering, the supply of timber at the working places, inspection and testing of the roof, and perhaps a dozen others. Numerical values are assigned to each of these elements, and each mine is inspected by the insurance company before arranging the amount of premium payable under the Workmen's Compensation Law. Where the several risks are provided against by appropriate preventive measures, a lower premium is fixed than would be otherwise the case. It is to the interest of the mine owners, therefore, to diminish the risks as far as possible, and safety methods thus become an important factor in the earning power of the mine. State inspection, of course, tends to secure a certain measure of safety, but it is believed that a further degree of security is provided by the method of merit rating for insurance purposes.

Probably there is more truth in this contention than might at first appear. The one grave defect in State regulations is that they must necessarily be based upon average conditions, and while they may prove too stringent in some cases they are certainly too lax in others. The regulation of a colliery for maximum safety is a problem peculiar to itself, and cannot be adequately expressed in general terms

applicable to every case. If a mine manager is assured that a reduction in his insurance premium can be obtained by introducing certain improvements to which his attention is drawn by the insurance company, there will at least be an inducement to endeavour to secure the reduction. The practical working of this plan is illustrated in Mr. E. C. LEE's paper, an abstract of which appeared in our issue for last week. We are there told that the effect of this new element in the mine safety problem has been already felt in those coal mining States in which insurance schemes are in force. Thus the Pennsylvania Insurance Department has adopted the Mine Safety Standards of the Associated Insurance Companies referred to above. Some companies, which had previously been satisfied that they had nothing more to learn in the improvement of their mines, have been induced to go a stage further for the purpose of satisfying the insurance companies, and, what is perhaps still more important, they have found that they have been more than repaid for the expense incurred. Even State inspectors, who were inclined to doubt the possibility of effecting more than Government action had been able to accomplish, have been led to confess that the Insurance Safety Standards are an improvement on the regulations of the State Mining Department, and in some cases it is believed that a reduction in the number of accidents by at least 50 per cent. has been brought about by this means.

As practical examples Mr. LEE quotes many instances. Thus, in Mine No. 1 of the Pittsburg and Eastern Coal Company, the insurance premium had been reduced from 5.81 to 2.82 dols. per cent., resulting in a saving in total premiums for this mine of 6,200 dols., which more than paid for the improvements effected.

We may perhaps be permitted to observe that the saving in premium does not represent the whole of the economy effected by this means. Every mine manager is interested in keeping down his accident rate from the point of view of maintaining a maximum output. Even trivial accidents involve a loss of the profits of labour. In the case of more serious accidents mines may be laid idle, and untold losses may be incurred. The advantages resulting from the system of merit-rating, therefore, mean something much greater than the decrease in insurance risk. They mean a real diminution in accidents, which may be far more serious to the working costs of the mine than the value of the injured men's earnings. The real merit of the system seems to lie in the moral effect of the insurance inspection, which, by assigning a monetary value to each safety method, introduces a practical argument in its favour. Many of the improvements suggested by Government inspectors are liable to be regarded as personal fads actuated rather by zeal for conformity to artificial legal standards than for any practical purpose. An insurance company, on the other hand, as a business concern, having no sentimental axe to grind, regards the matter in the light of dollars; and its arguments, therefore, are listened to with corresponding respect. This is no disparagement of the Government inspector, whose vision is necessarily limited by legal requirements. It is merely a result of human nature, to which solid fact appeals more forcibly than theory.

The Present Position of Chemists.

THE value of the services rendered by chemists during the war is recognised on all sides. But, apart from what may be called war industries, the development of the manufacture in this country of synthetic dyes and pharmaceutical preparations, which is proceeding now and will, it is hoped, attain to large dimensions after the war, make it clear that the chemist will in the future play a much greater part in the economy of this country than in the past. When it is remembered that these industries, practically new to this country, are dependent upon coal tar for their raw material, and that the distillation of coal and fractionation of the tar produced are both essentially processes which necessitate chemical control, it is possible to form some idea of the degree to which chemical science must be utilised in the years to come.

These considerations lend a peculiar interest to the important meeting which took place at Manchester on November 10, and was attended by some 700 chemists. At this meeting, for the first

time, definite public expression was given to the desire, long felt by individuals, for the legal recognition of chemists, and their organisation as a professional body.

In the past the chemist has failed to obtain adequate recognition as an educated professional man, for two main reasons. One of these was confusion in the mind of the public with the "chemist and druggist," who, although necessarily a man who has received a considerable chemical training, is primarily concerned not with the science of chemistry but with the dispensing and sale of drugs. The second and more important reason was the large number of men who, having received a smattering of chemical theory and instruction in purely routine testing of a few materials, called themselves "chemists" and were employed as such. This second reason was most serious in its adverse influence upon the status of the chemist, because these "chemists" were prepared to work for the wages of semi-skilled mechanics (which indeed they were), and, being unable to do more than perform routine operations, they gave to their employers a poor opinion of the capabilities and usefulness of a chemist.

In order to remedy this state of affairs two reforms were essential. The first was to limit the use of the name chemist to those who possessed the necessary qualifications, the second was to insist that these qualifications should be of a well-defined high standard.

There was a serious difficulty in the case of the first of these in that the term "chemist" had already been legally assigned to the "chemist and druggist" by the Pharmacy Act, which was passed before chemistry had become a science in itself.

The need for the second reform was the reason for the formation, in 1877, of the Institute of Chemistry, which a few years later was granted a Royal Charter. The objects of the Institute of Chemistry, as stated in its Charter, are "the elevation of the profession of consulting and analytical chemistry and the promotion of the efficiency and usefulness of persons practising the same by compelling the observance of strict rules of membership and by setting up a high standard of scientific and practical proficiency."

It will be seen that the situation had been realised by the founders of the institute 40 years ago. How, then, is it that the status of chemists is so little improved to-day? The answer to this question is that the Institute of Chemistry has been unable to attain its aims. This is not the place in which to deal in detail with the reasons for the failure, but there is no doubt, in the minds of those who have followed its history closely, that the main cause has been that the council of the Institute has never been representative of, and for many years has been completely out of touch with, the rank and file of the profession. No one will deny that the Institute has done much important work, the justly high esteem in which the Fellowship (F.I.C.) is held as the blue ribbon of the profession being sufficient evidence of this. Many chemists, moreover, have reason to be grateful to the Institute for support given to them in maintaining their rights. But the fact remains that the Institute has never made an effort to organise the profession as a whole, and as time went on tended more and more to become an examining body pure and simple.

It is unfortunate, but true, that the manufacturer seldom takes into account academic qualifications. He will often prefer to engage a man who is without university education, but has had a few years practical experience, rather than a young man who has just taken his degree with honours in chemistry, especially when the latter asks for a higher salary. Yet there is no doubt that, given full scope, the university graduate, in the large majority of cases would prove to be the better investment. For while the untrained man may be able to carry out routine testing and control old-established methods of manufacture, it is the university graduate with a thorough knowledge of his science who will be most likely to suggest improvements leading to better yields, smaller costs, and larger profits. Hence it is to the general interest that no person should be permitted to call himself a chemist unless he possesses certain minimum qualifications which will ensure that he will be able to advance the industry in which he may be engaged. Moreover, in the future there will be required not

chemists, but more chemists, and there is a hope in the profession for the best brains in the country. But brilliant young men will not enter the profession which is neither looked up to nor well paid, unless the re-born chemical industries of this country are to languish after a few years, it is essential that the chemical profession should be placed in such a position of dignity and respect as will attract the best men from our universities.

These are the facts which have led the general body of chemists to realise the urgency of the recognition and legislative definition of their professional status. Although not expressed in these terms, these are the main objects for which the Institute of Chemistry was formed, and in which it has largely failed. Before anything can be done it is necessary to organise the profession, and where so many conflicting interests exist it is difficult to obtain united action. Leaving out of consideration for the moment the comparatively small body of eminent chemists admittedly at the head of the profession, the following main classes of chemists may be recognised:—

1. The Fellows and Associates of the Institute of Chemistry.
2. A limited number of chemists whose qualifications are such that they may be regarded as eligible for election without examination to the Fellowship or Associateship of the Institute of Chemistry.
3. A large number of chemists whose qualifications are not of the same high standard required for admission to the Associateship or Fellowship of the Institute of Chemistry, but whose training and experience, nevertheless, entitle them to be considered chemists.

Any organisation which is to move towards public and legislative recognition must obviously include all these classes. Up to the present only the first class has been organised, and since they probably do not represent more than 15 or 20 per cent. of the total number of chemists, no action has been possible. The need for obtaining the support of the third class mentioned above has long been apparent to the rank and file of the Institute; but as it would have depreciated the value of their high qualifications, they not unreasonably objected to the admission of this class, without examination, on an equal footing with themselves. The creation of a new class of members of the Institute is the obvious way out of this difficulty, but the council has not yet seen fit to make any move in this direction.

Under these circumstances two attempts have been made this year to organise the whole body of chemists into a single association with a view to taking united action. The first of these is called the National Society of Industrial Chemists, but possibly because its programme appears to be economic rather than professional, it seems to be meeting with but limited support. The other originated at Manchester and is called the British Association of Chemists. In this case the proposed qualifications for membership, while less stringent than those required for the Institute of Chemistry, are yet of a high standard. Moreover, its objects are in effect the organisation of chemists on an entirely professional basis with a view to placing chemistry in its proper position on a level with the other learned professions. This movement appears to be meeting with wide support all over the kingdom, not least among the members of the Institute itself, who recognise that it offers what the Institute, as at present constituted, is unable to obtain.

Reading between the lines of the speeches at the Manchester meeting, it is clear that the council of the Institute recognised that the existence of the Institute other than as an examining body was seriously threatened, and it was evident that, on account of its *laissez faire* policy in recent years, the council could not count upon the support of more than a fraction of the Institute members who were present at the meeting. On the other hand the originators of the British Association of Chemists, nearly half of whom are themselves members of the Institute, admitted that, provided it was willing to do so, the council of the Institute was the appropriate body to attempt the realisation of its aims. It is not surprising, therefore, that negotiations have been possible that the council of the Institute prevailed upon to undertake the work which will be necessary to enable it to carry out the proposals of the British Association of Chemists. It is desired not only in the interests of the profession but also in that of the nation, that

an agreement should be reached without delay. We cannot afford at the present time to waste our energies in internal conflict. Unity means progress not only towards the legitimate aspirations of the profession, but also in the more rapid development of the science upon which the future of the human race so much depends.

In conclusion, may we, as neutral observers, offer a few words to the members of the Pharmaceutical Society? It seems to us that the title of "chemist," granted to them by Act of Parliament, under conditions totally different from those obtaining to-day, means little to them; so little, that if the words were removed from every pharmaceutical chemist's premises in the United Kingdom, not one person in a thousand would notice its absence. Yet it means much to that other large body of men to whose ingenuity, perseverance and skill in the application of chemical science we, in this country, owe so much during the last three years. Surely, in these times of great sacrifices, an appeal to the sense of justice of a body of educated men to relinquish what is admittedly legally theirs, but, perhaps, belongs morally to others, will not fall upon deaf ears.

THE LONDON COAL TRADE.

THURSDAY, NOVEMBER 22.

Reports show that many of the depots are still very short of stock. The number of loaded wagons arriving at the Metropolitan stations were considerably reduced during the past week. Orders have not been so heavy as formerly, so that merchants have been able to cope with the arrears somewhat better, but the stocks on the ground in accordance with the Controller's suggestion has not been at all satisfactory, and the pressure for extra supplies has been exceedingly strong. The figures given for the two weeks ending October 27 and November 10 are as follow:—Tonnage received week ending November 10, 106,721 tons, as compared with 106,237 tons; tonnage delivered, 84,759 tons, as compared with 89,771 tons; in stock, 227,250 tons, as compared with 178,217 tons; in transit, 51,482 tons, as compared with 49,547 tons; orders unexecuted, 102,341 tons, as compared with 135,072 tons. There is still a very heavy pressure at all the collieries in the Midlands and Yorkshire for coal to be delivered. Unfortunately, there are still a large number of orders on hand unexecuted, and the quantity coming forward to London has fallen off during the week. The stocks on the ground have increased very favourably, although still inadequate. Very little free coal is offering. The pressure is moderated at many of the North London depots, yet the demand is as keen as ever from nearly all the South London depots, and particularly at the country stations on the southern railways. Steam coals are particularly short, and an active enquiry is everywhere evidenced. A far larger business could be done in these qualities if tonnage were available. So far as can be traced, the railway companies and the munition works are absorbing all the hard steam coal produced. Certain exceptions have been arranged by the Coal Controller to allow gas coal to come forward from the South Yorkshire district to what is known as Area 13, and also certain quantities from the Leicester and Warwickshire district. Area 13 embraces Hampshire, Dorsetshire, Devon and Cornwall, and in these districts the shortage has been felt most keenly. In the seaborne market the supply has been well maintained, and on Monday 33 cargoes arrived in the River Thames, and five for Wednesday's market. The freights to London from the Humber are firm at 20s. 6d. per ton, and even 21s. has been secured in more than one instance. The Tyne reports show that tonnage is very scarce, and chartering idle. Gas coals (which form the bulk of the shipping tonnage coming forward to the Port of London) have so far been well supplied, and, as a whole, the outlook for the winter's supply is in a far more satisfactory position than last year. Nuts and cobbles are exceedingly scarce. Slacks have been taken up more freely lately, but there is still a plentiful supply, and it is known that very large quantities of nutty slacks are in hand at all the Northumberland collieries. Foundry coke has been in good demand for the iron furnaces and foundries, and gas coke also is selling freely. The Norwegian State Railways have again sent out tenders for hard steam coals for delivery in January and February.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, NOVEMBER 16.—There was no alteration in the seaborne house coal market, which continued firm, but supplies short. Cargoes, 14.

MONDAY, NOVEMBER 19.—The change to much colder weather caused a good enquiry for seaborne house coal, and although there was a fair supply, no available cargoes were on offer. Cargoes, 33.

WEDNESDAY, NOVEMBER 21.—The seaborne house coal market was very quiet, there being no cargoes on offer. Arrivals, 5.

THE TIN-PLATE TRADE.

Liverpool.

Quite a lot of business has been placed with makers for tin-plates on French account, but as all these orders are booked direct with works, merchants do not benefit at all. A fair amount of home trade buying was reported, and full prices were paid, the official maximum, which now stands at about 31s. basis net for cokes, being firmly adhered to. Tin-plate orders are wanted by some of the works, however, and quotations for these are being shaded to some extent. The special permits now being issued for stock wasters are relieving the congestion, which was becoming a serious matter with several makers.

Partnerships Dissolved.—The *London Gazette* announces dissolution of the partnership of W. M. Watson, T. S. Coomber, and F. J. Coomber, trading as Watson and Coomber, iron and tin-plate merchants. Two separate businesses are being formed. The partnership of G. H. Walker (who continues) and G. V. Deakin, trading as Gaskell Walker and Deakin, engineers and merchants, Leeds, has been dissolved.

THE COAL AND IRON TRADES.

THURSDAY, NOVEMBER 22.

Scotland.—Western District.

COAL.

The coal trade in Scotland is still without signs of improvement, and markets generally are dull and uninteresting. Business everywhere is irregular, and collieries are having great difficulty in maintaining employment. In the west of Scotland district the one redeeming feature is the strong household demand, though the industrial qualities are also in fairly steady request. Shipments amounted to 79,404 tons compared with 95,114 in the preceding week and 105,372 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	22/-27/
Ell	26/6-28/	26/6-28/	25/-25/6
Splint.....	28/-30/	28/-30/	26/-32/6
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The activities in the Scotch iron trade show no relaxation. Government demands are enormous, and outputs are quickly swallowed up. The scarcity of labour and of raw and semi-manufactured materials are two principal adverse factors. In pig iron, every brand and quality is quickly taken off the market. Hematite, particularly, is moving away freely. Prices where controlled are still unaltered, but where free an additional 5s. per ton has to be added to the following quotations:—Monkland and Carnbroe f.a.s. at Glasgow, Nos. 1, 125s., Nos. 3, 120s.; Govan, No. 1, 122s. 6d., No. 3, 120s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 130s., Nos. 3, 125s.; Gartsherrie, No. 1, 131s. 6d., No. 3, 126s. 6d.; Glengarnock, at Ardrossan, No. 1, 130s., No. 3, 125s.; Eglinton, at Ardrossan or Troon, and Dalzell, at Ayr, Nos. 1, 126s. 6d., Nos. 3, 121s. 6d.; Shotts and Carron, at Leith, Nos. 1, 130s., Nos. 3, 125s. per ton. Malleable iron makers have no lack of orders, particularly for the smaller sizes. Supplies for ordinary consumption are difficult to obtain, but some transactions in "Crown" iron bars at £16 10s. per ton are reported. The heavier gauges of black sheets are in constant demand, but outputs are somewhat curtailed owing to the irregular flow of raw materials.

Scotland.—Eastern District.

COAL.

Conditions in the Lothians district are unchanged. Business on local account is quickly overtaken, and with exports at a minimum, broken time at the collieries is frequent. Shipments amounted to 17,013 tons against 15,750 in the preceding week and 33,748 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	28/
Secondary qualities.....	25/6	25/6	27/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The situation in Fifeshire is even less satisfactory than in the Lothians, and there is practically no indication of an improvement. The miners in some portions of the county are feeling the pinch to a large degree, as they are only getting employment to the extent of two and a-half shifts per week, bringing in a wages return of 25s. per week, which in many instances means partial starvation under present conditions. Some of the men have left for the Cumberland iron ore mines, but a considerable amount of distress still exists. Shipments for the week amounted to 36,593 tons against 38,083 in the preceding week and 39,985 tons the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	30/-35/
Unscreened do.....	24/-25/	24/-25/	28/-32/6
First-class steam coal.....	28/	28/	28/-33/
Third-class do.	24/	24/	22/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Quotations are all subject to an additional charge of 2s. 6d. per ton, with the exception of shipments to France and Italy.

The aggregate shipments from Scottish ports during the past week amounted to 133,010 tons, compared with 143,947 in the preceding week and 179,105 tons in the corresponding week last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The market has been very sorely hampered during most of the week under review by the shortage of tonnage arrivals. This week there has been a revival in official requisitioning of coal, and, although "free" tonnage is still in exceedingly small volume, quite a considerable number of requisitioned steamers are at hand to carry away the cargoes on official account. The result is that the market wears a much brighter aspect at the time of writing. Northumberland steam coal collieries are in a stronger position, so far as tonnage supplies are concerned, than are the gas coal pits of Durham county; even these latter find regular employment much more easy of attainment. Excessively large stocks of most descriptions of steams and gas coals are still on hand, the new spurt of activity not having yet been sufficient to denude the market of the considerable accumulations resultant from recent slack times. Bunkers are still dull, and their sale continues to drag. Smithies, which a week ago were quoted at up to 33s. 6d.

for special sorts for export, are still in good enquiry for overseas customers, but the latter have succeeded in bringing the top quotation down to 32s. 6d. For inland consumption, ordinary qualities of smithies and coking coals are meeting with a good request, thus clearing the market fairly well of the output. Coke is still demanded at a rate which exceeds the output, and, consequently, is scarce and very firm. The Norwegian State Railways are enquiring for their usual quantity of 18,500 tons of steam coals. Delivery is to be over January and February. Tenders are due in on November 26.

Prices f.o.b. for prompt shipment.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	25/-30/
Do. Tynes (Bowers, &c.) ...	29/6-32/	29/6-32/	27/6-30/
Secondary, Blyths	25/6-28/	25/6-28/	25/-27/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	25/-27/6
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	20/
Do. Tynes	18/6-21/	18/6-21/	17/6
Do. specials	20/6-23/	20/6-23/	21/
Other sorts:—			
Smithies	25/-32/6	25/-33/6	20/
Best gas coals (New Pelton or Holmside) ...	25/-27/6	25/-27/6	27/6-30/
Secondary gas coals (Pelaw Main or similar) ...	23/6-26/	23/6-26/	19/-21/
Special gas coals	26/6-29/	26/6-29/	27/6-30/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	18/-20/
Do. do. Northumbrians	26/6-27/6	26/6-27/6	19/-20/
Coking coals	24/-27/6	24/-27/6	19/-20/
Do. smalls	24/-27/6	24/-27/6	18/
House coals	28/6-32/	28/6-32/	30/-32/6
Coke, foundry	42/6-45/	42/6-45/	38/-42/6
Do. blast-furnace	42/6-45/	42/6-45/	34/-36/
Do. gas	35/-37/6	35/-37/6	32/-34/

Sunderland.

COAL.

No material change is evident yet in the coal market. The slight improvement, due mainly to the arrival of requisitioned steamers for steam coal, is maintained, but this concerns Northumberland chiefly, and still leaves the Durham collieries in a more or less unsatisfactory position as to foreign trade. The home demand for industrial fuel is good. Bunkers are superabundant, and the accumulated stocks of steam smalls are very heavy. Coke is steady, with a good home demand and moderate exports. Market values are without change, being nominal at the official figures. The Norwegian State Railways are again in the market for the usual quantity of 18,500 tons of steam coal to be delivered during January-February, tenders to be sent in at once.

Prices f.o.b. Sunderland.

Gas coals:—	Current prices.	L'st week's prices.	Last year's prices.
Special Wear gas coals	29/-32/6	29/-32/6	29/
Secondary do.	25/-27/6	25/-27/6	25/
House coals:—			
Best house coals	32/6	32/6	30/
Ordinary do.	30/6	30/6	25/
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	27/6
South Hetton do.	31/-32/6	31/-32/6	27/6
Lambton unscreened ...	26/6	26/6	19/
South Hetton do.	26/6	26/6	18/
Do. treble nuts	22/6	22/6	22/
Coking coals unscreened	27/6	27/6	18/6
Do. smalls	27/6	27/6	17/
Smithies	27/6	27/6	19/
Peas and nuts	27/-28/6	27/-28/6	24/
Best bunkers	27/6	27/6	19/6
Ordinary bunkers	26/6	26/6	17/6-18/6
Coke:—			
Foundry coke	42/6-45/	42/6-45/	37/
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke	35/-37/6	32/6-35/	31/

Middlesbrough-on-Tees.

COAL.

A rather better feeling generally is observable in the coal trade. The tonnage situation shows some improvement, and prospects of more steamers coming to hand are regarded as bright. With more tonnage about, traders are looking ahead and making arrangements for the future. Official absorption is larger. Enquiries for fuel from neutrals are still only moderate, but odd transactions are recorded from time to time, and the Norwegian State Railways are seeking to make further purchases. For home use, most descriptions of fuel are in good request. There is a general demand for large steams, best gas coal and coking fuel. Bunkers continue slow of sale, and steam smalls are a drug on the market. Best steams are 32s. 6d., and small steams run from 21s. to 23s. Best Durham gas coals are 27s. 6d., and second qualities 26s.; whilst Wear specials are put at 29s.; unscreened Durham bunkers are 26s. 6d. to 27s. 6d. Coking coal continues to be well taken up at current rates. There is little new with regard to coke. A plentiful supply meets the heavy local demand, with the result that the market is active. Medium blast-furnace kinds are 33s. at the ovens, and qualities low in phosphorus 35s. 6d. at the ovens. Foundry coke for home use is 38s. For shipment to neutrals, beehive and patent oven coke are both put at 45s., and gas-house product is in good request at 37s. 6d.

IRON.

The question of advancing fixed maximum prices of pig iron to cover increased cost of production is still discussed, but the opinion is now freely expressed that a better way to adjust the situation would be to subsidise makers. There is now a rather better service of trucks, but distribution is still hampered by shortage, and November deliveries are considerably in arrear. As is usual about this period of the month, home business in Cleveland pig iron is quiet. Some improvement in export trade, however, is reported. For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; whilst for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. Makers are barely able to cope with the intense home demand for hæmatite, but relief to the stringent situation is understood to be at hand by substantial increase in output of basic iron. Preparations are pro-

ceeding for the shipment of parcels recently licensed for export to Italy. Nos. 1, 2 and 3 east coast brands are 122s. 6d. for home use, and 141s. for export to the Allies. A fairly good business is passing in foreign ore, and deliveries show improvement. Production of manufactured iron and steel is absorbed by the huge needs of the Government and the shipyards, to the practical exclusion of ordinary commercial business. Quotations are very strong.

Cumberland.

COAL.

Maryport.

A marked improvement has set in. Since the weather moderated, more tonnage has been available, with the result that coal is getting away more freely. Business is very much firmer in both the local and export markets. Coal for industrial purposes is in much stronger demand. Landsale is a livelier account, and some of the depots have enough business booked to keep them going till the end of the month. The cross-channel trade is now busier than it has been for months. Some large consignments of north east and Scotch coal are being shipped from Silloth to Irish ports. Shipments amounted to 3,830 tons, compared with 1,580 tons at the corresponding period of last year. Coke production is increasing. At Maryport best house coal is quoted at 1s. 7d. per cwt. At Workington best coal is from 1s. 5d. to 1s. 6d. per cwt. Current quotations are:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls ..	19/2	19/2	16/8
Do. peas ..	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	25/
Best works fuel	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gasworks	21/6	21/6	19/

IRON.

The hæmatite pig iron trade on the west coast, in the district between Maryport and Carnforth, continues in a remarkable state of activity. The output of local iron ore is steadily increasing. All the iron smelted in the district is going into prompt use. Bessemer mixed numbers are again quoted at 127s. 6d. per ton f.o.t., with special iron at 140s., and semi-special iron at 135s. per ton f.o.t. Billets and plates are in firm demand, but other commercial sorts are still rather quiet. All the iron mines are working full time.

South-West Lancashire.

COAL.

There is nothing new to report in the inland household trade. Merchants have still many arrears up in the books, and the tonnage coming forward from the collieries does more than keep pace with the orders that daily flow in. With regard to shipping, there is a distinct falling off in the arrival of steamers, and the demand for steam coal for bunkering and export is consequently quiet at the moment. Stormy weather adds to the delays. A good deal of inconvenience is naturally caused by the holding up of wagons. Prices remain according to schedule, plus the 2s. 6d. per ton advance in cases where it applies. Fair shipments continue of household coal for the coastwise and cross-channel trade. The consumption of slack increases, and there is practically none available in the better qualities. There is said to be a little surplus in the commoner grades, but it is mentioned by those in the trade more for the novelty of it than that there is any serious tonnage to be procured. In the gas coal trade pressure for full deliveries is now being put upon the suppliers by the users.

Prices at pit (except where otherwise stated).

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net) ...	27/ upwds.	27/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/-20/
Do. (f.o.b. Garston, net) ...	26/ upwds.	26/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net) ...	25/	25/	24/ upwds
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	23/-23/6
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange. The general condition of the coal trade continues about the same as for some weeks past—that is, all qualities of house, steam and furnace coal are in good demand, and not easy to obtain. Coal for shipment is principally for contract account. Prices generally are as below:—

Prices at pit (except where otherwise stated).

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington) ...	—	—	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

There is no change to report in the state of trade in this district. Works are fully occupied on war material. Everyone is working at high pressure.

Yorkshire and Derbyshire.

Leeds.

COAL.

Tuesday's market was fairly well attended by all sections of the trade, but fewer colliery representatives than usual. Sellers were in a minority, and there is very little coal of any description available for new business. Generally speaking, the collieries are taxed to fulfil contract requirements, although working full time and maintaining the output as well as depleted stocks will allow. The demand for house coal remains very keen. The restrictive regulation of retail deliveries is having an increasing effect in relieving the immediate pressure, both in regard to London and the local markets. Rather better supplies are available also, and altogether a more settled and improved tone prevails at the moment. While the pressure on the collieries is more than can be easily met, and there is a strong enquiry for supplies, the urgency of the situation is somewhat less a prominent feature. Very little coal could be purchased on the market. Best qualities of house coal are unprocureable. Coastwise, there is very little doing, except in second class and inferior qualities, and freights remain high, 21s. Goole to London being quoted for handy-sized boats. Locally, merchants are, in a few instances, managing to add to their small stocks at the depots, being helped by the restrictions on deliveries to customers. Pit prices for the West Riding:—Haigh Moor selected 22s. 6d. to 23s. 6d., Silkstone best 22s. to 22s. 6d., Silkstone house 21s. to 21s. 6d., other qualities 19s. 6d. to 20s. 6d. Contract deliveries of gas coal are in most cases found to be inadequate to cover requirements, and inroads are being made into stocks at the works. A number of gas engineers were on the market, endeavouring to secure additional supplies, but there is practically nothing on offer. A fair quantity of gas coal continues to be shipped from the Humber ports to France, at full limitation prices. Manufacturing fuel in all qualities is in keen request. In all the chief industrial centres of the West Riding, such as Huddersfield, Bradford, Leeds, the Calder and Colne valleys, overtime is more or less the rule, and this, coupled with the colder weather and shorter days, requiring factories to be heated, creates a heavy consumption of fuel, giving rise to complaints of shortage. Nuts are extremely scarce, and no other sort at all plentiful. Nothing is scarcer than coking slacks, of which coke makers have extreme difficulty in obtaining sufficient to keep their ovens in full work. In a number of instances this is only possible by crushing large coal. Coke itself is in full demand, the output going immediately into consumption, without fully satisfying requirements.

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallsend & London best	21/-21/6	21/-21/6	19/-20/
Silkstone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkstone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/6	20/6-22/6	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	18/-18/6	17/6-18/6	16/-17/
Gas nuts	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/-18/
Large double-scrned engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens			
Furnace coke	32/	32/	25/8

Barnsley.

COAL.

According to various accounts, the troubles arising from absenteeism are fortunately not now so serious, but the output continues to be inadequate. Again, generally speaking, there has been no change in the character of business, and, on the whole, deliveries appear to be giving greater satisfaction, particularly manufacturing fuel and house coal. The huge production of steam fuel is readily disposed of, both on account of the Allies and for home requirements. In regard to the latter, the railway companies are showing more keenness with regard to their stocks, and are endeavouring to maintain these at considerable level to provide for delayed deliveries. It appears to be impossible to produce sufficient steam nuts in order that ordinary consumers can have the advantage of this desirable fuel. The bulk still goes to the munition and engineering concerns which are engaged on important war work. The

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	22/6-24/6	22/6-24/6	20/-22/
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/
Secondary do.	18/-18/6	18/-18/6	15/6-16/
Steam coals:—			
Best hard coals	20/-21/	20/-21/	17/6-18/6
Secondary do.	19/-20/	19/-20/	16/6-17/6
Best washed nuts	18/9-19/	18/9-19/	16/6
Secondary do.	18/-18/9	18/-18/9	15/6-16/
Best slack	15/-15/6	15/-15/6	14/-15/
Secondary do.	13/-13/6	13/-13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/
Gas nuts	18/9	18/9	16/
Furnace coke	32/	32/	25/8

Supply of gas coal continues to excite a good deal of attention, and hopes of an improvement up to the present have not been realised. The situation is an anxious one, and the daily increased consumption of gas for heating purposes; whilst there is also a growing enquiry for use in connection with motor transport. Stocks are being more largely called for, but the position in respect to slacks required for coke making is in no way altered. The supplies are not sufficient to keep the by-product plants in full operation to meet the very heavy demand for furnace coke. The improvement with regard to supplies of house coal for nearer districts referred to last week has been maintained, and there are hopes that the position in London and the south is now of such a character that some proportion of stock can be laid by in the districts which are normally supplied from this area.

Hull.**COAL.**

Though supplies over rail are fairly well maintained, they are barely equal to the heavy demand, and it is not always an easy matter to get delivery or arrange shipment. The shortage of tonnage is still acute, and, of course, this is an additional handicap on trade. Large steam coal continues in good demand, the Admiralty taking considerable quantities, and full maximum prices rule, with a premium of up to 5s. obtainable for best South Yorkshire hards for prompt loading for neutral destinations. The Derbyshire output is so largely taken up on home account that next to nothing is offered for export. France is still a big buyer of West Yorkshire varieties. Nuts and all kinds of industrial fuel are well sought after, and values are maintained. The freight market is quiet, and late rates for Scandinavia and Spain firmly held.

Chesterfield.**COAL.**

Conditions are unchanged, coal of every class being in great and urgent demand. It is practically impossible to satisfy customers' requirements either with regard to house coal or in respect of fuel for manufacturing purposes. Cobbles and nuts are most urgently needed for gas producers in connection with the steel industry. Large steam coal is also in brisk demand for furnace work. The various classes of slack are called for, and supplies of this fuel are less difficult to find than other kinds of fuel. Railway companies are pressing for good deliveries of steam coal for locomotive use, and gas companies are equally urgent in their demand for gas coal. There is no change in the export trade, which is now at a complete standstill so far as this coal field is concerned. The coke market is in active condition, and every quality finds a ready sale.

IRON.

The state of the iron trade of the district is one of activity. The production of pig and finished iron is on an extensive scale, and the whole plant is working up to its full capacity. Extensions are proceeding in various branches with the view to increasing the make of pig iron and finished bars. Basic pig iron is in great request.

Nottingham.**COAL.**

In the domestic fuel section there have been less active demands on local merchants within the last few days, due undoubtedly to quite a large number of householders having already secured winter stocks, and also to the weather being of a mild description. There is, however, a fairly brisk demand on the collieries by merchants who are anxious to replenish their depleted stocks, and all classes of households are readily accepted. The deliveries, generally, to areas supplied from this district are regarded as satisfactory under the abnormal conditions. The pressure on collieries for steam producing fuel continues, and the output of all the hard coal pits in this county is readily disposed of, very few odd lots being obtainable in the open market. Gas fuel is in active demand, the tonnage available outside contracts being on a small scale. Slacks are in good request with a shortage continuing in regard to coking grades.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/	21/-22/	19/-20/
Good house coals	20/-21/	20/-21/	18/-18/6
Secondary do.	18/6-19/6	19/6-20/	17/-18/
Best hard coals.....	18/6-19/	18/6-19/6	17/-18/6
Secondary do	17/-18/	17/9-18/3	16/-17/
Slacks (best hards)	14/6-15/	14/6-15/	12/-13/
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/	13/	11/

Leicestershire.**COAL.**

There is an accumulation of uncompleted orders, and no signs of any change can be perceived. The enormous demand for daily deliveries to munition works and factories under Government control continues. Railway-owned wagons and locomotives are still inadequate. There is an intensely keen London demand for all classes of household, while deep and main cobbles and nuts are cleared day by day. Small nuts for mechanical stokers sell with remarkable freedom. There are no stocks of any kind at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/
Second, hand picked	19/-20/	19/-20/	15/6-17/
Deep screened cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/
Small nuts.....	17/-18/	17/-18/	14/6-15/6
Deep breeze	15/3-16/	15/3-16/	12/9-13/6
P.	14/6-14/9	14/6-14/9	12/-12/3
.....	8/6-9/6	8/6-9/6	6/-7/
.....	16/-17/6	16/-17/6	14/-15/
.....	16/6-17/6	16/6-17/6	14/6-15/6
.....	15/6-17/	15/6-17/	13/6-15/
.....	16/-17/6	16/-17/6	14/-15/
.....	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.**Birmingham.****COAL.**

The heavy demand for all classes of fuel is maintained. The comparatively mild weather is greatly aiding merchants, but even as it is they are greatly exercised to meet even a proportion of the requirements of their customers. Supplies are very tight. Last week there were transit delays owing to local fogs, and while in ordinary times this would have made little difference, at present, with stocks almost negligible, it is highly inconvenient. Output is fairly well maintained, but after contract supplies are met there is little surplus for the market. Smalls of all descriptions are scarce. The following are the coke advances: Durham, 7s. 6d. foundry, 5s. furnace; Yorkshire, Lancashire, Derbyshire and Nottinghamshire, 6s. 4d.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	24/6	24/6	22/
Do. seconds deep	22/6	22/6	20/
Do. best shallow	21/6	21/6	19/
Do. seconds do.	20/6	20/6	18/
Best hard	21/	21/	18/6
Forge coal	18/6	18/6	16/
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/
Do. hand-picked			
cobs	20/6	20/6	18/
Best hard spires	22/6	22/6	20/
Forge (steam)	18/6	18/6	16/
D.S. nuts (steam)	17/	17/	14/6
Small (do.)	17/	17/	14/6

IRON.

No definite information has been vouchsafed regarding the revision of prices, but it is generally accepted that an alternative will be provided to a general price disturbance, which is regarded as most undesirable at the moment. A scheme, it is understood, is being worked out by the authorities, in consultation with pig iron houses, which it is hoped will meet the situation without unduly inflating values to the consumer. Supplies of both foundry and forge pigs are becoming more and more scarce, and it may be that further facilities will have to be offered for producing these descriptions, output of which has been greatly curtailed by reason of the pressure for basic iron. Basic iron, in turn, is hampered by difficulties connected with supplies of the necessary manganiferous ore. In other respects the situation has undergone little change. It was expected that plate shearings would have been brought under the control system, and information to this effect may be expected soon. The strong demand for these to take the place of sheet bars has kept them for some time at the high figure of £11 10s., which compares with the maximum of £10 7s. 6d. for sheet bars, fixed so long ago as the beginning of 1916. Bedstead angles have gone up by 20s. a ton, and now stand at £18. This is the first change since the end of June. The bar iron houses are well placed in the matter of orders, and are watching very closely the trend of events as regards pig iron. Unfortunately they cannot replace pigs to any great extent by scrap, as there are no great quantities available. Full maximum prices are obtained for what is going, especially for lots of heavy wrought scrap cut up and sheared. The market is very firm for merchant bars at £13 15s. net at makers' works, and also for small sizes of iron, which range from £16 10s. for three-eighths sizes to a much larger figure, which depends largely on delivery, for smaller sizes. North Staffordshire makers get £13 15s., net, for crown bars, and for gas strip, for which there is an enormous demand, as high as £16 is realised. No change has occurred in the sheet branches, in which output is concentrated on ordinary black qualities. Steel makers have no material to offer. Finished houses are short of billets, bars, and other semi-raw material, and war needs are safeguarded.

Forest of Dean.**Lydney.****COAL.**

An exceptionally strong demand continues for all qualities of household coals of this district, and colliery owners are experiencing considerable difficulty in satisfying the needs of their various buyers. In the railborne department, in addition to a long list of unexecuted arrears orders, fresh bookings in large numbers are made daily. Shipments, too, are good, and a number of vessels are in dock awaiting cargoes. Great pressure in regard to supplies still prevails for the steam coal of this locality, and the collieries are behind with their deliveries.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/
Forest	25/6	25/6	23/
Rubble	25/9	25/9	23/3
Nuts	24/	24/	21/6
Rough slack	15/6	16/	13/
Steam coal —			
Large	22/6-23/6	23/-23/6	20/
Small	18/-18/6	18/6-19/6	16/-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.**Devon, Cornwall, and South Coast.****Plymouth.****COAL.**

Messrs. Wade and Son state that owing to the prevailing mild weather, the small supplies of house coal coming into this district have been sufficient to supply merchants' immediate requirements, but they are still unable to add to their winter stocks, excepting in a few instances. It is complained that a great deal more of Welsh coal is being forwarded than of the free-burning kinds, and that the former is very difficult to ignite or to keep alight in small grates. There is now cause for hoping that there will be a considerable improvement next month in regard to the quality of the house coal supplies to this district.

THE WELSH COAL AND IRON TRADES.

THURSDAY, NOVEMBER 22.

Monmouthshire, South Wales, &c.**Newport.****COAL.**

Conditions are almost unaltered. The arrival of tonnage has been moderate, but not sufficient to clear away the large stocks of coal which had accumulated, especially of the cheaper qualities and smalls. Some irregularity prevails in the working of the collieries. Prices remain on the basis of the figures of the Coal Controller. House and gas coals have been in great request, the latter more particularly so. Patent fuel has been slow, and there has been only a small supply of coke. There are some indications of the market brightening up in the near future.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	33/6	30/-31/
Western-valleys, ordin'y	31/6	32/6	29/-30/
Best Eastern-valleys ...	31/6	31/6	27/-28/
Secondary do.	30/6	31/6	24/-25/
Best small coals	23/6	30/6	19/-20/
Secondary do.	22/6	24/	17/-19/
Inferior do.	20/6	22/6	16/-17/
Screenings	25/6	25/6	19/6-20/
Through coals	29/6	29/6	20/-23/
Best washed nuts.....	32/6	32/6	25/-27/
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	24/-26/6
Secondary do. do. ...	33/3	33/3	22/-24/
Patent fuel	32/6	35/	37/6-40/
Furnace coke.....	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	57/6-60/

IRON.

There is now a much better output from all the local iron and steel works, the result in many cases of improved appliances and enlarged plant. It is hoped that the new works of the British Mannesmann Tube Company at Newport will soon be turning out a large quantity of finished goods. One of the difficulties of the situation, however, is to find houses for extra workmen. The tin-plate trade, under the restrictions of licences, is doing as well as might have been expected. Only small arrivals of pitwood are reported, and the price is still maintained at 75s. for best French fir.

Cardiff.**COAL.**

It is difficult to write anything of much interest about this market at present. Business is as dull as it possibly can be, and is almost exclusively confined to the orders given on Admiralty and Allied Government account. For other transactions of an ordinary commercial nature, little or no tonnage is available, and this state of affairs is reflected in the attendance on 'Change. The long-expected classification list has at last been published, but, strangely enough, it has called forth very little comment, due probably to the fact that most exporters dealing in particular coals knew generally how they were classed and made their arrangements accordingly. As a publication it will prove of great value not only to the local trade, but to all consumers of South Wales coals. In the original scheme, which was issued in June last, there were 54 grades of coal scheduled. In the amended scheme of October 12 last, the number was increased to 72, and it may be taken for granted that the work of the Classification Committee has been anything but easy when it is seen that the list occupies no fewer than 145 pages. The difficulties encountered were, of course, exceedingly great, and the task of dealing with them required considerable tact and delicacy. The list is classified in two sections. In one the colliery companies are arranged alphabetically, with the description of coal produced at each of the pits and the minimum price at which it may be sold. In the other section the grades of coal are given and the collieries producing

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam			
coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	29/-30/
Ordinary	30/	30/	28/-29/
Steam smalls No. 1	21/6	21/6	18/-20/
Do. 2	21/	21/	
Do. 3	20/6	20/6	17/-18/
Do. 4	20/	20/	
Do. 5	19/6	19/6	16/-17/
Do. 6	19/	19/	
Do. 7	18/6	18/6	15/-16/
Do. 8	18/	18/	
Best dry coals	30/	30/	30/-31/
Ordinary dries	28/6	28/6	27/6-30/
Best washed nut	30/	30/	30/-31/
Seconds	28/6	28/6	29/-30/
Best washed peas.....	27/6	27/6	29/-30/
Seconds	26/6	26/6	28/-29/
Monmouthshire—			
Black Veins'	30/	30/	29/-30/
Western-valleys	29/	29/	28/-29/
Eastern-valleys	29/	29/	26/-28/
Inferior do.	28/	28/	25/-26/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	24/6-25/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	29/-30/
Small	26/	26/	20/-22/
No. 2 Rhondda—			
Large	27/	27/	28/-30/
Through-and-through	22/-23/6	22/-23/6	20/-22/6
Small	17/-19/	17/-19/	18/-20/
Best patent fuel	30/	30/	39/-40/
Seconds	30/	30/	37/6-39/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	55/-60/
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	75/	72/6-75/	46/-48/

* Nominal.

them—a sort of cross reference. A complete index has been added, and the whole work, which is published at the nominal figure of 5s., has been produced under the supervision of Mr. Finlay A. Gibson, the secretary of the Coal Owners' Association, to whom much credit is due for the clear and concise way in which the information is tabulated. The only other item of interest has been the Italian pooling proposal, the suggested terms of which were posted on 'Change on Tuesday, and a meeting is to be held to ratify or modify it, as the case may be. The scheme, of course, only applies to private Italian trade. No official returns of Italian shipments have been available since December last, when the figure was 117,000 tons, but it is believed that the average during the present year has been considerably lower than the December figures. The question of unauthorised stoppages at the collieries owing to disputes, has again received the attention of the joint board, and a committee of employers and workmen has been appointed to try and arrive at an understanding which would obviate these stoppages in the future. It was reported that since July no fewer than 67 stoppages had taken place without notice. So far as the tonnage system is concerned, there is practically no change. Sufficient shipping is available for carrying out official requirements, but there is practically no margin, and stocks accumulate. This is especially the case with small coals, some of which are being discarded for bunkering purposes in favour of better quality steams, which give better steaming results and produce less smoke than the ordinary inferior grades of coal which have hitherto been used for bunkering purposes. Gas coals are in request, and there is a heavy demand for household qualities. Coke producers are endeavouring to obtain an increased rate for coke for export purposes. Patent fuel is in plentiful supply at schedule rates.

IRON.

There is no change in the local iron and steel trades. All the works continue extremely busy, and outputs are maintained at their maximum. In the tin-plate trade, makers are well booked with orders for several months ahead, chiefly on British and Allied Governments account, and the greater proportion of the output is taken up in the execution of these orders. In some respects work is not proceeding so regularly as could be wished, owing to the shortage of bars, and makers of the latter find a difficulty in producing their allotted quantities, owing to so much of their output being required for other purposes. Prices continue firm on the basis of 30s. for standard sizes, and the sliding scale which came into operation some time ago enables makers to add 1½d. per box for each £5 increase in the price of block tin above £240. As this is now over £279, the additional price of the plates should therefore be 10½d. per box. All rail mills are busily employed, chiefly in the production of light sections, for which there is a heavy demand. There is no change in the galvanised sheet trade, and prices continue nominal. Scrap metals are in brisk demand at maximum rates. Iron ore supplies are well maintained.

Swansea.

COAL.

There was a good attendance on 'Change, and the anthracite coal market continued to display a very strong tone. Large, cobbles, nuts, beans and peas were practically unobtainable, but rubbly culm and duff were without enquiry. Steam coal conditions remained unsettled, and there was a very poor demand for this quality.

COASTWISE SHIPMENTS IN OCTOBER.

According to the returns issued by the Commissioners of H.M. Customs and Excise the following quantities of coal were shipped from the United Kingdom during October:—

From	Total cargo.		Total bunker.	
	1916.	1917.	1916.	1917.
	Tons.	Tons.	Tons.	Tons.
Bristol Channel ports	93,919	97,110	9,775	8,497
North-western ports	266,971	128,963	48,486	35,197
North-eastern ports	494,200	450,394	21,393	14,696
Humber ports.....	62,462	32,198	7,522	3,497
Other ports on east coast	534	11,988	7,835	2,089
Other English ports	4,251	5,398	2,040	2,020
Total from England and Wales	922,337	726,051	97,051	65,996
Ports on east coast of Scotland	45,951	44,386	8,002	5,838
Ports on west coast of Scotland.....	132,459	162,387	18,424	18,022
Total from Scotland	178,410	206,773	26,426	23,860
Irish ports	110	—	2,818	2,631
Total from United Kingdom	1,100,857	932,824	126,295	92,487

The destination of cargo shipments was as follows:—

To ports in	Oct. 1916.	Oct. 1917.
	Tons.	Tons.
England and Wales	652,191	600,785
Scotland	31,836	17,846
Ireland	416,830	314,193

Capt. Charles Grant Seely, now reported killed in action on April 19 last, was the eldest son of Sir Charles Seely, M.P. He was born in 1894. He was at Trinity College, Cambridge, when the war broke out. On August 4, 1914, he joined the Hampshire Regiment, and took part in the Gallipoli campaign. On another front he was present during fighting last March, and was killed in command of his company close to the enemy position, after being wounded three times during the advance.

Action by Mining Engineer.—At Wigton County Court last week, Wm. Wilson B. Barnes, consulting mining engineer, Shap, sued Thomas Blacklock, coal agent, Mealsgate, and Tom Bainbridge, ore sampler, Leadenhall-street, London, for the recovery of £23, balance of 1 and expenses incident to inspections of the Lowe Ruthwaite mine plant, mill, etc., near Ireby, in September 1914, made at the request of Blacklock's agent. Plaintiff said he gave advice regarding the mine, and also had in view the purchase of the property, with a view to re-sale. Some correspondence was put in, which led to the abandonment of the case, and his Honour gave judgment for defendants, with costs.

LETTERS TO THE EDITORS.

The Editors are not responsible either for the statements made, or the opinions expressed by correspondents.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

As replies to questions are only given by way of published answers to correspondents, and not by letter, stamped addressed envelopes are not required to be sent.

HIGHER EDUCATION OF COLLIERY OFFICIALS.

SIRS,—Having carefully studied the subject discussed before the Manchester Geological and Mining Society, which appeared in your issue of the 16th inst., I am pleased to find some of the points I wrote about some time ago. There is no "incentive" given to the rising generation of mine workers to take up the studies which are necessary to obtain these positions. While in other industries there is every opportunity for all to improve their "status," in mining many of the employers will not allow their officials to associate themselves together, with that main object in view. Some few years ago the managers who joined their association were told they must not do so.

About nine or ten years ago the "managers" thought it was only right and just that inducements should be offered to "under-managers" to join them, so that they might be benefited by taking part in the discussions of lectures and papers that were read for the education of mine officials; but there were many who objected to this course being adopted, and many of the first-class men considered it would be detrimental for the second-class to be admitted on the same platform as the first-class. There is far too much class distinction.

I would suggest that, after the war is over, the Government should make it compulsory for "boys" to attend mining classes at least once a week. In the meantime, all employers should encourage their employees all they can, recognise them, and assist them to continue their studies in science and mining.

Legislators pass laws for our country, but never give any instruction to enable less-educated persons to grapple with them. Much good would be done if the manager at each colliery would give lectures to all, at least once a month, on the Mines Act and any other Orders that may be issued from time to time by the Home Office.

I should be pleased to see the question of higher education for us put into practice, and not merely talked about. ONE INTERESTED.
Nov. 19, 1917.

SIRS,—May I make the following comment upon Mr. Kerr's paper on "The Higher Education of Colliery Managers," also upon Mr. Blake Walker's speech and upon your own leader of the 16th inst.?

No one will dispute that it is needful to have the best highly-trained and mentally-equipped men as colliery managers. However, I am not sure that Mr. Kerr's scheme of scholarships tenable for three years, which would enable students to have six months out of each year at the university and six months of actual experience and earning wages, would be a success. If a poor student were permitted to have a scholarship, I venture to say that on his return to employment he

would not be sure of obtaining facilities suitable for the higher equipment referred to. Constant light suitable employment, and evening classes would be of more service. An error that most of our leading educationists have made is the divorcing of the school from light, suitable employment. The highly-trained university man is not a success in actual industry. Real industrial education should be constant, and actually industrial. It is quite likely that the student who won the scholarship under Mr. Kerr's scheme would be a specialist in physics or chemistry, whose suitable workshop for life would be a laboratory. He might be unfit for the management of a colliery plant.

There is need for classification in order to meet speciality. An efficient colliery manager needs, most of all, to be an organiser and utiliser of material, men, and money. At a large colliery his staff of under-managers, foremen, deputies, and overmen must possess the same powers. A manager may need a complement of working men specialists at his elbow, but he must be an organiser and administrator.

Mr. Blake Walker raises the point of the importance of the deputy, and the lack of co-operation of labour. The deputy, I may say, is, or should be, a very important person. He is the most convenient subject for blame, and very often he does not know whether he stands on his head or his feet. He finds that labour

under his supervision is generally reasonable. He requires fair, clear, methodic superintendence. However, superintendence is sometimes complicated. Authority and responsibility are divided. For the service he is comparatively poorly paid. The lowest rate in Yorkshire is 15s. plus the war wage, and yet even Mr. Walker will admit that the collier is receiving £1 per day. The deputies used to appeal to their respective managements for comparatively fair rates of payment, but they were usually met with comparisons, raised by their managers, of lower rates being paid in the county. Over six years ago the deputies formed an association in Yorkshire and a federation in Great Britain. For doing this they are now mistrusted and misrepresented by their superiors. The deputies fail to see how they cannot be trusted with an organisation (like all other sections of the industry) without being suspected of disloyalty.

This brings me now to the editors' notes. The editors seem to think that the deputies, by being organised, wish to hunt with the hare and the hounds as well. May I say in reply that the picture of the ship and its crew raised by Mr. Walker is much better than the picture of the hare and hounds at this moment.

The Government have already prepared an Industrial Reconstruction Scheme, which is intended to unify employers and employed into a spirit of oneness. A workman is an industrial subject, and so is the deputy. Sensible co-ordination is better than iron-handed officialism. If all other sections of the industry are permitted to have their own organisations, then why cannot the deputies have the same right, without so much misrepresentation? If the mere fact of deputies being organised upon their own lines and with their own choice is to be misjudged as disloyalty, it is most regrettable.

F. K. SMITH, General Secretary,
Yorkshire Deputies' Association.
7, Eastgate, Barnsley,
November 20, 1917.

THE IRISH COAL TRADE.

THURSDAY, NOVEMBER 22.

Dublin.

There is no change, but a claim has been made by the coal workers for a weekly increase of 10s., and an advance in the tonnage rates since last report. A further advance in prices is probable. A conference between the representatives of the Coal Merchants' Association and the Irish Transport and General Workers' Union resulted in the matter being referred to arbitration. Present quotations: Best Orrell, 48s. 6d. per ton; best Arley 47s. 6d.; best Wigan, 46s. 6d.; Pemberton Wigan, 44s. 6d.; best Whitehaven, 46s. 6d.; best kitchen coal, 45s. 6d., all less 1s. per ton discount for cash; Scotch steam coal, 39s. per ton; Welsh steam, 50s.; coke, 46s. 6d. per ton delivered. Irish coal from the Wolf-hill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton—all f.o.r. Athy, on the Great Southern and Western line. It is stated that progress is being made with the line of railway to connect these collieries with Athy. Best large coal at the Castlecomer Collieries, co. Kilkenny, is 28s. 4d. at the pithead. Since the month opened less than half the normal weekly deliveries have been made from cross-channel ports. The total quantity of coal discharged upon the quays during the past week was 13,892 tons, as compared with 16,730 tons the week previously.

Belfast.

Supplies are arriving in the port more regularly, and merchants' stocks are reported moderate. There is no change in the local market, prices remaining unaltered. Current quotations for household coals are:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Approximate prices of Scotch steam coal are 31s. 6d. per ton for inferior classes, while the better qualities are as high as 37s. 6d. to 40s. per ton. Gas coke ranges from about 42s. 6d. to 45s. per ton, and foundry coke commands from 63s. 6d. to 68s. 6d. per ton. Freights remain firm owing to the continued scarcity of tonnage.

THE BY-PRODUCTS TRADE.

Tar Products.—The market is quiet, but steady, and the only salient feature is the demand for naphthas. Not much can be recorded about tar at present, and pitch appears to be regulated by transport facilities. The price quoted as the London basis—48s. per ton net in bulk f.o.b. at producers' works—simply represents some transactions reported recently, and is not necessarily a guide to the actual position now. On the east coast, the quotation averages 20s. to 25s., and on the west coast 18s. 6d. to 19s. 6d. No doubt if shipping were more plentiful, we should witness a strong market. As the case stands, good orders are received from abroad, but not much can be done in shipments at present. Naphthalenes appear likely to maintain their current prices. The other products hardly call for comment, owing to the difficulties on the one hand, and Government requirements on the other. Current quotations are:—Coal tar, 26s. 6d. to 30s. 6d. Pitch, east coast, 20s. to 25s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 18s. 6d. to 19s. 6d.; Clyde, 18s. 6d. to 19s. 6d. nominal. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. 2d. to 3s. 3d. Heavy naphtha, north, 1s. 8d. to 1s. 10d. Heavy oils, in bulk, north, 4½d. to 4½d. Creosote, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s. to 90s., in bags. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—The market is nominal in the sense that fixed prices govern transactions. It is maintained, and a considerable output is agriculturalists throughout the country.

Mr. C. H. Wordingham, president of the Institution of Electrical Engineers, has accepted office as one of the vice-presidents of the British Electrical and Allied Manufacturers' Association (Incorporated).

LABOUR AND WAGES.

South Wales and Monmouthshire.

Congiliation Board, at its meeting on Tuesday, had considered a proposal from the workmen's side. The proposal, introduced by the employers, as to the number of stoppages without notice that had occurred at the collieries since the previous meeting of the Board two months ago, these following upon no fewer than 36 stoppages between the beginning of July and September 13. Since the latter date there had been 31—making 67 in all. After a discussion of the general question, the workmen's representatives proposed that a joint sub-committee might with advantage be appointed to consider the present relationship between the employers and men at the collieries, their belief being that the adoption of the proposal might lead to an avoidance of stoppages. The employers agreed to the proposal, and said that they were willing at all times to adopt any suggestion which might assist in bringing about an understanding upon questions affecting the workmen at the collieries. A committee of eight representatives from each side will therefore be appointed, and an early meeting arranged for. A joint committee will also be chosen to consider points which the workmen's representatives desire to place before the employers as to the abolition of sub-contracting. A number of disputes which had been referred to the Board were brought forward, and representatives were appointed to investigate, power to settle being conferred upon them.

The question of the colliery examiners' strike came up in reference to payment of three-fifths of the bonus turn to afternoon and night shift men. The employers reported that the Coal Controller had been asked: Is any proportion of the bonus turn payable to afternoon and night shift men who were able to work only Monday, Tuesday, and Wednesday? The Controller's decision was: If the pit had been examined and was open for work, and the men declined to work—No. If the company could not examine the pit, and there was consequently no work—Yes. The employers stated that they would act according to these instructions.

It is probable that a meeting of the Tin-platers' Conciliation Board will be held to deal with the situation which has been created by the award of the Committee on Production as to which serious discontent exists amongst the workmen. The trade union agent has communicated with the Employers' Association, protesting against the award, which is regarded as impracticable; and one of the chief grounds of objection is that female employees, who hitherto have received bonus payments just as the male employees have, are not included in the Committee's decision.

The workmen at Llandebie Colliery have resumed work, terms of arrangement having been settled. It has been agreed that there should be no victimisation. The strike lasted five weeks.

The Federation executive had under consideration the dispute at Bedwas Colliery, and appointed two of their members to assist the local agent in endeavouring to reach an agreement.

At a meeting of the Federation executive in Cardiff, the circumstances of the Fforchwen Colliery, in the Aberdare district, were dealt with, a deputation of the workmen attending to point out that their loss of time was very serious, as many as 59 days having been idle ones this year. It was decided that Mr. T. Richards, M.P., should write to the secretary of the Coal Owners' Association, in order to ascertain the practicability of ensuring a more equal division of work.

At Ammanford on Monday, summonses which had been issued against nearly 100 colliers for refusing to fill Gwauncae-Gurwen trucks when the men at that colliery were on strike, were adjourned for a fortnight. In the meantime, it is hoped that the difficulty may reach settlement. The district meeting of anthracite men, which took place in Swansea on Saturday, passed a resolution disapproving of the prosecution, and also stating that "unless these summonses are withdrawn, we call for a special district meeting within a fortnight for the purpose of taking united action."

The wages award of the Committee on Production has created some amount of feeling amongst the steel workers, labourers, and tin-platers in the Eastern Valley of Monmouthshire; and at a conference held at Pontnewydd on Sunday there was a strong feeling in favour of rejecting it. The meeting decided to call a conference of all the members of the joint trades, in order to discuss whether the award should be accepted.

The Western Miners' Association, meeting in Swansea on Saturday, passed a resolution on the subject of the "comb out" of men for the Army, and resolved to ask for a special conference of the South Wales coal field before *bona fide* miners between the ages of 18 and 41 were called up. There was also a resolution calling upon the general secretary of the Federation to explain why lads between 16 and 18 were not allowed to vote in the recent ballot, seeing how important it was to them.

The anthracite miners' monthly meeting in Swansea on Saturday, had a report on negotiations with the Coal Controller as to withdrawal of men from certain collieries; and the agent, Mr. J. D. Morgan, explained a scheme for dealing with workmen thrown out of employment, this scheme to be introduced to the Controller and Federation jointly.

The East Glamorgan miners met in Caerphilly on Monday, and the agent stated that a serious question was in dispute at Bedwas, where the management contended that they had a right to remove a man from one part of the conveyor face to another, on the ground that the award of the late Lord St. Aldwyn authorised the removal of a man from one part of the colliery to another when he claimed the minimum wage. The contention of the workmen's agent is that this is putting an interpretation on the award which is not justified, for he holds that the conveyor face is one working place, inasmuch as the men are working under tonnage rates and the earnings are pooled and shared between the whole of the workmen engaged on the conveyor face. He stated that the matter would go before the Conciliation Board. With regard to the claims of men to participate in the pooling of earnings at Bedwas, he stated that he had met the persons interested, and that in the majority of cases a settlement had been arrived at.

The Eastern Valley miners' meeting at Pontypool on Monday, discussed the statement of Mr. C. Edwards, M.P., on the subject of the Government's propaganda in South Wales, and demanding that the Government "would complete public enquiry into the charges made by Mr. Clem. Edwards, M.P., in respect of the statement sent into the South Wales coal field by the Government's propaganda. We further suggest that all be taken and published with the result of enquiry from all those who prefer to do so, and those refuting them."

The Western Valley miners met at Abertillery on Monday, and decided that a recommendation should be sent out to the lodges that they should not assist in the "comb out." The question of paying income tax came up on the receipt of letters from three lodges, and it was decided by a representative vote of 7,173 to 3,551 to adhere to a resolution that upon any members' goods being seized or he being imprisoned for non-payment, drastic action should be taken.

Addressing a monthly meeting of the Avon Valley miners, the agent, Mr. W. Jenkins, referred to the depression of trade in their district, and spoke of an interview on the subject which a deputation of workmen and colliery proprietors had had with the Coal Controller. Mr. Jenkins described himself as dissatisfied with the position, not believing that the Coal Controller and Shipping Controller were paying enough attention to the giving of equal treatment. Conclusive evidence had been brought forward that a better supply of tonnage was given to Cardiff and Newport than to the western ports, although Port Talbot and Swansea had the latest equipment for dealing with rapid loading of coal, and could deal with shipping quite as well as up-channel ports. Yet there had been a reduction of 50 per cent. in the tonnage of Port Talbot, Swansea, and Neath; and it was time the authorities gave better treatment to those ports. A large number of workmen had received notices, the employers stating that this was due to their being compelled to close the pits, or work only one or two days a week. The executive committee of the Federation would be asked to deal with the matter again. Owing to so large a number of men being unemployed, the meeting decided to impose a levy upon those still at work, and voted £500 to the assistance of those who were in need.

North of England.

The school strike in the Washington and Usworth district, which commenced at the beginning of this week, in order that pressure should be brought to bear upon the county educational authorities to put into operation the Feeding of Necessitous School Children Act, terminated on Wednesday, the county authorities having accepted the suggestion of the local miners that the maximum income of families eligible for relief from the Prince of Wales's Fund should be 27s. weekly, instead of 24s.

Northumberland coal owners met the members of the Wages Committee of the Northumberland Miners' Association on Friday of last week, to consider the latter's application for an increase in the county minimum wage. After hearing the case put forward by the men, the owners intimated that they would consider the representations, and reply in due course. Another meeting is to be held next week.

The agenda—details of which appeared in this column last week—of the half-yearly council meeting of the Northumberland Miners' Association was dealt with as follows:—(1) Carried unanimously. (2) Carried by 26 votes to 22. (3) Unanimously carried. (4) Withdrawn, as the Miners' Federation has this matter in hand, on a resolution passed at the annual conference. (5) Unanimous. (6) Withdrawn in support of (7). (7) Defeated by 20 votes to 17. (8) Not seconded. (The reason for the poor support accorded to these three motions was stated to be the fact that the Wages Committee of the association is now negotiating with the coal owners on this question.) (9) Defeated by 52 votes to 4. (10) Carried by 35 votes to 14. (11) Unanimous. (12) Defeated by 33 votes to 7. Motions Nos. (13), (16), (17), and (19) were each carried with one dissentient. No. (14) was carried by 53 votes to 4, after speeches in which it was asserted that there was a great amount of overcrowding in the pit houses of Northumberland—much more than was the case in other mining districts of the country. It was urged that the shortage of houses was a national question of great importance, and it was announced that the Parliamentary Committee of the Trades Union Congress and representatives from the executive committee of the Miners' Federation would wait upon the President of the Local Government Board this week to urge housing reform, the demolition of insanitary dwellings, and the provision of more houses without delay. Motions Nos. (15) and (18) were carried unanimously. Motion No. (20) was defeated with one dissentient, the feeling being that it would be better to secure a reduction in prices than an increase in wages. Motion No. (21) was lost by 16 votes to 10. Motion No. (22) was carried by 34 votes to 21. A special motion in favour of telegraphing to the Home Secretary urging the Government so to amend the Representation of the People Bill as to confer the local government vote on wives of men qualified as local government electors was agreed to. Motion No. (23) was carried by 32 votes to 29. No. (24) was passed by 49 votes to 2. Motions Nos. (25), (27), (29), and (30) were unanimously adopted. No. (26) was approved by 25 votes to 23. No. (28) was defeated by 52 votes to 7. No. (31) was carried by 30 votes to 27. Subsequently, a resolution was carried, with five dissentients, appreciating the work done by Mr. Wm. Straker, the secretary, in pushing forward the necessity of conscripting all surplus wealth, with a view to the abolition of the National Debt. The meeting then ended. It should be made clear that all decisions of the council meeting are subject to the approval or veto of the members of the association as a whole, and that a county vote must be taken ere any of these decisions is acted upon.

Owing to shipping transport difficulties, the Consett Iron Company proposes to lay idle a portion of the Westwood pit. More men will be drafted into the main seams of the pit, and others displaced will be given employment at the company's other collieries.

The following awards were received at the November meeting of the Joint Committee for the Northumberland Coal Trade:—Ellington: Yard seam, hewing advanced 2½d. per ton. Main coal seam, at and above 3 ft. 6 in. high, whole 1s. 11d., broken 1s. 9d.; 3 ft. 4 in., whole 2s., broken 1s. 10d.; 3 ft. 2 in., whole 2s. 1d., broken 1s. 11d.; 3 ft., whole 2s. 2d., broken 2s.; 2 ft. 11 in., whole 2s. 3d., broken 2s. 1d., and so on, 1d. per ton for every inch the seam decreases in height. High Main seam, at and above 4 ft. high, whole 1s. 9d., broken 1s. 7d.; 3 ft. 8 in., whole 1s. 10d., broken 1s. 8d.; 3 ft. 4 in., whole 1s. 11d., broken 1s. 9d.; 3 ft. 2 in., whole 2s., broken 1s. 10d.; 3 ft., whole 2s. 1d., broken 1s. 11d.; 2 ft. 11 in., whole 2s. 2d., broken 2s., and so on, 1d. per ton for every inch the seam decreases in height. In the case of the two latter seams, it is understood that places in broken shall not be worked double if not 4 yds. wide. At the same meeting, the Ellington owners wanted filling and other prices fixed for working High Main and Main seams, but the application was ruled irregular. The owners and workmen of Throckley Maria pit asked the committee to decide whether or not coal hewers should change shifts at the face on the first working day of the quarter, as on other days. It was decided to ascertain the facts, but that the parties should be recommended to come to an agreement. West Wylam

owners' application to have hewing prices, etc., fixed for the Towneley seam of the John pit was sent to arbitration, but owners and workmen were recommended to agree.

Federated Area.

At a meeting of the executive council of the Lancashire and Cheshire Miners' Federation last Saturday at Bolton, it was agreed that all questions arising out of the Coal Controller's decision should be sent to the agent of the particular district in which the grievance arises, with a view to a satisfactory arrangement being arrived at, but in the event of no settlement, the particulars should be sent to the Coal Controller and Mr. Thomas Ashton, general secretary of the Miners' Federation of Great Britain, for the Coal Controller's decision.

Efforts are in progress to bring about a settlement of the trouble at the Blackwell Colliery Company's pit at Sutton-in-Ashfield, where the men are on strike through the employment of non-union labour. Over 1,000 workmen are involved in the dispute, and each week's stoppage means a loss of 4,000 tons of mineral. At a recent meeting of the men, a letter was read from Mr. J. T. Todd, general manager, appealing to their patriotism at the present critical time, and asking them to return to work pending a full discussion between them and the management. The men, however, declared they could not return until a settlement was reached.

It was reported, at a meeting of the Derbyshire Miners' Association held at Chesterfield on Monday last, that an arbitration had been conducted at Derby by Judge Lindley into the dispute at the Manvers Colliery, Ilkeston, concerning the cutting of fast ends in machine-holed stalls, and that his Honour had given his decision in favour of the workmen. It was reported the council of the association are taking steps to ascertain the number of Derbyshire miners serving in the Army. The council decided to contest the newly-constituted Clay Cross Division in the Labour interest at the next Parliamentary election.

Scotland.

Arrangements are being made in Fife for the meeting of representatives of the surface workers and mechanics employed at all the collieries in the county for the purpose of comparing wages and working conditions, with a view to securing uniformity.

The Leadhills Mining Company have refused to concede the increase of wages recently awarded to the coal miners of the country. As members of the Miners' Federation of Great Britain, the men hold that the advance should apply to them. The matter is being brought before the Government.

Sir A. Churchman, Director of Mineral Oil Production, had a conference in Glasgow with representatives of the Scottish Shale Miners' Association regarding wages dispute. The executive of the association decided recently in favour of an immediate stoppage of work in consequence of the refusal of the oil companies to accede to the terms of the Coal Controller's award, which they claimed should apply to shale miners as well as coal miners. At the request of Sir Arthur Churchman, the men agreed later to continue at work pending the result of a conference with him. The meeting was purely of a consultative character, and no decision was come to. A conference is to be arranged at an early date between representatives of the men, the oil companies, and the Government.

The third draft of Scottish miners has left for the iron ore mines in Cumberland. The number of applications for the 700 vacancies far exceeds present requirements.

In regard to the strike at Bedlay Colliery, belonging to Messrs. Wm. Baird and Company Limited, the Coal Controller has suggested a resumption of work pending a complete reference of the points at issue to arbitration. In view of the continued troubles after the previous strike, the men declined to resume until a full settlement has been arrived at.

It is announced that the lead miners of Scotland are not being allowed to participate in the recent war bonus awarded to coal and ironstone miners. The executive committee of the Scottish Mine Workers' Union has been asked to take up the matter with the Ministry of Munitions.

The firemen in the Cleland district of Lanarkshire have been agitating for some time for an eight hours working day. This particular request is not by any means confined to the firemen in Cleland district, but the trouble there has recently become so acute that there is a threat to strike. The whole subject has been remitted to the executive committee of the National Union of Mine Workers.

At Chapel Colliery, Newmains, Lanarkshire, a dispute arose recently in one of the machine runs regarding tonnage rates. Through the intervention of a representative of the union, a temporary arrangement has taken place whereby the men will be paid both tonnage and fathomage rates meantime until the section has developed.

At Knowton Colliery, Shotts, the men have been on strike through the manager imposing a reduction in tonnage rates. The Coal Controller has had the whole circumstances of the dispute reported to him, and a proposal with a view to negotiations for a settlement has arrived from his Department.

A dispute has cropped up at No. 16 pit, Redding, Stirlingshire. It appears that the owners shortened the drawing road, and introduced mechanical haulage, and the workers contend that the amount taken off the rates is in excess of what it ought to have been. On the other hand, the company maintains that the alteration in the rate is in accordance with the existing drawing scale. Negotiations for a settlement are proceeding.

At most of the collieries in West Lothian, where payment of the war wage for the idle Saturday has been withheld, the owners have now agreed to pay, except in one instance, where the matter has been remitted to the Coal Controller.

Iron, Steel and Engineering Trades.

As the result of a conference in London between the executive councils of the Dock, Wharf, and Riverside Workers' Union and the National Union of General Workers, formerly known as the Gas Workers' Union, a scheme of amalgamation of the two organisations was adopted. The alliance will have a total membership of over 450,000.

At a conference in London between the National Federation of Blastfurnacemen and employers' representatives in the pig iron industry of England, Scotland, and Wales, it was decided to make application to the Minister of Labour to appoint a special tribunal, consisting of three members, to adjudicate upon the claim regarding payment for work between 6 a.m. on Saturday and 6 a.m. on Monday.

A largely attended meeting of the iron ore miners employed at the Hodbarrow iron ore mine was held at Millom last week. The meeting was called to explain the arrangements with respect to the employment of Scottish miners in the Hodbarrow mines. It was agreed that the arrangements should be given a fortnight's trial, and another meeting to be then held to consider the matter.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Miners' Ballot Result—Mr. Winstone on "German Gold"—Alleged Breach of Regulations—Bridging the Neath—Cardiff Chamber of Commerce—Distribution of Shipping—School of Mines Prizes Distribution.

Official returns of the miners' ballot show that upon the actual poll there was a majority of over 70,000 against "down tools"—the figures being 98,946 against, and 28,903 for. In addition to this, it is to be borne in mind that thousands of men in certain areas refused to vote at all, and announced that whatever might be the general result of the ballot they would continue at work. The membership of the Federation is about 156,000, although not all these were eligible to vote. The total number of votes registered is nearly 128,000, and the cast against "down tools" is well over 77 per cent.

Every district gave a majority against "down tools," and the Rhondda Valley, which has been regarded as the centre of Syndicalism and Pacifism, was all of one side, contrary to the extreme policy which had been suggested. The result is all the more noteworthy because of the allegation made in the House of Commons by Mr. Clem. Edwards, M.P. for East Glamorgan, who has stated that German gold has been used to influence the miners in their action. Upon this point, Mr. Winstone, acting-president of the Federation, has issued a direct challenge to Mr. Edwards, M.P., that he will submit his allegation to proof, he having stated that the object was to bring about dissolution of trade. Mr. Winstone states that those gentlemen who made the charge should, "for the honour of Wales generally, and the Welsh miners in particular, either prove or withdraw the charges. I am prepared to give £10 to any object they care to name if they can prove one case in Wales. I will, on proof, pay £10 to meet out-of-pocket expenses." The accusation Mr. Winstone deals with is that "the Welsh people, and especially the Welsh pacifists, are receiving German gold."

With regard to the statements in Parliament as to the influence of "German gold" among South Wales miners, special enquiries have been set on foot which show that there is no connection at all between this alleged position and the "Unofficial Reform Committee" of miners—these latter being a sectional group acting independently of the Federation in order to advance what is practically Syndicalism.

The ballot upon the question of "down tools" bids fair to have a result quite unforeseen, and very disagreeable to those who gave occasion for it to be taken, the bulk of the members of the Federation having apparently awakened to the need of taking a more regular and direct interest in the affairs of the organisation. There is an outcry against allowing Socialists and Pacifists to secure office in the lodges, and thus to choose the delegates to conferences or to arrive at local decisions which hitherto have been given without full assent of the whole membership.

The Cwmaman workmen's hall having been injured by subsidence, the matter came before the Federation executive, upon a request that they would assist in obtaining some remedy for the difficulty in which the committee find themselves; and that body has resolved to invite the attention of the Labour Party to the subject. The first step will be to arrange a deputation to the Local Government Board.

No fewer than 71 summonses against the agent and manager of the Main Collieries have been issued on the application of Mr. Dyer Lewis (H.M. chief inspector) for alleged breach of Regulations under the Coal Mines Act. The prosecuting solicitor said that there were 24 summonses against the agent and a similar number against the manager in respect of that part of the Act which provides that "the face of the heading should be systematically and adequately supported by props," and, in regard to this, Mr. Owen, inspector of mines, deposed that upon examining two districts of the Cwrt Herbert Colliery, he received complaints about general scarcity of timber, and that in one stall the roof had fallen because there was not sufficient timber. There was a strike on at that colliery when he made the examination, the cause of the strike having been shortage of timber. This evidence was corroborated by Mr. T. Waldin, H.M. inspector. One of the workmen stated that the stall in which he was engaged was in a dangerous condition because of shortage of timber, and that he had been told, after complaining, not to work there any longer as the place was not safe. The chairman of the workmen's committee and other witnesses gave evidence as to shortage. It was submitted, on behalf of the defendants, that as there was no work in the pit there could be no offence; and upon this the prosecuting solicitor asked leave to amend the dates of the summonses. The magistrates adjourned the hearing for a fortnight, and suggested that the dates should be amended.

The Neath Rural District Council has discussed the proposal of a bridge over the Neath River near Briton Ferry Iron Works, which would reduce the distance between Briton Ferry and Swansea by 5½ miles. The Council have asked for further details to be supplied by the promoters of the scheme.

The Cardiff Chamber of Commerce, discussing the recommendations of the Welsh Commission upon industrial unrest, considered that some of the recommendations would be extremely injurious to industry if adopted, and a committee was appointed to draft a statement of its objections. This committee has now reported, and some of the objections have special relation to the coal trade.

With regard to the recommendation that excess profits upon commodities for home consumption should all be appropriated by the State, the committee report that this will be grossly unfair to proprietors and shareholders, and would operate as a fatal discouragement to improvement of plant and machinery; as also to the investment of capital. Upon the suggestion that workers should be more closely identified with the control of the industry in which they are engaged, the committee point out that under the Conciliation Board arrangements prevailing in this district, a workman already participates in the prosperity of the industry, and that further control must mean dual management, which would militate against efficiency and economy.

Another recommendation was that security of tenure should be guaranteed to every workman by providing that he should not be liable to dismissal except with the consent of his fellow workmen; and this the committee regard as most seriously interfering with discipline and effective control, every manager knowing that unreasonable dismissal would probably lead to strikes, and that the protection afforded by the trade unions of the proposed industrial council effectively prevent victimisation. The recommendation that all workmen should belong to a trade

union and all employers be similarly members of an employers' association—or, at any rate, be bound by the decisions of an employers' association—is regarded by the committee as exceedingly undesirable, being in direct conflict with the democratic principle of the freedom of the subject. The committee strongly support the recommendation for speeding up the settlement of disputes, and express an opinion that "the State should prohibit any strike payment being made in respect of stoppages which occur before such disputes are referred to the recognised boards or councils for adjudication." The committee declare that experience has provided a refutation of the Commissioners' statement that repudiation by the men of their leaders is of exceptionally rare occurrence.

Another recommendation was to remove disparity in wages earned in similar work, and to abolish sub-contracting; and upon this the committee state that "in the mining industry it is inevitable there should be considerable difference in wages. Workmen differ greatly in respect of skill and industry, and conditions differ so greatly as between different collieries and different seams in the same colliery, that it is impossible to ensure uniform earnings without subsidising the lower paid man, and raising him to the level of the higher paid man, which would, of course, greatly increase the cost of production, and be unfair to the superior workman."

As to proposed reduction in hours of labour for surface workers at collieries other than those handling coal, the committee consider it very unfortunate that suggestions should be made that must lead to diminution instead of increase in output. A similar opinion is expressed in regard to another recommendation which deals with the restoration of trade union rights and privileges. They also considered that the recommendation as to appointment and dismissal in future of colliery firemen, examiners, and their deputies "by joint committees of the management and men" would most seriously interfere with the discipline and efficient management of the collieries.

Upon recommendation No. 40 in the Commissioners' report, which deals with direct payment in respect of small coal by adopting rates for "large" and "through" respectively, the committee point out that in every wage agreement "it is expressly provided that payment for large coal also includes payment for service in connection with small," and they assert that the Commissioners' suggestion would cause great disturbance, and change the basis of nearly every price list in the coal field, besides leading to serious deterioration in the quality of coal filled by the workmen.

It is reported that the Gellyceidrim Collieries, Brynamman, have passed into the possession of Messrs. Cleaves and Company, of Swansea, who are the largest shippers of anthracite in the kingdom. The collieries have an output of 400 to 500 tons per day, chiefly of the Stanlyd, which is the highest quality anthracite. It is stated that the transfer has been made upon the basis of a payment of about £2 for each £1 share.

The annual distribution of prizes of the South Wales and Monmouthshire School of Mines took place in the Engineers' Institute in Cardiff on Saturday, the chair being occupied by Mr. H. T. Wales, in the absence of Sir Clifford Cory, M.P. Mr. J. W. Beynon referred to the development of by-product work, and said that in Germany the coal trade had been exploited to such an extent that coke was now practically looked upon as a by-product, and the so-called by-product formed the basis of the prosperity of the industry. A golden reward had been reaped from the aniline dye trade; and what Germany had done in the past, this country could, and would, do in the future.

Amongst the chief prize-winners were Mr. W. T. Lane, who took the £50 post-diploma scholarship, the £40 David Davies scholarship, and also the joint diploma of University College and School of Mines. Other winners of £40 scholarships were R. V. Phillips, T. G. Cogsworth, D. S. Evans, A. Howells, and D. E. Jones. Mr. W. T. Lane also took the gold medal of the joint mining diploma, and Mr. Alfred Howells the silver medal. The £10 scholarships were won by Messrs. D. J. Williams, A. S. Rose, J. W. Anthony, J. Williams, T. Beachan, H. A. West, D. J. Treharne, H. S. Handy, and W. H. Lee.

An interesting statement was made on Monday at Blackwood by one of the executive members of the Federation. He expressed his belief that the introduction of mechanical conveyors was a necessity, and that in the future these would be very widely in operation.

The long drawn out contest between the Assessment Committee of Pontypridd Union and the colliery proprietors has at last reached conclusion. It is now announced that the new assessments will total £460,000, as a result of agreement arrived at. One of the chief questions dealt with was as to separate rating of by-product works and coal washery installations. The colliery proprietors desired that these should be treated as part of the colliery, and not separately assessed, but the court rejected this view.

Mr. Winstone, acting-president of the South Wales Miners' Federation, was one of the deputation which waited upon the President of the Local Government Board on Tuesday with regard to the very unsatisfactory housing conditions in the colliery districts of South Wales, and he set before the President some of the more pressing instances of evils which arise from overcrowding.

Northumberland and Durham.

Quicker Unloading—Compensation Case—Mr. Burt, M.P., Congratulated—Saving Bunker Coals—Enginemen's Secretary—Miners' Association Funds.

A meeting, arranged by the Ministry of Munitions, was held in Newcastle on Friday of last week, between those interested in the importation of iron ore and certain officials of the Ministry, with the object of discussing the unloading of ore steamers in the Tyne, and the devising of means to expedite the discharge. It was agreed that certain works should be visited and the local conditions inspected.

A man, named Wharton, hewer at Eldon Colliery, having been killed at his work, his widow was awarded £300 compensation, which was invested for the benefit of herself and other dependants. She was allowed 25s. per fortnight, and her granddaughter, Violetta, whom she maintained, was allotted £5 down. Mrs. Wharton died, and bequeathed the balance of the compensation, £271 0s. 11d., to her three children and Violetta. Violetta applied to the Compensation Committee to have the whole of the unexhausted balance paid to her, on the ground that the granting to her of £5 by the court constituted her now sole dependant of the deceased hewer. The committee referred the matter to Judge Bonsey, by whom it was dealt with at Bishop Auckland County Court last week. It was pointed out that Violetta was no relation to the hewer, being, in fact, the illegitimate granddaughter of his widow. The judge observed that Violetta had benefited during her grandmother's life, and that her circumstances were affected by

the latter's death. Her mother, however, would have a quarter of the remainder, as would she herself. He decided that he could not interfere with the decision of the committee. Thus the point will be referred back to the committee for settlement.

That was a characteristic speech in which the Right Hon. Thos. Burt, M.P., responded to the congratulations and good wishes of the members of the council of the Northumberland Miners' Association offered on Saturday, on the attainment of the veteran leader's 80th birthday. He referred to his long connection with the association, commencing in 1863, and continued as general secretary from 1865, and said he had often wondered how he became a public man. He was sure Nature did not design that he should become one, nor were his inclinations that way. He was glad to say that victimisation for trade union principles had now almost entirely disappeared. He had always advised workmen to appeal to common sense and reason rather than strikes. He considered that two of the most important things the association had ever done was to establish the Joint Committee and the Conciliation Board. He was glad that the Government was following the example of the Northumberland miners, and was incorporating in Acts of Parliament machinery for settling disputes by conciliatory methods.

Economy in coal consumption was one of the advantages claimed at a local shipping gathering recently by Mr. Axel F. Ericsson, chairman of the Ericsson Shipping Company and the Monitor Shipping Corporation, for the "Monitor" type of corrugated-sided ship, to which he pins his faith. He stated that, in 1910 and 1911, when shipping was depressed, his pioneer vessel, the "Monitoria," made a profit of £4,542, of which £452 was due to saving in coals. He estimates that there is a reduction in the consumption of bunker coals of 15 per cent., whilst the shape of the ship allows 4 per cent. more cargo to be safely carried.

The programme of the Newcastle section of the Society of Chemical Industry for the session which was inaugurated on Wednesday of last week, includes an address by Dr. J. T. Dunn, Newcastle city analyst, on "The Melting Point of Coal Ash," and a paper by Mr. G. W. Hewson, chief chemist to Messrs. Palmer's Shipbuilding and Iron Company Limited, on "Coke as a Fuel for the Blast Furnace."

Mr. John Humphrey, of Gosforth, has been elected agent and full-time secretary of the Northumberland Colliery Enginemen's and Firemen's Association. Mr. Humphrey polled 727 votes to 171 given for Mr. Sam Snow, of Ashington, and 150 for Mr. Thomas Weatherley, of Bedlington.

The quarterly financial statement of the Northumberland Miners' Association shows total accumulated funds amounting to £40,302. The political fund has a balance in hand of £689, and the medical charities fund a balance of £883. The expenditure included £337 for stoppage allowances, and £1,581 for death legacies. The membership is returned at 25,423 adults and 4,497 half-members.

Cleveland.

In a presidential address to the members of the Cleveland Institution of Engineers this week, Mr. J. H. Harrison urged that Tees-side should not be content merely to turn out raw or less highly-finished products, but should add the manufacture of highly-finished goods to the list. They should pay particular attention to the question of the utilisation of waste products, and pointed out that, in that district, they had a great object-lesson in the very large amount of electricity which was being generated from the exhaust steam from blowing engines. They had another in the domestic use which was being made of coke oven gas, whereby the whole of the gas lighting and heating of Middlesbrough was being done. There were other waste products which were only waiting to be harnessed to some useful purpose. Quite recently it was discovered that the dust from blast furnace gas contained a fair amount of potash, and this was now being extracted and turned to profitable account, whilst the waste heat from steel furnaces was now being used with surprisingly good results in raising steam. He suggested that the coarse dust from blast furnace down-comers, being chiefly composed of coke, ore, and lime, could be moulded into briquettes, and profitably used to re-charge the furnaces.

Cumberland.

A meeting of the members of the Cumberland colliery rescue and aid teams was held at Workington last week. Mr. J. Wright presided, with Mr. W. Armstrong (hon. secretary), and Mr. H. Skerry (hon. treasurer). The secretary stated that he had written asking the coal owners to meet a deputation to re-consider the question of wages, etc.

Yorkshire.

Goole Shipping—Runaway Corves—Magistrates and Slackers—Fatal Fall of Stone—Coal Dust Case.

No particular amount of success appears to be attending the efforts of the Goole Chamber of Commerce and Shipping to bring about the better utilisation of the port. A large number of collieries have been approached, and while their replies favour the suggestion of shipping coal from Goole, especially when it could be sent by canal, thus minimising the use of the railways and saving the haulage of wagons, the reply of the Shipping Controller is not encouraging. He points out that, while desirous of assisting Goole, there is no measure of substantial relief that can be devised which is not attended with very serious objection. Some small measures, he says, might be found practicable from time to time, and the Port and Transit Executive Committee have undertaken to bear the matter in mind.

A run of 16 corves, which broke away, when full, in the Melton Fields seam of the Houghton Main Colliery, near Darfield, and were precipitated down a subsidiary shaft, had the effect of rendering the colliery idle one day last week. Considerable damage was done to the shafting and other machinery, but fortunately nobody was injured.

Magistrates are urging that more drastic action must be taken regarding miners who are shirking their work at the present time. In Yorkshire the slacking prevails to a serious extent, and the justices are getting weary of merely ordering damages claimed to be paid. It is suggested that the Home Office will have to take action in the matter. At Barnsley last week, damages were awarded against men prosecuted by Messrs. Newton, Chambers and Company; at Leeds, 14 men and boys from the Waterloo Main Colliery were prosecuted; whilst at Doncaster the prosecution of shirkers is a weekly occurrence. It is nothing short of imprisonment will meet these cases.

Three men lost their lives in an accident in the West pit of the Denby Grange Collieries last week. A fall of stone weighing hundreds of tons completely buried them. The work of rescue was very dangerous and laborious, and it was not till after 24 hours' continuous labour that two men, named Beckwith, who are brothers, were rescued.

After, and his brother has since succumbed. John Kaye, their brother-in-law, was killed outright. At the inquest at Wakefield, that the accident could not have been fore-dict of "Accidental death" was returned. As made to the splendid manner in which the of the deceased men worked to rescue them.

A meeting of the council of the Yorkshire Miners' Association was held at Barnsley on Wednesday, the president (Mr. H. Smith) in the chair. The main question for consideration was that of surfacemen's wages. The council decided to recommend the branches to take an individual ballot vote throughout the county with a view to decided action, unless a settlement can be arrived at in the meantime. Several district grievances were dealt with. At Wentworth Silkstone it was reported that the setting down of a price list had been followed by the question of arrears of wages, and that on the latter matter no agreement had been arrived at with the employers. It was decided by the council to leave the question in the hands of the permanent officials, with power, failing a satisfactory settlement, to advise the men to withdraw their labour. As the men concerned are only on day to day contract, it is hoped that a settlement will be arrived at without a stoppage. At Suthill Wood Colliery the question in dispute is the alleged non-payment by the employers to certain workmen of the recognised district day's wage. The men, after having taken a ballot, were given permission for the question to go before the district as to whether they will be allowed to tender notices.

Surprise is being manifested in Bradford because of the local committee's dilatoriness in not fixing the price of coal. The reason for the delay is stated to be a difference between the fixing of the price and the carting charge. The Corporation charges for coke delivery and cartage, according to the different distances, work out as follows: 3s., 4s. 6d., 5s. 3d., and 5s. 6d.; the coal merchants' proposed charges are 3s., 3s. 9d., 3s. 9d., and 4s. 6d.; whilst the Coal Committee suggest 2s. 6d., 3s., 3s., and 3s. 6d.

An arrangement has been made between the local coal merchants and the Retail Coal Prices Committee, at Skipton, whereby the supply of coal at a fixed price is assured to consumers in that district throughout the coming winter.

Lancashire and Cheshire.

At the recent colliery firemen's examination held at the Walkden Technical School, 134 men presented themselves for examination. Of these all but two were for re-examination after the five years' period.

On Friday of last week, before the Liverpool stipendiary, Mr. H. S. Higginbottom and the New Moss Colliery Company were summoned for selling coal at prices exceeding those allowed under the Act. After hearing counsel on both sides, the magistrate adjourned the case *sine die*, in order that the question of the "corresponding price" might be decided upon by the Board of Trade.

Mr. Seth Blackledge, secretary of the Maypole (Wigan) branch of the Lancashire and Cheshire Miners' Federation, has been appointed miners' agent for the Leigh and Manchester district, to fill the vacancy caused by the resignation of Mr. Jesse Butler. Mr. Blackledge is well known as an organiser throughout the Lancashire and Cheshire coal field, having served on the executive committee of the Lancashire and Cheshire Miners' Federation, as well as on the executive committee of the Miners' Federation of Great Britain.

Notts and Derbyshire.

In a case at Nottingham last week, when Maj. W. E. Walker, managing director, and Mr. Albert Beeton, manager, of the Clifton Colliery, were summoned for using tubs not so constructed as to prevent, as far as possible, coal dust escaping from them, the hearing eventually resulted in an adjournment. It was explained, on behalf of the prosecution, that the section under which the summonses were issued did not apply in a mine which was wet throughout, but the Clifton Colliery was a dry one, worked with naked candles, and if an explosion occurred an accumulation of coal dust would act like a train of gunpowder. Prior to 1911 the tubs at Clifton were open at one end. Since the passing of the Act, a board, 1½ in. high, had been placed at the open end of the tub, which in no way complied with the Regulations. Evidence was given by Mr. H. A. Abbott, Sheffield, one of H.M. inspectors of mines. In conversation with Maj. Walker, he stated the latter said the use of closed tubs was impracticable. The witness admitted, in cross-examination by Mr. B. Campin, who defended on behalf of the Midland Coal Owners' Association, that for one-third of the way the roof clearance above the top of the tubs was only about 5 in., and that in this portion of the road a permanently closed tub would be impracticable. It is expected that the hearing of the case will occupy some time.

At the last meeting of the council of the South Derbyshire Miners' Association, a discussion took place concerning the question of defraying expenses incurred in defending a recent case, and it was decided that the Miners' Association bear the charge. Strong opposition was expressed to the association having anything to do with the matter.

Mr. C. G. Bond, managing director of the Bricksworth Ironstone Company, and also trading as Bond and Company, Nottingham, was fined £25, with £20 costs, for unlawfully dealing in war material without a licence. It was stated that the defendant complained of the wagon shortage, and that when 80 were allotted to the Bricksworth Ironstone Company, some of the private wagons owned by Bond and Company were let out to other people.

The Midlands.

The Birmingham Municipal Coal Committee have held a meeting this week, under the presidency of the Lord Mayor, to consider the question of domestic coal retail prices, mentioned a fortnight ago. The principal business was the consideration of the prices charged by coal yards and bag wagon dealers. Some time back these dealers represented to the committee that the margin of profit allowed them was too small. Upon that the Lord Mayor communicated with the Coal Controller in London, and the reply received was to the effect that the difficulty appeared to be that the same price had been fixed in other towns besides Birmingham, and that it was not easy to make individual arrangements for particular districts. The reply was considered very unsatisfactory, and this week it was decided that the Lord Mayor shall communicate with the Coal Controller on the subject. The committee consider special prices for the various districts where it can be shown that the same price has been fixed in other towns. The committee themselves are advised prices for the Controller's consideration to take the same into consideration. One of the committee has given much trouble to the small dealers in Birmingham and dis-

trict. These state that unless some advance is conceded they will have to go out of the business. Such an event is what the Municipal Committee are most anxious to avoid, otherwise there will be no sufficient means of distributing domestic coal to the working classes in the city during the coming winter.

Kent.

Nearly 6,000 tons of coal were raised at the Tilmanstone and Snowdown collieries last week.

It is computed, from the results given by borings in the neighbourhood, that over 30,000,000 tons of coal are contained in the mineral area beneath the 642 acres of the Langdon Abbey estate, near Dover, the minerals of which have been left by the late Mr. W. P. Hampton to the Public Trustee for the benefit of Kentish charities. Workable seams giving a total of 54 ft. of coal were proved in these borings.

Reporting to Dover Town Council on the year's work of the local Harbour Board, Ald. Prescott, who represents the Council on the Board, referred to the efforts which had been made to secure the shipment of Kent coal to France from Dover, but stated that these had been unsuccessful owing to the opposition of the Admiralty authorities, and the traffic therefore went to another port. He expressed the hope, however, that after the war there would be a considerable trade in the shipment of Kent coal from Dover, and mentioned that the Board had retained facilities on the Admiralty Pier extension for this traffic.

The Channel Steel Company are reported to have selected a site near Dover for the smelting works which they intend to erect for dealing with the ironstone in their areas which they have acquired in East Kent, together with the Shakespeare Colliery.

Scotland.

Grant to Mining School—Burntisland Shippments.

The coal masters of the country have signified their willingness to supplement the grant of £1,000 made to the Fife Mining School by the Educational Committee of the county, by about one-third of that amount.

At Burntisland last week the shipment of coal was 11,750 tons, a decrease of 5,800 tons on the corresponding week of last year. At Methil the shipment was 24, tons, against 19,963 tons in the previous week.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Arniston Coal Company Limited.—Final dividend of 24s. per share, free of tax, on the ordinary shares, making 40s. per share for the year ended September 30.

Atlas Steel Foundry and Engineering Company Limited.—Including £1,568 brought in, the accounts for the year ended September 30 show a profit of £15,332. It is proposed to apply £2,000 for depreciation, to place £1,500 to general reserve, and to pay a dividend of 10 per cent., free of tax, same as for the previous year, carrying forward £9,342, subject to excess profits duty, etc.

Horden Collieries Limited.—The report for the year ended September 30 states that the amount standing in last year's balance-sheet under purchase of leases and Hutton Henry freehold land and minerals has been reduced from £90,770 to £14,064. This is due to the realisation of the Hutton Henry freehold land and minerals and to an agreement for working coal under the North-Eastern Railway. The question of disposing of the Hutton Henry property has frequently occupied the attention of the directors, and a favourable opportunity of accomplishing this having recently presented itself, it was decided to accept the proposals made. The property sold comprises an outlying portion of the royalties which could not have been worked for many years. The Castle Eden royalties will be available at a much earlier date. An additional area of coal workable to Blackhall and Castle Eden collieries has been taken on lease. The quantity thus obtained is about equivalent to that contained in the Hutton Henry freehold which has been sold. The accounts show, after providing for depreciation, income tax, and contingencies, a profit of £187,079, which, added to £65,602 brought forward, makes a total of £252,682. After providing for debenture interest, and carrying to reserve account £40,000, the directors recommend a final dividend of 8½ per cent., making 12½ per cent. for the year; and to carry forward £78,427.

Midland Iron Company Limited.—Further dividend of 5 per cent., making 10 per cent., free of tax, for year to September 30, same as for the previous year.

Pease and Partners Limited.—The directors have resolved to declare, on December 18, subject to the approval of the Controller of Mines, an interim dividend of 10s. per share on ordinary and deferred shares, being 5 per cent. for the half-year.

Roberts (William) (Tipton) Limited.—Dividend of 1s. per share, free of income tax, on ordinary shares (interim). Last year, no interim dividend.

Shotts Iron Company Limited.—The directors announce a final dividend on the ordinary stock of 5s. per share, free of tax, making 7s. for the year, against 8s. last year.

Stanton Iron Works Company Limited.—The directors have declared an interim dividend of 6 per cent., less tax, on the ordinary shares, payable December 10. A year ago 7½ per cent. was paid.

NEW COMPANIES.

Aadnesen and Dahl Limited.—Private company. Registered office, 7 and 8, Bute-crescent, Cardiff. Registered November 15. To acquire the business of shipbrokers, coal exporters, ship owners, and general shipping agents. Nominal capital, £50,000 in £1 shares. Directors: L. Aadnesen and H. Dahl.

Beta Engineering Company Limited.—Private company. Registered November 10. To acquire the business of tool makers and repairers and general engineers. Nominal capital, £1,500 in £1 shares. Directors: A. T., W. H., and L. E. Brougham. Qualification, £100.

Boiling (J.) Limited.—Private company. Registered November 15.—To acquire the business of a coal merchant and removal contractor. Nominal capital, £500. Directors: R. Millar and W. H. Wescott. Qualification, five ordinary shares.

Bwlch Colliery Company Limited.—Private company. Registered November 13. To acquire the business of a colliery proprietor. Nominal capital, £1,000 in 1,000 £1 shares. Directors: T. H. David (Pontneathvaughan), T. Brown, and W. L. David. Qualification, £50.

Fornett Engineering Company Limited.—Private company. Registered office, 66, Queen-street, Sheffield. Registered November 15. To carry on business as general engineers and tool makers. Nominal capital, £2,000 in £1

shares. Directors: J. Picken, J. Britland, H. C. Rawson, A. Randall, and A. Adkins. Qualification, 50 shares.

W. and D. Conveyor Engineering Company Limited.—Private company. Registered November 14. Manufacturers of labour-saving machinery in connection with the transportation of goods, etc. Nominal capital, £10,000 in £1 shares. Directors: W. O. King (Cardiff), F. Fletcher, C. H. Bennett, W. H. Wegeulin, and W. E. Dondney.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

DUBLIN, NOVEMBER 28.—500 tons of coal for Rathmines Urban District Council. Forms from the Electricity Works, Rathmines, Dublin.

GRIMSBY, NOVEMBER 30.—10,000 tons of fine slack or nutty slack for the Corporation. Forms from the deputy-electrical engineer, Electricity Works.

LINGWOOD (NORFOLK), NOVEMBER 26.—Coal for the Workhouse. Forms from the clerk, 17, Prince of Wales-road, Norwich.

MANCHESTER, NOVEMBER 26.—Coal for the Manchester Guardians. Forms from the Union Offices, All Saints', Manchester.

MIDDLESBROUGH, DECEMBER 8.—Steam coal (six or 12 months) for Tees Conservancy Commissioners. Forms from the general manager, head offices, Middlesbrough.

OLDHAM, NOVEMBER 27.—Coal for the Baths. Forms from the general superintendent, Central Baths, Oldham.

SHEERNESS, DECEMBER 24.—1,000 tons good Yorkshire or Langwith nutty slack, to pass through a 1½ in. mesh, for the Urban District Council. Forms from the clerk, Council Offices, Trinity-road.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

BARRY DOCK, NOVEMBER 19.—Stores.—Iron, steel, wire ropes (six months) for Barry Railway Company. Forms from the secretary, Barry Docks.

DUBLIN, DECEMBER 3.—Stores.—Iron and steel, castings, permanent way fastenings, oils, etc., for the Dublin and South-Eastern Railway. Forms (6d.) from the secretary, Westland Row Station, Dublin.

ENNISKILLEN, DECEMBER 1.—Stores.—Tubes, wire, copper plates, spelter, cement, castings, galvanised sheets, wire, iron, oils, tin-plates, etc., for the Sligo, Leitrim and Northern Counties Railway. Forms (1s.) from the secretary, Enniskillen.

LONDON, NOVEMBER 27.—Copper Tubes.—Copper tubes and rods for the Great Indian Peninsula Railway. Forms from the company's offices, 48, Copthall-avenue, E.C.

MIDDLESBROUGH, DECEMBER 8.—Stores.—Castings, bolts, nuts, etc. (12 months), for the Tees Conservancy Commissioners. Forms from the general manager, head offices, Middlesbrough.

NOTTINGHAM, NOVEMBER 29.—Stores.—Refined tar, pitch, creosote, etc. (12 months), for the Works and Ways Committee. Forms (5s., returnable) from the city engineer, Guildhall.

SOUTH HETTON, DECEMBER 1.—Colliery Stores.—Timber (English), oils, iron castings, wire ropes, etc. (except electrical), during six months. Forms from J. R. Lambert, South Hetton, near Sunderland.

DISABLED WORKMEN'S WAR COMPENSATION ACT.

The omission of two words, "1897 and," from the recent Workmen's Compensation (War Addition) Act, and its possible serious consequence to a number of totally disabled workmen in receipt of compensation, was the subject of representations by a deputation from the executive of the Miners' Federation to Sir George Cave at the Home Office last Friday.

The new Act increases the amount of compensation payable to persons suffering incapacity by 25 per cent., but clause 1 specifically limits this additional war payment to cases under the 1906 Act. The intention of Parliament was to give this additional payment to all persons who are receiving compensation for total incapacity. A majority of the employers and of the insurance companies are paying the additional compensation to persons who were injured previous to 1906, but certain employers and insurance companies are standing to the strict legal interpretation of the new Act.

Mr. Robert Smillie and Mr. Harry Twist presented the case for the workmen.

Sir George Cave said the intention of the Government was that the Act should include all persons who suffered total incapacity from industrial injuries since the Act of 1897. The Home Office had negotiated and was negotiating with all the accident insurance companies to get them to carry out the intention of Parliament, and to pay the additional 25 per cent. compensation in all cases of total incapacity. If any employer, or any insurance company responsible for compensation to totally disabled workmen, did not carry out what was the intention of Parliament, a short amending Bill would be introduced to make good the oversight.

The question (adds our Labour Correspondent) is one which affects alike all persons who are receiving compensation under the Workmen's Compensation Act for total incapacity, and is not limited in its application to miners.

Mr. Francis Evan Moss, of Kilhey Court, Worthington, near Wigan, gas coal contractor, left estate valued at £35,134.



The Silent Conveyor

(Spence's Patent).

A Fair Example of Results.

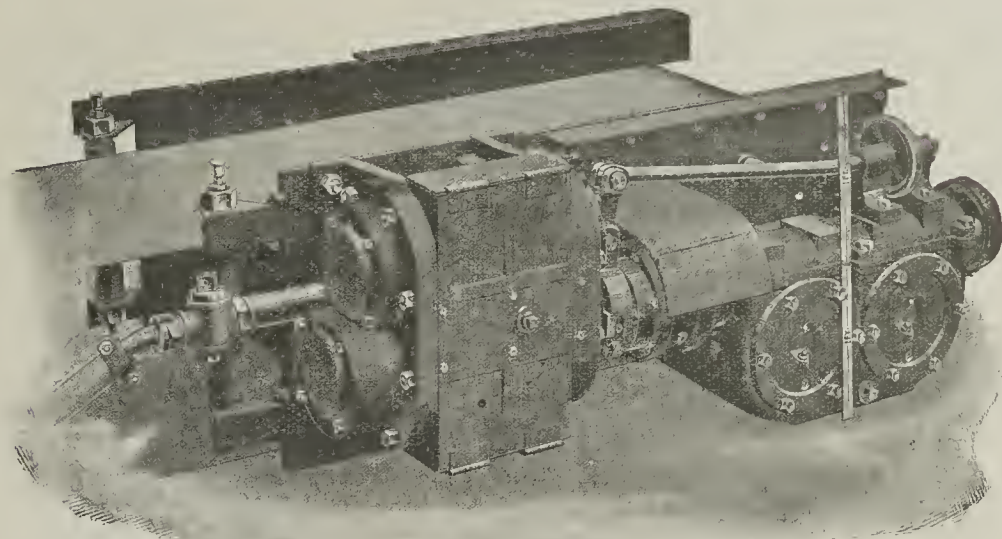
Length of Face - - 80 yards

Height of Seam - - 2 ft. 9 in.

Average Gradient
against load 1 in 12

Average discharge
(5 men) - 60 tons per shift

Average load (input) - 4 B.H.P.



Meco Belt Conveyor Head, Spiro-turbine Drive.

Perfectly noiseless in operation.

Positive in action, will convey equally well uphill or down.

Most economical in power consumption.

Electric or air-driven.

Will take the place of your enlisted men and will increase tremendously your output of coal.

Write to-day for Illustrated Catalogue and full particulars.

The

Mining Engineering Co. Ltd.

Meco Works, Moorfields,

Telegrams: "Meco, Sheffield."
Telephone: 4530 Central (2 lines).

SHEFFIELD.

THE FREIGHT MARKET.

of small dimensions has been possible in the freight market, because of the scarcity of tonnage. Fortunately, there is some improvement in the volume of official requisitioning of coal, and such cargoes are coming forward in rather larger numbers, thereby imparting some greater degree of activity to the mining industry. There is a very healthy demand for shipping, both for Allied and neutral directions, but, for the most part, this request has to remain unsatisfied. On the north-east coast, Swedish fixtures are most prominent in the little list of chartering that has been arranged. Rates in that direction are perceptibly improved, Gothenburg having been done for Tyne loading at from 190 kr. to 192½ kr., and Stockholm at 200 kr., as compared with 185 kr. to 190 kr. and 195 kr. respectively a week ago. Coasting rates are firm, at 21s. to London. Apart from the engagement of vessels to carry coke and pitch to French Atlantic ports, there has been nothing done for any other direction than those named. The Spanish Atlantic is still firmly quoted, at 160s. to Bilbao or Santander, whilst Portugal is listed at 95s. to Lisbon, and 105s. to Oporto. Gibraltar is possible at 100s. To Barcelona, the rate for Tyne loading continues to be 275s., but it is interesting to note that a vessel has been fixed at Newcastle for Clyde loading to Barcelona at the extraordinarily high rate, even as high rates go, of 300s. At South Wales, the bulk of the business done has been for near French ports, the only other fixtures mentioned being that of a neutral steamer for Algiers at 160s., and that of a 4,000-tonner for Gibraltar at 100s. The request for vessels for neutral directions continues good. At other shipping centres, business is similarly limited by tonnage scarcity. Noteworthy fixtures are the River Plate from Liverpool at 130s., and Gothenburg from Leith at 187½ kr., with the option of Stockholm at 10 kr. more.

In the homeward market, the River Plate is dull and unaltered, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. In the American market, tonnage on heavy grain basis is in good demand, with 40s. quoted for the United Kingdom from the Northern Range, 45s. for French discharge, and 70s. for West Italy. The coal freight for Virginia to Buenos Ayres remains at 125s., with 33 dols. with Rio delivery. A little more tonnage for December cotton shipments is being released. At the Far East, Madras Coast merchants are quoting the recently-advanced rate of 550s. for kernels to Marseilles. Rice ports are steady, at 500s. for Saigon-Haiphong loading for French ports. Kurrachee to the United Kingdom on scale is unaltered, at 250s. Bombay on d.w. basis to the United Kingdom is firm, at 275s. Mediterranean and Spanish ore ports are enquiring freely for tonnage, and rates are well upheld.

Tyne to Calais, option Dunkirk, 250, 45s.; coke; Gothenburg, 2,500, 192½ kr.; option Stockholm, 200 kr.; Gothenburg, 1,600, 190 kr.; London, 1,200, 21s.; and Stockholm, 2,500, 200 kr.

Cardiff to Algiers, 3,000, 160s.; neutral; Brest, 1,400, 45s.; neutral; Caen, 700, 48s.; neutral; Gibraltar, 4,000, 100s.; Havre, 1,350 and 1,400, 22s. 6d.; and Nantes, 600, 30s.

Liverpool to River Plate, 3,000, 130s.

Swansea to Havre, 1,350, 22s. 6d.

Newport to Nantes, 1,300, 29s.

Middlesbrough to Rouen, 600, 75s., pitch.

Leith to Gothenburg, 1,850, 187½ kr.; option Stockholm, 197½ kr.

Barry to Brest, 1,400, 45s., neutral.

Port Talbot to La Pallice, 1,500, 61s. 6d., neutral.

Swansea or Burryport to Guernsey, 350, 42s.

Glasgow to Barcelona, 2,100, 300s.

OBITUARY.

Mr. F. Seymour, of Pontyberem, who died on Tuesday at his residence in that town, at the age of 69, was at one time chairman of the West Wales Coal Owners' Association; and he also had been a member of the Conciliation Board. He was manager of the Pontyberem Colliery till 1910, when it passed into the possession of the Ammanford Company, Mr. Seymour continuing his connection with the last-named until his death.

The death took place on Friday of last week, at his residence at Worsley, near Manchester, of Mr. Peter Rowson, for many years under-manager at Lord Ellesmere's Mosley Common Collieries, Boothstown. He was 68 years of age.

Mr. Walter Wilson, a well-known miners' leader in the Ashington district, died somewhat suddenly on Monday, at the age of about 60 years. He was a member of the Ashington Urban District Council, and was chairman of that body last year.

The death is announced of Mr. William Thompson Hartley, Fairfield, Calverley, in his 71st year, who was the head of the firm of coal merchants at Calverley Bridge.

The death has occurred at Seascale, Cumberland, of Mr. Wm. Hildreth, who, up to a few years ago, was chief of Messrs. Pease and Partners' coal and coke department at the offices in Northgate, Darlington. Advancing years led to his retirement to Seascale, but he continued to represent Messrs. Pease in business circles in the West Country until recently.

The death is announced of Mr. Henry Walters, aged 62, chairman and managing director of the Tonhir Colliery.

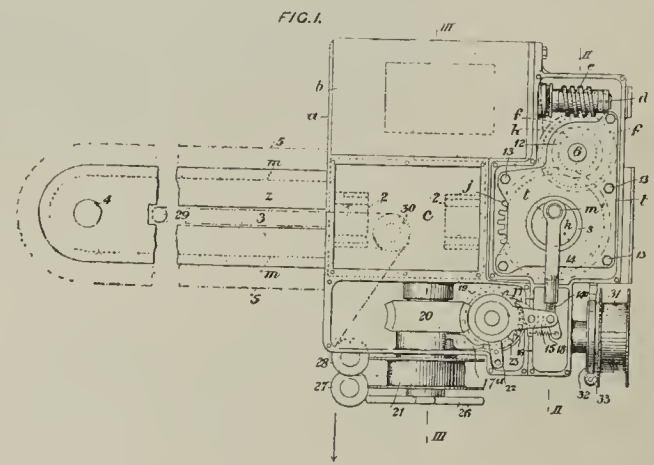
Mr. Ebenezer Lewis, who was engaged in the coal trade at Cardiff for nearly half a century, died recently. His age was 68. During the whole of his career he had been connected with the Troedyrhiw Company, in which for many years his father was a partner.

King's Appreciation of Miners' Patriotism.—Correspondence has passed between Mr. Clement Edwards, M.P., and the King's private secretary, Lord Stamfordham, as the result of the South Wales miners' vote on the military "comb out" question. The first letter ran:—"Buckingham Palace, November 10. Dear Mr. Edwards.—The King has read with interest and satisfaction your letter of to-day, and is very much interested in the striking facts which you have brought to his notice in the South Wales Miners' strike. These show how patriotic the miners have behaved. His Majesty feels that the results are in no small degree due to the fact that you have brought the question to his notice.—Yours very truly, (Signed) The King." A subsequent letter stated that "His Majesty is very much interested in what you say as to the miners for their fighting comrades."

ABSTRACTS OF PATENT SPECIFICATIONS
RECENTLY ACCEPTED.

109088. *Improvements in Hoists for Charging Blast Furnaces, etc.* T. G. Wrightson, F. M. Ringquist, and Head, Wrightson and Company Limited, Teesdale Iron Works, Thornaby-on-Tees. — This invention relates to improvements in hoists especially adapted for charging blast furnaces. In such hoists a carriage which is raised and lowered in or upon a hoist frame supports a skip or bucket. According to this invention, the skip is connected to one end of a toggle lever whose other end is pivoted to the carriage, and a guide is provided on the hoist to control the movement of the toggle lever. The carriage may consist of two cross heads of the width of the hoist frame, connected together by the toggle lever, whose movement is controlled by means of the guide on the hoist. The hoisting rope is connected to the lower cross head, from whence it passes over a pulley at the top of the hoist frame to the winding drum. The rope from which the skip is suspended passes over a pulley on the carriage, and is connected to the lower cross head, to which is attached a rope led to and wound on the winding drum, but in the opposite direction to the hoisting rope, so that as the hoisting rope is wound up, this rope is paid out. As the carriage is hoisted the cross heads are held apart by the toggle lever, movement of which is prevented by the guide until the carriage reaches the top of the hoist, when the pivot of the members of the toggle lever is unsupported, thus allowing the lower cross head to approach the upper and the skip to be lowered by its own weight. (Two claims.)

109092. *Improvements in Coal-Cutting Machines.* F. E. van Slyke, Slingerlands, Albany County, New York. — This invention comprises improvements in coal-cutting machines. The object of the invention is to construct a compact machine of relatively light weight and small dimensions which is particularly suitable for use in cutting in headings or short faces, but which can be used in other places. Fig. 1 is a plan of a coal-cutting machine constructed according to these improvements. *a* is the framing or casing comprising a chamber or compartment *b* containing the motor, which may be an electric motor, in which case the chamber *c* may be used for containing the starting resistances and other accessories. A compressed air or other pressure fluid motor may be used in place of



an electric motor. The shaft *d* of the motor is fitted with a worm *e*, which gears with a worm wheel *f*, which is keyed to, or in driving connection with, a vertical hollow shaft *g*, upon which is formed or secured a toothed wheel *h* meshing with a toothed gear *j* on the vertical shaft *k*. The sprocket wheel *l* for driving the cutter *m* is secured at the lower end of the shaft *k*. Now, owing to the double speed reduction, firstly, between the worm *e* and worm wheel *f*, and, secondly, between the gears *h* and *j*, the desired speed ratio between the motor shaft *d* and the sprocket wheel *l* is obtained without employing a large diameter worm wheel. The shaft *k* is of large diameter, as shown, which not only enables a more satisfactory bearing to be employed, but enables a crank pin *m* to be mounted eccentrically without cranking the shaft or fitting a crank arm thereto. This pin *m* drives the pawl and ratchet mechanism which feeds the winding drum, as hereinafter described. The toothed gear *j* comprises a toothed ring mounted on a flange *n* projecting from an annular shoulder *o*, which serves for stepping the shaft *k* in and on its lower bearing sleeve *p*. A tubular upstanding projection *q*, formed on the floor of the casing or framing *a* supports the bearing sleeve *p*, the latter being merely inserted and resting with its upper flange *r* on the upper edge of projection *q*. The shaft *k* is inserted in bearing sleeve *p*, its shoulder *o* resting on the flange *r*, and a bearing sleeve *s* is placed on the upper part of the shaft *k*, a cover plate *t* being applied for keeping the sleeve *s* in place, the said plate *t* having a downward tubular projection *u*, which engages a flange at the bottom of the sleeve *s*. The plate *t* also serves to secure the wheels *h* and *f* in place as will appear. The sprocket *l* is loose on a bearing *v* on the reduced lower end of the shaft *k*, and a clutch *w* is provided for coupling the wheel *l* to or uncoupling it from the shaft *k*. An annular recess *x* is formed in the lower end of the large diameter portion of the shaft *k* to receive the upper part of the clutch member when the latter is raised to uncouple the sprocket wheel *l*. The cutter arm is built up of top and bottom plates, the arm being mounted upon supports depending from the floor of the chamber *c*. The chain line *5* indicates the path of the tips of the cutters on the chain. At the commencement of a cutting operation the cutter must be entered into the face, and for this purpose the machine is brought up to the face so that the sprocket *l* is close thereto. A post *29* is driven into the floor, or otherwise suitably fixed, the said post passing through the longitudinal opening *3* in the cutter arm. The haulage rope is then passed from the drum *21* around the pulley *28*, and from the latter it passes to and around a pulley *30* just behind the front support *2* of the cutter arm, and lastly it passes to and is made fast on the post *29*. Consequently, if the motor is started and the clutch *w* is engaged with the sprocket *l*, the cutter chain will be driven, and by then tightening the cone clutch *25* by means of the hand nut *26*, the cutter arm will be hauled into the face as the cutters cut into the same. When the cutter arm has been entered to a sufficient extent, the motor is stopped, the post *29* is removed, the rope is removed from the pulleys *30* and *28* and is passed around the pulley *27*, and made fast to a post lying in the direction of the arrow in fig. 1, so that upon re-starting the motor the cutter will cut its way along the face under the haulage action of the drum *21*, as will now be readily understood. During this haulage there is, as is well known, a tendency for the machine to slew round so that

the cutter arm will not remain perpendicular to the face, unless a restraining means be provided. A drum is therefore mounted on the rear of the machine, and is fitted with a friction brake device, the retardation effect of which is adjustable by means of a hand screw. A rope is taken from this drum in the opposite direction to the direction of haulage, and is made fast to a post, so that by properly tensioning this rope and adjusting the brake device, the requisite restraint is applied for keeping the cutter arm perpendicular to the face, in which the cut is being made. (Six claims.)

109093. *Improvements in Blast Furnace Charging Plant.* H. S. Bleckley, T. Atherton, and E. Massey, of the Pearson and Knowles Coal and Iron Company Limited, Bewsey-road, Warrington. — This invention has for its object an arrangement of plant for feeding blast furnaces with ore and coke. The apparatus is designed with a view to avoiding the heavy losses which at present occur through breakdowns preventing the furnace being fed for a time, and also to make the whole plant more convenient, and to allow of a very considerable number of wagons of material to be in attendance at the furnace in case of a temporary breakdown at the bins or coking plant. The mode of action is as follows: A skip on its wagon having been brought along the rails, is hooked on to the hook and lifted from its trolley. It is then carried to the first of the chutes containing the ore required. The man in the cabin actuates the motor, which turns the crank disc, and this actuates a hook which lifts another, and thus allows the ore from that particular chute to fall into the skip. The moment the skip over-balances, the main actuates the motor, which instantly allows the rod to fall, closing the chute. He then traverses the gantry until it comes to the next chute that has the ore required, when the like action is carried on until the various ores are all placed in their right quantity in the skip. The skip is now traversed on to the wagon on the line, while another wagon with an empty skip takes its place. From the line the first wagon is brought to the elevator, when it is tipped into the furnace in the usual manner. (Seven claims.)

109582. *Concrete Blocks for Lining Pit Shafts, etc.* F. Walker, 62, Chequer-road, Doncaster. — This invention relates to improvements in the construction of concrete building blocks of the stepped T-shaped type, in which the bond is obtained by inverting alternate blocks. Fig. 1 is a sketch plan of concrete walling for a pit shaft in accordance with the invention, showing more particularly the grooves applied to both the vertical and the horizontal jointing faces; fig. 2 is a front elevation (on a larger scale) of two complementary courses of the blocks. The blocks *A* are formed in steps *B* on each side, narrowing from a wide base upwards, so that, when two blocks are laid, an intermediate inverted block will fill up the space between the aforesaid pair of blocks. The blocks *A* are all the same shape and pattern, and have at the main horizontal joints a series of ordinary iron dowels *C* for which spaces are provided in the moulding of the blocks. The steps *B* of the blocks are flat in a transverse direction, and are slightly tapered in an outward direction both vertically and horizontally. A vertical iron blow pipe *D* is placed centrally in the mould of each block, for forcing in liquid cement to fill up the stepped grooved joints and also the flat grooved joints between the blocks, these central vertical pipes being readily accessible and discernible to show when the joint is completely filled with the cement. A horizontal blow-pipe *E* is also inserted in each block, to enable the spaces *F* between the back of the blocks and the outer lining to be similarly filled up. A laterally connected series of parallel uniform internal flat grooves *G* are provided on all

FIG. 1.

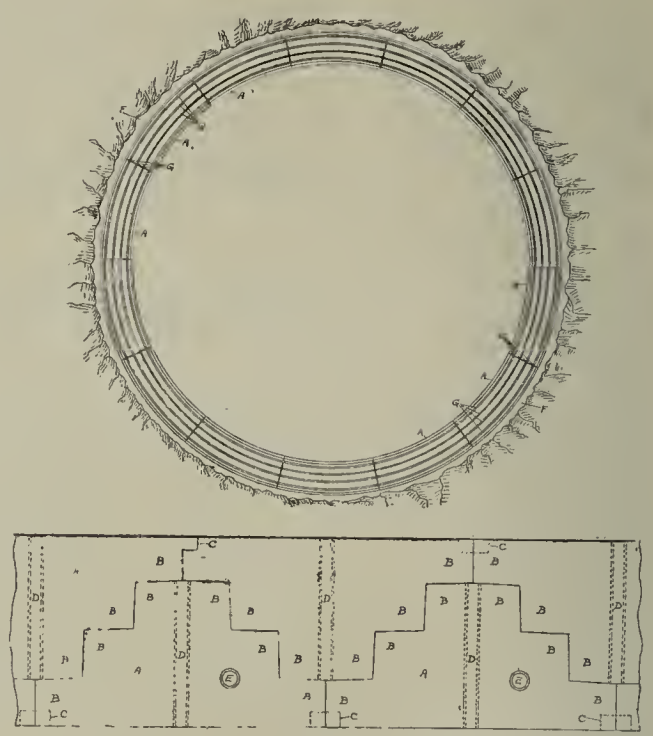


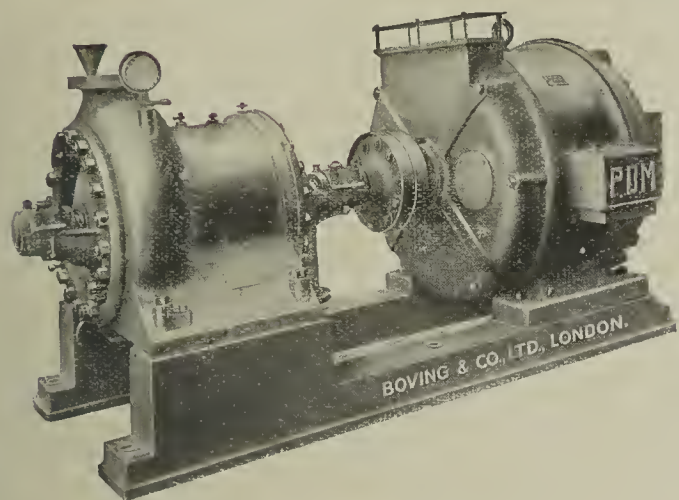
FIG. 2.

the jointing faces of the stepped blocks, both vertical and horizontal, the spaces being filled up as aforesaid by forcing in liquid cement, thus consolidating the whole circle or course of blocks as it is built up. If desired, the walling may be strengthened by courses of wider blocks *A* at convenient intervals and at the top; whilst in case it should be necessary to build a pit shaft lining from the top downwards, the lining wall may be further strengthened and reinforced in the ordinary manner by bolts *H* connected by ferrules *I* and passed vertically through holes moulded in the blocks and adapted to continuously connect the successive courses of blocks together. (Three claims.)

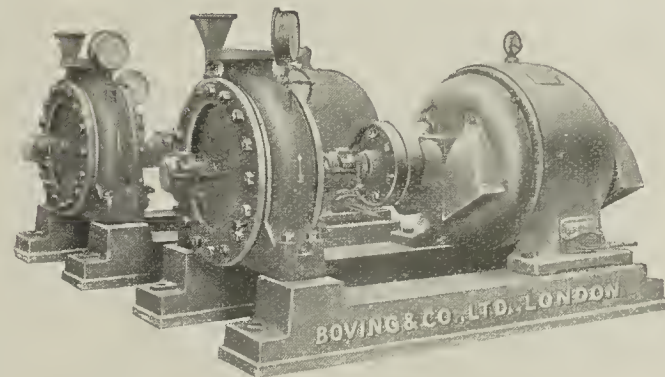
109297. *Improvements in Electrical Precipitation of Suspended Particles from Gases.* A. Mond, 19, Southampton-buildings, Chancery-lane, London, W.C. (Communicated from W. A. Schmidt, Los Angeles, California.) — This invention relates to improvements in the process for subjecting gases to the action of an electric discharge, in which the discharge is used for separation of suspended particles from the gases. In order to prevent sparks or voltaic arcs in apparatus for obtaining silent electric discharge for electro-chemical work, such as the molecular decomposition of gases and vapours, the current is distributed over a certain number of sharp-edged conductor bars arranged in a circle in such manner that the total length of the discharge field is in exact proportion to the strength of the principal current, and the distance from pole to pole

BOVING TURBINE PUMPS.

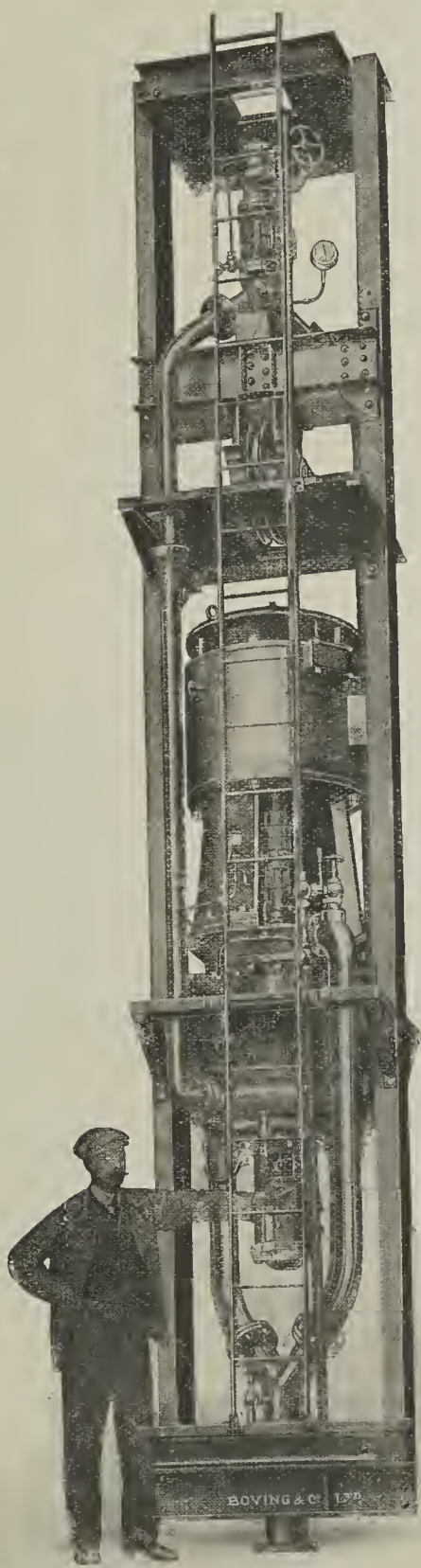
THE MOST RELIABLE AND EFFICIENT
BRITISH MADE PUMP.



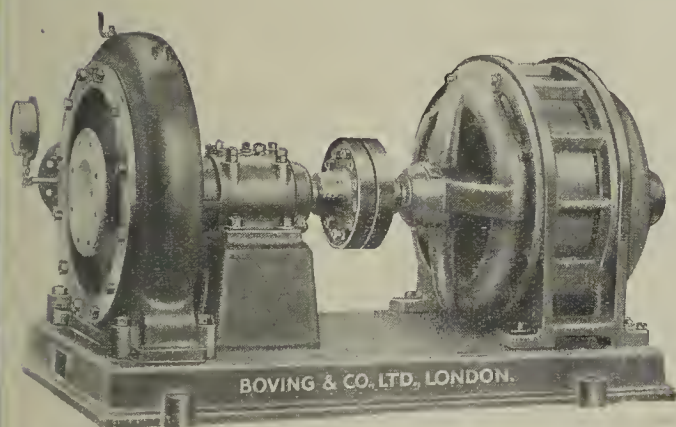
LARGE MINING PUMP
(6 Repeat Orders).
860 g.p.m.
755 feet.
1,450 r.p.m.



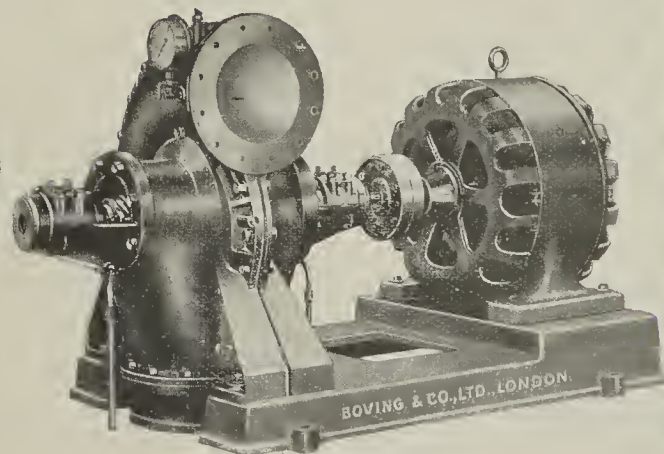
2 SMALL MINING PUMPS.
220 g.p.m.
328 feet.
2,900 r.p.m.



2 SINKING PUMPS
as shown (Repeat Order).
333 g.p.m.
475 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Medium Pressure.
800 g.p.m.
125 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Low Pressure.
3,000 g.p.m.
40 feet.
725 r.p.m.

BOVING and CO. Limited,

HYDRAULIC ENGINEERS,

Telegrams :
"JENORTEN, WESTCENT."

Telephones :
HOLBORN 6420 (3 lines).

56, Kingsway,
LONDON, W.C. 2.

The Possibility of Coal in Tunis.—In a note presented to the Académie des Sciences, Paris, Messrs. Gentil and Joleaud report the results of their investigation of a small lenticular deposit of coal in Tunis, nine miles north-northeast of Medjez-el-Bab railway station, and near the junction of the Oued and Melah and Oued-el-Kranga rivers. The deposit is about 22 yds. long and 11 yds. wide, and has yielded 20 tons of coal of the following average composition: Moisture, 1.967 per cent.; volatile matter, 48.49 per cent.; fixed carbon, 49.50 per cent.; ash, 0.976 per cent.; and furnishing 52.29 per cent. of coke. The coal itself is black, hard, bright, very pure, and has the sp. gr. 1.55. Though enclosed in marls of the albian formation, it would appear to have been torn off from some coal measure deposit and transported by some dislocating force, and subsequently become encrusted with albian marls. It must have been derived from some still unknown autochthonic zone to the northward; and all the conditions indicate that this parent deposit must be one of considerable size.

THE COLLIERY GUARDIAN

AND

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Points on the Electrification of Collieries.*

By A. C. NELSON.

No mining district in Great Britain possesses the electrical advantages of Northumberland and Durham, which have at disposal the resources of one of the largest coal-power electric supply companies in the kingdom which, on account of its size, can offer current to its consumers at a price per unit that no individual colliery can compete with in the absence of some special advantage, such as waste heat from coke ovens, etc. Even this advantage of cheap fuel does not prevent some of the pits from having a connection with a supply company from which to obtain their surplus power rather than extend their generating plant by means of coal-fired boilers.

The two counties mentioned are separated by the river Tyne and, strange to say, this river is the point at which, geologically, the coals change, although they are in other respects the same seams and can be easily identified. The coals on the north side of the river are hard steam or non-coking coals, whereas those on the south or Durham side are the best coking coals obtainable. This is more interesting to electricians than it appears at first sight. The fact of there being no coke ovens north of the Tyne, in Northumberland, opens the door to the power supply company, and practically all the Northumberland pits will finally find it to their advantage to take their supplies of current from this source. In Durham, many of the pits have coke-oven plants, from which a large and valuable amount of waste heat is given off. The cost of fuel in the production of power is, approximately, 70 to 75 per cent. of

by using our special mining knowledge to increase the output, so does the supply company specialise in the production of a cheap supply of electricity.

What seems the best explanation of this statement was given in an American electrical journal, which began by saying "Either a two-and-a-half billion dollar mistake has been made by some of the ablest business brains in the United States or else the central station principle of power production is right and the isolated plant principle is wrong," and proceeded to demonstrate that since the first business of a colliery is to get coal, all the time a manager spends in looking after the power plant, might be more profitably occupied in increasing the coal output. It also pointed out that a central station has a better load factor and diversity factor than an isolated plant and can generate at a lower first cost, whilst from the financial side, any money borrowed for erecting power plant by a colliery could be utilised to better advantage in the winning of coal. The argument ended by giving a cost per kilowatt of an isolated plant at a large colliery compared with the cost when connected up with a central station supply, and it shows 35 per cent. saving in favour of the latter.

During the last six years the author has been constantly engaged in substituting electrical plant for steam plant, and has had considerable opportunity of proving the above American arguments. The pits with which he is connected produce non-coking coal, and they decided to avail themselves of the central station supply. The first steps of the electrification were

Also, the boilers form a considerable portion of the average colliery plant, and, therefore, part of the agent's, manager's, engineer's and enginewright's time is occupied in keeping them in order, and some charge should certainly be made for this. It is also found that depreciation and maintenance of boiler houses, electric light wiring, lamps and current for same are generally left out in these comparisons. The cost of water supplied to boilers should be charged, if taken from outside sources. If from one's own supply, then depreciation, maintenance and cleaning, costs of reservoirs, ponds, etc., should be included. It also should be remembered that the boilers, with their necessary ash heaps, take up a large part of the colliery site, and that these ashes have to be conveyed in their turn in specially constructed iron wagons along a railroad to the ash heap, generally by means of an engine. Large stocks of spares and stores have to be carried for steam plant, and the insurance of these and the plant is usually omitted. As all these things are eliminated by taking current from a supply company, they should be charged against the steam. At the actual machinery there is a considerable saving in oils, packing, grease, etc.

In electrical winding there is a saving of wear and tear on the ropes and cages, and the maintenance cost of the shaft guides, conductors, etc., is reduced, due to the steadier working of electric winders. This also applies to electrical haulages. Greater simplicity of control is obtained by winding electrically, and consequently, enginemen being easily trained, they are not the masters of the situation, as with steam winders. The maintenance of plant, when electricity is used, is reduced to a minimum, and a point of importance which should not be lost sight of is that whilst a steam engine may work inefficiently for weeks without the engineer being aware of the fact, with electricity it is at once

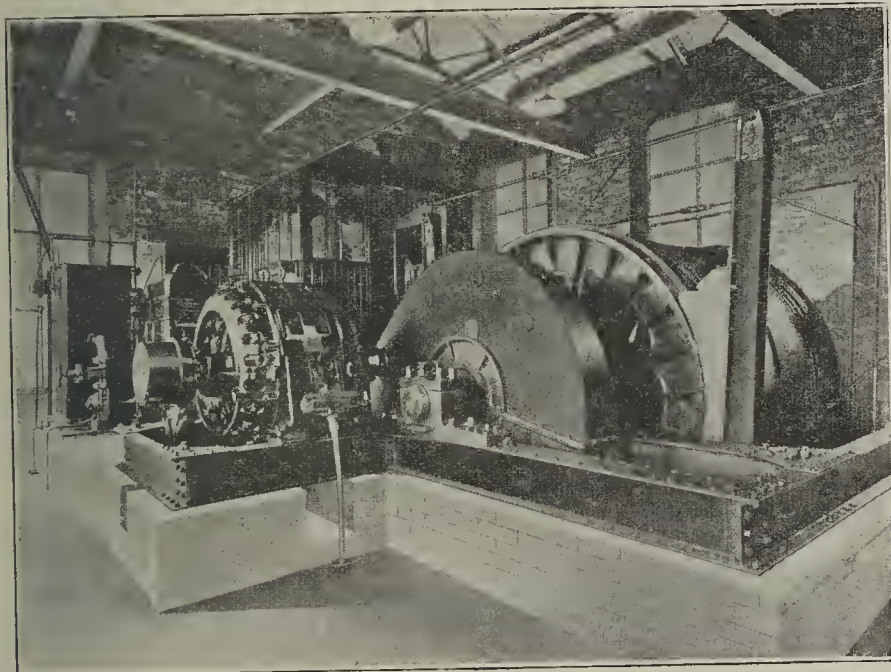


FIG. 1.—EDWARD PIT GEARED ELECTRIC WINDER.

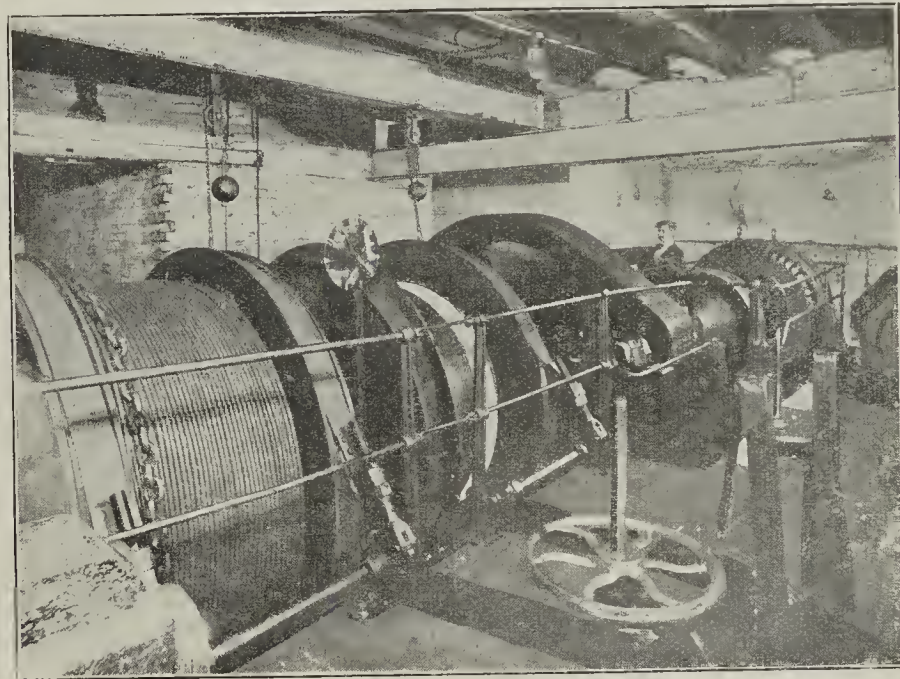


FIG. 2.—HEBBURN "C" PIT UNDERGROUND HAULAGE.

the total cost, and where, therefore, there is a quantity of waste heat available, it is obviously the right thing for the colliery company to make use of it for power production. Even then the best procedure to adopt seems to be for the coal company to make an arrangement with a supply company to generate current from this waste heat for them, because a supply company, being experts and having a greater diversity of load, are able to get the most out of it. This has been done in several cases in Durham, and the advantages of such an arrangement are that the coal company, by the help of the supply mains, are assured of a continuous supply in the event of a shortage of waste heat occurring, and, at the same time, have a market for any surplus of this, as it can be converted into current and pumped into the supply mains.

In considering what supply to adopt, it will be seen from the above that the electrical engineer in Durham has more advantage in generating his own supply than his northern colleague, but many of the pits in Durham take large supplies of electricity from the supply company, and the process of changing over from steam to electricity is making rapid strides. In Northumberland, the colliery owners are rapidly appreciating the fact that electricity is far more economical than steam. In the author's opinion, a steam coal pit which is in close proximity to a good central supply of electricity has only one economical way of acquiring current, and that is to purchase it. For a Northumberland colliery to start and generate its own supply of electricity, except in special cases (other than a few isolated cases of exceptional circumstances), would be a complete waste of time, in the sense that this time would have been far better spent in more directly trying to increase the output of coal. In the same way as we reduce our costs

directed in cutting off the low-pressure boilers and the naturally inefficient engines working from them. In each case comparative prices and costs were taken of up-to-date steam plant and electrical plant, and it was found, in most instances, that the electrical plant had the advantage. Now, it is in the taking out of these comparisons that the majority of colliery engineers make vital mistakes, and it is, of course, only to be expected when one considers the fact that, with the steam power applied to mines, he has the benefit of his own experience added to that of countless colliery engineers who have gone before him, whereas, with electricity applied to mines, he himself is practically a beginner, and there are very few colliery electrical engineers who have had any long experience.

In comparing costs of electricity taken from a supply company with those of steam plant, colliery engineers are very apt to err in favour of the latter. Practical experience has shown that the depreciation and maintenance charges for steam plant are very much under-rated in comparing the two. For instance, it is altogether wrong only to take the cost of the coal used, plus cost of firemen and cost of repairs and depreciation on the actual boiler plant. One should remember that not only are the boilers used for making steam, but the depreciation, maintenance and repairs should be taken on steam pipe ranges, water pipe ranges, boiler pumps and joints of same (which require more renewals and repairs than electric cables). Special railway sidings, wagons and bunkers are necessary for supplying coal to boilers; these need repairs and renewals, and the sidings have to be regularly cleaned, due to coal falling from wagons. Interest should be charged for coals lying in bunkers, and besides the actual wages of the fireman, his compensation, insurance and colliery house and coals should not be forgotten. These houses could be utilised for extra coal producers. Charges should be made for the locomotive, driver and shunter taking coals to boilers.

revealed by the meters, and can be attended to immediately. The apportionment of costs of power for any individual part of the plant can be ascertained with the greatest ease where electricity is used.

The efficiency of electricity and its elasticity of application will lead to its gradual displacement of all other power, and the sooner we realise this fact the sooner we shall be able to overcome successfully international competition. The industrial development of this country is intimately connected with the development of the use of electric power. Large central supply stations, efficiently managed, can, owing to the diversity of loads, do more to help this industrial development forward than any individual, and our Board of Trade have recognised this and are taking steps to remove political and artificial obstruction so that consumers may have the benefit of a cheaper power supply.

Installations at Wallsend and Hebburn.

The plant which has been installed at the Wallsend and Hebburn Collieries during the last few years is approximately 13,000 h.p., and the amount of current used is 11,000,000 units per annum.

There are two large duplicate direct-coupled winders, and, at the present moment, a third is being installed. All the parts of the three winders are interchangeable. The particulars are as follow:—Motor: 730/1,950 h.p. three-phase induction type, with wound rotor and slip rings, 50 r.p.m., which is direct coupled to shaft. Depth of shaft, 1,080 ft.; weight of cages and slings, 86 cwt.; weight of tubs, 6 tubs at 6 cwt. each, 36 cwt.; weight of coal per wind, 60 cwt. to 72 cwt. (we have 9 cwt., 10 cwt., and 12 cwt. tubs); weight of rope per yard, 14 lb.; diameter of rope, 1.67 in.; class of rope, improved patent plough steel, Lang's lay; number of tubs per wind, six; tons wound per hour, 160 to 180, according to tubs; time of winding, 50 secs.; time of changing, 10 secs.; number of decks per cage

* Paper read before North of England branch of Association of Mining Electrical Engineers on November 24.

three: type of guides, steel rail; voltage at motor terminals, 2,750 volts; cycles, 40; amperes, accelerating, 175; after six revolutions, 175; amperes, steady, 140 to 170; units per wind, 5.7; units per ton, 12.5. —Makers guarantee that the total energy consumed per wind, including auxiliary, but not changing decks, shall not exceed, when raising 60 tons of coal:—A, 874 ft. shaft, 4.85 units; B, 1,100 ft. shaft, 5.6 units; C, 1,221 ft. shaft, 6.2 units. Drum, parallel, 12 ft.; number of turns on scroll of drum, 28 turns of rope on drum and three dead turns; ratio of gearing, direct; type of controller, type L R 7 B liquid with fixed electrodes, electrolyte being circulated by a pump and cooled by water circulation; makers of winder, British-Westinghouse Electric and Manufacturing Company Limited; life of ropes, over 3½ years.

At the Edward Pit a small geared winder (fig. 1) of the following dimensions has been installed:—Motor, 125 b.h.p. normal, 250 b.h.p. maximum, 230 r.p.m., 2,750 volts, three-phase, 40 periods.

The winding engine is designed for raising a net load of 30 cwt. from a depth of 834 ft. at a maximum speed of 660 ft. per minute. Drum speed, 23.3 r.p.m.; motor speed, 230 r.p.m.; drum, 9 ft. dia. on tread by 8 ft. wide. Power Plant Company's gearing, machine cut double helical staggered teeth, cast steel spur wheel, forged steel pinion 15 to 149 teeth, enclosed in an oil-tight casing.

Although the author's experience has been mostly with large direct-coupled winders with parallel drums, he is very favourably impressed with the work of this small geared winder. The advantage of eliminating the gear as a source of breakdown must not be forgotten, but the efficiency of gearing has so increased during the last few years that this point can now be ignored with safety and, providing that simultaneous decking is possible, a geared winder with conical drum is better practice. With geared winders the motor does not require to be so massive, and the starting and stopping movements are more simple. An interesting fact which has developed in the use of electric winders is that the life of the winding ropes is considerably increased. In the case of the first winder put in, it was found that, although the old seam winder had a 22-ft.

exhaust and closes the intake valves of the air engine, which allows the switch to fall to an open position. By this method of switching, positive movement is obtained, no half-measures being possible whereby the operator can cause any arcing at the contacts; and the result has been that, since these switches were installed, there is not the slightest trouble and the contacts have only to be inspected, cleaned, and renewed (where necessary) once each week and the oil needs changing only once in six weeks, which oil is filtered and left to settle until the next change, when it is used again, new oil only being used to make up.

For the sinking of one of the Rising Sun shafts 22 ft. diameter, 140 fms. in depth, it was decided to use the permanent electric winder and switch gear and, although the sinking contractor was very dubious at the commencement, he was very soon more than satisfied with the results. Water winding to the extent of 500 gals. per minute was dealt with by the winder during the sinking. The conditions of sinking with an unbalanced load are a severe test on switch-gear, but we had no trouble whatever. The cost of maintenance on these switches for 12 months winding coal is as follows:—46 contacts, £19; 10 contact springs, 7s.; 66 gals. new oil, £10 14s. 6d.; 80 lb. white waste, 13s. 6d.; and time, £4 5s.; total, £35.

With regard to the greater safety of electric winding, as compared with steam winding, when a steam winder is in motion the breaking is, in some cases, done by putting the steam against the winder. If this is done too severely, it might easily draw the rope from its socket and precipitate the cage to the pit bottom. In electric winding the switches can be set to do easily the ordinary braking, but would trip in the event of a too-severe application. The smoother running and more regular speed of these winders make them easier to handle, with a minimum of braking. The same switch setting makes the operator use his brakes for all ordinary purposes, only using reverse current when absolutely necessary. This, of course, means economy of power, and is a point in favour of electric winding.

Underground Haulage (fig. 2).

It is in this class of work that electricity, owing to the intermittency of the work and the distance from its

Wallsend Colliery—Main and Tail Haulage.—Two drums 5 in. by 2 ft. 6 in. wide. Gearing, one cast steel spur wheel, 87 teeth, one pinion, 19 teeth, 4.5 to 1. One rope wheel, 6 ft. diameter. Proportioned to give a speed of 7.8 miles per hour. Motor, 150-h.p., 575 r.p.m.

Rising Sun—Electric Haulage, Rope-Driven.—Two drums, 5 ft. by 2 ft. 6 in. Gearing, cast iron, with machine-moulded doublehelical teeth, proportion 4½ to 1. Belt pulley, 7 ft. diameter, grooved for seven 1½ in. diameter ropes. Belt pulley on motor, 30 in. diameter. Motor, 150-h.p., 575 r.p.m.

Rising Sun, 150 H.P. Main-and-Tail Haulage.—Two drums, 4 ft. by 22 in. wide. Gearing by the Citroen Gear Company. Single-reduction gear, consisting of cast steel spur wheel, 197 teeth. Pinion, forged mild steel, 12 teeth, 16.3 to 1. Proportioned to give a rope speed of six miles per hour. Motor, 150 h.p., r.p.m. 575.

The above three motors are interchangeable.

Ventilation.

Some very important and interesting changes have been made in the arrangement of the systems of ventilation, the old arrangement, more particularly in the Wallsend group, having left much to be desired. Of the pits, "G" and "H" are the oldest workings. The Edward Pit lies about 1¼ miles N.N.E. of these and the Rising Sun Pit one mile due west of the Edward Pit. A fifth shaft, the Bigge Pit, about 500 yards west of Edward Pit, was not at this time in use, the walls having fallen in and the shaft become blocked. Of the pits named, the Rising Sun and the "H" Pit were downcasts and the "G" and Edward Pit upcasts. At the first-named, the fan consumed 310-horse power and the water-gauge stood at 7½ in. The power consumption at the Edward Pit fan was 225-horse power and the water-gauge 8½ in. Under the best conditions, there would naturally be a strong pull on the fans, a trouble aggravated by the fact that both upcasts were main winding shafts. But at certain points the fans were to some extent pulling against each other, the inevitable result being that the working places on the side would receive partly-fresh and partly-used air. It was decided to adopt the only rational solution, and have an independent system of ventilation for each of the collieries,

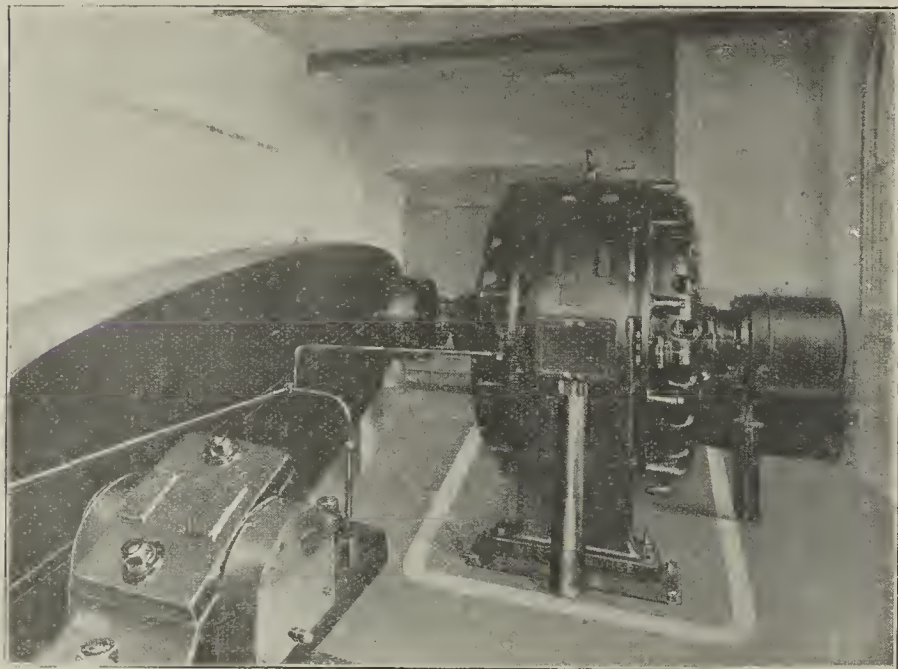


FIG. 3.—WALLSEND ELECTRIC FAN DRIVE.

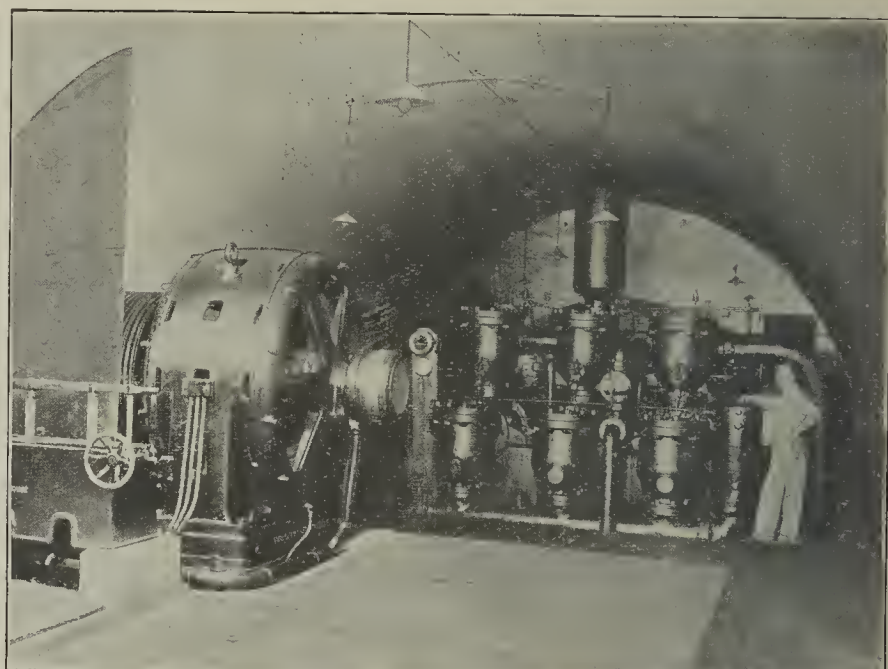


FIG. 4.—No. 1 RAM PUMP (HEBBURN).

drum and the new electric winder only 12-ft., the life of the ropes was increased from 2 years 1 month to 3½ years, at which time it had to be taken off to comply with the Coal Mines Regulation Act, and, as the rope was in excellent condition when taken off, it was decided to apply to the inspector of mines to get this regulation extended in favour of electric winders. The above is explained by the smoother running of electrical plant. In the same way that two-cylinder steam engines run smoother than a single-cylinder steam engine, so does a multipolar motor run smoother still, as each pole is equivalent to a cylinder.

The continued stopping and starting of winders makes the switch gear a most important part of an electric winder equipment. The work it has to do is enormous and naturally their first troubles with electric winding started at this point. The first stator reversing switches supplied were not properly constructed for the work they were called upon to do. Being operated by hand and in conjunction with the rotor resistance, which was practically all out at the moment when the switch was closed, if the brake was released at this point the winder raced away at full speed. This meant that the rotor resistance had to be put in circuit again before the brake could be released and the winder set in motion at a safe speed. The result of this was that the switch was sometimes opened again and a fresh start had to be made. This not only lost time in coal-drawing but reduced the life of the switch contacts. Heavy rushes of current obtained at the moment of making switch contact when the rotor resistance was practically all out caused arcing between phases, finally breaking down the insulation. To obviate the above faults, the makers designed and supplied an electrically and air-operated set of stator reversing switches, of ample dimensions for oil and greater distance between phases. Also, provision was made for releasing the gases generated by the breaking of heavy currents in oil. These switches are arranged to operate with the rotor resistance.

The operator only closes a small switch which energises a solenoid on the switch which, in its turn, opens the inlet valve to the oil. On closing the switch. The solenoid remains closed until the switch is required to be opened. On opening of the solenoid opens the

source of power, shows its greatest advantages. For the main haulages it is ideal and, when taken underground, it obviates the abomination of a running set of ropes in the shaft or the alternative of pipes down the shaft. It must not be forgotten that both the ropes and pipes in the shaft are restrictions to the ventilation. For the secondary haulages it also has great advantages. In fiery mines, for auxiliary haulages near the faces, compressed air is safer, and compact hauling engines can now be obtained which have the advantage of not being affected by the dusty or dirty conditions which usually exist in bye at all mines. The author has found that, from large main-and-tail and direct-haulage gears, the liquid type of controller with reversing switches is by far the best. They are slightly more expensive in first cost, but considerably cheaper to maintain. They are also less liable to breakdown, which is a more important point. Some of the haulages installed are as follow:—

Hebburn Main-and-Tail Haulage "C" Pit.—Two drums, 5 ft. dia. barrel, 2 ft. 6 in. wide, power plant steel double helical cut teeth ratio 8.6 to 1, pinion 17 teeth, wheel 145 teeth, motor 240 h.p., 465 r.p.m.

Hebburn "A" Pit Main-and-Tail Haulage.—Two drums, 4 ft. by 2 ft. gearing by Power Plant Co., machine-cut double-helical gearing.

First Set.—Double-helical cast steel spur wheel, 141 teeth, gearing into a machine-cut double-helical high carbon steel pinion, 17 teeth.

Second Set.—One steel spur wheel, 97 teeth, gearing into pinion 40 teeth. This set to give a speed on drum shaft of 23 r.p.m., with 240-h.p. Motor running at 465 r.p.m. One steel spur wheel, 69 teeth, gearing into pinion, 68 teeth. This set to give a speed of 56 r.p.m. on drum shaft with 240-h.p. Motor running at 465 r.p.m.

This haulage is arranged to run at two speeds to enable it to work two heavy inclines and still keep the electrical plant interchangeable with the "C" pit haulage.

Hebburn Main-and-Tail Haulage—Yard Seam.—Two drums 4 in. diameter on head 2 in. wide. One pair Power Plant Company's machine-cut double helical wheels, ratio 7.2 to 1; 380 to 53 r.p.m. to transmit 80-h.p.; consisting of forged steel pinion, c.i. solid wheel, 25 and 179 teeth; 50-h.p. motor, 380 r.p.m.

though, owing to the very large extent of the goaf, it was necessary to exercise the utmost caution during the time the change over was being effected. The "G" Pit, which, as already stated, was the upcast and main winding shaft, has now been converted into the downcast, and the "H" Pit converted into the upcast. The Waddle fan, which was driven by a 310-horse power motor at 7½ in. water-gauge, is now driven by a 65-horse power motor at 2½ in. water-gauge. The stand-by fan at this pit has a Coventry chain drive (fig. 3), to allow it to run at half-speed at week-ends and, at the same time, to allow of a quick change-over to full speed in case of breakdown of main fan. The efficiency of the chain as compared with belt or rope drive is also an advantage in its favour. The Bigge Pit has been opened up and repaired, and now forms the upcast for the Edward Pit. The ventilating plant consists of a Keith Blackman fan, driven by belt from a Westinghouse motor, and is equal to a duty of 50,000 cu. ft. at 3.5 in. water-gauge, but, at the present time, the pit is being ventilated with a power consumption equal to 6.7-h.p. and ½ in. water-gauge. At Rising Sun Pit a second shaft has been sunk, not solely for the purpose of ventilation, but with a view to opening out of the Beaumont Seam. A Keith Blackman fan, belt-driven from a Westinghouse motor, equal to a duty of 200,000 cu. ft. at 6 in. water gauge, has been installed. The power required for present ventilation, however, is 45-h.p. and the water-gauge 1½ in. The Hebburn group consists of three pits, the "A," "B," and "C." Of these, the "B" is a pumping shaft only, "A" and "C" being downcast and upcast pits respectively. Under the old arrangement, both were used as winding shafts. With the better facilities of bringing up coal at the "A" Pit, due to the installation of an electric winder and an arrangement of simultaneous decking, the "C" Pit is no longer used for winding coals but is now entirely bricked up. This has enabled the speed of the fan to be reduced from 330 r.p.m. to 290 r.p.m., with a saving in energy amounting to 774,610 units per annum. It will be noted from the foregoing that, with the old arrangement, coal was wound from no fewer than three upcast shafts, whilst now only the downcast shafts are used for coal, which, apart from the increased factor of safety, is decidedly more economical. Naturally, the

question of safety was the first consideration when the new scheme was decided upon.

The following table gives a comparison of the units of current consumed before and after the change over:—

	Before change.	After change.
Average daily consumption on Edward pit fan, 3,700 units per day, equals, per hour.....	154	—
Average daily consumption "G" pit fan, 5,092 units per day, equals, per hour ...	212	—
Average daily consumption Rising Sun pit fan, 660.72 units per day, equals, per hour	—	27.53
Average daily consumption Bigge pit fan, 100.8 units per day, equals, per hour ...	—	4.2
Average daily consumption "H" pit fan, 1,466.4 units per day, equals, per hour	—	61.1
	366	92.83

A saving is thus shown of 273.17. The net saving over a period of 12 months would, therefore, be equal to 2,392,940 units per annum. Add to this the saving effected at Hebburn Colliery, 774,610 units per annum, and the total saving for the year is shown to be 3,167,550 units per annum. Even accepting the cost of energy at a very moderate figure, the saving effected represents a very substantial addition to revenue.

The application of electricity to fan drives, with the motor connected directly to the fan, is attended with difficulty, owing to the speed of ordinary motors being constant. In the case of motors driving fans through belts or ropes, we have also found that the changing of pulleys to give an increase or decrease in the revolutions of the fan is also, to a certain extent, not altogether reliable. The change has often to be done at week-ends and is hurried, and the results are sometimes hardly what was anticipated. To avoid this, a 150-horse power adjustable speed polyphase induction motor, with seven speeds—namely, 260, 300, 340, 400, 480, 600 and 800 r.p.m. is being installed, and, if successful, it will allow the fan to be run at a speed which is just enough to give an adequate ventilation without running at an over-speed, and will give easy change in speeds to meet week-end and holiday arrangements. It will then give an electric drive with all the advantages of a steam drive, in addition to its own particular advantages. A point in favour of electricity when applied to driving fans is the steady water-gauge which is given by the constant speed of the motor. The fluctuations in the water-gauge caused by drop of steam pressure due to cleaning fires, etc., has sometimes caused inconvenience and danger underground.

Pumping.

Hebburn Colliery.—No. 1 Ram Pump (fig. 4).—Pump 12½ in. by 18 in. horizontal three-throw pump (Pearn), rope-driven, delivering 600 gals. per minute against total vertical head of 1,100 ft.; gearing, cast steel machine-cut wheels; pump shaft, spur wheels, 86 teeth; intermediate shaft pinions, 20 teeth; rope pulley, cast iron, 13 ft. 3 in. dia., 13 ropes; speed, 121-126 r.p.m.; rope pulley on motor, 3 ft. 9 in. dia.; 280-horse power induction motor, 390 r.p.m.

No. 2 pump is a duplicate of No. 1 and both pumps run continuously.

Sulzer Pump.—One horizontal high-lift centrifugal pump, six stage, 1,200 gals. per minute against a head of 1,060 ft. Number of revolutions, 1,170 p.m. Motor 550-h.p., 1,170 r.p.m., 600 volts, fitted with special ventilating fans for drawing cool air through the windings and totally enclosed to protect from water.

The Sulzer pump, owing to its lower efficiency as compared with the ram pump, is only run in case of breakdown. Its advantage as a stand-by is its lower capital cost and saving in excavation for housing the same underground.

Wallsend Colliery.—Sulzer Pump.—One high-lift centrifugal pump, seven stage, 600 gals. per minute against a head of 1,000 ft. and running at 1,170 r.p.m. Motor, 280-h.p., 1,170 r.p.m., 440 volts, fitted with special ventilating fans for drawing cool air through the windings and totally enclosed to protect same from water.

Air Compressing.

Most of the compressors are electrically-driven, and are as follow:—

Wallsend Colliery.—Broom and Wade Compressors.—No. 1 compressor, capacity 1,000 cu. ft. at 80 lb. w.p. Direct-driven from a 200-h.p. motor, 230 r.p.m., four vertical cylinders 14 in. diameter by 14 in. stroke. Cost, £764.

Alley and McLellan Compressor.—Capacity, 400 cu. ft. of air at 70 lb. w.p. Direct-coupled to motor 65-h.p., 440 volts, three-phase, 290 r.p.m. Cylinders, 18 in. by 10½ in. diameter by 10 in. stroke.

Rising Sun Colliery.—Ingersoll Rand Compressor.—Rope-driven, two-stage air cylinders, water-jacketed, horizontal overhead intercooler. Rope wheel, 9 ft. 10 in. diameter, grooved for seventeen 1½ in. ropes. L.P. cylinder 32 in. diameter by 21 in. stroke. H.P. cylinder, 21 in. by 21 in. Cost, £1,963. Capacity, 3,000 ft. of air at 70 lb. w.p. Motor, 465-h.p., 2,750 volts, 330 r.p.m., three-phase, 40 periods.

Edward Pit.—Ingersoll Rand Compressor.—Belt-driven air-compressor, cylinder 12½ in. diameter by 12 in. stroke. Capacity, 250 cu. ft., 60 lb. w.p. Cost, £160. Motor, 60-h.p., 440 volts, three-phase, 40 periods, 750 r.p.m.

Ingersoll Rand Compressor.—Belt-driven, two stage motor, jacketed air cylinders with intercooler. L.P. air cylinder, 19 in. diameter by 16 in. stroke. H.P. air cylinder, 12 in. diameter by 16 in. stroke. Cost, £656. Capacity, 1,000 cu. ft. at 80 lb. w.p. Motor 135-h.p., 230 r.p.m., three-phase, 40 periods, 2,750 volts.

Alley and McLellan.—Direct-coupled.—Capacity, 400 cu. ft. of air at 70 lbs w.p. Cylinders, 18 in. by 10½ in. diameter by 10 in. stroke. Motor, 65 h.p., 290 r.p.m.

Hebburn "C" Pit.—Ingersoll Compressor.—Rope-driven, two stage, air cylinders water-jacketed. Horizontal overhead intercooler. Compressor fitted with rope wheel 9 ft. 10 in. diameter, grooved for seventeen 1½ in. ropes. L.P. air cylinder, 32 in. diameter by 21 in. stroke. H.P. air cylinder, 21 in. diameter by 21 in. stroke. Cost, £1,963. Capacity, 3,000 cu. ft. of air at

70 lb. w.p. Motor, 465 h.p. 6,000 volts., 330 r.p.m., three-phase, 40 periods.

Alley and McLellan.—Capacity, 400 cu. ft. of air at 70 lb. w.p. Direct-coupled, cylinders 18 in. by 1½ in. by 10 in. stroke. Motor 65 h.p., 440 volts, three-phase, 40 periods, 290 r.p.m.

Owing to the inelasticity of the speed of polyphase motors, electrical air-compressing is attended with difficulty of economical regulation, as with electric drives of fans. When the pressure is reached with a steam compressor, the governor comes into action and slows down the engine until pressure is again required. In the case of a motor drive, several types of control were tried with a view to economy when compressor is not fully employed, and it was finally decided that automatic control by contactor gear is the best practice. The following figures, taken on a 3,000 cu. ft. compressor, show the saving to be gained by installing this gear:—The compressor and motor require one-fifth load when running light, therefore the energy consumption would be 81 kw. at a power factor of 0.42; assuming that the cost of current is ½d. per unit, the cost of one hour's running light works out at 2s. 3d. Assuming a six days' week of 144 hours, and that during only one-third of this period the set was running light, then the cost of energy per week would be 48 times 2s. 3d., which equals £5 8s. per week, which represents £280 per annum. Added to this, we get more efficient compression and lubrication as the heated cylinders and bearings are cooling during standing periods.

Screens and Shops.

All the machinery for the screens and shops is driven electrically and on the mit system. In the case of screens, each belt and tippler has its own motor and, as the same size of motor is usually employed for driving shops, the advantage as regards spares is obvious. Each blacksmith's hearth has its own motor, so that the night-shift blacksmith, instead of running a large blower of, say, 5 h.p., runs his own small ½-h.p. blower, and that only when he requires the draught.

Miners' Electric Lamps.

There are at present 1,000 miners' electric lamps of the Ceag type in use, chiefly by the putters. These lamps, although more expensive in first cost and maintenance than oil lamps, justify their adoption for the following reasons:—It is practically impossible with ordinary use to lose your light, as in the case of an oil lamp, which goes out with the slightest knock or fall. This avoids the putter having to walk a considerable distance in the dark to a lighting station, which usually causes some loss of work to the hewers. By their better and more continuous light they increase the output. They reduce accidents and facilitate the repair and replacing of tins on rails. Although the makers claim many other advantages for them, these are the points that appeal to the user. Finally, there is a great future for a good dry-cell lamp for miners. For the relighting of oil lamps underground, there are installed several magneto relighters in the place of sparking coil and accumulator type. This avoids the carrying in and out of the mine of accumulators and of charging of same, and the result is a more efficient relighter, with practically no maintenance cost.

Signals.

To avoid the long, weary trails inbye to put right the battery of Leclanché cells attached to the underground signals, the practice of supplying the shaft and underground signals with current from motor generators and accumulators was adopted some three years ago, with the result that faults are practically nil, and maintenance charges have been reduced to a minimum, whereas, in the days of Leclanché cells, stoppages were numerous, renewals expensive and the relations of the management and electrician always at breaking-point. Some time ago a Sterling shaft-signalling system was installed at one of the pits, and this has been so satisfactory that orders for similar systems have been placed for the other pits. The construction of the apparatus is of the most substantial description and practically unbreakable.

In conclusion, one great advantage of taking a supply from a power company in abnormal times, is that when the pits are idle for want of shipping or from any other cause, such as strikes, etc., the power costs are reduced to a point which no colliery company, either steam-driven or generating its own electricity, can ever hope to achieve.

Workmen's Compensation Act.—Sir George Cave informed trade union leaders who waited on him that he had been considering the advisability of setting up a Commission to enquire into the working of the Workmen's Compensation Act, and consider what amendments were necessary in view of the experience gained. He hoped that this might be possible at an early date, so that the recommendations may be forthcoming before the end of the war. He feared that a suggested amending Bill to increase the rates of compensation all round would meet with hostility at present.

Indian Coal Rationing.—Since the beginning of the present month more direct arrangements have been made for the regulation of Indian coal distribution, to ensure due precedence being given to the demands of the military and naval authorities and the needs of important industries. In substitution of the authority of the committee appointed in Calcutta at the beginning of the year, and to eliminate the delays necessitated by reference to the Railway Board and the Government of India, a Coal Controller, assisted by a deputy, has been appointed, the committee being retained for advisory purposes. The Controller is Mr. G. C. Godfrey, agent of the Bengal-Nagpur Railway, who has been temporarily acting as a member of the Railway Board. The difficulties arise from the output of coal being insufficient to meet both internal demands in these days of quickened industrial output and heavy requirements on the part of our forces in Mesopotamia. The railways have to carry coal in large quantities from the Bengal fields to Bombay and Karachi, sea transport from Calcutta not being available. Efforts have been made to relieve the situation in India by the use of oil fuel on the North-Western State Railway.

SOUTH WALES INSTITUTE OF ENGINEERS.

The South Wales Institute of Engineers has decided to form three associations of engineering students, which, while being an integral part of the institute, are to have autonomous powers of local management. The first of these students' associations was opened at the Treforest School of Mines on Saturday, the 24th inst., by Mr. Hugh Bramwell, the president of the institute, in the presence of Principal Griffiths, D.Sc., F.R.S., University College, Cardiff; Mr. Spence Thomas, managing director, and Mr. W. R. Davies, general manager, Melingriffith Tin-plate Works, Cardiff; Mr. E. Edwards, Treorky (Ocean Coal Company), Mr. D. Hannah, formerly agent to Messrs. D. Davis and Sons; Mr. J. Ray, Treharris; Dr. Simonis, of the Belgian Geological Survey; Mr. J. W. Davison, Great Western Colliery, Pontypridd; Mr. M. Price, secretary of the institute; Mr. H. M. Ingledew, secretary of the School of Mines. Over 90 of the students at the school have joined the association, and during the inaugural ceremony received their certificates of membership.

The CHAIRMAN, Principal Knox, pointed out that papers read before the Association of Students might compete for the Lewis Prizes (founded by the late Lord Merthyr) awarded by the South Wales Institute of Engineers, and he welcomed the latest step the institute had taken in the direction of the co-operative action that was essential to the solution of the great problems which would face them arising out of the world war.

Inaugural Address.

In the course of his inaugural address, Mr. HUGH BRAMWELL recalled the British Society of Mining Students, which he joined in 1878, and which was intended to embrace all young mining students in the whole country. This society existed for many years, and did very useful work, but was dissolved a few years ago. To his mind, the cause of its death was the absence of a centre, a circumstance which led to a lack of interest and co-operation. Now, this could not be said of the students' associations just formed, these being connected with, and in fact part of, the South Wales Institute of Engineers, which had enjoyed a progressive career for 60 years. To belong to such an institution was a kind of hall mark. He strongly recommended to the students the practice of making notes of matters of interest that came under their observation. These would often prove highly useful to them in after years. The engineer who, from his own knowledge, was able to pronounce whether as a mechanical invention, it was good, bad or indifferent, derived this ability largely from long-made careful notes of what he had seen throughout his career, and had thus had impressed upon his memory. He (the speaker) had recently come upon an early note-book of his own, dated 1879 or 1880, relating to a small electrical installation at a Durham colliery for lighting the surface. The memorandum showed there was a small vertical engine driving an Edison-Hopkinson dynamo, the armature being about 9 or 10 inches in diameter, and the lamps Maxim lamps filled with nitrogen. These lamps cost about 20s. each, and were not renewable, but by an arrangement with the makers they could be got for 4s. a lamp if the old one was returned. To have preserved a little memorandum of that kind was surely interesting, and also instructive, when they compared such a lamp with the character and cost of the modern filament lamp. Another piece of counsel he would give the students was that while remembering the great engineering and other things that were accomplished by the old civilisation in the East, mighty things had also been done by the new civilisation, and were still being done. Let the student get a good grasp of these ancient and modern accomplishments, feel confidence in his knowledge and deductions, and be not afraid to state them in his papers to fellow-students in the association.

Election of Officers.

After the presentation of certificates had taken place, the following office-bearers of the new association were elected:—President, Principal Knox; vice-presidents, Messrs. J. Samuel, E. Edwards and W. Davison; hon. treasurer, A. L. Davies; hon. secretary, W. T. Lane. Members of council: Messrs. A. S. Rose, D. Thomas, R. L. Thomas, A. Howell, R. C. Morgans and M. H. Davies.

In moving a vote of thanks to Mr. Bramwell, Principal GRIFFITHS, as one who had had much to do with societies of that kind, commended the new Association of Students just formed by the South Wales Institute of Engineers. As an instance of the practical usefulness of such societies, he mentioned that, when a comparatively young man at Cambridge, he was asked to submit to a small society, called the Science Group, some notes on certain research work, in which he had been engaged in his spare time. At the meeting a distinguished man of science, who had come as a visitor, urged him to send his notes to the Royal Society. This he did, and hence his own scientific career. If it had not been for that students' association, he did not suppose his line of life would have taken the direction it had done. These societies often gave young men their first chance—sometimes difficult and long-delayed. His advice to students was to be not too ambitious in striving after originality, but to study a subject diligently, get a view of it in all its bearings, and write what he knew of it; and possibly, as they proceeded with the task, something new might evolve itself. Anyhow, let them write what they thought of matters they had studied, and hear what their fellow students had to say. In this way, the exchange of views and ideas would prove useful and encouraging. In concluding, Principal GRIFFITHS said he should be happy to come down to the School of Mines to give the students a lecture at any time that was mutually convenient.

Mr. H. SPENCE THOMAS seconded the resolution of thanks to Mr. Bramwell, and extended an invitation to the students to visit Melingriffith Works.

The vote was cordially adopted.

COKE OVEN MANAGERS' ASSOCIATION.

MIDLAND SECTION.

The meeting of the session of the Midland Coke Oven Managers' Association was held on Saturday, November 24, at the Grand Hotel, Shemeld. Mr. J. W. LEE, of Grassmoor, occupied the chair.

INAUGURAL ADDRESS.

The CHAIRMAN, after thanking the members for the confidence they had placed in him, said that it was the duty of a chairman to serve, and one of the duties bringing with it the most anxiety was the preparation and delivery of an address. Even in normal times this would be so, but in these strenuous days it was a most difficult task. Time for its careful preparation was absent, and the noting and collection of the necessary facts and figures was next to impossible. He intended very briefly, therefore, to select from his experiences during the last few months some that he hoped would be of interest and profit to them.

Concentrated Liquor Plant.

Like many of them, he had had to erect and bring into use during the year a concentrated liquor plant as an addition of new plant to the existing stills. The new plant (supplied by Messrs. Newton, Chambers and Company Limited) consisted of a five-tray decomposer of the Brunner-Mond type, two condensers, a liming vessel, an absorber, and necessary tanks, etc. The ammoniacal liquor was fed into the top tray of the decomposer by gravity feed from an overhead tank kept at a constant level. The liquor feed should be free from tar; otherwise the resultant trouble from naphthalene would be very great. No heat was applied to the liquor in the top tray, but provision was made for cooling by water. Since the water had to be passed through lead coils, pit water could not be used, so town water was connected. Theoretically, the temperature of the liquor in this tray should be kept as cool as possible, the limit usually stated being 20 degs. Cent.; but as the quantity of water required to effect a reduction of a few degrees was very great, and as experience had shown that the loss of ammonia from this tray at a temperature of over 45 degs. Cent. was negligible, and was returned to the scrubbers, no water was now being used, and a consequent saving of over £100 per year was being effected.

The temperatures to which the liquor was heated on each tray by means of indirect steam were shown in the tests given. In the bottom tray provision was made for using direct steam, by means of which it was possible to get a higher temperature on the bottom tray, and reduce the sulphuretted hydrogen content of the liquor leaving the decomposer. The liquor from the decomposer entered the stills, and the vapours entered the first condenser. The temperature at the outlet of this condenser was maintained at 92½ degs. Cent. The condensates returned to the stills entering the second section from the top of the "free" still. The ammonia gas entered the liming vessel, bubbling through a seal of milk of lime. After liming, it passed to the second condenser through the absorber to the storage tank. The lime, after use in the liming vessel, bringing with it a quantity of ammonia, entered the top section of the "fixed" still.

The following tests would illustrate the working of the plant:—

LIQUOR TO DECOMPOSER.—TEST NO. 1.

Steam pressure—on main, 140 lb.; on decomposer, 9½ lb.

Direct Steam on Tray No. 5.

Temp.	Ammonia.			CO ₂ .	H ₂ S.
	Degs. C.	Free.	Fixed. Total.		
Feed	40	0.976	0.238	1.214	0.973
No. 1 tray	39	0.976	0.236	1.212	0.946
" 2 "	47	1.059	0.204	1.263	0.940
" 3 "	80	1.051	0.197	1.248	0.529
" 4 "	94½	0.964	0.190	1.154	0.526
" 5 "	100	0.953	0.186	1.139	0.132

Gas from decomposer to foul main—free from NH₃.
"Lime liquor" from lime vessel to stills contained 14.50 per cent. NH₃.

"Run back" from 1st condenser contained:—3.40 per cent. NH₃, 0.48 per cent. H₂S, and 0.46 per cent. CO₂.

The waste liquors from the still contained:—No. 1 still 0.0170 per cent., No. 2 still 0.0019 per cent., and No. 3 still 0.0231 per cent. NH₃.

The concentrated liquor contained:—25.16 per cent. NH₃, and 0.58 per cent. H₂S.

TEST NO. 2.

Steam pressure—on main, 130 lb.; on decomposer, 8½ lb.

Direct Steam on Tray No. 5.

Temp.	Ammonia.			CO ₂ .	H ₂ S.
	Degs. C.	Free.	Fixed. Total.		
Feed	—	0.976	0.146	1.122	1.320
No. 1 tray	43	0.978	0.146	1.124	1.300
" 2 "	46	1.013	0.133	1.146	0.647
" 3 "	68	1.286	0.127	1.413	0.500
" 4 "	93	1.309	0.196	1.505	0.110
" 5 "	99½	0.836	0.167	1.003	0.107

Gas from decomposer to foul main—free from NH₃.

The waste liquors from the stills contained:—No. 1 still 0.0022 per cent., No. 2 still 0.0087 per cent., and No. 3 still 0.0298 per cent. NH₃.

The concentrated liquor contained 24.47 per cent. NH₃, and 0.44 per cent. H₂S.

TEST NO. 3.

Steam pressure—on main, 140 lb.; on decomposer, 10½ lb.

No Direct Steam on No. 5 Tray.

Temp.	Ammonia.			CO ₂ .	H ₂ S.
	Degs. C.	Free.	Fixed. Total.		
Feed	40½	1.058	0.258	1.316	0.996
No. 1 tray	39	1.058	0.258	1.316	0.946
" 2 "	43	1.027	0.248	1.275	0.646
" 3 "	64	1.115	0.250	1.365	0.529
" 4 "	90½	1.197	0.268	1.365	0.506
" 5 "	96	0.296	0.286	1.582	0.168

Gas from decomposer to foul main—free from NH₃.

The waste liquors from the stills contained:—No. 1 still 0.0107 per cent., No. 2 still 0.0022 per cent., and No. 3 still 0.0204 per cent. NH₃.

The concentrated liquor contained 25.34 per cent. NH₃, and 0.58 per cent. H₂S.

The results of these tests are self-explanatory, and needed no further comment, except to point out that, without liming,

on this type of plant it was not possible to produce a concentrated liquor with a sulphuretted hydrogen content of 0.5 per cent.

Repairing Regenerator Brickwork.

In the early part of the year urgent repair became necessary on the chimney of the regenerator ovens, which was found to be badly cracked from the top downwards. Nearly 20 ft. was taken off and rebuilt without interruption to the working of the ovens. Before and after this work had been done, considerable difficulty was experienced on this battery in obtaining the required draught, the air flue and regenerator on the bench side being badly blocked. Water in large quantity had entered the foundations on this side of the battery, and, as a consequence, the brickwork had perished, and, crumbling, blocked up the bottom portion of the regenerator. He had for years impressed upon his students the great importance of building every type of furnace, retort, or oven upon a dry foundation, and taking extraordinary precautions to keep water out. No price was too great to pay to keep water and heated firebrick apart. Whilst there was a certain loss of fuel in drying a wet foundation, a far greater loss resulted from the damage done to the brickwork by water and steam. Add to the physical effect the chemical reactions taking place between water containing up to 200 grains of solids per gallon—chiefly alkaline sulphates—sulphuric acid, and firebrick, and one obtained an explanation of the damage to the chimney, and the blockage of the flues.

The effect upon the firebricks in the regenerator was well illustrated by the samples exhibited on the table. One of them, taken from the top portion of the regenerator, and hardly affected, showed on analysis: Silica, 70.80 per cent.; alumina, 22.62; iron oxide, 5.26; lime, 0.52; magnesia, 0.50; alkalies (by difference), 0.30 per cent.; whilst the specimen showing the final result consisted of sodium silicate, 94.72 per cent.; and silica, 5.28 per cent.

In view of the fact that upon this battery the colliery depended for its supply of gas for power purposes—nearly 750,000 cu. ft. per day—and that failure of supply meant stoppage and serious loss, they were confronted with the problem of cleaning out the regenerator on the bench side, re-filling, and keeping the battery in work. Without going into details, the repairs were done on the turns, the length of the times of working in the flue being determined by the heats, which, of course, had to be carefully nursed. The regenerator was about 160 ft. long, and contained over 180,000 chequer bricks, resting upon nearly 1,000 bottom blocks, these in turn being supported on over 100 walls, containing nearly 9,000 bricks. The supporting walls, bottom blocks, and nearly one-third of the chequer bricks were affected by the action of the water. The whole of the chequer bricks had to be removed, the perished parts dug out, walls and bottom blocks renewed, and the regenerator re-filled with chequer bricks. The work was commenced in April, and, owing to difficulties in obtaining bricks, was not yet finished, but had, so far, been carried out without any interruption of the supply of gas to the colliery power plant, or loss in output.

Coal Washing.

It had been necessary during the year to devote much attention to the question of coal washing. As very little data on the subject were available, some of the results obtained in a Humboldt washer would be of interest. The washer was over 15 years old, but would (except in cost of running) give results equal to some more modern washers. The slacks from the wagon were emptied into a pit, and taken by means of a band conveyor and a bucket elevator to a large screen, where they were sized before washing into ¾ in., ½ in., and ¼ in. The ¾ in. and ½ in. passed straight to the washers. The ¼ in. slack was elevated to a dust screen, and the fine dust removed before washing the ¼ in. slack. The washed ¼ in. slack was carried up an elevator to a conveyor, and passed over a grid to remove some of the water. From there it ran down a shoot to a shaker, where it met the ¾ in. and ½ in., the whole then passing through a grinder before elevation into the bunkers. The dirt from the ¾ in. and ¼ in. washers was mixed together, passed through a screen, and re-washed, to remove any coal left in.

SUMMARY OF RESULTS.

Slacks, etc., to Washer.

	Main.	Deep hard.	Heath-cote.	Tupton Nuts.
Ash	13.34	16.43	12.55	5.65
Volatile matter	29.08	25.10	29.06	31.27
Sulphur	2.85	3.01	2.19	2.01
Dirt in coal (sinking at 1.45)	23.14	26.21	21.54	5.98

After Screening—Before Washing.

	¾ in.	½ in.	¼ in.	Dust.
Ash	11.64	19.54	26.56	22.40
Volatile matter	30.02	25.02	22.94	19.96
Sulphur	2.35	2.43	2.98	2.65
Dirt in coal (sinking at 1.45)	19.34	21.74	32.82	33.31

After Washing.

	¾ in.	½ in.	¼ in.	Dust.
Ash	3.70	5.21	8.87	—
Volatile matter	34.13	31.12	30.98	—
Sulphur	2.07	2.18	2.38	—
Dirt in coal (sinking at 1.45)	3.21	3.85	8.45	—
Coal in dirt	3.35	22.25	8.83	—

After Dirt Rewasher.

	¾ in.	½ in.	¼ in.	Dust.
Ash	—	4.40	3.75	—
Volatile matter	—	33.65	33.40	—
Sulphur	—	0.03	2.11	—
Dirt in coal (sinking at 1.45)	—	—	3.56	—
Coal in dirt	—	3.94	3.15	—

DISCUSSION.

Mr. J. T. PRICE (Manvers Main) said he had a decomposer similar to Mr. Lee's, of the Brunner-Mond type. He was assured by the makers' representative that the coils would last seven years, but as a matter of fact one of them did not last seven days.

It was not a question of too high a steam pressure, because they had a reducing valve, and never got above 9½ lb. to 10 lb. Now, they were getting as good results without the coils as they did with them.

Mr. LEE said that in their case that would be very difficult, because their stills were below the capacity required for the plant. The number of ovens had been increased from the original 50 to 110, and up to within the last year the ammonia scrubber plant and the ammonia plant were of the original size. The coils were tested at 35 lb. pressure, and up to now they were quite sound. In reply to a further question by Mr. PRICE, Mr. LEE said the difference in the lime consumption compared with sulphate was practically 12½ per cent. more. The amount of ammonia which the vessel returned to the still was a real difficulty. At first there was a good deal, because the temperature was very low, but now he had put in a little steam jet to assist in maintaining the temperature of the lime vessel. The gas entered that vessel at 92½ degs., and dropped down to whatever they allowed it to reach—actually it got down to about 85 degs. even with the jet on. The greater difficulty that he was up against now concerned the absorber, which had no head room. It was supported on cross girders from the wall, and on pillars. Only by extraordinary means could he remove the pillars from the bottom, as he could not support it very well without, and the absorber was blocked.

Mr. G. HEDDEN (Parkgate) said it seemed to him that Mr. Lee was adding CO₂ and H₂S again to the liquor passing from the decomposer back to the scrubbers.

Mr. LEE said he had not troubled much about the CO₂, because actually there was very little difficulty in removing it. He had examined the concentrated liquor that morning, and found that it contained 25.4 per cent. of ammonia, 0.39 per cent. of H₂S, and 1.366 per cent. of CO₂. The H₂S content, curiously enough, had not increased very much in the crude liquor going to the decomposer, but what would happen was this: One night the return pipe taking the gases from the top of the decomposer to the foul main was blocked (due to naphthalene), and they broke the pipe, and let the products go into the air. On the waste gas flue they had a recording pyrometer, and within half an hour of the pipe being broken—of course, the valve was closed as well, so that nothing was being drawn in—they had a reduction in temperature of 100 degs. Cent. During the whole time that the pipe was disconnected, the temperature kept down. When they connected up again, they recovered more than the 100 degs. Cent. in half an hour. He put the fall in temperature down to the fact that they were losing some of the heating value of the H₂S, which was going into the atmosphere. So that H₂S did not seem to get back into the liquor, though if they got a stronger liquor it would.

Mr. J. A. WILSON (Staveley) did not think that the return of these products would have much effect. They always had some in the gas, and a little more added would make no difference.

Mr. LEE agreed. They had 800 grains of H₂S in their gas going to the purifiers after they had taken out ammonia. In reply to a further remark by Mr. WILSON that the figure for coal and dirt in the ½ in. stuff after washing—22.25—as compared with the ¼ in., was extraordinary, the speaker said that actually that section of the washer was overloaded, and, curiously enough, they had a bigger proportion of ½ in. stuff than of ¾ in. or ¼ in. The dirt was sieved down to ¼ in. and ½ in. In reply to a question about the water supply, Mr. LEE said it did not fluctuate. It was ample, and kept at a very low temperature—never more than 16 degs. Cent. in the summer, and as low as 8 degs. in the winter.

Mr. C. P. FINN (Hemsworth) said that, in handling a plant primarily designed for making sulphate of ammonia, he supposed Mr. Lee had had the same difficulties that most of them had had, and had found that the stills could not deal with the amount of liquor as efficiently as when making sulphate. Had Mr. Lee any figures showing what was the proportion of run-back on the liquor treated, because the run-back was additional to the normal quantity of liquor that the still dealt with? In his own case, the best that he could get was about three times as much as when he was working on making sulphate of ammonia—three times as much ammonia in the waste liquor. Had Mr. Lee ever found any difficulty with regard to the working of a coke tower for absorbing vapour? He (the speaker) had had considerable difficulty with such a tower, due, in the first place, to the height at which the tower was placed, and the difficulty of getting water up to it. He had to pump the water up to the tower, and, after working some time, the tower failed to act as an efficient absorber, and they had to renew the coke. On taking out the original coke, they found it covered over—in some places almost in solid masses—with a deposit that was mainly carbonate of lime and carbonate of magnesia. That being the case, and the coke tower giving a good deal of trouble, he began to look about for some better way of absorbing the unabsorbed ammonia. He had three methods in view. The first was to put, instead of a coke tower, a small still of about five or six compartments with trays, something on the lines of a dephlegmating column in a benzol vessel plant, only with suitable lids so that the trays could easily take out and clean. The cost of that seemed very high, viz., £95. The second method was to use a weak acid—say, waste acid from benzol washing—diluting and using that as an absorber, run that into the tanks, and treat it with the other liquor from the still; but having seen in other hands the result of getting sulphuric acid or sulphate of ammonia into the liquor, and its effect on the still, he thought twice before adopting that. The third remedy was not to use a coke absorbing tower, but to connect the vapour pipe on to the suction side of the plant, when they would have the scrubbers again as final absorbers; and that was the method that

he was preparing to carry out. This would do away entirely with the coke tower and its re-filling, which was not a pleasant task for workmen. It was dangerous, and on his particular plant respirators had to be worn. Furthermore, there was the loss of ammonia due to throwing out the coke, and, of course, the plant had to stand. With regard to the action of water on firebrick work, he did not know whether any of the members had had to evaporate waste liquor, as he had. The construction of a piece of apparatus had cost a good deal of time and money. He found firebrick or red brick of very little use indeed, because the saline matter simply disintegrated the brick, and it came out mere mush. Their evaporators were finally constructed of waste blocks of sandstone obtained from a quarry near by. In working one of these evaporators during the last two and a half years, he had had rather peculiar experiences. The composite parts had become covered over with a deposit of sulphate of lime, so that the evaporator inside was almost like a ferro-concrete structure, a monolith. It was like one big casting of sulphate of lime. That was a very desirable condition, because the result was that they had had no repairs to do on that evaporator, and it was working quite efficiently. Perhaps some people had tried evaporating, and had had experience of dealing with the waste liquor by means of the hot flue gases from boilers, with an evaporator interposed between the boiler range and the chimney. He should not like to have one of that type himself. If anybody had had any lengthy experience of one, he should say that they would find that this kind of action went on in the brickwork, and would probably affect the boiler settings eventually.

Mr. LEE, in reply, said he estimated the run-back of the ammonia, which was brought back from the liming vessel, at 40 per cent. additional load upon the stills. The coke scrubber which they actually had was only used to take up the ammonia in the air displaced in the storage tanks, not for any other purpose. They had the same trouble as Mr. Finn with the question of water. They could not get sufficient height to take town water up to the scrubber. But, of course, they might as well let the ammonia go away, because they only sold free ammonia. What slight amount there was was going away to a pipe, but the loss was very small indeed. It did suggest itself to him that they might do what Mr. Finn had evidently planned to do, and connect that pipe up to the suction pipe of the foul main. But he suggested to Mr. Finn that he was going to have difficulty in preventing getting a suction on to his storage tanks, and if he got such a suction he would lose such a great deal of ammonia that it would not be worth doing.

Mr. FINN said if the water supply was at all fluctuating, as it was in some places, they got water from the absorber. He had thought of leaving the tanks connected to something like a coke tower. He had had naphthalene stoppages, more particularly when they had thrown spent oil out of circulation.

Mr. W. GREEN asked if Mr. Lee had found any increase in the output of H_2S in the purifying plant. The H_2S which was returned either went into the liquor or went forward. Mr. Lee was in the particularly fortunate position of having to get the H_2S down for his purifying plant; and he wondered if that gentleman had noticed any increase in the gases to the purifying plant compared with what he had before he started the concentrated ammonia plant and was returning these gases into the scrubbing plant.

Mr. LEE replied "No," because the conditions were exactly the same. They returned into the same main from the saturator. Some of the H_2S was absorbed into the lime vessel. What did go back was really less than it used to be when they were working on sulphate of ammonia. In half an hour they could change over from liquor ammonia to sulphate of ammonia, and in another half-hour back again, if necessary.

Mr. B. W. HAIGH (Barnsley Main) said his experience with regard to the liquor going to the plant corresponded with Mr. Lee's. They found, when their plant started, that the temperature of the liquor was about 38 degs. Cent. The makers said it was quite impossible to work a plant at that temperature; so, by utilising some old superheater tubes, and by air cooling, passing the liquor through this series of tubes, they had reduced the temperature to about 20 degs. They had great trouble in getting the top tray of their decomposer cool. Often it got as high as 80 degs. Cent., and then they were quite sure they were losing ammonia. The decomposer gases went from the regenerator straight up the chimney, so that, of course, anything lost was lost for ever, so far as the ammonia yield was concerned. To make sure that they should not lose it, they had not trapped their decomposer gases into the saturator, by a weak solution of sulphuric acid, and the foul gas went away up the chimney as before; and by that means they were fairly sure that they were not losing any ammonia in that way. They did find, when they got their plant fairly well started, that the production was considerably less than it was of sulphate—about 10 per cent. In last month's returns, however, the figure was something under 5 per cent. As the plant was designed, all the concentrated liquor had to be moved about by means of compressed air, but now that they had done away with compressed air altogether, and used pumps only, they had brought the loss down to half of what it was before, and hoped to improve it still further.

Mr. LEE said that their plant, as originally designed, included two receiving vessels, into which the liquor had to run as made from the absorbers. From them, at periods during the day which would amount to at least once every shift, and perhaps more, it had to be changed from one receiver to the other, the receiver which was full emptying by compressed air into the storage tanks. He objected to that at the beginning, saying they must run it into the storage tanks by gravity; and, of course, that was done. The disadvantage of that was that they had to load by com-

pressed air. But they had a man who was doing nothing else, practically, but loading benzol and other things, and he had a gauge on his tanks. He loaded with his gauge, and he had now got it so that he could get his tanks so full, and then shut off his air, and the excess of air which was still remaining in his storage tank was sufficient, by the time it had spent itself, to fill the other tank. In that way they avoided having to blow off any excess of compressed air into the atmosphere. If he did not fill his tank to within a few inches, they did not trouble, but he could get it to a very great nicety.

Prof. L. T. O'SUEA said that he could speak with some experience about the action of the washer. One thing that struck him in the matter was how very careful they should be, when they put down their washer, to see that it was capable of doing the work which they required, and also of agreeing as to what was the standard by which they were going to test that work. They had all probably their own ideas as to what that standard should be, but as far as he could make out, it meant that they had to come to an agreement between the constructor and the user of the washer as to how they were going to determine the dirt in the washed coal and the coal in the washed dirt. It seemed to him that the standard they ought to take was as to how much coal was left in the dirt, and how much dirt in the coal, or what was to be considered free coal and what was to be considered dirt. It all resolved itself into the question: "How much ash am I to have in my final product in order that I may make coke which shall be useful to the metallurgist?" That was what was wanted, and it did not matter whether it was free coal that made it or free dirt so long as they got the right ash. Ash was the main thing in the washing of coal. But, of course, the proportion of coal in the dirt, and dirt in the coal, should not be neglected, because they could get the ash almost as low as they liked if they only left enough coal in the dirt. The figures relating to the quantity of dirt in the washed $\frac{1}{2}$ in. and $\frac{1}{4}$ in. coal mentioned by Mr. Lee showed that there was a tendency for the ash to accumulate in the smaller sizes that were washed. He always felt that the washer that separated the coal into sizes before washing was probably doing the job in a better way than washers which did not separate. It was always necessary, as far as he could make out, if they did not size the coal before washing, to re-wash the smaller sizes in order to bring the ash down to what they wanted it.

the period, so that the reduction in heats was not great. They only worked in the day time, and they recovered the heats always at night, and they were never in the position that the whole of the regenerator was no good to them. When they were beginning to rebuild the portion that was renewed, they blocked up as far as they could the openings to the air flue along the distance where it was dirty, and made the gases travel along to the chequer work which was actually in position. The type of regenerator and so on must determine the way in which the work was to be done. In the way they had adopted, they were able to do it without any serious loss in output, and the men stuck it in very fine style.

Mr. F. HADFIELD (Wharnciffe Woodmoor) said the renewal of regenerators could be made without any interruption. At their colliery, for the length of 30 ovens it was entirely renewed in one week, without any reduction in output. They broke in on the Monday morning, and worked continuously. They took out the chequers, renewed the bridge, cut the skewbacks out, replaced all the chequers, and put the gas in—all in a week.

Mr. CHRISP, in moving a vote of thanks to Mr. Lee, said he had in his paper tackled in a very practical and scientific way some subjects which had been troubling them, and had spared no pains to make the paper as interesting and helpful as he possibly could. He hoped Mr. Lee would have a very successful year of office.

Mr. GERALD H. LANT (hon. secretary), in seconding, said he had learnt a good deal from the valuable experience which Mr. Lee had given them.

Mr. LEE, in reply, said it had been a real pleasure to bring the paper before them. He announced that the next meeting of the section would be held in Sheffield on December 15, when Mr. Hebden would give a paper on "Ammonia and its Compounds."

GAS EXPLOSION AT AN INDIAN COLLIERY.

The report of the Chief Inspector of Mines in India for the year 1916 describes an explosion of gas which occurred at the Equitable Coal Mining Company Limited's Dishergarh coal mine.

This explosion, by which 14 lives were lost, is the most serious of its kind in the coal fields of Bengal and Bihar and Orissa, having regard to the fact that firedamp was ignited by a naked light, and that there

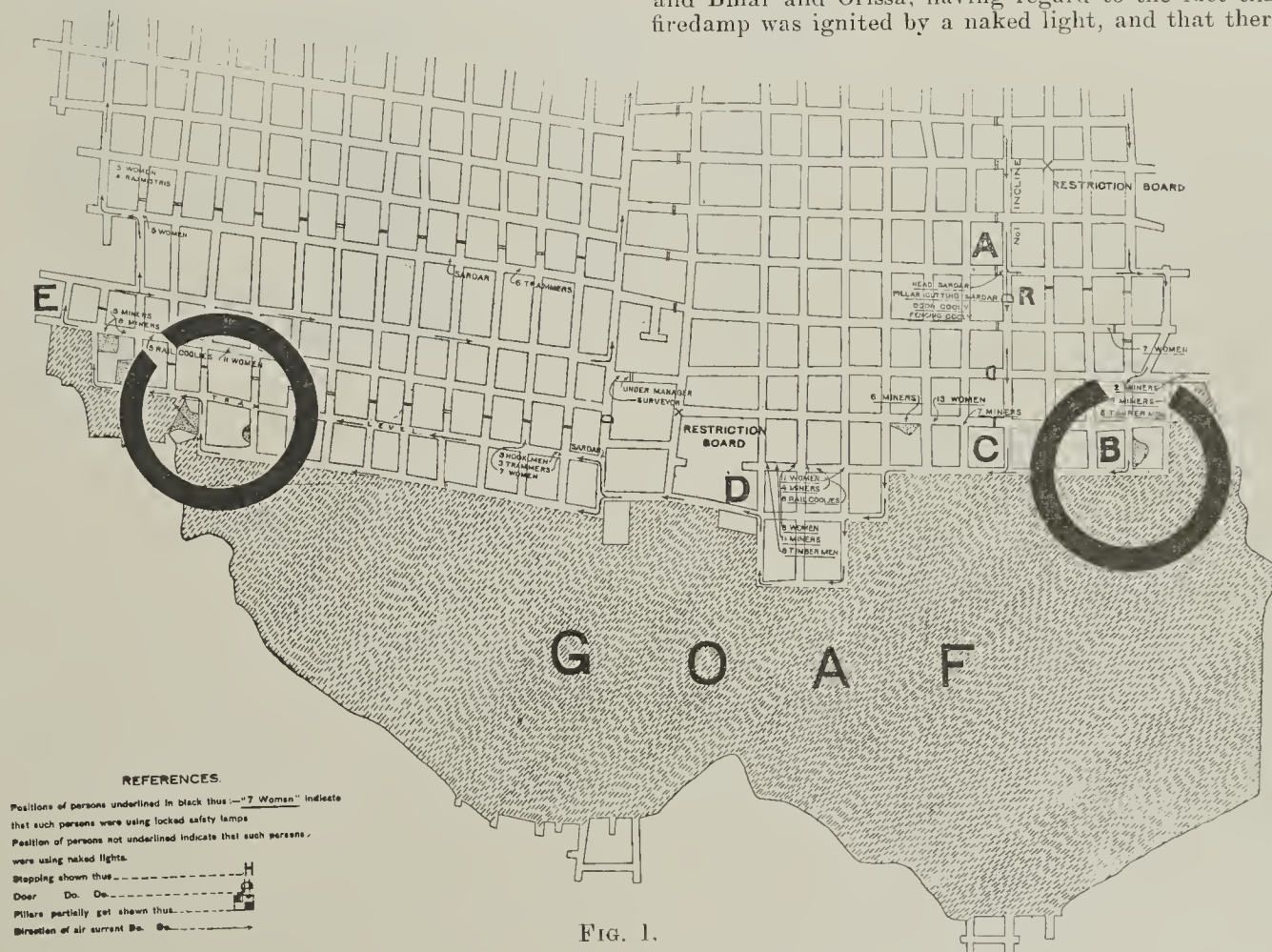


FIG. 1.

Mr. G. CHRISP said that he had something coming on with regard to regenerators, and he had proposed tackling the job in a way totally different from that which Mr. Lee had apparently adopted. At the moment he quite failed to see why Mr. Lee did not have the regenerator totally out of action. It could scarcely have been of any service to him, because it was empty for the greater portion of its time, and was only being cooled down, he took it. To his mind, it appeared quite feasible to arrange the length of the flame in such manner that they did not get the regenerator too hot, and so worked on one side only, as a waste heat plant. That was the way he proposed taking his own out. It seemed to him that there was a great deal of time lost by Mr. Lee's method. There might have been special reasons why he decided to work as he did. If so, he should like to know them.

Mr. LEE said that at first they did attempt to do the job by cutting off one side altogether, but the regenerator on the bench side got so hot that he was afraid he was going to be in for a bigger job still, owing to the brickwork running in the regenerator. They could remove stuff which had perished, but it was a tremendous job to remove stuff which had run. Only by an enormous amount of work could they have reduced the heat upon the ovens by burning less gas. They did try at first to reduce the gas and burn only on one side of the oven, but then the regenerator got so hot that they gave the thing up entirely. They only lost one oven a day, on the average, right through

was no other contributing cause, such as a mine fire. Fig. 1 shows the workings and the arrangements for using safety lamps and naked lights in the neighbourhood of the explosion; and fig. 2 shows in detail the portion of the mine where it occurred.

The Dishergarh Colliery, in so far as the Dishergarh seam, in which the accident took place, is concerned, consists of two inclines (Nos. 1 and 2) and three shafts (Nos. 5, 6, and 7). About the middle of the colliery there is a barrier of coal. All galleries through this barrier, except one, are closed by stoppings. In the one gallery in which there is no stopping, an iron door is fixed, which could be closed on an emergency, dividing the mine into two sections, eastern and western. The eastern section consists of Nos. 1 and 2 inclines and No. 5 shaft, and the western of Nos. 6 and 7 shafts. The explosion occurred in the eastern section. The seam is 18 ft. thick, and dips to the south at an angle of 1 in 5½. The ventilation of the eastern section is effected as follows: The air enters the mine at Nos. 1 and 2 inclines, and by means of stoppings on the western side of No. 1 incline, is conducted down to the dip workings. As the galleries between Nos. 1 and 2 are all open, these two inclines, together with the galleries between them, form an intake air course for some distance, the main portion of the air current travelling east and then south, and afterwards west along the northern edge of the dip workings to a point where a small amount of air, which is allowed to leak through an opening in a regulating door, joins it, and the air current then proceeds west-

to near the barrier, ventilating the whole of the workings. At this point the air current divides, a portion going to No. 5 shaft, where it returns to the surface, whilst the remaining portion goes through the goaf to F, where it joins an intake air current which ventilates a portion of the western section of the mine. This air current comes down No. 7 shaft.

In the eastern section of the mine, the first mining operation of forming pillars and galleries had been extended to the southern or dip boundary, and the work in progress consisted only of the removal or goafing of the pillars. The area from which pillars had been removed is shown hatched, and marked "goaf" on fig. 1.

In the report for 1915, an account was given of an explosion in these workings, by which three men were burnt by gas igniting at their naked lights, but without fatal results. The area from which the gas issued, causing this explosion, is shown by the ring on the right hand side of fig. 1. After that explosion, safety lamps were made compulsory in that portion of the workings marked A, B, C, D on fig. 1. Naked lights were allowed in part of the western section. The limits of the safety lamps area are shown by the positions of the restriction boards on fig. 1. Gas was found and reported in the neighbourhood of the right hand ring, between the dates of the two explosions, on 79 days in 1915 and on 125 days in 1916.

On the day of the accident, whilst several persons were working in the portion of the mine shown by the ring in the left hand side of fig. 1, the sound of a fall of roof in the goaf was heard. The workers retreated to the tram level, shown in figs. 1 and 2, and almost immediately afterwards an explosion of gas occurred; 14 persons were burnt to such an extent that they succumbed, some soon after being brought out of the mine, and others on various subsequent dates. Four other persons were burnt more or less badly, but recovered, and one or two were slightly burnt. The positions of the various persons are shown in fig. 2. It will be noticed that some who were killed were further away from the goaf than others who were not so badly burnt. The probability is that the gas was forced out of the goaf by the fall in a comparatively pure state, and reached its maximum explosive point when it was mixed with the oxygen of the air, as it approached the tram level.

The explosion was fortunately local in its effects; it did not spread further than the immediate locality, and there were no signs of violence. An inspection made later on in the day disclosed the fact that gas was burning in the goaf, in which a high cavity was observed. The fire was only put out by shutting down the pits and inclines for some hours.

It cannot be stated with certainty from where the gas, which caused this explosion, came originally. It might have been occluded in the roof stone, and released by the fall. This, however, is extremely unlikely. What is far more likely is that the gas flowed through the goaf to the cavity, from which the fall of roof expelled it, in which case it either came from the goafing of the solid coal, immediately to the west of the left hand ring, or flowed over from the neighbourhood of the right hand ring. It admittedly did not pass from near the latter ring along the travelling roads of the mine.

At the Local Government enquiry, held by the Collector of Burdwan, with the Chief Inspector of Mines in India and Mr. T. H. Ward, mining engineer, as assessors, it was fairly established, as the result of preliminary enquiry, that the gas was ignited by the naked lights used by the workers. On the day of the explosion there were a little short of 100 of each kind in use.

The rule under the Indian Mines Act as to the use of safety lamps reads as follows:—

No lamps or light other than a locked safety lamp shall be allowed or used—(a) in any place in a mine in which there is or is likely to be any such quantity of inflammable gas as to render the use of naked lights dangerous; or (b) in any working approaching near a place in which there is likely to be an accumulation of inflammable gas; and when it is necessary to work the coal in any part of a ventilating district with safety lamps, it shall not be allowable to work the coal with naked lights in another part of the same ventilating district situated between the place where such lamps are being used and the return airway.

Explanation.—For the purposes of this rule, the expression "ventilating district" means such part of a seam as has an independent intake commencing from a main intake air course, and an independent return airway terminating at a main return air course.

There is no legal definition of a main airway in the Indian Mines Act, but in the English Coal Mines Act, 1911, it is laid down that "main airway" means an airway commencing from, or terminating at, a shaft or outlet to the surface, or any airway from which a split is taken to ventilate any district of the mine, or into which a split so taken returns. It is to be inferred from the definition that an intake airway will cease to be a main intake airway at the point at which the last split is taken from it, and a return airway will cease to be a main return at the point at which the last split is taken to it.

From this definition and inference, there are two main intakes in this seam—one the very large one from No. 7 pit to where the air is taken to the surface, and the other the intake coming from the goaf. Similarly there were two main return airways leading up to No. 5 pit, and one

leading up to No. 6 pit, and there were two ventilating districts.

Apart from these legal definitions, it is generally understood in mining parlance that there is (a) an intake taking air to the district, (b) the district in which the miners work, and (c) the return airway, taking air from the district. An intake airway ceases to be one when it reaches the district, and a return airway commences where it leaves the district.

Two questions therefore arose:—Were safety lamps necessary in the naked light area (a) because this part itself was a place where there was likely to be a sufficient quantity of gas to render the use of naked lights dangerous, and (b) because they were on the return side of the lamps in use in the safety lamp area?

In the case of (a), the contention of the management was that, as no gas had been found in that area, they were justified in using naked lights. In the case of (b), two pleas were advanced. Firstly, that the gas found between A and B was so small in amount that safety lamps were not necessary under the rule, but were merely used as a matter of precaution; and, secondly, that because a freshening split of air was taken direct through a regulator door from A to C, the part A B C and the naked light area were two separate ventilating districts.

Using safety lamps as a temporary precaution in places such as advance drivings, where there might be a little gas and yet in such a minute quantity as not to make necessary the use of safety lamps in the terms of the rule, is, and always has been, common in mining. Nothing is stated with regard to the practice in the English Coal Mines Act, 1887, nor in the Indian Mines Act, but in the English Coal Mines Act, 1911, it is laid down that working with naked lights on the return side of safety lamps is not illegal, if the use of safety lamps is introduced as a temporary precaution and their introduction is not necessary throughout the district. In the absence of definite wording, this is, of course, implied.

To use safety lamps as a temporary precaution in an advance driving is, however, a very different thing

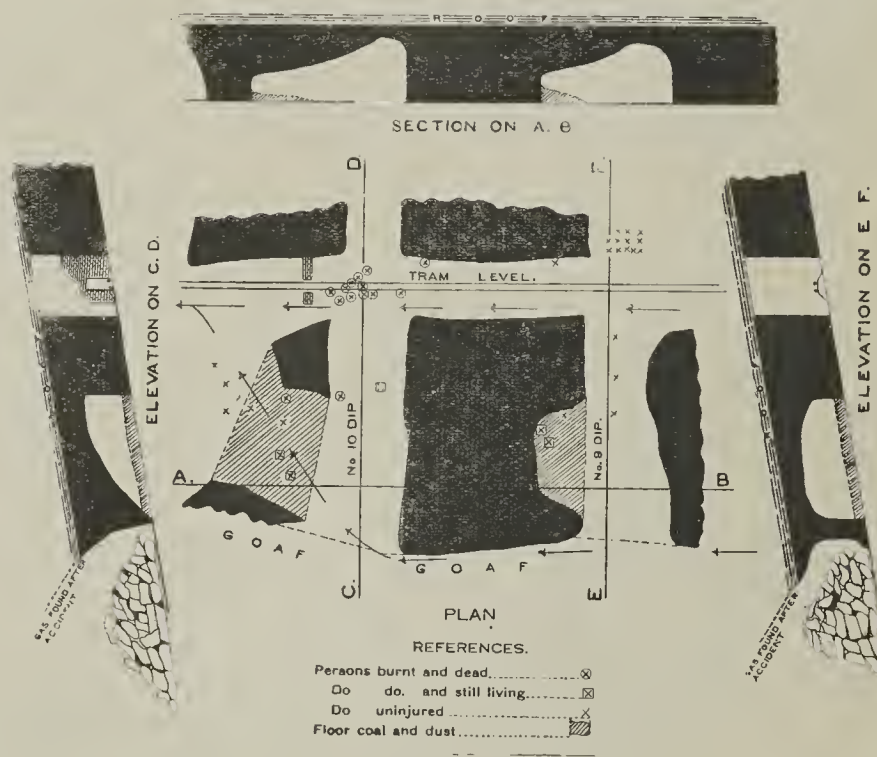


FIG. 2.

from using nearly 100 lamps for several months over so large an area as that from A to D.

With reference to the question of the mine being divided into two separate ventilating districts, it is an essential element in the definition of a separate ventilating district that it should have an independent return airway. There was no independent return airway in this case. In order to have an independent return of the air going from A round B to C, it would be necessary for this air to return to the surface without mingling with the air from the remaining area. This was not the case. Moreover, in any mine it may be necessary to erect doors and curtains either temporarily or permanently at any point in a ventilating district, to divert the air round certain working places, allowing it to mingle again with the current in the working district. In fact, this is the usual method of clearing away an accumulation of gas. It cannot, however, be held to be "splitting the air" in its legal sense.

The court of enquiry formed the opinion that the rule had not been observed in either of its phases. Legal proceedings were instituted against the agent and the manager, and the court decided, in effect, that air passing over safety lamps where such are required by rule must not be taken on over naked lights, however much it is diluted.

A number of the big works in Petrograd are closing owing to lack of fuel, as a result of the disorganisation of labour and transport.

Requisitions for 1918.—The Board of Trade announces that, with a view to determining the total requirement for the year 1918 of household coal, coke, etc., in London and the surrounding area, to which the Metropolitan Coal Distribution Order applies, all requisitions of consumers must be received, either by the Coal Controller or by the local coal overseer for the district in which the consumer's premises are situated, not later than December 31. Where requisitions are not received until after that date, supply under the requisition will probably be delayed. Requisitions are not required for the purchase of coal and coke in quantities of less than 2 cwt. in the case of coal, and 3 cwt. in the case of coke.

EFFECTS OF STORAGE UPON THE PROPERTIES OF COAL.*

By S. W. PARR.

(Continued from page 983.)

Deterioration.

Experiments on the weathering of coal are described in *Bulletin* 38.† Car lots were stored in open and in covered bins, and smaller lots of 100 lb. to 200 lb. under water. The samples for determination of heat values were taken on the day of mining the coal, and thereafter at seven days, two months, six months, and one year.

All, with the exception of the submerged samples, were continued in storage for a total period of six years. Two additional sets of laboratory samples were taken; one after a total period of three years, and another at the end of six years. After storage in the original bins for four years, both the covered and open lots were moved to a new location. After a period of six years, final laboratory samples were taken in connection with the cleaning up of the various lots and the making of boiler tests. Five standard boiler tests were made at the close of the period.

Typical analytical results for the entire period are presented in Tables 5 and 6.

TABLE 5.—VERMILION COUNTY NCT COAL.

<i>Stored in Exposed Bins.</i>							
Sample taken after mining.	Dry coal.			B. t. u. referred to actual or unit coal.	Decrease.		
	Ash.	Sulphur.	B. t. u.		B. t. u.	P. c.	
Same day	10.55	... 4.25	12,991	14,814	—	—	
7 days	13.98	2.65	12,412	14,716	98	0.66	
2 months	14.21	2.47	12,265	14,577	237	1.60	
6 months	13.53	2.10	12,396	14,575	239	1.61	
1 year	13.62	2.82	12,282	14,498	316	2.13	
3 years	13.22	1.75	12,018	14,075	739	4.98	
6 years	13.06	1.58	11,984	14,000	814	5.49	
<i>Stored in Covered Bins.</i>							
Same day	10.55	... 4.25	12,991	14,814	—	—	
7 days	13.98	2.65	12,412	14,716	98	0.66	
2 months	13.03	2.13	12,475	14,604	210	1.42	
6 months	11.76	2.14	12,571	14,472	342	2.31	
1 year	13.52	2.72	12,220	14,403	411	2.77	
3 years	14.26	2.29	11,691	13,890	924	6.23	
6 years	9.84	1.57	1,202	13,867	947	6.39	

Stored in Covered Bins.

Same day	10.55	4.25	12,991	14,814	—	—
7 days	13.98	2.65	12,412	14,716	98	0.66
2 months	13.08	2.13	12,475	14,604	210	1.42
6 months	11.76	2.14	12,571	14,472	342	2.31
1 year	13.52	2.72	12,220	14,403	411	2.77
3 years	14.26	2.29	11,691	13,890	924	6.23
6 years	9.84	1.57	1,202	13,867	947	6.39

Stored Under Water.

Same day	10.55	4.25	12,991	14,814	—	—
Same day as submerged.	13.98	2.65	12,412	14,716	98	0.66
6 months	15.37	3.34	12,013	14,524	290	1.96
1 year	13.85	3.81	12,231	14,517	297	2.00

Note.—For unit coal formula, see footnote to Table 8.

TABLE 6.—VERMILION COUNTY SCREENINGS.

Stored in Exposed Bins.

Sample taken after mining.	Dry coal.			B. t. u. referred to actual or unit coal.	Decrease.	
	Ash.	Sulphur.	B. t. u.		B. t. u.	P. c.
Same day	17.88	2.35	11,937	14,888	—	—
7 days	13.98	2.87	12,414	14,726	162	1.09
7 days	13.69	2.29	12,507	14,759	129	0.87
2 months	15.73	2.53	11,958	14,497	391	2.63
2 months	14.69	2.90	12,178	14,578	310	2.08
6 months	15.63	2.44	11,969	14,487	401	2.69
1 year	14.46	2.24	12,066	14,304	584	3.92
3 years	15.95	1.98	11,229	13,625	1,263	8.48
6 years	13.79	3.85	11,210	13,275	1,613	10.83

Stored in Covered Bins.

Same day	17.88	2.35	11,937	14,888	—	—
7 days	13.98	2.87	12,414	14,726	162	1.09
7 days	13.69	2.29	12,507	14,759	129	0.87
2 months	15.26	2.51	12,124	14,608	280	1.88
6 months	14.51	2.25	12,071	14,391	497	3.34
1 year	15.36	2.42	11,797	14,225	663	4.46
3 years	14.43	2.26	11,199	13,329	1,559	10.47

Stored Under Water.

Same day	17.88	2.35	11,937	14,888	—	—
Same day as submerged.	13.98	2.87	12,414	14,726	162	1.09
Same day as submerged.	13.69	2.29	12,507	14,759	129	1.87
6 months	13.87	2.32	12,270	14,514	374	2.51
1 year	13.55	2.71	12,283	14,483	405	2.72

Indicated Heat Losses.—The heating value decreases most rapidly during the first week after mining, and continues to decrease more and more slowly for an indefinite time. One per cent. is about the average loss for the first week, and an additional loss of 2 or 3 per cent. may occur by the end of the first year. At the end of the six-year period the indicated losses in some cases equal nearly 11 per cent.

These losses may be ascribed to three distinct causes: (a) The escape of combustible gases; (b) the absorption of oxygen; (c) the increase in weight of the organic or combustible portion of the coal.

Escape of Combustible Gases.—From certain experiments given in a former bulletin,‡ there is positive evidence that combustible gases exude from freshly-mined coal. The extent of this loss, however, is very small. Porter and Oviitz§ have carried out a quantitative measurement of such escaping gases, and estimate in the case of a coal from Benton, Franklin County, Illinois, the total loss of heat values in a period of 17 months to be 0.16 per cent. As this was an extreme case for this variety of coal, it is evident that the heat loss due to the exudation of combustible gases is practically negligible.

Absorption of Oxygen.—In *Bulletin* 32|| on the occluded gases in coal, it is shown that freshly-mined

* University of Illinois Engineering Experiment Station *Bulletin* No. 97.

† Parr and Wheeler. "The Weathering of Coal." Univ. of Ill. Eng. Exp. Sta. *Bull.* 38, 1909.

‡ Parr and Wheeler. "The Deterioration of Coal Samples." Univ. of Ill. Eng. Exp. Sta. *Bull.* 17, p. 33.

§ United States Bureau of Mines *Technical Paper* No. 2, 1910.

|| Parr and Barker. "The Occluded Gases in Coal." Univ. of Ill. Eng. Exp. Sta. *Bull.* 32.

coal has a marked avidity for oxygen. It has been shown* that the union of oxygen with the coal is a chemical combination, and not a simple absorption. While we should expect such chemical action to be accompanied by the generation of heat, and consequently by a reduction in the heat value of the coal, there is little information available as to the extent of such loss.

Porter and Ralston† show the positive formation of heat from oxygen combination, but do not present any data as to the amount of this loss. Lamplough and Hill‡ have attempted to measure the amount of heat, and their results show an average for English coals of 3.3 calories for each cubic centimetre of oxygen absorbed. Winnill and Graham§ have carried the same line of experimentation further, and have modified slightly the factor for the heat generated, their result showing 2.1 calories per cubic centimetre of oxygen absorbed. The difference is, for the purpose of the present discussion, not material, since the desired result is the approximate heat loss due to the oxygen combinations at ordinary temperatures. The maximum absorption under the most favourable circumstances ranges from 7 to 8 c.c. oxygen per gramme of coal as recorded in the experiments by Lamplough and Hill, and also by Winnill and Graham. Porter and Ralston found in the case of a Franklin County, Illinois, coal exposed for five months at ordinary temperatures to pure oxygen, an absorption at the rate of 5.3 c.c. per gramme of coal. This is approximately 10 calories per kilogramme of coal, or about 0.12 per cent. of the heat value of the coal. Loss of heat thus represented is so small that it is negligible as a factor effecting deterioration in the quality of the coal. It may, however, possess significance in the matter of spontaneous heating.

Increase in Weight.—It is evident that, if in the processes which attend the weathering of coal there is an increase in weight of the coal substance, the indicated heat losses are more apparent than real. For example, if at the beginning of the storage period a pound of the unit coal substance shows a value of

stituents of coal during storage with the corresponding increase in the weight of any given sample must result in a relatively lower amount of ash, or an apparent decrease in ash.

Of course, the exact duplication of these theoretical conditions was impossible in these experiments. The oxidation of the sulphur varied, and the leaching out of the soluble sulphates would alter the ash values in a corresponding degree. Other variables might enter, such as irregularities in sampling, or the possible accumulation of foreign or earthy matter. Notwithstanding all these possibilities of inaccuracy, there is a striking consistency of results with reference to the decrease of indicated ash percentages as the process of weathering proceeded. The ash values of the several masses taken at the beginning and at the close of the six-year period are presented in Table 7.

TABLE 7.—INDICATED ASH AT THE BEGINNING AND AT THE END OF SIX YEARS IN STORAGE IN OPEN BINS.

Coal and county.	Average ash values as determined by analysis of 3 samples.*	Average ash values after 6 years as shown by analysis of 2 samples.†	Indicated decrease in ash.
Nut—Sangamon.....	17.01	12.96	4.05
Nut—Vermilion.....	12.95	11.45	1.50
Nut—Williamson.....	14.32	13.41	0.91
Screenings—Sangamon..	17.43	16.17	1.26
Screenings—Vermilion..	15.20	13.79	1.41
Screenings—Williamson	14.19	13.03	1.16

* (1) At the mine, (2) at unloading of car, (3) after 2 months.
† (1) From open bins, (2) from covered bins.

The factors for the submerged coal have not been included in this table. Although these samples were under test for only a year, they show a constancy in the ash values and an absence of change, which is in keeping with the uniformity of heat values credited to the unit coal substance.

The increase in weight of the coal in storage by addition to the organic constituents is further illustrated by the values presented in Table 8. The values pre-

TABLE 8.—INCREASES IN WEIGHT OF COAL DURING STORAGE, IN RELATION TO THE INDICATED DECREASE IN HEAT VALUE.

Coal and county.	B.t.u. per lb. of fresh coal, average of three samples taken—(1) at mine, (2) at unloading of car, (3) after two months storage.	B.t.u. per lb. after six years open storage, dry coal basis.	Ash as weighed dry coal basis, with heat values as in col. 2.	Sulphur in dry coal after six years open storage.	Ash plus additive material acquired in six years open storage.	Ash as in col. 3, but corrected for sulphur as in formula for unit coal.	Showing amount of additive material by difference.
	1	2	3	4	5	6	7
Nut—Sangamon.....	14,614	11,180	14.10	3.76	23.5	17.3	6.2
Nut—Vermilion.....	14,700	11,984	13.06	1.58	18.5	14.9	3.5
Nut—Williamson.....	14,838	12,339	12.86	2.20	16.9	15.1	1.8
Screenings—Sangamon	14,524	11,326	14.95	3.32	21.9	17.9	4.0
Screenings—Vermilion	14,717	11,210	13.79	3.85	23.8	17.0	5.2
Screenings—Williamson	14,716	12,077	13.42	2.23	17.2	15.7	1.5

For discussion of "Unit Coal and Corrected Ash" see Univ. of Ill. Eng. Exp. Sta. Bull. 37, p. 33.

$$\text{Unit B.t.u.} = \frac{\text{Indicated (dry) B.t.u.} - 5,000 \text{ sulphur}}{1.00 - (1.08) + 22/40 \text{ sulphur.}}$$

$$\text{Corrected (dry) ash} = \text{ash as weighed} \times 1.08 + 22/40 \text{ sulphur.}$$

14,700 British thermal units, and at the end of the period the original pound has increased in weight by absorption or additions, say 5 per cent., then the heat value per pound of the resulting material will be 14,000 British thermal units, thus indicating an apparent loss of 4.76 per cent. Evidence from many sources has accumulated to show that coal exposed to air or oxygen increases in weight. In the experiments described by Parr and Hadley|| it is shown that under certain conditions in the residue insoluble in phenol, which is regarded as the degradation product of the cellulose constituent, there is as much as 3 per cent. increase in weight due to the taking up of oxygen. This work further shows that such additional oxygen is chemically combined, and not merely absorbed. Other experimenters have presented evidence to the effect that coal increases in weight. Somermeier¶ has shown an increase due to oxidation for an Illinois coal 2.47 per cent. Porter and Ralston** show also a measurable increase in weight due to oxygen absorption. In their experiments on oxidation at various temperatures they note that Illinois and Pittsburg coals "show increases of weight up to 260 degs. in spite of the loss of carbon and hydrogen in CO₂, CO, and H₂O." Study of some of the values presented in Table 7 seems to give further evidence of an increase in weight of the organic or combustible part of the coal. Some of these data, with a discussion of their bearing on this point, are presented under the following topic.

Decrease of Ash Percentages.—A study of the relative ash values corresponding to the various stages of indicated heat losses reveals a consistent lowering of the percentages of ash. This result obviously is normal since the actual increase in the organic con-

* Parr and Hadley. "The Analysis of Coal with Phenol as a Solvent." Univ. of Ill. Eng. Exp. Sta. Bull. 76.

† United States Bureau of Mines Technical Paper 65, p. 8, 1914.

‡ Trans. Inst. Min. Engin., vol. 45, p. 629, 1913.

§ Winnill and Graham. "The Absorption of Oxygen by Coal." Colliery Guardian, September 11 and 18, 1914, pp. 564 and 613.

|| "The Analysis of Coal with Phenol as a Solvent." Univ. of Ill. Eng. Exp. Sta. Bull. 76.

¶ Prof. Somermeier was doubtless the first to suggest that the indicated decrease in heat values was in reality the result of an increase in weight. N. W. Lord and E. E. Somermeier. United States Geol. Surv. Bull. 323, p. 22.

** United States Bureau of Mines Technical Paper 65, pp. 20-22, 1914.

sented in column 1 represent the heat value for the unit coal when fresh, as found by averaging the unit coal values for three samples taken at the mine, at the time of unloading, and after two months in storage. The calorific values of the dry coal in open storage at the end of six years are shown in column 2. The accompanying ash and sulphur values are shown in columns 3 and 4. Column 5 shows the percentages of ash or inert material which must be present in order that the fresh unit coal values of column 1 may after six years drop to the values shown in 3. These percentages are derived by the formula—

$$100 - \frac{\text{British thermal units per pound after storage}}{\text{British thermal units per pound of fresh coal}}$$

The values in column 6 are the corrected ash values for the coal after six years in open storage.*

The difference between the apparent corrected ash values of column 6 and the required ash for producing the values shown in column 2 is a measure of the additive material which is assumed to have been taken up by the organic constituents as absorbed oxygen or hydroxyl additions. These additions bear a certain general relation to the indicated decrease of ash shown in Table 7, and, of course, thus bear a more direct relation to the indicated deterioration percentages.

These facts taken together, therefore, seem to afford added basis for the statement that the actual losses of heat values in stored coal are apparent rather than real, and that the true heat losses are those due to escaping combustible gases and to the heat generated by direct combination of oxygen, both of which have been shown to be practically negligible.

Moisture Values for Weathered Coal.

The moisture values for the stored coal at the end of the six-year period are presented in Table 9. Some recent work on the properties of the water in coal† by Porter and Ralston suggests a relation between the type of coal and the amount of "inherent" or hygroscopic moisture retained by the coal upon air drying. It might be argued, therefore, that if the coals here considered during storage altered in type, possibly by a reversion toward the lignitic form, then a correspondingly high percentage of the moisture should be retained on air drying. The values shown in the table are without significance as far as this theory is concerned. However, the data should be presented for

$$\text{* Corrected ash (dry)} = \text{ash} + 1.08 + \frac{22}{40} \times \text{sulphur (see formula for unit coal, footnote to Table 8.)}$$

† H. C. Porter and O. C. Ralston. United States Bureau of Mines Technical Paper 113, 1916.

other reasons. For example, the high percentage of total moisture is in a general way characteristic of the several kinds of coal in that it is affected by the degree of subdivision or disintegration which has taken place. That the coals which have undergone the greatest disintegration have the highest percentage of total moisture present is to be expected, and is due to physical rather than to chemical action.

(To be continued.)

LAW INTELLIGENCE.

SUPREME COURT OF JUDICATURE. COURT OF APPEAL.—November 28.

Before Lord Justice PICKFORD, Lord Justice BANKES, and Mr. Justice SARGANT.

Welsh Coal for France.

Myers, Rose and Company Limited v. D. Marbais.—In this case, the plaintiffs appealed from a judgment of Mr. Justice Horridge relative to the supply of Welsh coal under contract.

Mr. Le Quesne stated that his clients, Messrs. Myers, Rose and Company Limited, coal merchants and colliery agents, Hull, contracted to supply the defendant with 30,000 tons of Welsh industrial coal in monthly quantities at optional French ports from May 1 to November 30, 1916. No coal was supplied in August and September, because defendant failed to obtain an import licence from the French authorities (in accordance with a new scheme which had come into operation), and therefore the British Government would not issue a corresponding export licence. Defendant obtained the necessary licence for October and November, and received all the coal he was entitled to. The present claim was for damages for the failure of the defendant to take delivery of 1,200 tons of coal which the plaintiffs tendered by a ship called the "Louise," but which the defendant had rejected upon the ground that the construction of the vessel was such that unloading would be very expensive. Mr. Justice Horridge held that the defendant had wrongfully rejected that tender, but that the plaintiffs were not entitled to damages in respect of the 1,200 tons. The plaintiffs urged that by the failure of the defendant to comply with the requirements of the French Government, and get the import licence, the plaintiffs were entitled to damages in respect of their inability to carry out the contract. Defendant had by his omission prevented the plaintiffs completing the contract.

Their lordships ruled that the plaintiffs were entitled to damages in respect of the defendant's refusal to accept the delivery of the 1,200 tons by the "Louise," and that the defendant was entitled to damages for the non-delivery of about 600 tons of coal by the plaintiffs claimed for by defendant's counter-claim. Plaintiffs were granted the costs of the appeal.

Excess Mineral Rights Duty.

(REFEREE'S DECISION.)

Duke of Northumberland v. Commissioners of Inland Revenue.—Mr. T. Jones, M.I.C.E., as referee, has issued his decision in six appeals by the Duke of Northumberland against assessments to excess mineral rights duty, dated April 25, 1917, by the Commissioners of Inland Revenue in Northumberland.

The referee states that the parties attended at his office on October 24, and presented their views. Mr. St. John G. Micklethwait appeared for the appellant, and Mr. Kingdon for the Commissioners. The grounds upon which the six appeals were based were identical, and were as follows: "That the amount claimed is excessive, and that in estimating the pre-war standard of rent, a reduction for income tax has been made based on the rate current for the accounting year, and that such deduction should be based on the rate of income tax current for the pre-war year." Mr. Micklethwait framed his argument for the appellant on the ground that each claim (in order to arrive at the amount chargeable with excess mineral rights duty for the accounting year ending September 1916) applied the rate of income tax applicable to 1916, of 4s. in the £, to ascertain the comparative figures of the pre-war standard income, instead of the actual pre-war income tax paid of 1s. 2d. in the £. This variation would materially reduce the amount of excess profits duty claimed on each of the six appeals, by reducing the amount deducted for income tax from the pre-war standard of rent to the extent of 0.708 of the amount actually deducted in the claims sent in by the Inland Revenue Commissioners, and, to that extent, increased the net pre-war amount of rent by a substantial amount in each case. In the example dealt with by Mr. Micklethwait for the third accounting year (ending September 1916), it would reduce the excess of the net rent for the accounting year over the pre-war standard of rent by the amount of £990, as the income tax calculated at 1s. 2d. in the £ was only £407, instead of the £1,398 (at 4s. in the £) claimed by the Commissioners. The referee intimates that he has carefully considered the arguments, together with the mineral rights duty sections of the Finance (1909-10) Act, 1910, Part 3 of the Finance (No. 2) Act, 1915, and Part 3 of the Finance Act, 1917, to which his attention was specifically directed by Mr. Micklethwait and Mr. Kingdon, and his decision is as follows:—

"That in all cases of income arising from royalties varying according to current market prices of minerals, where, in order to arrive at an excess profit figure, the tonnage of the accounting year is applied to the prices of the pre-war average year, the actual income tax per £ paid in respect of the pre-war year is the proper factor to be deducted from the amount so arrived at for the pre-war year, and that the actual income tax paid in respect of the accounting year is the proper factor to be applied to arrive at the figure of excess income for the said accounting year. That the amount upon which the excess mineral rights duty charged against the appellant is fixed, must be arrived at after a deduction for income tax in the respective years according to the respective rates of tax then in operation, whether payable or paid. That this decision shall govern the whole of the six appeals by the appellant referred to me for decision. I award no costs on either side, as I consider the point raised a proper one for reference."

Mr. John Dean, J.P., general manager of the Salford Collieries of the Wigan Coal and Iron Company Limited, has been notified that his second son, Pte. Kenneth John Dean, aged 19, of the Loyal North Lancashire Regiment, died of wounds received in action.

CONTENTS.

ARTICLES:—	PAGE
Finance of Employers and Employed	1039
Public Case	1039
Points on the Electrification of Collieries	1031
Gas Explosion at an Indian Colliery	1035
Effects of Storage upon the Properties of Coal	1036
Coal Mining in India in 1916	1043
South Wales Mining Timber Trade	1044
Dust Danger from Tubs	1045
Colliery Accident	1046
Labour and Wages	1047
The American Coal Trade	1047
Explosives in Coal Mines	1047
Open Contracts	1049
Metallurgical Coke as War Material	1049
The Freight Market	1050
Obituary	1050
Abstracts of Patent Specifications Recently Accepted	1050
New Patents Connected with the Coal and Iron Trades	1052
Publications Received	1052
REPORTS OF MEETINGS:—	
South Wales Institute of Engineers	1033
Coke Oven Managers' Association	1034
Association of Mining Electrical Engineers	1046
THE COAL AND IRON TRADES	1040-1043
The London Coal Trade	1040
The By-Products Trade	1043
The Tin-plate Trade	1043
LAW INTELLIGENCE	1037
PARLIAMENTARY INTELLIGENCE	1044
NOTES FROM THE COAL FIELDS	1048
COAL, IRON AND ENGINEERING COMPANIES	1049
MISCELLANEA:—	
Workmen's Compensation Act—Indian Coal Rationing	1033
Requisitions for 1918	1036
German Coal for Holland—Coal Wastage	1040
Coal Exports Order	1043
Partnership Dissolved	1046
Institute of Metals—Criminal Appeal Case	1047
Coal Conciliation Board	1050
Peruvian Coal Fields	1052

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The Colliery Guardian

AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, NOVEMBER 30, 1917.

The London market is very short of rail and seaborne coal, but the retail orders are lessening, so that depots are fairly supplied. The outlook for the winter is brighter.

Tonnage is not coming forward at Northumberland ports as fully as expected, and most qualities of coal are freely offered for next week's loading. Coking sorts and smithies are in brisk demand. Durham is experiencing a good demand for industrial fuel. Milder weather has eased the pressure for house coals in Lancashire, but, on the other hand, the cross-channel and coastwise trade remains urgent. Enquiries exceed supplies in Yorkshire, and the deficiency of slack for coke manufacturing presents a serious problem there. The French demand for gas coal and Hartleys is a feature of the firm market in Hull. Business is dull in Cardiff, and tonnage supply has been further affected by recent unfavourable weather at sea. The inland demand is good. Anthracite is firm in Swansea, and the supply of large sorts improved a little. Sellers of rubbly culm and duff are more plentiful than buyers. The outlook in Scotland is discouraging. Except for first-class navigation coal and steams, the collieries have great difficulty in disposing of output.

Chartering is difficult, owing to the monotonous shortage of shipping. The tone is firm on the north-east, and 21s. is reported Tyne to London. The Liverpool fixtures include Philadelphia to Cuba (coal cargo) 8 dols. Remarkably high rates are offered in South Wales for neutral destinations.

In the Committee stage of the Coal Mines Control Agreement (Confirmation) Bill the Government accepted a number of amendments.

A new Order in Council requires exporters to obtain a licence for the export of coal to British destinations after December 6 next.

A scheme is under consideration for the better distribution of coal miners in Scotland, in addition to the facilities provided for a number of them in the Cumberland iron ore mines.

The Coal Controller is reported to be considering the position in Durham and other areas with a view to improving insufficient earnings by a number of workers.

Strong protests are being made against the Imports and Exports (Temporary Control) Bill now before the House of Commons. The Bill proposes to continue State control for three years after the war.

At Cardiff a joint meeting was held of representatives of coal owners and workmen to devise means for the prompt settlement of disputes and prevention of strikes without notice.

The annual meeting and election of officers of the South Staffordshire Association of Colliery Under-Managers will take place at Dudley to-morrow (Saturday).

Mr. G. Blake Walker, M.Inst.C.E., will submit a paper on "Recent Developments in By-Product Coking" at the meeting of the Institution of Civil Engineers, Great George-street, Westminster, on Tuesday, December 4. The proceedings will commence at 5.30 p.m.

The agenda of the meeting of the South Wales Institute of Engineers to-day (Friday) includes a discussion on Mr. J. A. Yeaton's paper, "Coal Briquetting, with Special Reference to Anthracite Coal." The inaugural meeting of the Monmouthshire District Association will be held at Crumlin on December 1, commencing at 5.30 p.m. The president, Mr. H. Bramwell, will address the students.

Prof. Henry Louis will deliver an address on "The Economics of Coal Production" at the Society of Chemical Industry (London section) in Burlington House, Piccadilly, London, on December 4, commencing at 8 p.m.

The "Colliery Guardian Monthly List of Recent Coal Literature" has been postponed until December 28.

Under the auspices of the Employers' Parliamentary Council, a national conference of representatives of the Central Associations of Employers will be held in the Conference Room, Central Hall, Westminster, on December 12, to discuss a united policy in regard to the Government's Reconstruction proposals.

National Alliance of Employers and Employed.

QUIETLY and without ostentation there has recently sprung up a new organisation, called the "National Alliance of Employers and Employed," which already embraces many of the largest firms in the country and representatives of the most prominent trade unions. The chairman of this new body is the Right Hon. F. HUTH JACKSON. The hon. treasurers are Sir ROBERT HADFIELD and Mr. W. A. APPLETON, C.B.E., and the executive committee is composed of an equal number of captains of industry on the one hand and prominent labour leaders on the other.

The objects of this Alliance may be briefly summed up as the promotion of the interests of all industrial works by the co-operation of employers and employed. It will deal with all questions affecting labour and employment, the welfare of industrial workers, industrial efficiency, and particularly the difficult problems connected with demobilisation after the war. It has also in view the consideration of suggestions for securing a permanent improvement in the relations between employers and workmen, to which end it is proposed to secure some means for systematically reviewing the industrial situation from the labour standpoint, as outlined in the Whitley Report.

This movement has not, as some have asserted, been engineered by employers. It was initiated in April 1915 by a small committee which did not include a single employer of labour. It was not until September of last year that four employers were invited to meet four leading trade unionists for the purpose of deciding upon a plan of action. In the meantime another body, the Industrial League for Improvement of Relations between Employers and Employed, had also been formed for the purpose of establishing social conferences for discussion and debate, and this organisation is now working in close agreement with the Alliance. Amongst all other efforts which are now being made to establish better relations between Capital and Labour, the two bodies named above are the only organisations based upon the principle of equal responsibility and equal administrative authority of employers and employed.

The progress of this movement may be gathered from the fact that already a large number of local committees have been set up in the chief manufacturing centres, and it is supported not only by representatives of nine of the trade unions but also by the Associated Chambers of Commerce of the United Kingdom and by the Federation of British Industries. The last step taken to consolidate the organisation was to provide a constitution, and to make arrangements for its financial support, which was accomplished as recently as November 15 last, and the Alliance thus becomes an established body equipped with adequate machinery for dealing with the difficult questions with which it is concerned. Although this movement has scarcely got beyond its

initial stages, there is already ample evidence that it will become a permanent and strong organisation. There are, of course, opponents both among employers and employed, the latter of whom are perhaps more noisy than numerous, with interests very far removed from the objects which the Alliance has at heart. It has to be recognised that we have in this country a minority of reactionary and revolutionary spirits, whose main object is to promote hostility rather than co-operation between employers and employed. Many of these men would find their occupation gone under any scheme of partnership of capital and industry. Perhaps not all of them are actuated by these selfish motives, for there are still some who seem to be possessed of an honest conviction that workmen should not on any account become too satisfied with their position. But whatever their motive may be, it is difficult to conceive that any real objection can be taken to the programme drawn up by the Alliance, which includes the following industrial questions—viz., a living wage for all workers, regulation of hours of work, proper workshop conditions, housing accommodation, continuity of employment, education and technical training, and encouragement of trade unionism. To these are added such questions as the encouragement of workers to take an interest in their efficiency, maximum output, and joint committees in works to consider the interests of the industry—a schedule which admits that there is an employer's as well as a labour point of view.

Perhaps one of the most interesting side-lights on the function of the Alliance is furnished by the method proposed for dealing with the reinstatement in civil employment of those who are now fighting for their country. For this purpose it is suggested that powers should be obtained from Parliament to set up a Central Statutory Board to consider all questions of labour adjustments arising not only from demobilisation, but also from the liberation of controlled establishments. There is not an industry in the country that will not be affected by these events, which, however remote they may seem to be at the moment, may perhaps be nearer than we imagine. The Alliance suggests that not less than two-thirds of this Central Statutory Board should be representatives of employers and employed in equal numbers, the remainder being members of Government departments or such other representatives as may be desirable.

The Clifton Tub Case.

THE Home Office prosecution of the Clifton Colliery Company for an alleged contravention of section 62, subsection 2 of the Coal Mines Act, 1911, presents some unusual and interesting features of more than ordinary importance to colliery owners. In order to understand its full import it is necessary to recall the precise wording of the Act. The subsection in question says that "the tubs shall be so constructed and maintained as to prevent, as far as practicable, coal dust escaping through the sides, ends, or floor of the tubs, but any tub which was in use in any mine at the date of the passing of this Act may, notwithstanding that it is not so constructed, continue to be used in that mine for a period of five years from the said date." In the annotated edition of the Act, issued by the Home Office, a comment is made upon the interpretation of the words *as far as practicable*. This expression occurs also in section 42, dealing with travelling roads and haulage, and a note under this section calls attention to the fact that the legal meaning of the words *so far as is reasonably practicable* in section 51 of the Act of 1872 was defined in *Walls (or Wales) v. Thomas* (1886) 16 Q.B.D. 340, where it was held that the words did not relate to the carrying on of the mine as a profitable concern, but to the physical or engineering difficulties in the way of carrying out the rules. Presumably, therefore, the Home Office attaches the same meaning to the words *as far as practicable* in the Act of 1911 as to the words *so far as is reasonably practicable* in the earlier Act. The note further says that the requirement above mentioned is absolute, and the arrangements, construction, and clearance must be the most efficient possible for the purpose.

Of course, these notes, although expressing the official view, have not the force of law, but are intended to provide such explanations, in the light of decisions in the superior courts, as may be helpful

concerned with administering or carrying out the Act. They are the views upon which the Owners of mines are instructed to act, and the importance in the present instance lies in the explanation thus afforded of the action of the inspector in regard to the suggested interview with the committee of the Midland Counties Colliery Owners' Association for the purpose of discussing the question. The Owners' Association desired to point out that the construction of the tubs according to the Home Office requirements would operate against the output of coal, and would interfere with the practical working of certain coal seams in the counties of Derby and Nottingham. They also contended, *inter alia*, that so strict an interpretation was not called for in this case, in view of the freedom from serious accumulations of inflammable dust, and the system of loading large coal to meet the requirements of the steam coal and iron trades. Mr. WALKER, however, declined to discuss with the committee any question of the application of the subsection as set out in the Act, which he rightly maintained applies to every mine not naturally wet. The Clifton mine, being a dry mine, therefore, although worked with naked lights, comes under the Act, and Mr. WALKER was not willing to discuss any other matters than the practicability or otherwise of closing the ends of the tubs, and the difficulty under present conditions of obtaining the necessary materials. He objected to the committee's proposal to bring Dr. HALDANE with them for the purpose of discussing the safety of the working methods in vogue in this pit.

As a matter of fact, it was not claimed that this pit is in the least degree dangerous. The coal has a high percentage of moisture, and no gas is given off in quantity requiring the introduction of safety lamps. Since 1914 systematic stone dusting has been carried out in the haulage roads, and the last examination of the dust showed an average of 79.3 per cent. of ash, which is considerably higher than the 1:1 mixture generally accepted as a safe proportion. Dr. HALDANE, in his evidence, described the pit as "enormously safe"; and, on the whole, it does not seem necessary upon the score of safety alone to make any change in the working of the pit.

But the Act requires the ends of the tubs to be closed. The prosecution admits the difficulty of using tubs with completely closed ends in parts of the Clifton pit, by reason of the want of sufficient clearance to load from the top with large coal. The only feasible way of carrying out the terms of the Act would be the obviously inconvenient plan of closing the ends after the tubs had been filled. The management had taken certain steps to comply with the required conditions by putting in end pieces about 4 in. high, but this does not satisfy the Home Office, apparently for the reason that at Butterley Colliery, where thin seams are also worked, the ends of the tubs can be practically closed after filling. It has apparently been conceded that some modification of the rigid requirements of the Act should be made in cases where the haulage rope passed at the bottom; and although the provisions of the Act appear to be mandatory, it was argued by Mr. CAMPION for the defence, that the Home Office has already departed from that position. Moreover, in section 102 of the Act it is expressly laid down that no proceedings shall be taken for non-compliance with any of its provisions if it is shown that they are not reasonably practicable.

This point has already been made clear by Lord READING in his judgment in the case of *Atkinson v. Shaw*,* where he says, "The Legislature was passing an Act to apply to all coal mines throughout the kingdom; these mines vary in character, and precautions which are salutary in one colliery may be highly dangerous in another. . . . Therefore Parliament, recognising, when it imposed this obligation generally, that in some cases performance of it might not be possible, provided that if owner, agent or manager can satisfy the magistrate that the contravention had been through circumstances over which he had no control, or that it was impracticable to make the contravention comply with the Act of Parliament, he is not liable."

It is pointed out that section 102 restores the provisions of the Act, which were practically used in the Act of 1914, in a modified form section 62 of the Act of 1911. It does not appear to be so absolute as the

Home Office note implies. As there are many pits in the Midland area which might be adversely affected by the magistrate's decision at Nottingham, it is possible that the matter will not be allowed to end there.

THE LONDON COAL TRADE.

THURSDAY, NOVEMBER 29.

The retail trade in the London district has shown a distinct falling off during the past week. Many of the depots are fairly well off for stock, so that merchants are beginning to show a disinclination to receive certain qualities of coal which are not suitable to their regular trade, and for the first time for many months past they are cancelling orders which have been in hand so long. The pressure for hard steam coal continues, but household qualities (notwithstanding the cold weather) are easier. With the retail trade falling off, and the heavy stocks in the cellars of the large houses possessing the necessary accommodation, more scope has been afforded for putting a fair amount on the ground. Trolleys have been enabled to canvass the poorer neighbourhoods, but all the reports point to the fact of there being less demand for coal. The cold weather during the earlier part of the week stimulated the trade a bit, but at no time has the demand been so great as it was during the past few months. The quantity coming forward to London stations has been restricted, doubtless owing to southern stations claiming more attention in regard to supplies, and even now there is an active demand for the bulk of the stations outside the Metropolitan area. Bakers' nuts and hard kitcheners cobbles are firm, and small nuts are keenly wanted. Slacks are selling freely, but the supply is abundant, and only the better qualities are maintaining the full price. In the seaborne trade there has been a falling off, and on Monday's market only 19 vessels were reported as entering the Thames, and 11 for Wednesday. Shipping seems to be greatly hampered by the stormy weather, and vessels are considerably delayed. Emergency coal is still coming forward in limited quantities at the fixed prices issued by the Controller, under the direction of the London Coal Committee, and many of the Midland collieries are compelled to despatch a definite quantity into the London area, which should greatly help the supply as compared with a year ago. The south of London depots are having better attention, and the pressure is to a very large extent diminishing. The amount of coal at the London depots is now approximately a quarter of a million tons, and the outlook for the winter's supply is considered far more satisfactory than the preceding winter, however cold the weather may be. According to notices exhibited on the Coal Merchants' Subscription Room door, somewhat heavy penalties have been imposed upon merchants who have recently let a number of wagons on hire without the sanction of the Railway Material Licence Department of the Ministry of Munitions; also for not filling up the proper forms and revising the list of employees and sending it to the recruiting officer of the district monthly. During the week a fairly good quantity of the Forest of Dean small coals has been offering on the London market, and the railway rate of 6s. 1d. to 6s. 6d. is fairly reasonable, but the pit price of 16s. 6d. to 17s. for the small coal and 27s. 3d. to 27s. 6d. per ton for large coal appears rather high. The Controller has granted exemptions in the special cases of many of the Southern gas companies for a fair quantity of Yorkshire and Durham unscreened gas coals to come through London for areas 13 and 14. The recent shortage in their supplies has rendered this course necessary.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, NOVEMBER 23.—There was no alteration in the seaborne house coal market, which continued quiet, with no cargoes offering. Cargoes 18.

MONDAY, NOVEMBER 26.—The sudden change to very cold weather caused a good demand for seaborne house coal, but the supply was short, and no available cargoes were on offer. Cargoes 19.

WEDNESDAY, NOVEMBER 28.—There was no alteration in the seaborne house coal market, which remained firm. No sales reported. Cargoes 11.

German Coal for Holland.—According to the *Vaderland*, of The Hague, Germany has agreed, as from December 1, to increase the monthly coal delivery by some tens of thousands of tons, and has promised one extra delivery. The journal learns that the absence of the free passage to Great Britain for Dutch colliers is due to the fact that Germany adheres to her demand that each collier shall be accompanied by a paddle steamer.

Coal Wastage.—An appeal for a drastic revision of our methods of consuming coal was made by Dr. Hickling, of the Manchester University, in a lecture to the members of the Ancoats Brotherhood at the New Islington Hall. Dr. Hickling remarked that the one principle guiding the getting of the coal was that the man who got it must make an immediate profit on it, whether the method was the best for the nation or not, and this was resulting in an enormous wastage. Then, when the coal was won, the only use we made of it was to burn it, and this in the most ineffective manner possible. The day for merely throwing coal on the fire had long gone past. — Prof. Watkinson referred to the same matter in an address delivered at a meeting of the Keighley Association of Engineers on Saturday last. He said that at present 65 million tons of low-grade fuel were wasted yearly. But this could be utilised if we had a proper scheme for electrical distribution of energy. Thus, by the transmission of energy in the form of electricity, we should have a concentration of power plants in the neighbourhood of the coal fields. By-products could be procured, and from the coal burnt at the present time we ought to be able to procure 200 million tons of tar. From this we ought to get about eight million tons of tar oil suitable for use in oil engines such as the Diesel engine, and that quantity was equal to four times its weight of coal, and would be more than sufficient to drive all the ships of the British Navy and the mercantile marine. Benzol and ammonia could also be recovered if the coal was gasified properly, and sulphate of ammonia would be produced for agriculture. For the distribution of the electricity produced, Prof. Watkinson insisted that the matter would have to be taken in hand by the Government, and trunk lines of 70,000 to 100,000 volts laid down. Then the trunks would be tapped by the municipalities, who would further distribute the energy.

THE COAL AND IRON TRADES.

THURSDAY, NOVEMBER 29.

Scotland.—Western District.

COAL.

Nothing of particular importance has occurred in the Scotch coal trade during the past week. Owing to the lack of export tonnage, markets generally are dull and lifeless, and prospects are still remote. In the west of Scotland the collieries manage to keep going comparatively well in view of a steady demand for industrial sorts and an increasing household turnover. Nevertheless, the position is not over encouraging. Shipments for the past week amounted to 120,051 tons against 79,404 in the preceding week and 103,246 in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	23/-27/
Ell	26/6-28/	26/6-28/	24/-25/
Splint.....	28/-30/	28/-30/	26/-30/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

While activities in the Scotch iron trade are fully maintained, markets are unsettled owing to the uncertainty with regard to fixed prices and the rapid rise of "free" quotations. The latter feature contributes a further disturbing factor in the course of ordinary business. No doubt some workable basis of prices for private trading will shortly be established, but meantime quotations are advancing without any apparent limit, some already being dearer by 20s. per ton compared with two weeks ago. Quotations for Scotch makers' iron are approximately as follow:—Monkland, Govan, Eglinton and Dalmellington, Nos. 1, 119s., Nos. 3, 114s.; Clyde, Carnbroe, Gartsherrie, Summerlee, Calder, Langloan, Shotts and Glengarnock, No. 1, 120s. 6d., No. 3, 115s. 6d. per ton—all f.o.t. makers' works; Carron, f.a.s. at Leith, No. 1, 150s., No. 3, 145s. per ton. Malleable iron makers are very busy with Government orders, and have also a large amount of ordinary business on hand. Export prices show a continuous rise, and quotations are on a day-to-day principle. In black sheets there is practically nothing doing on private account, and the same applies to galvanised material. All classes of engineers are exceptionally busy in the meantime.

Scotland.—Eastern District.

COAL.

The situation in the Lothians coal trade is without alteration, and is far from encouraging. Local requirements are of a small bulk, while shipments are very much reduced. Clearances for the week amounted to 17,422 tons against 17,013 in the preceding week and 22,103 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	28/
Secondary qualities.....	25/6	25/6	27/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Conditions in Fifeshire also remain in an unsatisfactory state. With the exception of first-class navigations and steams, the collieries are finding great difficulty in disposing of outputs in spite of a considerable reduction in working hours. A scheme is under consideration to arrange for the transference of the miners to busier districts in Scotland, while a number of men have already left for the Cumberland iron ore mines. Shipments for the week amounted to 28,219 tons compared with 36,593 in the preceding week and 34,647 in the corresponding week of last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal	29/-31/	29/-31/	30/-35/
Unscreened do.....	24/-25/	24/-25/	28/
First-class steam coal.....	28/	28/	30/-33/
Third-class do.	24/	24/	21/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Shipments to France and Italy at prices quoted; other destinations 2s. 6d. per ton extra.

The aggregate shipments from Scottish ports during the past week amounted to 165,692 tons, compared with 133,010 in the preceding week and 159,996 tons in the corresponding week last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

Thanks to a healthy demand on official account, accompanied by the requisite transport facilities, the steam coal collieries have been kept fairly busy. At the time of writing, this regularity of employment is well maintained, and prospects are quite good. Accumulated stocks are not yet by any means exhausted. At the Durham gas coal collieries, the position is hardly so good, work at the pits being hampered by reason of tonnage shortage, which, although not as acute as was recently the case, is still sufficient seriously to embarrass business. Gas coals are plentiful at the minimum scheduled figures. The home market for smithies and coking coals continues to absorb the great bulk of the output and assists in maintaining the export price of special smithies at 32s. 6d. per ton. The bunker market is very dull, excepting for special qualities, which are making from 30s. to 32s. 6d. and are reported to be well booked up for about ten days from now. Coke is rather quieter by reason of the tonnage scarcity, and the demand no longer exceeds the output. The market is inherently sound, and only the scarcity of shipping militates against its great activity. There is little forward business of note reported this week. The contract to

* See *Colliery Guardian*, May 14, 1915, p. 1019.

supply the Norwegian State Railways with 18,500 tons of steams for delivery over January-February has not yet been allotted; tenders have been sent in based on the minimum scheduled figures.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/-
Do. Tynes (Bowers, &c.) ...	29/6-32/	29/6-32/	28/-30/
Secondary, Blyths	25/6-28/	25/6-28/	25/-27/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	25/-27/6
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	20/-
Do. Tynes	18/6-21/	18/6-21/	17/6
Do. specials	20/6-23/	20/6-23/	21/-
Other sorts:—			
Smithies	25/-32/6	25/-32/6	20/-
Best gas coals (New Pelton or Holmside) ...	25/-27/6	25/-27/6	27/6
Secondary gas coals (Pelaw Mainorsimilar) ...	23/6-26/	23/6-26/	19/-21/
Special gas coals	26/6-29/	26/6-29/	27/6-30/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	18/-20/
Do. do. Northumbrians	26/6-27/6	26/6-27/6	18/-20/
Coking coals	24/-27/6	24/-27/6	19/-20/
Do. smalls	24/-27/6	24/-27/6	18/-
House coals	28/6-32/	28/6-32/	30/-32/6
Coke, foundry	42/6-45/	42/6-45/	38/-42/6
Do. blast-furnace	42/6-45/	42/6-45/	34/-36/
Do. gas	35/-37/6	35/-37/6	33/-35/

Sunderland.

COAL.

The coal market is dull and shows no change. Business is of small account, with a poor foreign enquiry. The arrival of tonnage over the week end has only been small, and the collieries are very indifferently supplied with boats, hence work is very irregular. Local coals are finding their chief outlet in the home trade, which is absorbing substantial quantities of gas, house and manufacturing fuel, including washed peas and nuts. Bunker coals are plentiful, and are moving very slowly. Values generally are unaltered, and remain at the fixed minimum. Steam smalls are dull and continue to accumulate. The coke market is steady, but not much doing for shipment. Gas coke is in good request. The Norwegian State Railways order for 18,500 tons of steam coals is expected to be placed to-day.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	—
Secondary do.	25/-27/6	25/-27/6	—
House coals:—			
Best house coals	32/6	32/6	—
Ordinary do.	30/6	30/6	—
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	—
South Hetton do.	31/-32/6	31/-32/6	—
Lambton unscreened ...	26/6	26/6	—
South Hetton do.	26/6	26/6	—
Do. treble nuts	22/6	22/6	—
Coking coals unscreened	27/6	27/6	—
Do. smalls	27/6	27/6	—
Smithies	27/6	27/6	—
Peas and nuts	27/-28/6	27/-28/6	—
Best bunkers	27/6	27/6	—
Ordinary bunkers	26/6	26/6	—
Coke:—			
Foundry coke	42/6-45/	42/6-45/	—
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	—
Gas coke	35/-37/6	35/-37/6	—

Middlesbrough-on-Tees.

COAL.

The fuel market is, on the whole, quiet, and values show little or no change. Complaint is general of irregularities and delays in the arrival of engaged tonnage. In the home market enquiries for most descriptions of fuel continue on a good scale, but negotiations with neutrals appear to be falling off. Gas coal, coking, household and manufacturing fuel are in particularly strong request, with values still standing at the fixed minima. Steam smalls are dull, and bunkers very quiet, this market being slow and erratic, with only good qualities taken up to any extent. Steam smalls range from 21s. to 22s. 6d., best Durham gas coal is 27s. 6d., seconds 26s., and Wear specials 29s.; whilst coking coal is fairly well taken up at round about 27s. 6d., and Durham unscreened bunkers run from 26s. 6d. to 27s. 6d. Household coal is readily bought at rates recently named. Coke is steady and firm, with a good home business passing, but demand for shipment abroad is only moderate. The continued heavy local requirements are met by very ample supply, with the result that there is a rather active market. Average blastfurnace kinds are 33s. at the ovens, and low phosphorus qualities 35s. 6d. at the ovens; whilst foundry coke is 38s. For export to neutrals, both beehive and patent oven are 45s., and gas-house product is readily purchased at 37s. 6d.

IRON.

Little new is ascertainable concerning the various branches of the iron and steel industries. The opinion now prevails that sanction will not be given to advance quotations to cover increased cost of production, but that matters will be rectified by subsidising manufacturers. Commencement of December allocations of Cleveland pig iron has brought in a fair amount of home buying. Deliveries under the November allotments fell much below expectations, due chiefly to the shortage of trucks, and consequently applications for the last month of the year are very heavy. There is rather more foreign business passing. For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 92s. 6d., and No. 1 is 96s. 6d.; and for shipment to the Allies No. 3 is 102s. 6d., No. 4 foundry 101s. 6d., No. 4 forge 100s. 6d., and No. 1 107s. 6d. The situation is still stringent in east coast hæmatite, demand being as intense as ever, and supply barely sufficient to meet current requirements. Deliveries to home customers, however, are maintained on a sufficient scale to satisfy minimum needs, but little surplus iron is left for export, so that it is gratifying to have the assurance that relief is at hand by substantial increase of output of basic iron. Mixed numbers of hæmatite are 122s. 6d. for home use, and 141s. for export to the Allies. Manufacturers

of finished iron and steel are kept running at high pressure to cope with the huge needs of the Government and the very large demands of the shipyards, and traders realise that under existing conditions it is little use attempting to put through ordinary commercial business. Prices are very stiff.

Cumberland.

Maryport.

COAL.

Great briskness is exhibited in the coal and coke industries in West Cumberland. There is a very strong market for fuel, and business is much firmer in all branches. All the collieries in the county are now more fully employed, and with the restarting of Wellington pit there has been a marked increase in production, but the entire output is being readily disposed of. In the home market there is a strong enquiry for all classes of fuel. The collieries are pressed with orders on both local and coastwise account, but home consumers are making such a heavy call on the supplies of house and industrial fuel that it is now almost impossible to deal with more than one half of the business that is being offered on export account. Stocks of all sorts for shipment are lower than usual. Gas coal is very firm, and engine fuels for the local railways are in steady request, but stocks are scarce and large quantities are still being imported from Scotland and other outside districts. The coastwise trade is fairly steady. Scarcity of tonnage prevents rapid clearance of even the limited amount of coal available for cross-channel shipment. Coke makers are busier than ever, and the entire output from the 390 by-product coke ovens at present in operation is being taken by the West Cumberland smelters. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls „	19/2	19/2	16/8
Do. peas „	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	25/
Best works fuel	31/	31/	30/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	22/6	22/6	20/
	21/6	21/6	19/

IRON.

Production continues to increase in the Cumberland hæmatite pig iron industry, and the output of native iron ore has greatly improved of late. The market for pig iron is very firm. Billets and plates are in firm demand, but rails are quiet, and at present no railway material is being rolled. Prices of all grades are quoted at the maximum. The imports of foreign iron ore for the week amounted to 3,000 tons.

South Lancashire and Cheshire.

COAL.

There was a good attendance on Tuesday last on 'Change. House coal still continues in great demand, and also all kinds of manufacturing fuel. The tonnage for shipping is, of course, restricted by the various supplies committees in order to provide an adequacy for inland use. Prices generally are as below:—

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington) ..	—*	—*	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

There is nothing new to report, with the exception of the unsettled state of affairs regarding pig iron and finished commodities, the prices of which have not yet been definitely fixed since the large advance in fuel took place. The matter is being dealt with in the proper quarters.

South-West Lancashire.

COAL.

Speaking broadly, the inland household trade is slightly easier in its tone, and there is no doubt many people are so well provided for that they will see themselves through the worst of the winter without additional supplies. With regard to shipping, conditions remain much as reported last week. The demand for steam coal for bunkering and export on the whole is quiet. The supply of shipping tonnage tends to lessen, and delays of various kinds to steamers are becoming more marked. There is, however, no excess of coal to speak of, and prices are up to full official rates. For the cross-channel and coastwise trade an urgent demand continues for all descriptions, and more would be purchased if it could be obtained or suitable vessels chartered. With regard to slack and small fuel generally, there is considerable pressure for the better grades, and it is only in the very common qualities or the fine grades that a little free tonnage can be found available for prompt purchase.

Prices at pit (except where otherwise stated)

	Current prices.	L'st week's prices.	Last year's price.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net) 26/ upwds.	27/ upwds.	27/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/-20/
Do. (f.o.b. Garston, net) 25/ upwds.	26/ upwds.	26/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net) 24/	25/	24/ upwds	18/
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	22/9-23/6
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

Yorkshire and Derbyshire.

Leeds.

COAL.

Very little variation from week to week is discernible in the general situation of the trade in West Yorkshire. With the collieries working so largely under the Controller's orders and the distribution of the output closely regulated, in the nature of things there is little scope for changing conditions or for initiative on the part of those engaged in the trade. There was the usual numerous attendance on the market on Tuesday, including a number of the representatives of the London trade, and the customary active enquiry for almost every description of coal, particularly gas and steam sorts, but the quantity offering was almost negligible. Collieries are so well booked up with orders that there is practically nothing left in the ordinary course for new business, and supplies of any kind of coal are extremely difficult to secure. The pits continue to work full time and at full pressure, and while there are occasional complaints of delays on the railways, especially over long distances, transit is on the whole satisfactory, without any surplus of wagons anywhere. The house coal trade with London and district proceeds along well-defined lines. The efforts of London factors and merchants to augment their present deliveries by purchases on the market do not meet with much success. Deliveries are still on a heavy scale, though more restricted than was the case a few weeks ago. Reports from the depôts indicate an active demand. Coastwise shipments from the Humber ports have fallen to very narrow limits, and are practically confined to contract coal, about equally divided between Goole and Hull. In local markets the position is easier, as deliveries are coming forward with more freedom, and the public pressure for supplies is noticeably checked by the distribution regulations. Only in isolated instances, however, has any material progress been possible in the direction of accumulating stocks against the time of maximum consumption in the colder months of the winter. Pit prices for the West Riding:—Haigh Moor selected 22s. 6d. to 23s. 6d., Silkstone best 22s. to 22s. 6d., Silkstone house 21s. to 21s. 6d., other qualities 19s. 6d. to 20s. 6d. With regard to gas coal, deliveries generally are below requirements. The heavy use of gas for munitions purposes and to an increasing extent as a propellant for motor cars, has caused the consumption, especially in the large towns, to be abnormal, and stocks of coal at the works are being rapidly consumed. In some instances applications have been made to the Coal Controller for permission to obtain extra supplies from Durham, and these have been granted. This will relieve the position to some extent, provided that the wagon difficulty can be got over. Manufacturing fuel is in strong request. Washed nuts and rough slacks are in most demand, and there is no surplus of any quality. The shortage of coking slacks is still a feature, and some coking plants are only kept going to the full extent by using nuts and crushing large coal. The demand for coke is well maintained, to an extent in excess of the possible output.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallsend & London best	21/-21/6	21/-21/6	19/-20/
Silkstone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkstone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/6	20/6-22/6	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	18/-18/6	18/-18/6	16/-17/
Gas nuts	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/-18/
Large double-scrned engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens			
Furnace coke	32/	32/	25/8

Barnsley.

COAL.

The condition of business is practically unaltered, with the demand continuing heavy and in most cases exceeding the output, which is well maintained. A greater difficulty has been experienced in regard to the transit, and shipments are less satisfactory owing to the marked scarcity in tonnage. The situation, however, is easily dealt with by the diversion of this traffic for home purposes. Supplies of large steams may be regarded as satisfactory under the circumstances, and the consumption on home account is again very extensive. A considerable quantity of coal is still to be taken in substitution for steam nuts. The shortage of slacks for coke manufacture is still a most serious problem, and great efforts have still to be put in to employ; and even then the output is inadequate to satisfy the needs of the blast furnace areas. In a lesser degree the delivery of gas coal continues to give cause for a good deal of anxiety, although the difficulty is largely contributed to by the long railway journeys. Another

In connection with steam and manufacturing fuel extensive consumption by the electricity plants. Areas the demand for power is steadily growing. Supplies are hardly sufficient to meet their wants. In regard to house coal the milder weather is helping the situation. At the present time supplies to nearer districts are of a more satisfactory description and enable merchants to dispose of orders in arrears.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	22/6-24/6	22/6-24/6	20/-22/-
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/-
Secondary do.	19/6-20/-	19/6-20/-	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/-
Secondary do.	18/-18/6	18/-18/6	15/6-16/-
Steam coals:—			
Best hard coals.....	20/-21/-	20/-21/-	17/6-18/6
Secondary do.	19/-20/-	19/-20/-	16/6-17/6
Best washed nuts.....	18/9-19/-	18/9-19/-	16/3-16/6
Secondary do.	18/-18/9	18/-18/9	15/9-16/3
Best slack	15/-15/6	15/-15/6	12/6-13/-
Secondary do.	13/-13/6	13/-13/6	10/6-11/-
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/-
Gas nuts.....	18/9	18/9	16/-
Furnace coke.....	32/-	32/-	25/8

Hull.

COAL.

The market continues firm, and business on steady lines. All supplies being readily absorbed. Heavy weather at sea interfered with shipping and caused delay. Otherwise things have gone pretty much as usual, and fairly large quantities have been sent to France. With shipping tonnage extremely scarce, very little neutral business can be done. Recent transactions have been on the basis of 35s. for best South Yorkshire hards, and 30s. for West Yorkshire Hartleys, but in the bulk they do not amount to much. All kinds of coal are well taken up, large steams being in particular request by the Admiralty and the railways, and West Yorkshire screened sorts by the French importers. Nuts and industrial fuels are practically wholly required on official account at home.

Chesterfield.

COAL.

The coal trade of this district presents no special feature. The demand for coal of every description is as active as ever. House coal orders are plentiful, and supplies are eagerly awaited by merchants in every district. It is fortunate that this November has been free from fogs. In its absence the remarkably open weather proved a great blessing to the railways of the country. There is a steady call for fuel for manufacturing purposes, cobbles and nuts being in chief request. This class of fuel is specially needed for gas producers in connection with the large steel works of Sheffield and district. Every class of coal for boiler firing is in good demand, and large hard coal is wanted for annealing furnaces. Gas companies are pressing for good supplies of gas coal. Steam coal for locomotive use is also in great request. No change for the better can be reported in connection with the export trade, and business in this department continues at a standstill. The coke market maintains its steady condition, and the whole production of the coke ovens of the district is readily taken up.

IRON.

Great activity is apparent on every hand. Pig iron is in good demand, and orders for finished iron are plentiful.

Nottingham.

COAL.

So far as local merchants are concerned, the quieter demand for domestic fuel continues, and current orders are being comfortably dealt with out of the fairly satisfactory supplies obtainable from the collieries. Better class households constitute the larger proportion of the orders, but common qualities are in fair demand. This decline in the retail section is tending to relieve the pressure on collieries, although merchants generally are anxious to secure full contract deliveries. The activity in the steam coal branch is fully maintained, and with an improvement recently in regard to absenteeism on the part of miners, the output at some of the pits has increased. Notwithstanding, the demand is such that all available supplies are rapidly disposed of. Contracts absorb practically all the surplus fuel after the tonnage required for war work has been apportioned. There is still a heavy demand for steam nuts, and ordinary customers find it difficult to obtain this class of fuel. There is a good sale of most grades of slacks. Gas coal and coke are in strong demand.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/-	21/-22/-	19/-20/-
Good house coals	20/-21/-	20/-21/-	18/-18/6
Secondary do.	18/6-19/6	18/6-19/6	17/-18/-
Best hard coals.....	18/6-19/-	18/6-19/-	17/-18/6
Secondary do.	17/-18/-	17/-18/-	16/-17/-
Slacks (best hards)	14/6-15/-	14/6-15/-	12/-13/-
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/-	13/-	11/-

Leicestershire.

COAL.

The pressure for deliveries for domestic purposes is intense, the consumption having been increased by very cold weather. The position is becoming more acute every day, and merchants are beginning to adopt the attitude that more coal must be forthcoming if serious trouble is to be avoided. All the supplies for civilian purposes have to be loaded in private wagons, and this transport is in great demand for Governmental works and for the army, and this has first claim. The output in London and district are at the maximum, and strictly maintained by deliveries. What output has to be subdivided according to necessities. All classes of household, deep steam, and nuts, as well as small nuts for gas, are all cleared off day by day. Four additional output per week would prove a priceless advantage during the winter months, especially to

domestic consumers in the great centres of population. There are no reserves of any kind at country stations or at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/-
Second, hand picked	19/-20/-	19/-20/-	15/6-17/-
Deep screened cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/-
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/-
Small nuts.....	17/-18/-	17/-18/-	14/6-15/6
Deep breeze	15/3-16/-	15/3-16/-	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/-
Main nuts for London kitcheners	16/-17/6	16/-17/6	14/-15/-
Stams, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Stams, seconds	15/6-17/-	15/6-17/-	13/6-15/-
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/-
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The situation as regards coal has undergone no change. The demand is very active for practically all classes, and supplies are still short. The scarcity of nuts and of good class slacks is pronounced, and the bulk of the production is going to the munition works and other concerns engaged on war productions. The advent of colder weather will quicken the run on house coal, already very heavy. The new regulation forbidding merchants to give supplies to people who have more than a month's supply in hand is having a wholesome effect. It has eased demand very materially, and will eventually regulate distribution. Merchants say it is the best Order the Controller has yet issued.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep ...	24/6	24/6	22/-
Do. seconds deep	22/6	22/6	20/-
Do. best shallow	21/6	21/6	19/-
Do. seconds do.	20/6	20/6	18/-
Best hard	21/-	21/-	18/6
Forge coal	18/6	18/6	16/-
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/-
Do. hand-picked			
cobs	20/6	20/6	18/-
Best hard spires	22/6	22/6	20/-
Forge (steam)	18/6	18/6	16/-
D.S. nuts (steam)	17/-	17/-	14/6
Small (do.)	17/-	17/-	14/6

IRON.

A good deal of irritation is being expressed at the protracted delay in clearing up the position regarding prices. Business is hampered, notwithstanding the protecting clause. It stands to reason that neither buyers nor sellers care to enter upon negotiations when they have no definite prices to work upon. Business continues on a limited scale, and some pig iron houses which withdrew from the market for a week or two, in the hope that prices would be finally settled in the interval, have returned. There is not a good supply of foundry iron, and sellers are reserved. Derbyshire No. 3 is 92s. 6d., and Northamptonshire No. 3 90s., and, of course, with a proviso for any change in price. Consumers are anxious to increase their purchases, but are unable. There is unabated demand for practically all descriptions of finished iron and steel, and the great bulk of the output is absorbed by war work. A large quantity of steel is diverted for shipbuilding purposes, and heavy claims are also made upon the supplies of raw and semi-raw material for the construction of aeroplanes, an industry which makes demands on copper sheets as well as steel. Productive capacity is continually being increased, but withal the requirements of paramount importance are such that little material can be spared for subsidiary purposes, while exports are negligible. For October, for instance, the exports of galvanised sheets, an important industry in this district, amounted to only 571 tons, while for the ten months ended October they were 18,046, compared with 113,707 for the corresponding period of 1916 and 257,122 in 1915. Small quantities are turned out for the Government, but black sheets, painted, are mostly used, and transactions in these are confined to Government requirements, there being no sheet bars to spare for outside orders. The price is £17, with about 25s. extra for painting. Gas strip has reached a basis of £16 a ton, and steel strip £18. These branches are uncontrolled, but nearly all the material is used by firms engaged on essential work. Bar iron brings full maximum rates, nut and bolt iron is about £14 10s. delivered in the Black Country, puddled iron £12 15s., and billets £13. Scrap is enquired for in large quantities, but the supply does not appear to be very large, and dealers are inclined to hold back.

Forest of Dean.

Lydney.

COAL.

The pressure for supplies of all descriptions of house coal continues very strong, the situation even for this period of the year being an abnormal one. The output is considerably below the requirements of merchants and, as

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/-
Forest	25/6	25/6	23/-
Rubble	25/9	25/9	23/3
Nuts	24/-	24/-	21/6
Rough slack	15/6	15/6	13/-
Steam coal —			
Large	22/6-23/6	22/6-23/6	20/-
Small	18/-18/6	18/-18/6	16/-17/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

a result, arrear orders are accumulating by every post. Railborne orders are very plentiful, whilst at the docks many vessels are held up several days awaiting their cargoes. A very large proportion of steam and manufacturing fuel is being reserved for firms engaged on Government work, the general position remaining much the same as that of the last few weeks.

THE WELSH COAL AND IRON TRADES.

THURSDAY, NOVEMBER 29.

Monmouthshire, South Wales, &c.

Newport.

Although the stormy weather at the beginning of the week interfered a good deal with the arrival of tonnage, a considerable improvement has occurred recently; but stocks of coal are still high, particularly of smalls. The market has been comparatively featureless during the week. There has been a sharp demand for gas coals, and of course house descriptions at this time of year are naturally in request. Some of the collieries have suffered in consequence of the want of wagons, work being only intermittent. Patent fuel has been plentiful, but cokes were scarce. The outlook at the beginning of the week was somewhat darkened by the fear of labour trouble on the railways.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	32/6	30/-31/-
Western-valleys, ordin'y	31/6	31/6	29/-30/-
Best Eastern-valleys ...	31/6	31/6	27/-28/-
Secondary do.	30/6	30/6	24/-25/-
Best small coals	23/6	23/6	19/-20/-
Secondary do.	22/6	22/6	17/-19/-
Inferior do.	20/6	20/6	16/-17/-
Screenings	25/6	25/6	19/6-20/-
Through coals	29/6	29/6	20/-23/-
Best washed nuts.....	32/6	32/6	25/-27/-
Other sorts:—			
Best house coal, at pit...	35/6	35/6	24/-26/6
Secondary do. do. ...	33/3	33/3	22/-24/-
Patent fuel	32/6	32/6	37/6-40/-
Furnace coke.....	47/6	47/6	50/-52/6
Foundry coke	47/6	47/6	57/6-60/-

IRON.

There is very little change to report in the position of the iron and steel trades of the district. The works are continuing to keep up a large output, with prices nominal, as most of the work is on Government account. The control of the tin-plate trade rather tends to a restriction of business. There has been only a moderate arrival of pit-wood, the price of which keeps up to about 75s. for best French fir.

Cardiff.

COAL.

Stormy weather at the week end again interfered with the supply of prompt tonnage, and irregular working is the rule at a great number of collieries throughout the coal-field. These frequent stoppages are causing such a dislocation of the trade, that the Coal Controller has appealed to both employers and the workmen to suggest remedial measures. In the first instance, the joint secretaries of the Conciliation Board were asked to undertake this duty, but realising the gravity and importance of the task, they replied that they had not the time at their disposal, and suggested the appointment of a joint committee of seven members to investigate the subject. The Coal Controller has taken prompt action, for he has appointed the joint secretaries (Messrs. Finlay A. Gibson and Mr. T. Richards, M.P.) and Messrs. J. J. Anthony and H. A. A. Phillips as a commission of enquiry. The scope of the enquiry is to ascertain the best means of mitigating as far as possible the effects of the shortage of shipping, as shown in the short time recently worked in the district, and the possibility of distributing the available orders more evenly over the coal field, with due regard to the particular class of coal required. It is even contemplated that it may be desirable to close certain collieries, provided a reasonable opportunity exists for the men thus displaced to find employment at neighbouring pits. It will be seen, therefore, that the field of investigation is a very wide one, and that a determined effort is to be made to put an end to the present chaotic condition of affairs. So far as the collieries producing best Admiralty coals are concerned, there is little fear that they will be interfered with, and the main objects of the Coal Controller must be to produce a sufficiency of coal for the British and Allied Governments for the prosecution of the war. Where the shoe pinches is in the disposal of the surplus after these requirements have been met. In normal times the markets of the world were at the command of the producer, but owing to the falling off in the supply of tonnage these outlets are not now available, with the result that collieries producing secondary and ordinary grades of coal are at their wits' end to know what to do with it when they have raised it to the surface. Their sidings are choc-a-bloc, waiting for an opportunity to rush a cargo to the port of shipment, and all the railway sidings are crammed with thousands of wagons of coal which cannot be liberated. Temporary measures have been mooted, but no definite action has been taken, and the position is not only not improving but is becoming gradually worse from week to week. One suggestion is that there should be a proportionate allocation of the orders so that all the collieries producing the classes of coal required may be put upon an equitable basis. Another proposal is that there should be recognised stop days in each week until conditions improve. The latter suggestion is not looked upon favourably by employers, as the output per head of the workmen is always considerably lower after a holiday than in a normal working week. A third remedy is that some of the older and more costly collieries to work should be closed down, temporarily at all events, and the owners compensated for their loss of output. There is another side to this question, and the miners' leaders would put forward a strong case for the compensation of the workmen who were displaced. It is stated that the Admiralty collieries are producing all the

coal that is required by the authorities, and therefore the displaced colliers would not be required there. On the other hand, however, there is a demand, exceeding the supply, for gas-producing coal, and men might with advantage be transferred to those areas. A further suggestion is that there is room for much improvement in the distribution and regulation of the tonnage already at the disposal of the Controller of Shipping. So far as the market generally is concerned there is practically no change, although an illuminating instance of the huge profits made by neutral shipowners came to light on Tuesday. The authorities for some time have insisted that coal released for neutral countries shall be carried in vessels of the nationality of destination, and a freight has just been fixed from the Bristol Channel to Barcelona at 350s. per ton for a steamer of 2,500 tons. This is 100s. per ton higher than the last fixture from Cardiff some weeks ago, and about 60 times the rates prevailing in peace times. Freights to other Spanish ports are in the same proportion, which means that the Spanish consumers have to pay more than £20 a ton for their coal. The fixed rate to Gibraltar is 100s. per ton. All transactions, which are chiefly on official account, continue to be carried through on the scheduled rates, plus the extra 2s. 6d. per ton (France and Italy excepted) to meet the increase in miners' wages. There is an active demand for coke and gas coals, and a steady output of household coals, the scarcity of which is not so apparent as a few weeks ago. Patent fuel is plentiful at controlled rates. The position with regard to pitwood is unchanged, and no announcement has yet been made as to the fixing of maximum prices. In the meantime best French fir commands 75s. per ton.

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

Steam coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	29/-30/
Ordinary	30/	30/	27/-28/
Steam smalls No. 1	21/6	21/6	19/-20/
Do. 2	21/	21/	—
Do. 3	20/6	20/6	17/-19/
Do. 4	20/	20/	—
Do. 5	19/6	19/6	15/-17/
Do. 6	19/	19/	—
Do. 7	18/6	18/6	14/-16/
Do. 8	18/	18/	—
Best dry coals	30/	30/	26/-27/6
Ordinary dries	28/6	28/6	24/-26/
Best washed nut	30/	30/	30/-31/
Seconds	28/6	28/6	29/-30/
Best washed peas	27/6	27/6	29/-30/
Seconds	26/6	26/6	28/-29/
Monmouthshire—			
Black Veins	30/	30/	28/-30/
Western-valleys	29/	29/	27/-29/
Eastern-valleys	29/	29/	25/-27/6
Inferior do.	28/	28/	24/-26/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	29/-30/
Small	26/	26/	20/-22/
No. 2 Rhondda—			
Large	27/	27/	28/-30/
Through-and-through	22/-23/6	22/-23/6	20/-22/6
Small	17/-19/	17/-19/	18/-20/
Best patent fuel	30/	30/	38/-40/
Seconds	30/	30/	37/-39/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	55/-60/
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	75/	75/	48/-50/

Nominal.

IRON.

Shipments of tin-plates last week only amounted to 7,874 boxes against 21,414 boxes received from works, thus leaving 86,511 boxes in stock in the docks warehouses and vans, compared with 133,709 boxes at the corresponding date of last year. The increased allocation of steel bars has had the effect of bringing six more mills into operation than were working in September. There has been a freer dealing in wasters, and congestion at works has been considerably relieved. It is felt, however, that the restrictions might also be modified with regard to oil sizes, for which there is strong demand for the home market for canning purposes. Order books are well supplied, and makers exercise considerable caution in entertaining new business. Since last week block tin has advanced nearly £5 per ton, the current quotation being £284 for prompt delivery and £282 5s. per ton in three months. Bessemer standard coals are 31s. per box, with other sizes in proportion. Blast furnaces are turning out increasing quantities of pig iron, and steel works are extremely busy in producing the material required for munition purposes, rails and ship-building plates. For the latter there is a strong demand, and extensions are being made which will increase the output. In the galvanised sheet trade there is no change. Iron ore supplies continue satisfactory. Prices in all departments are nominal.

Swansea.

COAL.

There was a capital attendance on 'Change, the anthracite coal market continuing to display a steady tone. Best large was in excellent demand, but Swansea Valley large was freely offered. Machine made nuts and cobbles were firmly held. Rubbly culm and duff were easy, without any demand. Steam coals were without improvement.

Llanelli.

COAL.

Shipping arrivals have been more satisfactory since our last report, and large anthracite qualities are active, with the better grades very scarce. Cobbles are also a good market and not many free parcels offering. There is a strong demand for nuts and beans, but supplies are well booked ahead in most cases, and buyers are finding it very difficult to cover their requirements. Peas are not in strong demand, and quantities offering freely. Culm and duff are both very slow and stocks at collieries and also in trucks very heavy. Steam coals are not moving freely and sellers in many cases have heavy stocks of throughs and smalls on hand, and this is causing idle days at collieries. Large kinds are also not brisk. House coals and manufacturing sorts are both in good demand.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	31/6-32/6
Seconds	29/	29/	29/-30/
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	24/6-27/
Machine-made cobbles	42/6	42/6	39/6-42/
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles	36/	36/	—
Machine-made nuts	42/6	42/6	—
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	28/6-29/6
Seconds	34/	34/	—
Thirds	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/-22/
Rubbly culm	13/	13/	13/-13/6
Red Vein culm	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	31/6-32/6
Seconds	27/	27/	—
Cargo through	23/6	23/6	24/6-28/
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Smalls	19/	19/	18/-20/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls	24/	24/	18/6-21/
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

THE IRISH COAL TRADE.

THURSDAY, NOVEMBER 29.

Dublin.

The port was closed for several days last week, but is now open for coal and other traffic. The demand for coal continues to be good generally, but merchants still find much difficulty in getting sufficient supplies to cover their requirements. As a result of the conference held last week between the Transport Workers' Union and the Coal Merchants' Association, an agreement was arrived at whereby all men on piece work are to receive an increase of 4s. per week, and men filling in boats an advance of 1d. per ton. It is stated that the Coal Section of the Transport Union is drawing up a system of cartage rates to apply all round, as a number of merchants are paying less than others. Present prices of Irish coals from the Wolfhill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton—all f.o.r. Athy, the nearest railway connection with the mines. At the Castlecomer Collieries, Co. Kilkenny, best large coal is 28s. 4d. per ton at the pit-head. There were over 33,000 tons of coal imported during the past week from English, Scotch, and Welsh ports, as compared with 13,892 tons the week previously.

Belfast.

Business locally is moderate, and there is no further change in prices of any of the qualities. Supplies fall short of the average, more particularly of the better classes of coal. Current quotations for household coals are:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Cheapest Scotch steam coal is about 31s. 6d. per ton, while the better qualities are as high as 37s. 6d. to 40s. per ton. Gas coke is roughly from 42s. 6d. to 45s. per ton, and foundry coke from 63s. 6d. to 68s. 6d. per ton. The total number of coal-laden vessels entering the harbour from November 4 to 17 was 110.

THE BY-PRODUCTS TRADE.

Tar Products.—Tar, like coal, maintains a steady sort of tone, and the position scarcely admits of fresh comment. Pitch is still in request, and if shipping facilities could be obtained, the market would develop at once. An improvement has been expected of late in consequence of the Order as to mixing pitch and fuel oil, but as yet the Order has not made any perceptible impression on accumulated stocks. Of course, mixing is not the work of a moment, and the transport arrangements always affect the outlook. Prices in Lancashire are comparatively low—18s. 6d. to 20s. 6d.—which compares with 48s. f.o.b. London. Solvent naphtha commands plenty of support, and the enquiries for prompt delivery exceed current supplies, and even forward sales present some difficulties. The quotation may not remain at the 4s. 3d. per gallon naked at London works, if report is correct in specifying recent business at that advanced figure. Heavy naphtha has shared in the advance. Other by-products do not present any change. Current quotations are:—Coal tar, 26s. 6d. to 30s. 6d. Pitch, east coast, 20s. to 25s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 19s. to 20s. 6d.; Clyde, 19s. 6d. to 20s. 6d. nominal. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. 2d. to 3s. 3d. Heavy naphtha, north, 1s. 8d. to 1s. 10d. Heavy oils, in bulk, north, 4½d. to 4½d. Creosote, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s. to 90s., in bags. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—Under the present prohibition regarding exports, the native production of sulphate must find its market here. A considerable quantity passes into agricultural channels every week at the official price.

Coal Exports Order.—The Coal Exports Committee has forwarded the following for publication:—Coal exporters and others concerned should take note that an Order of Council issued on November 27 prohibits on and after December 7 the export of coal to all British destinations abroad except under licence, and that therefore firms wishing to ship coal to such destinations after December 6 should apply on the proper forms (which can be obtained from the collectors of customs at the coal ports, or from the War Trade Department (Coal Division), 3, Central Buildings, Westminster, S.W.) for the necessary licences, in the same way as in the case of shipments to Allied and neutral countries.

COAL MINING IN INDIA IN 1916.

The report presented by Mr. H. H. Hayden states that there was a small increase in quantity, and a relatively larger increase in the value, of coal produced during 1916 over the production for the preceding year, and although the conditions of the industry have become largely artificial in consequence of the war, the effect has not been to produce a decrease in production. The increase, however, would no doubt have been larger had it not been for the great scarcity of labour consequent on agricultural prosperity. The classes from which the colliery labour is recruited being largely agricultural, a favourable monsoon results in a shortage, since the miner leaves the collieries to cultivate his fields and only returns when his work is completed and his savings exhausted. The average pit's mouth value in Bengal rose from Rs. 3-6-2 in 1915 to Rs. 3-8-9, and in Bihar and Orissa from Rs. 2-15-6 to Rs. 2-15-10. The largest proportion was raised in the Gondwana coal fields. The quantity there aggregated 16,863,466 tons. The remainder, 390,843 tons, was obtained from the tertiary coal fields.

The figures in the appended table of exports do not include exports by sea to Indian ports, which again fell very considerably. Those from Calcutta amounted to 540,000 tons, compared with a little over 1,000,000 tons in 1915.

TABLE I.—EXPORTS OF INDIAN COAL.

	1915.		1916.	
	Quantity. Tons.	Value. £	Quantity. Tons.	Value. £
Ceylon	554,885	343,202	548,105	339,054
Straits Settlements (including Labuan)	99,363	55,475	141,714	83,983
Sumatra	64,263	38,688	104,067	61,671
Other countries	33,290	21,505	84,944	47,829
Total	751,801	458,870	878,830	532,537
Coke	1,241	1,327	2,911	2,656

Total of coal and coke 753,042 ... 460,197 ... 881,741 ... 535,193

Imports fell from over 200,000 tons in 1915 to less than 38,000 tons in 1916.

TABLE 2.—IMPORTS OF COAL, COKE AND PATENT FUEL DURING 1915 AND 1916.

	1915.		1916.	
	Quantity. Tons.	Value. £	Quantity. Tons.	Value. £
Australia (including New Zealand)	24,106	35,958	12,301	17,118
Japan	18,069	20,533	—	—
Natal	15,292	16,437	10,799	32,930
Portuguese East Africa	52,312	61,519	3,587	5,323
Transvaal	26,448	29,224	—	—
United Kingdom	30,149	45,948	1,418	3,378
Other countries	3,075	3,303	1,852	2,596
Total	173,451	212,922	29,957	61,345
Coke	10,241	29,221	4,074	17,340
Patent fuel	6,962	11,007	2	57
Government stores	12,379	30,635	3,593	10,589
Total	203,033	283,785	37,626	89,332

There was again a reduction, amounting to nearly 200,000 tons, in the output of the Jharia coal field, which produced 51.87 per cent. of the total Indian output in 1916 as against 53.44 per cent. in the preceding year. There was, on the other hand, a slight increase in the Raniganj coal field, which produced 32.09 per cent. of the Indian total as against 32.07 in 1915. These two fields produced together about 34 per cent. of the Indian total, the next largest contributions being those of Giridih with 5.02 per cent. and Singareni with 3.56 per cent. There was a large increase in the output of Bokaro-Ramgarh from 10,232 tons in 1915 to over 197,000 tons in the year under review. The variations in the other coal fields were comparatively insignificant.

TABLE 3.—PROVINCIAL PRODUCTION OF COAL DURING THE YEARS 1915 AND 1916.

Province.	1915. Tons.	1916. Tons.	Increase. Tons.	Decrease. Tons.
Assam	311,296	287,315	—	23,981
Baluchistan	43,607	42,163	—	1,444
Bengal	4,975,460	4,992,376	16,916	—
Bihar and Orissa	10,718,155	10,767,683	49,528	—
Burma	25	—	—	25
Central India	139,680	200,285	60,605	—
Central Provinces	253,118	287,832	34,714	—
Hyderabad	586,824	615,290	28,466	—
North-West Frontier Province	60	75	15	—
Punjab	57,911	47,419	—	10,492
Rajputana (Bikaner)	17,796	13,841	—	3,955
Total	17,103,932	17,254,309	150,244	39,867

The percentage of coal production in the tertiary coal fields was 2.26 of the total, compared with 2.52 in the previous year. The chief coal field, Makum, produced 283,830 tons, whereas in 1915 the quantity was 308,071 tons.

The number of persons employed daily in the coal field decreased by 3,500, and the increase in the output in spite of this indicates an increase in efficiency, the output per person employed during 1916 being 110.21 tons, as against 106.84 in the preceding year. The total number of fatal accidents was 211, giving a death-rate of 1.34 per 1,000 persons employed.

* From the *Records of the Geological Survey of India*, vol. xlvii, part 2, 1917.

THE TIN-PLATE TRADE.

Liverpool.

A fair amount of business has been placed during the past few days, for which the full maximum price of about 31s. basis net f.o.t. at works for cokes, is paid. The imminent advance in wages and material, causing many makers to decline to book further orders than January, while others are stipulating when orders that any advance sanctioned by the Government while an order is in process must be paid by the buyer. Orders for the sizes of wasters which have been accumulating are now coming along, permits being granted more freely than of late. Tin-plates are very slow of sale just now.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—November 26.
South Wales Miners.

MR. AVE, answering Mr. W. C. ANDERSON, said he knew nothing of any suggestion to the effect that German gold had been circulated among the miners in South Wales. He believed that such a suggestion would be rightly resented by the miners. He had no evidence whatever to support it.

MR. PRINGLE asked whether the member for South Glamorgan had not circulated details.

MR. EDWARDS asked whether the Home Secretary was aware that particulars had been supplied to the competent military authority under the Defence of the Realm Act.

Sir G. CAVE replied that he did not know.

Hutments for Cleveland Miners.

Sir J. WALTON asked the Minister of Munitions to state the total cost of the hutments erected by the Ministry of Munitions for miners in Cleveland, also the cost of furnishing them, and the number of men provided for.

MR. KELLAWAY replied that the total cost of the hutments was £75,000, the cost of furnishing £10,550, and the number of men provided for 2,760. Replying to other questions, he said he had not enquired particularly whether competitive tenders were obtained or whether the contractor was paid a percentage on outlay. It was imperative that the hutments should be ready at the earliest possible moment, and the result was an increased output of ore, which was of the greatest possible importance. He had no information regarding the allegation that no miner had inhabited the hutments. A very substantial number of men had been brought into the neighbourhood.

Coal Prices in Italy.

MR. HOUSTON, in calling attention to statements that the price of coal, including freight and charges, delivered in Italian ports might be taken as 50s. 6d. per ton, while the cost of the same to the Italian consumer was stated to be as high as £24 per ton, asked whether steps could be taken to inform the Italian public that the high prices of coal charged to consumers in Italy were not due to the prices received by British coal owners, or to freights received by the British ship owner, or to profits made by the British Government.

Sir L. CHIOZZA MONEY, in replying, said he welcomed the opportunity of amplifying the statement made to a question on this subject on November 20. The figure of 50s. 6d. referred only to the cost of coal delivered in Italy in requisitioned ships, and was exclusive of war risk, which represented at least as much again. The coal supplied to Italy under these conditions represented less than one-half of the total quantity of the coal imported into Italy, and was entirely used for Government purposes. The balance of coal imported into Italy was carried at market rates of freight, which in the case of neutral vessels were as high as 185s. per ton, inclusive of war risk. He understood that the amount of coal spared by the Italian Government for private consumption was not more than 25,000 tons per month, and that the fixed price charged for this was 215s. per ton, this price being only 30s. above the cost of freight alone, on neutral vessel. He had no information as to the cases in which, as alleged, coal had been retailed at £24 per ton, but the statement could refer only to quite exceptional cases. From the information in his possession, he did not think there was any reflection on the British Government or the Allies.

Arigna Coal Field.

MR. DUKE informed Mr. JOYCE that he was making enquiries concerning the demand for coal mined at Arigna, and the transport arrangements.

November 27.

South Wales Miners' Federation.

MR. STANTON asked whether the President of the Board of Trade would examine the books of contributions and minutes of the lodges, branches, and districts of the South Wales Miners' Federation, with a view of protecting its members and its funds within the registered objects of that society; whether he was aware of the fact that the members' moneys had often been used for purposes entirely opposed to rule, and that the expenses of the delegates to peace meetings and anti-war meetings, large and small posters, thousands of handbills and pacifist literature, printing, police court fines, and grants towards conscientious objectors were paid out of the union funds; and whether he would take action against the persons responsible for such misconduct.

MR. BALDWIN said he would consult the Chief Registrar of Friendly Societies, but if, as appears to be the case, the lodges, branches, and districts referred to were unregistered, he was not sure that the Chief Registrar had any power to institute the enquiry suggested. In that case, the remedy would lie in the hands of the members themselves.

Coal Mines Control Bill.

The House went into Committee on the Coal Mines Control Agreement (Confirmation) Bill, Mr. WHITLEY in the chair.

The CHAIRMAN having ruled out of order an amendment to clause 1, standing in the name of Mr. ADAMSON,

Sir C. CORY asked if it was the intention of the chairman to rule out any amendment that would amend the agreement.

The CHAIRMAN said generally it was so. It was impossible to entertain amendments that would make the agreement no longer an agreement.

Sir C. CORY said that if the head of a Government Department could enter into an agreement which was not only binding on those who entered into it, but also on the whole trade, some of whom did not and never would have agreed to it, and Parliament had no power to alter the agreement, the Committee stage was a pure farce and

the object of his amendment was to ensure that the miners employed, as well as the coal owners, should be bound in the event of a coal mine agreement.

He added that the Committee could strike out that might be a good argument for the agreement and rejecting the first clause.

out from the Bill the provision applying the agreement to persons not voluntarily parties to it.

MR. T. LOUGH moved an amendment with the object of making it more definite that the Bill applied to coal mines specifically. He thought the words of the Bill which made it apply to any undertaking of which a coal mine forms a part were much too wide. As the provisions included powers affecting the taxation of excess profits, this was a matter of importance.

MR. ADAMSON said he objected to any limitation of the agreement. He would like to extend it so as to secure not only control, but ownership on the part of the State.

Sir ALBERT STANLEY (President of the Board of Trade), in declining to accept the amendment, said it was certainly not intended to extend the control under the agreement beyond what was absolutely necessary for the successful working of the mines. But he could not accept any limiting definition of coal mines. There were many other undertakings, such as ironstone works, and it was impossible to separate one from the other.

Sir GORDON HEWART (Solicitor-General) said it was not intended to extend the number of undertakings to which the agreement would apply. They were only seeking in this clause to enumerate the owners on whom the agreement was to be binding. Possibly the words were capable of being interpreted as going beyond what was intended, and he undertook on the Report stage to make the language of the clause more explicit on the point. It was not intended to bring under the Bill anything that was not properly part of the colliery undertaking. After further discussion, Sir Gordon Hewart said he recognised there was some apprehension on the matter, and after discussion with the President of the Board of Trade, he had decided to accept the amendment.

The amendment was then agreed to.

An amendment, moved by Sir CLIFFORD CORY, to omit the provision imposing imprisonment up to six months for wilful default in giving information required, was accepted and agreed to; and Sir A. Stanley accepted an amendment omitting a part of clause 1 providing penalties in the case of a colliery owner paying a dividend or repaying a loan without the consent of the Coal Controller. A further amendment was adopted for the purpose of empowering the Board of Trade to act if the office of Controller of Mines ceased to exist.

On the question that the clause as amended stand as part of the Bill.

MR. DAVID MASON contended that a financial resolution should be brought in, as the Bill imposed a tax.

MR. HERBERT SAMUEL said they had first been told by the Home Secretary that the guarantee to the coal owners could not in any circumstances impose a charge on the Exchequer, and then later they were told by the President of the Board of Trade that if the sum received from excess profits was not sufficient to pay the compensation, it would be necessary to come to Parliament and ask that the deficit should be made good by a Vote of Credit or in some other way. The Government must say whether there would be any charge on the Exchequer in any eventuality or not. If there was to be no charge, they should agree to that being stated in the Bill.

MR. ANDERSON protested against the way in which the Bill was presented to Parliament. They were told to take the Bill or leave it, but they could not substantially amend it. That was reducing Parliament largely to a nullity.

Sir GORDON HEWART said the Bill could not have been presented in any other form. The only satisfactory course was to make an agreement, and as soon as it became apparent that the agreement would not be accepted by all, there were only two courses open—either to abandon the agreement altogether, or to proceed as in this case. What was contemplated was that the moneys collected by the Coal Controller would be at least sufficient to enable him to meet the demand made upon him. The Bill made no provision for the payment of money out of public funds, and, therefore, no financial resolution was necessary. If, later, it became probable that there would be a deficit, then would be the time to ask for a financial resolution.

Sir C. CORY was confident there would be a deficit.

MR. LEIF JONES maintained that in certain eventualities it was certain that the Government would hereafter have to come to the House to ask for public funds to reimburse the Coal Controller, yet the Exchequer had said that in no circumstances could the guarantee in the Bill lead to such a demand.

MR. ADAMSON complained that the Bill gave no guarantee to the workmen, and that no Minister could give any pledge that it would not impose a charge on the taxpayer.

MR. RUNCIMAN said, so far as he could gather, from first to last neither in the agreement nor in the Bill was there any provision made to protect the consumer. The Solicitor-General said it was a thousand-to-one chance against there being a deficit. Was that the estimate of the Coal Controller? The only way the scheme could be made watertight was by throwing a charge on the consumer. That meant that consumers were to be mulcted in whatever sum might be necessary to find the funds to make the scheme workable.

On a division, the clause was added to the Bill by 124 votes to 39. The remaining two clauses of the Bill passed through Committee.

Clause 2 (provisions applicable in the event of the agreement being determined) was also agreed to, with an amendment accepted by the Government striking out the reference to any new agreement in substitution for the original one.

A new clause was agreed to providing for a declaration of secrecy, in such form as may be prescribed by the Board of Trade, on the part of persons who are in possession of special information in the interests of the Government. New clauses were adopted providing that the agreement should, if not previously determined, cease to have effect at the expiration of six months after the termination of the war, and that the Coal Controller or the President of the Board of Trade may sue or be sued for breach of the agreement. A clause to make it clear that sums collected by the Commissioners of Inland Revenue under the agreement should be paid over to the Coal Controller was also accepted.

MR. RUNCIMAN moved the following new clause:—
"Nothing in this Act shall deprive any person upon whom the agreement contained in the schedule is not made obligatory of any right to require the repayment of money owing to him by a person upon whom the agreement is made obligatory by this Act." He said that where loans had been made by bankers to colliery proprietors and coal owners, they should be repayable if the colliery proprietor was under an obligation to pay them, and this agreement, in so far as it interfered with the rights of bankers who were not parties to it, should be left on one side.

The SOLICITOR-GENERAL, in reply to Mr. ROCH, said the Bill did not purport to deprive any person upon whom the agreement was not made obligatory of any right. He confessed, however, that if the proposed clause were adopted, and if an individual or banking corporation were to require repayment of a loan from a person upon whom the agreement was made obligatory, and the Coal Controller were to refuse his consent, a state of affairs would arise which would be, to say the least, interesting.

The clause was agreed to.

November 29.

Huts for Miners.

MR. KELLAWAY, in answer to Sir J. WALTON, corrected a statement made on November 26. The miners brought into the Cleveland district were brought back from the Colours, and returned to their own homes. The contract for hut building was let to Messrs. R. McAlpine and Sons, Westminster, on a time and material basis, with a basis of profit based on cost, part of which was 4 per cent. and part 3 per cent. No miners were yet resident in the hutments, but it was hoped shortly to commence drafting in men.

Scientific and Industrial Research.

MR. HEWINS, in reply to Sir PHILIP MAGNUS, said the scheme of the Committee of the Privy Council for Scientific and Industrial Research would enable those engaged in colonial trade and in productive industries to become acquainted with the problems arising in different parts of the Empire, and with the results of any researches now in progress. The establishment of research associations was intended to place at the service of our manufacturers scientific experts.

Coal Mines Control Agreement Bill.

The debate on the Coal Mines Control Agreement (Confirmation) Bill and the Non-Ferrous Metals Bill will be resumed in the House of Commons on Monday next.

SOUTH WALES MINING TIMBER TRADE.

Hopes are entertained of an increase in the imports of foreign mining timber. It is stated that the Controller will entertain applications where it can be conclusively shown that increases could be effected without interfering with necessary imports. The importers of French mining timber will have no difficulty in proving that this can be accomplished. At present the whole of the foreign pitwood comes from France, and in the main is assembled by the smaller class of steamer and sailing vessel plying regularly between the South Wales ports and the French Bay ports. Welsh coal is taken on the outward voyage and unless pitwood is taken as a homeward cargo the vessels return in ballast. This ballast has to be loaded at the French port at heavy rates and unloaded at 2s. per ton. It is expected that the Pitwood Importers Committee of South Wales will make application for an excess quantity to be imported. At the present time 40,000 tons per month are allowed, of which 25,000 tons are given to the agents supplying the Admiralty collieries and the remainder 15,000 tons allocated amongst the approved importers. The foreign imports during the past few days have been upon a slightly better scale. For the week ended November 23, the quantity imported amounted to 20,624 loads, of which 12,720 loads were consigned to the agents supplying the Admiralty collieries, while 7,904 loads were for ordinary importers. The imports were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Nov. 19	Lysberg Limited	2,640
" 19	Lysberg Limited	3,000
" 20	Morgan and Cadogan	360
" 21	E. Marcesche and Company ...	240
" 21	Lysberg Limited	780
" 21	Lysberg Limited	2,280
" 21	Lysberg Limited	1,620
" 22	Morgan and Cadogan	384
" 23	A. Bromage and Company	600
" 23	Lysberg Limited	960
" 23	Lysberg Limited	720
" 23	Morgan and Cadogan	500
" 23	Morgan and Cadogan	840
" 23	Vyvyan Kelly and Company ...	2,040
		Total.....16,964

Newport:—

Nov. 17	Morgan and Cadogan	1,680
" 17	Franklin Thomas and Company	1,260
" 22	T. P. Thomas and Company ...	720

Total..... 3,660

Market quotations were strongly maintained at 75s. per ton ex-ship Cardiff, and there is indication of values continuing at this level until the fixed schedule prices come into force. In all probability the maximum will operate either from December 1 or January 1, and will be fixed at 65s. per ton for foreign and home-grown wood. Importers are not likely to continue trading at a loss, while forest owners and their agents will not be inclined to lower their prices in accordance with scheduled prices here unless the French Government are approached to bring in an order to limit the f.o.b. price of timber. Simultaneously with the introduction of a fixed price an Allocation Committee will be formed of representatives of coal owners whose duty it will be to allocate supplies according to existing stocks and collieries requirements, thus ensuring equal distribution.

Recent boisterous weather caused additional difficulties to the home-grown trade. When the real winter period sets in the deliveries of home-grown wood are likely to decline, but the operation of the Allocation Committee should go a long way to ensure such equality of distribution as would neutralise any stoppages of pits through want of timber. In the opinion of many people the foreign imports have been whittled down to too low a figure. A larger monthly quantity would give a margin of safety through the winter months, when deliveries of home-grown wood will be spasmodic. Quotations for home-grown range from 65s. to 75s. per ton according to length, girth and quality. The demand continues exceptionally heavy.

Industry After the War.—The Lords Commissioners of H.M. Treasury and the Minister of Reconstruction have appointed a Committee to consider and report on financial facilities available for industrial undertakings after the war, relative to the conversion of works and factories now engaged upon war work to normal production, and the exceptional demands for raw materials arising from the depletion of stocks.

DUST DANGER FROM TUBS.

GOVERNMENT PROSECUTION AT NOTTINGHAM.

Important considerations in relation to colliery work were involved in a case upon which judgment was given by magistrates at the Guildhall, Nottingham, on Friday of last week, when proceedings were resumed after adjournment from the 14th inst. The Clifton Colliery Company, which owns one of the largest pits in the neighbourhood, was summoned, jointly with the manager and agent, Maj. William Eaton Walker, and the pit manager, Mr. Albert Beeston, the company for contravening and the two other defendants for permitting the contravention of section 62, subsection 2, of the Coal Mines Regulation Act, 1911, by reason of the fact that the tubs in use were not so constructed as to prevent "as far as practicable" dust escaping from the ends. The evidence was supplemented by models of trucks in use at other collieries, including particularly those used by the Butterley and Gedling companies. Mr. H. Maddocks appeared for the prosecution, and Mr. Bernard Campion (for the Midland Coal Owners' Association) defended. The Clifton Colliery Company maintained that, having regard to the conditions, no better contrivances than those at present utilised would meet the purposes of the pit.

Mr. Maddocks, appearing for the solicitors who were the agents of the Public Prosecutor in the matter, stated that nothing in the section under which the summonses were issued would apply if the roof and sides of a pit were commonly wet. If a mine was not naturally wet throughout, it had been enacted that certain steps must be taken to prevent accumulation of coal dust. This was the case of a dry mine, and he submitted there had been a breach of the Regulations. If the ends of tubs were left open, it must be obvious there would be more coal dust, besides which there was the possibility of coal dropping out on the journey, getting crunched underfoot, and causing a dangerous accumulation. If one end of a tub were open, certain pieces of coal might project further than if both ends of the tub were closed, and they might become ground up against other tubs. The Legislature had declared that, as far as practicable, coal dust should not be allowed to escape through the sides, ends, or floors of the tubs. The Clifton mine was not fiery in its character, and naked candles were used in the workings. Before 1911, when the Act came into operation, it was the practice at Clifton to use tubs with one end open. The five years of grace allowed by the Act had expired, but nothing had been done substantially at this pit to comply with the statutory requirements. Some small alterations were attempted, but they in no way met the provisions of the Act. A board about 4 in. in height was substituted for that which had previously been the open end of the wagon, but this was not sufficient to prevent coal dust from escaping. No proceedings would have been taken against the defendants if the company had given an undertaking to do what they reasonably could do to carry out the provisions of the Act.

Maj. Walker acknowledged on February 19 last the receipt of a communication regretting that the Home Secretary took a serious view of the omission to provide closed ends for the trams in use at the colliery, assuring him that it was not desired to evade the Act, adding: "During the period of the war there has been great scarcity of labour and material, and for two years no new trams have been made at this mine. All trams which have been repaired have had the joints made as dust-tight as possible, and where it has been necessary to put in new boards, steel feathers have been inserted in the jointings. Since October 1914, shale dust has been systematically distributed on the haulage roads, and the last examination of dust taken from these roads showed an average of 79.3 per cent. of ash. In this district, there are several mines in which the existing conditions regarding open-ended trams are similar to those which obtain at this colliery, and in the course of a few days the Midland Counties Colliery Owners' Association will be communicating with the Secretary of State, through the inspector of mines, upon this subject, and I trust that the matter will be allowed to remain in abeyance until this communication has been received."

Question of Tram Construction.

Attention was directed by counsel to a letter, dated February 26, written by the secretary of the Midland Counties Colliery Owners' Association, to Mr. T. H. Mottram, the divisional inspector of mines, stating, in regard to section 62, subsection 2, of the Act of 1911, that "The above section provides that to limit the liability of the deposit of coal dust during the transit of mineral from the working face to the shaft, trams or tubs shall be so constructed and maintained as to prevent as far as practicable coal dust escaping through the sides, ends, or floor of the same; and this section is being interpreted to mean that the trams or tubs shall be so constructed as to be solidly enclosed on ends, sides, and floor. A committee appointed by the Midland Counties Colliery Owners' Association desires an interview for the purpose of pointing out that this construction would operate against the output of mineral, the practicable working of certain coal seams in the counties of Derby and Nottingham, and that, taking into consideration the freedom of serious accumulations of inflammable dust, the system of loading large coal underground to meet the requirements of the steam coal and iron trades, the low sections of certain seams, and generally the exceedingly large amount of moisture in the coal in the Nottinghamshire and Derbyshire coal fields, it is unnecessary to apply such a severe interpretation with regard to the construction of trams or tubs used in this district. We wish to bring arguments before you which, in our opinion, are sufficient to show the construction of trams such as have been suggested should not be obligatory throughout the whole of the Notts and Derby coal field. We would, therefore, be pleased if you would arrange, at the earliest opportunity, an interview between this committee and the Chief Inspector of Mines to discuss the question." Mr. Walker expressed willingness to meet the committee, which (as subsequently intimated by the secretary of the Midland Association) would consist of owners or managers of mines, accompanied by Dr. J. S. Haldane. But Mr. Walker intimated that he understood that the only questions which the committee wished to discuss were: (1) The practicability or otherwise of closing the ends of the tubs, and of making them comply with the subsection in question; and (2) the difficulty at present of obtaining material for the purpose of constructing and maintaining the tubs in a condition to comply with this requirement of the Act. He added: "It is impossible for me to discuss with the committee any question of the application of the subsection, as it is set out in section 62 that it applies to every mine, unless the floor, roof, and sides of the roof are naturally wet throughout. That being so, I do not see that there is any necessity for the committee to bring Dr. Haldane. Subject as above, I

shall be glad to meet the committee." The secretary of the Midland Colliery Owners' Association replied that they wished to place the whole of the facts before the Home Office authorities without reservation, and that they were very desirous that Dr. Haldane should accompany them. Mr. Walker telegraphed regretting he could not discuss with the deputation the general question of the requirements of section 62, subsection 2, to the Notts and Derbyshire mines, the only question for consideration being what should have regard principally to present conditions. The secretary, on behalf of the owners, answered that the committee considered the conditions imposed so restricted arguments as to render the interview useless. Subsequently, on April 28, Mr. Walker wrote pointing out that the long promised statement in writing from Mr. Saunders, secretary of the Owners' Association, had not been received, and adding: "The Home Office view is that the requirements of the section in question are perfectly clear, and under these circumstances the inspectors have been instructed to see that the provisions are carried out." To this Mr. Saunders replied: "The committee does not agree that the requirements of the Act are perfectly clear, inasmuch as the section provides that the tram or tub shall be so constructed as to prevent, as far as practicable, coal dust escaping, and no authority appears to be conferred upon any department or individual to decide as to whether the tub is so constructed, and whether the conditions of the mine render its use practicable. My committee wish to have a full and free discussion with you upon this subject, and the presentation of their views would not in any way commit your department." Mr. Walker replied that he was unable to alter the conditions relative to receiving the deputation, and, as he had already informed the secretary of the Owners' Association, the inspectors of mines had been instructed to enforce the provisions of the subsection in question. No interview took place. Counsel submitted that, in relation to the Clifton pit, no inherent difficulties existed to prevent the use of such tubs as would reduce the escape of coal dust to a minimum, citing what had been done at the Butterley Company's pits and at those of the Gedling Company. He insisted also upon the importance of the consideration that if owners were to be allowed to claim exemption in regard to their liability to conform to one provision of the Act, they might claim exemptions as to other provisions. He directed attention to the judgment in the case of *Atkinson v. Shaw* decided in the King's Bench Division.

Evidence of Inspectors.

Mr. H. A. Abbott, one of the senior inspectors of mines for the York and Midland Division, was the first witness. He detailed the result of his examination of the methods of working and the tubs at Clifton pit. He called the attention of the Clifton management to the tubs used with satisfactory results at the Kirkby and Gedling collieries. In cross-examination, Mr. Campion suggested that a truck with a completely closed end would be impracticable at the Clifton pit. Witness said that would not be so as regarded two-thirds of the mine, but it might be so in relation to one-third of it. As to breaking up coal when necessary for the purpose of getting it into the trucks, it would have to be done when the trucks would not hold the larger lumps. At the same time, he agreed it was not desirable to carry this process further than the exigencies of the situation rendered absolutely necessary.

Mr. E. H. Fraser, one of the junior inspectors of mines for the North Midland District, was the first witness for the prosecution at the resumed hearing of the case.

Mr. Joseph Bircumshaw, agent for the Butterley Company, gave evidence as to the construction and working of tubs at Low Moor and Kirkby collieries; further information being afforded by Mr. R. Richardson, manager of the Top Hard seam at Kirkby Colliery; Mr. F. Rawson, checkweighman at Kirkby; William Bayliss, Frank Arnold, and George Kemp, miners.

Mr. T. H. Mottram, divisional inspector of mines for Yorkshire and the North Midlands, gave evidence regarding an examination of the tubs at Clifton, which, he said, would not prevent the escape of dust at the open end. On the previous day, with Mr. Abbott, he visited the Low Moor Colliery, and went into several places where the roof was low. He observed large pieces of coal being filled into the tubs. The height of the roof was 4 ft. from the floor, there being a space of 4 in. from the top of the tub to the roof. He saw two pieces of coal weighed, one of 100 lb. and the other 106 lb., both of which went into a tub. In cross-examination, witness said if the object of the Royal Commission, to prevent coal dust, was to be attained, the only plan was to have trucks with closed ends; otherwise there would be dusty roads. He did not agree with counsel's description of the Clifton pit as being "singularly free" from dust, as analysis showed there was 480 lb. of dust in a ton of dirt. Coal must be broken up to a size which a man could lift to put into a truck with a closed end. Nobody would expect, however, coal to be broken up into 2 in. cubes. The end of the truck must be closed after the filling had been completed; they did not say that it must be done whilst the filling was in progress. A tub which had not a closed end, and allowed dust to escape, did not comply with the Act. If hand-filled trucks were completely closed before being moved away, that would be sufficient. He did not agree that an interview upon this matter had been refused by the Home Office. Asked by Mr. Campion whether he did not admit that, in carrying out this particular section of the Act, there might be circumstances under which it would not be possible to comply with the requirement as to closed ends, Mr. Mottram said he did not see any difficulty as far as filling the tub or transit were concerned. If the company proposed to close their tubs within 2 in. of the top, as at Butterley and elsewhere, he thought the matter would be favourably considered; but to run open-ended tubs was absolutely impossible.

Mr. William Walker, Chief Inspector of Mines, said he knew of no practical difficulty in connection with Clifton Colliery of tubs being made so that when filled the ends could be closed. He was down the Clifton pit some time ago. If a tub filled with coal was sent along the travelling road with the end open, dust must escape from it. There was no difficulty in filling into tubs of which models had been produced pieces of coal weighing 1 cwt. or thereabouts—there were no more difficulties with regard to such trucks than existed in relation to open-ended trucks. He had no intention of confining the Clifton Company to any particular method of closing the ends. Cross-examined: It would not be proper for the Home Office to dictate as to what particular kind of tub should be used. That was not the duty of the inspector of mines, either, but it was for the manager of a pit to comply with the Act, and for the inspector to see that he did it. Witness did not agree that the manager of a colliery knew more of the practical difficulties than an inspector. He thought an inspector with 30 years' experience in regard to a great variety of

mines must have more experience than a novice. His attention had been confined to one mine. He was down the Clifton pit in 1909-10, leaving this district to go to Scotland in the latter year. With regard to the fact that whilst they did not attempt to dictate as to the particular type to be used, they said that the section of the Act bearing upon the matter must be complied with, and that the ends of the tubs must be so made that the coal did not drop out. If the ends were not closed, more dust was made, and the section of the Act was not complied with. He thought there would be less dust if the coal was smashed up to get it into the trucks. With regard to the deputation of coal owners not meeting at the Home Office, they split upon the matter because it was wished by the owners to discuss what this particular section required. The Home Office view was that the requirement of this section was perfectly plain—that in every mine which was not naturally wet throughout, the end of the tubs must be closed, to prevent dust escaping as far as practicable.

Exceptional Cases.

Mr. Campion, for the defence, said he did not suggest that Clifton was exempted from the operation of the law because it was a dry mine, but in this instance there had been no offence. The question was whether the magistrates were satisfied that, "as far as practicable," everything had been done to comply with the Act. The Government officials appeared to think that the section under which the proceedings had been taken laid down a mandatory rule which could not be departed from. Nothing in this section limited the company to tubs which had both ends with a fixed closing up to the end. Mr. Walker, and, he believed, Mr. Mottram also, agreed that it was a matter of degree, and that there must be a modification in cases in which the haulage rope passed at the bottom. He did not know by what authority that concession was made by the Home Office, because if the Act contained a mandatory provision, without any qualification at all, the Home Office, upon its own showing, had no authority to depart from that provision. If the Home Office could depart by 2 in. from the terms of the statute, they could depart more. The question was: Could they depart from it? Immediately they got to the point that it need not be a completely closed end, it became a matter of degree—to be settled, how? By the question of practicability? It had been admitted by the Home Office that there must be some qualification regarding the words "every mine" by the use of the term "as far as practicable." Lord Reading laid that down in his judgment in the case of *Atkinson v. Shaw*. He found that section 102, subsection 3, applied to section 62, subsection 2, observing: "I take its intention to be this. The Legislature was passing an Act to apply to all coal mines throughout the kingdom; these mines vary in character and precautions which are salutary in one colliery, and may be highly dangerous in another. That is shown by the evidence in this case. Therefore Parliament, recognising when it imposed this obligation generally, thought in some cases performance of it might not be possible, provided that if the owner, agent, or manager can satisfy the magistrate that the contravention has been through circumstances over which it had no control, or that it was impracticable for him to make the provision demanded by Act of Parliament, he is not liable to a penalty. Now, it seems clear that the justices were of opinion, and they found, as a matter of fact, that the respondents had done all that was reasonably practicable under the circumstances to prevent the accumulation of coal dust. They have stated in terms that it was not practicable to carry out this provision of section 62, subsection 3, in this particular mine. That brings us, therefore, to the case provided for under section 102, subsection 3; and the magistrates, having come to the conclusion that it was not practicable to carry out the provisions of the Act in this respect, were perfectly right in deciding that the information should be dismissed." The judgment in this case, Mr. Campion submitted, meant that the interpretation of the section must yield to particular circumstances. A wide term, "as far as practicable," was used so as to give elasticity, but the Home Office refused to apply it in this case. Why they selected a particularly safe mine for enforcing their demands, he did not know. He supposed it was because the tubs there had no ends at all, and they thought it a particularly strong case. Mr. Justice Avory, in giving his judgment agreeing with that of Lord Reading in the case of *Atkinson v. Shaw*, said: "It has been suggested with some force that the words, 'as far as practicable,' in section 62, subsection 3, do not govern the duty to systematically clear, but that they only govern the words 'so as to prevent coal dust accumulating,' but through consideration I have come to the conclusion that this is a fallacious argument, and that this subsection ought really to be read as if it were in these words: 'As far as practicable the floor, roof, and sides of the road shall be systematically cleared of coal dust so as to prevent such coal dust accumulating.' If it is read in this way, the ease is clear from the finding of the justices that it was not practicable to carry out these provisions of section 62 in this particular mine, and that the respondents have done all that was reasonably practicable in the circumstances to prevent coal dust accumulating. These findings bring the respondents within section 102, subsection 3." Accordingly, the appeal against the magistrates' decision refusing to convict the owners was dismissed. Mr. Campion added that he intended to call witnesses to show that it was impracticable to work in this particular mine with the trucks which had been suggested, or any trucks which involved so little head room as would be left. The trucks had to be taken up to the coal face with a particularly low roof in a considerable portion of the mine, and his witnesses could devise no practicable means of working a tub with adjustable ends. It had been suggested there might be a loose end to the tubs with a little flap off, but the difficulty was that they could not get workmen to fit such flaps properly. With a temporary or movable end, workmen were led to act carelessly, and, if the movable end was not fitted properly, it followed that there would be more waste of coal dust than if there were an open end into which the men were bound to pack carefully. The Clifton mine was being worked satisfactorily, and, by careful filling of the trucks, with freedom from dust. The mine was also free from gas in both seams. He contended that there was no authority in law warranting the Home Office in putting aside the question of practicability here involved.

General Manager's Statements.

Maj. W. E. Walker, general manager and agent of Clifton Colliery, in his evidence, explained that the greatest trouble had been taken with the bottoms, sides, and ends of the trams, so that coal dust could not shake through. Very large coal had to be dealt with. If the large lumps were to be smashed up to fit into the tubs, they would be creating a danger. Every bit of coal

increased the dust. For steam purposes, and for works, the large unbroken lumps of coal were examined in cross-examination, witness said he did not burst of gas in the mine at any time, but he could never tell what might happen. Asked if such large lumps were needed for commercial use, it had ever occurred to him that tubs need not be actually filled at the coal face where the roof was very low, witness replied that he did not think such a thing would occur to him as a practical man. If the large coal were carried to another place, where the space was greater, and filled there, it would be merely an addition to the same process. There was, in this case, 10 to 15 per cent. of coal involved, representing pieces of 2 in. to 3 in. in size, but he suggested that there was no dust escaping from such tubs when sent out of the pit in tubs with open ends. The wind occasioned in the pit was not strong enough to blow small cubes of coal off the trucks. Very few pieces came out at the ends of the tubs. Asked if these pieces which fell into the road might not be crunched up and become dust, witness replied that the roads were cleaned up every day. There was coal dust on the roads in this mine, and, although they had taken great care to reduce it from the standpoint of danger, he admitted there was still 20 per cent. at the point at which the sample was taken for analysis. The coal dust lying there had been specially treated by the admixture of stone dust and other inert matter, of which there was always 50 per cent. used. Questioned in detail by Mr. Giehard as to the process of loading, witness supported the continuance of the present plan as being the best, urging that every care was taken. Mr. Albert Beeston, pit manager, and one of the defendants, also gave evidence, expressing the view that it was impossible, with efficiency, to load at Clifton pit coal into trucks of the type in use by the Butterley Company at Kirkby, or into any other of the trucks which had been suggested during the hearing of the case. If it were not for the big lumps required at Clifton pit, they would not be using the particular type of tram.

Capt. Percival Muschamp, general manager and agent of the New Hucknall Colliery Company, having examined

ASSOCIATION OF MINING ELECTRICAL ENGINEERS.

NORTH OF ENGLAND BRANCH.

Mr. A. C. NELSON, agent for the Wallsend and Hebburn Coal Company Limited, who has been elected president of the North of England branch of the Association of Mining Electrical Engineers, occupied the chair at a largely attended meeting held in Newcastle on Saturday afternoon last.

New Members.

The following gentlemen were admitted as members of the association:—J. L. Richmond, under-manager, Edward Pit, Wallsend Colliery; M. Bates, resident engineer, Hebburn Colliery; N. Hunter, assistant engineer, Wallsend and Hebburn Coal Company Limited; T. Waites, under-manager, Hebburn Colliery; J. Severs, manager, Hebburn Colliery; J. E. Tippet, resident engineer, Wallsend Colliery; O. Barraclough, under-manager, Wallsend Colliery; P. Davison, resident engineer, Edward Pit, Wallsend Colliery; W. Waterhouse, assistant engineer, Willington-on-Tyne; A. Henney, electrician, Hebburn Colliery; C. W. Coan, electrician, Wallsend; J. G. Wardle, electrical engineer, Wallsend; H. Silvester, electrical engineer, Monk-seaton; J. Jardine, colliery engineer, Willington Quay; E. Hunter, resident engineer, Rising Sun Pit, Wallsend; J. Hepburn, colliery foreman fitter, Langley Park; T. Proud, power station attendant, Langley Park; A. E. Wiks, Penman Metallic Packing Company, Newcastle; J. C. Erickson, assistant electrician, Wallsend; J. W. Wile, resident manager, Rising Sun Colliery; C. P. Wedderburn, chief electrician, South Derwent Coal Company Limited; J. S. Kendal, electrician-in-charge, Tanfield Lea Colliery; W. Griffiths, district engineer, General Electric Company Limited; and R. A. Wood, electrician, Washington.

a waste-heat station. The company used all their old coal duff, coke breeze and splint coals in special furnaces, and his firm had made an arrangement to have a big gas main from their coking ovens to add to the fuel supply. The station was generating about 48,000,000 units per annum, and the collieries were using about 32,000,000 units at the present time. They were increasing their consumption every year, and he thought that within three or four years they would be using about 48,000,000 units for the collieries alone. They were getting a very good load factor. They had a set of lines running right from the central station to Dunston, transmitting power at 20,000 volts, so that if anything happened to their Philadelphia station, they could call on Dunston for a supply.

The vote was very cordially passed.

Responding, Mr. NELSON said Mr. Mark Ford's remarks just showed the enormous advantage the supply company must have in being experts. The speaker's own pit at Hebburn paid the same price for power that he was negotiating to pay for a pit 17 miles away, so that he had really no advantage excepting that, at Wallsend, on account of the wayleaves—their royalty being an old one in a congested area—which, naturally, had some value, but they got a better price.

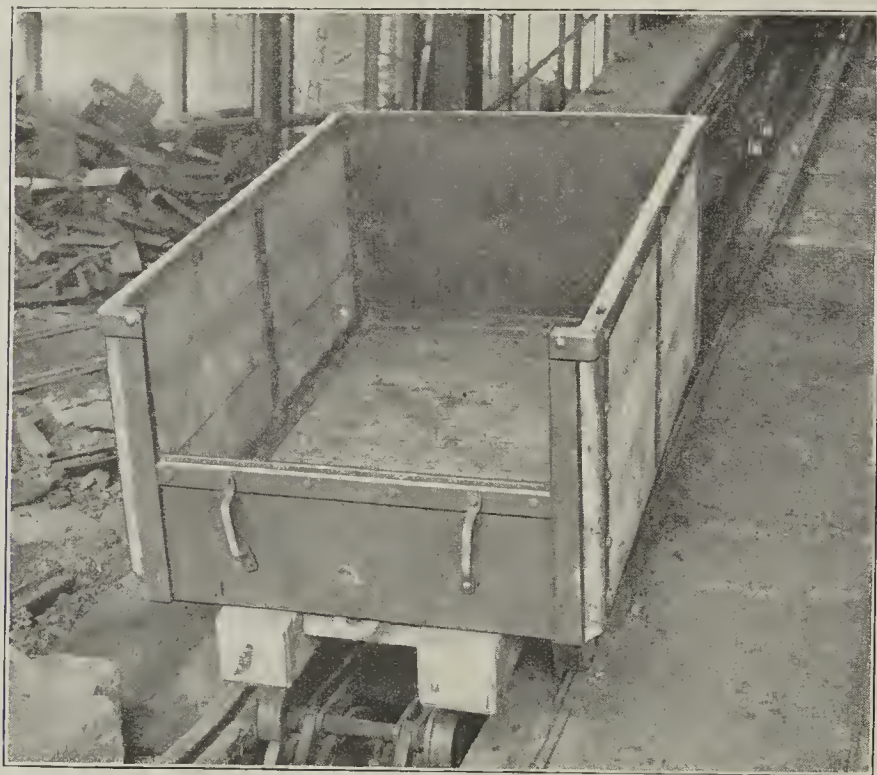
The meeting then ended.

COLLIERY ACCIDENT.

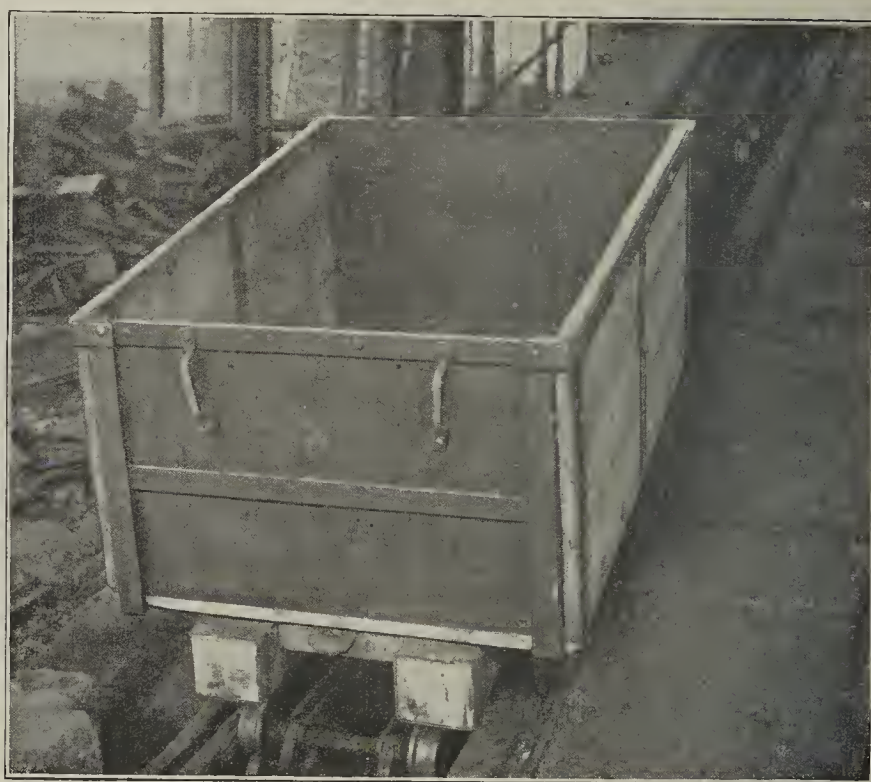
Edge Green.

A cage accident at the Edge Green Collieries of the Garswood Hall Colliery Company Limited resulted in the death of Charles Hughes, aged 28, a drawer, who was in the cage with two other men when the accident occurred. At the inquest on Friday of last week, Mr. F. N. Siddall, H.M. inspector of mines, represented the Home Office. The deceased and others were leaving No. 9 pit of the Edge Green Collieries on the Tuesday morning, when the

THE BUTTERLEY PIT TUBS.



OPEN.



CLOSED.

The end door of these tubs consists of a fixed lower leaf and a movable upper leaf which slides vertically in a channel. In loading, the upper leaf is drawn down in front of the lower one and, when the tub is full, pulled up as far as it will go, the lower edge being then pushed back, whereupon a slight downward pull causes it to lodge behind the flange of the bottom leaf, with which it makes a dust-tight joint.

the Clifton workings, said he was of opinion that the arrangements adopted for loading were the best possible under the circumstances involved. It would not be possible to use in the low places in the pit and to load by hand trams of the sort used by the Butterley Company, of which models had been produced. He had taken under perfectly fair conditions samples of dust from the pit for analysis by Dr. Haldane.

Dr. J. S. Haldane, F.R.S., who had examined samples of dust taken from the mine, was called to give the results of his analyses, but

Mr. Giehard submitted that the evidence was irrelevant to the case.

Mr. Campion said then he would content himself with putting the matter to the witness in general terms, and

Dr. Haldane expressed the view, based upon the results of his analysis of the coal dust taken from the mine, that Clifton pit was "enormously safe." The actual percentage of combustible dust was only 23, whereas 50 per cent. was what the Royal Commission put.

Evidence for the defence was also given by Mr. T. G. Lees, agent of the Newstead Colliery, and Mr. J. T. Todd, general manager of the Blackwell Company's collieries, the latter stating that trucks which had been suggested could not be used where hand loading was in operation, and where coal of any considerable size was required.

After the magistrates had held a brief consultation in private, the chairman (Mr. E. W. Enfield) said they found that the tubs in use at Clifton Colliery were not so constructed and maintained as to prevent "as far as practicable" coal dust escaping from the ends, and under these circumstances they imposed a penalty of £10 upon each of the defendants, the colliery company, Maj. Walker, and Mr. Beeston.

Mr. Giehard said he was instructed by the Home Office to ask for special costs in this case, but

The Bench thought the penalties themselves should be sufficient to cover all the costs.

—The London Gazette announces the appointment of T. R. Dyne and J. H. Dyne and Evens, pulley block manufacturers, Chaseley-street and York-road, Limehouse.

The Electrification of Collieries.

Mr. NELSON read a paper on "A Few Points of Interest to Northumberland and Durham Colliery Engineers Considering Electrification" (see p. 1031).

Discussion.

Mr. MARK FORD, manager of the collieries of the Washington Coal Company Ltd., moved a vote of thanks to Mr. Nelson. In thanking the author he thought he was voicing the thanks of thousands outside that room, because the science of mining was constantly changing. The address was bound to be of incalculable value to every mining engineer in the country who was developing his pit or installing electricity. The finish of the war would witness a tremendous development in the use of electricity in mines. Steam generation at collieries would almost be a thing of the past. Mr. Nelson had touched on the weak spots of steam generation at collieries. In the speaker's own village they had saved, at one pit, 10,000 tons of fuel in the year by the use of electric power. From a sanitary point of view, from the points of view of cleanliness and the health of the people in the neighbourhood, there was much to be said for electrification. There was no doubt that Mr. Nelson's collieries were situated very favourably in regard to his electric supply—practically in the electrical power company's yard—and one would very much like to know at what cost he got his supply and whether it cost him much less than it cost those who lived further away from the place of generation. Certainly, so far as the speaker was concerned, although their collieries were situated a few miles away, they had nothing to complain about.

Mr. H. J. FISHER, in seconding the motion, agreed with the majority of the remarks made by Mr. Nelson, especially as regarded taking power from a central power company. The group of collieries with which the speaker was associated (the Lambton and Hetton Collieries Ltd.), were all interlinked with the Newcastle Electric Supply Company's system. They had a generating station of their own now, but it was run by the Newcastle Supply Company, practically on the lines of

cage in which they were travelling collided with something in the shaft. The cage had to be lowered to the Arley mine, a distance of about 134 yds., before the three men could ascend, and it was while it was being lowered that the accident occurred. The deceased was thrown out of the cage, apparently over the protecting gate which was fixed in position, and was later picked up dead, having fallen into the dip hole at the bottom of the shaft.

Thomas Smith, a survivor, said that after all three had got into the cage, the signal was given, and the cage started to descend, both gates of the cage having been closed. After descending about 10 yds., the cage jarred against something. Witness mentioned that he had been down the shaft in the same way 40 or 50 times in the night shift, it being only when in the night shift that they were lowered to the bottom, and nothing similar had happened before. It was only a single deck cage.

Joseph Henry Johnson, on-setter, said that after the cage had started to descend he heard a rush of compressed air, and saw the guide ropes swinging about. He signalled to the winder to stop, and next had the air cut off. When the deceased entered the cage, witness explained, he was carrying his jacket on his arm. Witness said that on the previous Thursday he heard a sound as if something had either caught the cage or the cage had caught against something, and he went down straight away to have a look, but found that all was quite clear.

Joseph McBride, colliery fireman, deposed to examining the shaft after the accident, when he found that 15 ft. below the level crossing of the Nine-feet mine there was about 12 ft. of 3 in. pipe broken off and missing. A 9 in. pipe conveying compressed air runs down the shaft, and the 3 in. pipe which was broken was a horizontal branch from this 9 in. pipe.

Arthur Causey, inspector of ropes and cages, said it appeared as if the deceased had been in the act of putting on his coat at the time.

Mr. Siddall said he had made an examination of the place. There was no evidence that the leaves between the cage and the mouthing had been left down, and the cages were in order when he saw them. When he stepped on to the cage, he noticed that the cage could be moved, for it swung, and he came to the conclusion that the cage when sent away from the mouthing was not steady, that probably there was some amount of swing on it, and that

this swing was just sufficient for the cage to catch the flange of the pipe in the shaft. The deceased was probably struggling about in the cage trying to put on his coat, and his own opinion was that the cage was swinging enough to catch the flange of the pipe. He could not see that there was any blame attaching to anybody, as there had been no law broken. The rope guides were quite easy to swing in the middle of the shaft.

The jury returned a verdict of "Death by misadventure," adding that, in their opinion, no blame was attaching to anyone.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The employers having approved the suggestion of the workmen's representatives upon the Conciliation Board, the first meeting of the Joint Sub-Committee has taken place to deal with questions arising out of the issue of summonses against men who stopped work without notice. The purpose of establishing a Joint Committee is to devise some method whereby such stoppages shall be prevented in future. Mr. F. L. Davis presided at the Sub-Committee meeting, with Mr. James Winstone on the workmen's side. The latter stated that they wished to submit proposals for dealing promptly with disputes which arise at the collieries, their opinion being that if machinery were set up for dealing with these, the stoppages without notice would be prevented. In reply, the owners stated that they were prepared at any time to consider suggestions which would have the effect of avoiding disputes and strikes; and therefore they were willing to discuss any suggestions put forward with that object. It was arranged that the men's representatives should submit their proposals in writing, a subsequent meeting to be called for their consideration.

The Joint Sub-Committee of the Conciliation Board, which has in hand the questions as to paying war wages to colliery workmen, met in Cardiff on Tuesday, Mr. Evan Williams presiding. A number of cases were decided; those that did not reach decision were referred to two representatives for enquiry.

Efforts are being made to settle the difficulty which arose in Amman Valley during the recent strike. The question in issue—affecting about 1,200 workmen at the Ammanford and Gellceidrim collieries—is that the men refused to fill trucks of the Gwaun-cae-Gurwen Company when the men of this latter undertaking were on strike. Summonses have been issued for breach of contract in refusing to fill the trucks; and a Joint Committee of the Conciliation Board was appointed to make an enquiry into the circumstances—the Federation having made request that the summonses should be withdrawn. This enquiry commenced on Tuesday, the gentlemen appointed from the owners' side being Messrs. B. Nicholas, H. Bramwell, Evan Williams, T. H. Deakin, E. M. Hann, R. Rutherford, Howell Jones, and the secretary (Mr. F. Gibson); and from the workmen's side, Messrs. V. Hartshorn, B. Davies, W. Jenkins, J. D. Morgan, Frank Hodge, Owen Powell, Oliver Harries, and their secretary (Mr. T. Richards, M.P.).

The railwaymen of South Wales met in Cardiff on Sunday, there being an attendance of between 3,000 and 4,000; and the proceedings were conducted in private. It was announced that a resolution had been passed, instructing delegates to the adjourned conference "not to accept less than the 10s. increase demanded—this to date from the time claimed by our executive committee; and unless this is secured, to move that we immediately cease work." They decided to meet on Sunday next in order to receive the report and decide on further action. An amendment to the effect that instead of 10s. per week the demand should be £1 was defeated by a small majority.

The Cardiff district of railway engine drivers and firemen met on Sunday and discussed the outcome of the arbitration which has given 5s. per week advance, and 2s. 6d. to cleaners—the demand having been 14s. a week increase to drivers, 10s. to firemen, and 7s. to cleaners, with an eight hours day. A resolution was passed expressing appreciation of the efforts of the executive, but urging "the necessity of continued effort until the whole of our programme is attained." An amendment was submitted which described the award of the Committee on Production as inadequate, and calling for a national strike within 14 days; but this received only six supporters.

The Merthyr miners balloted on Friday for election of a miners' agent, there being 15 candidates. As a result, the 10 receiving lowest numbers have been eliminated, the remaining five to receive further ballot.

At a meeting of Caerau colliers, which was addressed by Mr. Vernon Hartshorn, a resolution was passed recommending a ballot of the coal field on the question of income tax now levied upon the workmen, it being desired to have a formal expression of the men's opinion in this matter before the Budget for 1918 is introduced. Another resolution urged the executive council of the Federation to deal with the relationship of the Colliery Examiners' Association to the Federation, so that the miners might decide what policy they would adopt in the event of a difficulty between the examiners and the employers.

North of England.

Silksworth miners have had a meeting to consider the distress in the district resulting from the irregularity of employment at Silksworth Colliery. This year the pit has lost about 87 shifts, and in the last four weeks has worked only 10 shifts. Steps are being taken to organise charitable efforts for relief purposes.

The Harton Coal Company Limited has increased the wages of its quarrymen at Marsden by 3s. per week for men and 1s. 6d. weekly for youths. The offer, made in response to a request for an advance of 10s. per week, has been accepted.

The Chilton lodge of the Durham Miners' Association has passed a resolution that no member should work any overtime, except in cases of emergency, and that their fellow members in the county who are working short time should be given employment at collieries where overtime is being worked at present.

At a meeting of the Buckhill Colliery miners' lodge, Great Broughton, last week—Mr. S. Stephenson presiding—the action of the manager in respect of the minimum wage was fully discussed, and it was decided to take a ballot of the members as to whether notice should be given to enforce it. A lengthy discussion took place regarding the rights of conscientious objectors in the light of recent events in Parliament, and a resolution was adopted urging organised workers to protest emphatically against the disfranchisement of conscientious objectors.

In his November circular, Mr. T. H. Cann calls attention to a point under the Minimum Wage Rules, recently settled in a claim sent in by Seaham lodge on behalf of

Thos. Oxley. Oxley was a dataller at the shaft bottom at 3s. 10d. per day. He worked five days at that wage, and then went by the manager's request to a different job inbye, at which the wage was 5s. 8d. The minimum rate under the schedule for lads of his age is 4s. 4d. The employers contended that they had the right under Rule 9 to deduct something from his earnings for the sixth day by aggregating his wages, and that they were only liable for £1 6s., the amount due for six days at the minimum. "The claim was put into our solicitor's hands, and, after consideration, the owners' solicitor admitted that, as Oxley's actual earnings (£1 4s. 10d.) did not equal the aggregate amount of the minimum wage for all days worked by him, Rule 9 did not apply, and that the owners were liable for five days' wages at the minimum and full wages for the sixth day. The principle is therefore established that, unless the actual earnings exceed the total of the minimum rates for the days worked, the employers do not claim to be entitled to aggregate the wages for the purpose of reducing the amount payable by them under the Minimum Wage Act. In our opinion, Rule 9 is invalid, but, even if the rule is wiped out, the owners will still be entitled to aggregate the wage, and to pay nothing under the Minimum Wage Act when a man's earnings at his own work on some days of the week are less than his minimum wage, and on others are sufficient to bring his total actual earnings for the week to more than the total of the minimum rate per days worked. It is not settled yet whether they are entitled to do so when they send a man, as in this case, to a class of work different from his own, and his actual earnings exceed the total of the minimum rates for the days worked, but we have been legally advised that they are not."

Federated Area.

The receipt of the award of the recent arbitration in the Mill Close mine dispute at Matlock was announced by Mr. Frank Hall (general secretary of the Derbyshire Miners' Association) at a mass meeting of the Winster branch of the association last Saturday. The award guarantees the ore getters a minimum wage of 8s. per working day of eight hours. The war bonus has been increased from 30 to 45 per cent. All provisions in the award are made retrospective as from August 28, which is the day upon which the men resumed work after striking for better conditions. It is stated that since they joined the association, four months ago, the miners' wages have increased by 75 per cent.

Scotland.

The Coal Controller has been taking an active interest in the strike at Bedlay Colliery, Lanarkshire, and he has forwarded by telegram his views on the question of resuming work. The miners, however, maintain that work shall not be resumed until a satisfactory settlement is arrived at, as in their view the terms of settlement in the recent strike were not carried out to their satisfaction.

The question of the recent war bonus has been the theme of much discussion amongst the Scottish miners, and a variety of interpretations have been given on obscure and doubtful points. One case in point has been before the Lanarkshire Miners' Union. It is as follows: In the event of a miner working six shifts on the day shift, and being employed for an extra shift on the night shift, ought he to be entitled to the equivalent of seven days' bonus? The Coal Controller's reply to this query is that the workman must be engaged on each day of the week.

The arbiter in the dispute at Douglas Park Colliery, Lanarkshire, has now issued his award. It will be submitted to the workmen in due course.

Mr. David Gilmour, of the Lanarkshire Miners' Union, has been successful in arranging for a meeting with a representative of the Ministry of Munitions, so as to discuss the payment of war bonus to the miners employed in the Leadhills mines.

At Farne Colliery, Rutherglen, the question of rates has arisen in the Kiltongue section. The men desire a fixed rate of 6s. 6d. per ton, whereas the company are insisting on the continuance of the present tonnage rate, with a floating increase where required.

The miners employed at Mossie Colliery, West Lothian, are dissatisfied with the present arrangement whereby they are called upon to work on the day shift, afternoon shift, and night shift alternately in the period of three weeks. They ask for the elimination of the afternoon shift and the continuance only of day and night shifts. They are also claiming additional payment in respect of night and double shifts.

Greenbank Colliery, in the Camelon district of Stirlingshire, has not quite developed as was expected some time ago, but there is now an immediate prospect that additional men will be required. At the colliery a separate branch of the Stirlingshire County Union has now been established.

Grievances have cropped up in the Kilsyth district of Stirlingshire, and the agent of the County Union has been called in to demand that the owners shall forthwith readjust and modify the conditions of employment in certain of the pits.

Complaint has been general throughout Mid and East Lothian that miners who have been engaged on company's work for brief spells have not been paid the wage they would have earned at their own work, or at least the equivalent of the county wage. The Lothians County Union have now issued instructions that no member shall comply with a request to do such work unless a guarantee is given that the standard wage shall be paid.

In connection with the dispute at Kinneil Colliery regarding payment of war wage, which resulted in the colliery being idle for two days, the point in dispute was submitted to the Coal Controller, who has decided that the drawers were not entitled to payment in the circumstances.

A unique point has emerged in the application of the war wage to miners who are in receipt of partial compensation. With the increase of wages given since the war, men in receipt of partial compensation who have resumed a light form of employment, find that their earnings now preclude them receiving a war bonus, as the average wage is now greater than it was previous to their becoming disabled, and the insurance company has refused to grant them a war bonus. A deputation has been formed to interview the Coal Controller and the Home Office on the subject.

A serious dispute has taken place at Udston Colliery, where a heavy reduction was imposed without sufficient notice by the manager, and the men have now been idle for over a week. The miners' executive have now asked the men to resume work, and 10 days' notice will be given in which they will negotiate the dispute.

At a meeting in Dunfermline on Saturday of the executive of the Fife Miners' Board, the district secretary reported that a serious state of matters had arisen at the Michael Colliery, Wemyss. Many of them, he said, were

unable to earn wages, because of the extent to which the double shift system of working was being engaged in some of the sections. It was agreed to remit the matter to the National Union executive, with a request that the stoppage of work at the colliery should be sanctioned in the event of the grievance not being satisfactorily adjusted with the employers. It was also reported that, contrary to agreement, colliery companies were in some instances withholding "lying time" to the men who had been selected for work in Cumberland iron ore mines. Moreover, cases had been reported of threats on the part of certain coal owners to eject the families of those men from the colliery houses—also in breach of agreement.

Iron, Steel and Engineering Trades.

An examination of the employers' books for September and October of the Scottish Manufactured Iron Trade Conciliation and Arbitration Board, shows the average selling price during that period to have been £14 10s. 8-13d. per ton. This means no change in the wages of the workmen.

THE AMERICAN COAL TRADE.

The situation in bituminous coal is rapidly revolving itself into a question of transportation rather than production. In many instances during the recent past, mines all over the bituminous region have been idle a considerable portion of the time on account of a lack of cars, says the *Coal Age*, November 10. The persistent belief exists, however, that the closing of Lake navigation will release a considerable amount of motive power and rolling stock. There is now little question but that the North-west will have ample stocks of coal to carry it through a severe winter. The local fuel administration in Chicago has resorted to a "card system" in selling coal, not so much to cut down consumption as to forcibly discourage the practice of hoarding.

Boston market is still without spot coal for steam users, and manufacturers who did not contract before August 31 have a poor look-out. No quotations can be reported beyond the authorised basis of 2 dols. 45 c. per net ton, f.o.b. mines, plus 15 per cent. commission per ton.

Receipts of bituminous in the Philadelphia district recently have continued at the same volume prevailing for the past month. Some of the larger plants have been able to stock fair quantities. The new Government price, in operation for two weeks, has made little difference in the offerings of spot coal.

The movement of anthracite coal to eastern markets has not been sufficient to satisfy the demands. Throughout a large portion of the eastern states retail dealers are making deliveries of only one ton to a customer. In many instances, stocks have been depleted almost to the point of exhaustion.

In Philadelphia the shortage appears serious, but relief is expected. The prices per gross ton f.o.b. cars for line shipment are as follow:—Broken, 4-55 dols.; egg, 4-45; stove, 4-70; nut, 4-80; pea, 3-40; buck, 2-90; rice, 2-40; 1 oiler, 2-20; barley, 1-90 dols.

The coke market situation is very unsatisfactory. Production and shipments are lighter than they should be, the chief complaint being shortage of cars. But apart from the restricted shipments there is a disposition on the part of some operators to hold coke back from the market, or even to seek a price higher than the fixed price of 6 dols.

Again the report comes from Washington that the Government will reduce the set price for coke and at the same time establish differentials for grades. Trading in coke is quite limited. Owing to the shortage of coke the production of pig iron continues at not over about 90 per cent. of the capacity of the blast furnaces available for operation.

EXPLOSIVES IN COAL MINES.

NEW ORDER.

The Home Secretary has issued, under date November 5, 1917, an Order including the explosive known as ammonite in the First Schedule of the Permitted List.

Ammonite has the following composition:—

	Parts by weight.	
	Not more than	Not less than
Nitrate of ammonium	75	71
Di-nitro-naphthalene	6.5	4.5
Chloride of sodium	22	20
Moisture	1	—

The explosive shall be used only when contained in a case of lead and tin alloy thoroughly waterproofed with pure paraffin wax; with a detonator or electric detonator of not less strength than that known as No. 6; the greatest weight of the explosive which may be used in any one shot-hole shall not exceed 18 oz.; the explosive must have been made at the works of the Miners' Safety Explosive Company Limited, at Stanford-le-Hope, in the county of Essex.

Four ounces of ammonite gave a swing of 2-44 in. to the ballistic pendulum, compared with a swing of 3-27 in. given by 4 oz. of gelignite containing 60 per cent. of nitro-glycerine.

Institute of Metals.—A ballot for the election of members of the institute is due to take place on December 12. Forms of application for membership can be obtained from Mr. G. Shaw Scott, M.Sc., secretary and editor, 36, Victoria-street, Westminster, S.W. 1. In the present year the membership has grown from 660 to over 860.

Criminal Appeal Case.—On Monday, in the Criminal Appeal Court, Charles Simmonds, coal merchant, of 1, Leith-road, Darlaston, appealed against his conviction at Staffordshire Sessions for having received four tons of steel knowing it to have been stolen, for which he was sentenced to nine months' imprisonment with hard labour. The court held that although the summing up was defective the features of the case would not entitle the defendant to an acquittal. The appeal was dismissed.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Miners' Scheme for Lessening Unemployment at the Mines—Increased Tipping Charges at Swansea—Eleven Local Constituencies to have Colliers' Candidates—Assessments—Wage Awards.

The Coal Controller is taking an important step with regard to the idle days at South Wales collieries, a matter which has operated with special disadvantage to the collieries in the west. Mr. Phillips, of Swansea, and Mr. Anthony, who respectively are connected with the Production and Distribution Departments of the Controller's Office, communicated with the secretaries of the Coal Owners' Association and of the Miners' Federation, the purpose being that these gentlemen should undertake an investigation into the circumstances which occasion irregularity. It was desired that they would, if possible, draft a scheme whereby the work can be better distributed. One form of equalisation would be to distribute the orders more widely over the coal field; and another idea is that the best way of dealing with the difficulty would be to close certain pits and give the men full time employment elsewhere. A third suggestion has been to encourage consumption by reducing prices and thus furnish more work. —At a meeting of the executive council of the Federation in Cardiff on Friday of last week, the letter of the Coal Controller was dealt with, and its invitation to their secretary (Mr. T. Richards, M.P.), and also to the employers' secretary (Mr. Gibson), was considered. It was felt, however, that even if Mr. Gibson and Mr. Richards were not too fully occupied with their ordinary duties to devote time for conducting such enquiry, a far better method would be for a joint committee of owners and miners' representatives to undertake the duty; and it was decided to communicate with the Controller in this sense, and to ascertain whether he would approve of the appointment of such a joint committee.

It has since been publicly announced that the Coal Controller has appointed Messrs. J. J. Anthony and H. A. Phillips, with the secretary of the Coal Owners' Association (Mr. F. A. Gibson), and the secretary of the Miners' Federation (Mr. T. Richards, M.P.), to enquire into the difficulty of so much idle time in the coal field, and to suggest means of ameliorating, as far as possible, the effect of the shortage of shipping. The Controller states that what is primarily in view is the possibility of more evenly distributing available orders over the coal field, with due regard to the particular class of coal required. "It is not, however, intended to exclude the possibility that it may ultimately be in the best interests of all concerned to allow certain collieries to close, provided reasonable opportunity exists for the men to obtain employment in the neighbouring pits. It is desired that the enquiry should take all possible remedies into consideration; and it is hoped that it will be possible to furnish the Controller with unanimous recommendations." One of the representatives of the Controller's Department, it is provided, should visit the head offices of certain colliery companies named at whose pits the position threatens to become acute in the very near future, and his duty will be to submit at once any recommendations for alleviating the situation. The Controller states further: "Attention will, no doubt, be drawn to the possibility of securing orders for certain collieries by permitting them to lower the price. It is possible that such a method will be successful in this or that particular instance, but it should be possible to obtain the same result by the allocation of orders." Both the Production and Distribution branches of the Controller's Office are represented in the enquiry.

Swansea Chamber of Commerce, dealing with the Imports and Exports (Temporary Control) Bill, passed a resolution which declared that the Chamber view the proposal with grave apprehension, believing that the trade and commerce of the country could be best encouraged and extended by removing restrictions at the earliest possible moment after peace, and that any control after the war should not be decided until the opinion of the commercial community had been ascertained.

At the same meeting, discussion arose upon the decision of the railway companies to increase the tipping charges; and Mr. W. T. Farr reported that, with Messrs. Ingram and Cocks, they had waited upon Mr. Roberts, representing the railway companies, and had learned that inasmuch as there had been an increase of 60 per cent. in the wages of tippers, the companies had decided that it was necessary to increase the old rate by 17½ per cent. This, he thought, would be considered fair. A letter was read from the Swansea Metal Exchange stating that it had been decided to appoint the president of the Chamber as a vice-president of the Exchange, there being a desire to work more closely with the Chamber. Upon this, it was decided to return the compliment by adding the president of the Exchange to the list of *ex-officio* members of the Chamber.

The strength of the miners' organisation in South Wales, and its commanding influence amongst other trade union bodies, is demonstrated by the fact that no fewer than 11 constituencies have been ear-marked by the Federation executive for contest by them on the occasion of the next Parliamentary election. Contrary to previous statements, Mr. T. Richards, M.P., their secretary, will stand for the western part of Monmouthshire, which will be the new Ebbw Vale constituency. Mr. W. Brace, M.P., Under-Secretary of the Home Office, is named for Abertillery, the area adjoining on the east. Mr. W. Abraham ("Mabon"), M.P., will stand for the Rhondda again; and Mr. John Williams, M.P., for Gower. The acting-president of the Federation, Mr. James Winstone, will again contest Merthyr; and the treasurer of the Federation, Mr. A. Onions, is named for the Rhymney Valley constituency of Caerphilly and Gelligaer. Mr. Vernon Hartshorn will stand for the constituency of Ogmore. There are to be conferences during the early days of December, and, in addition to the constituencies named, four others are indicated as scenes of contest—namely, East Rhondda, Aberavon and Neath, Pontypridd, and Bedwellty.

The non-unionist question still causes difficulties; and the executive of the South Wales Federation has been asked to send representatives to a conference for the purpose of reaching a non-unionist agreement which is being suggested.

Several assessment areas in Western Wales, including Carmarthen, aims at carrying out a scheme of the steel and tin-plate works, with Neath, being included. The proportionately to ratable value. The employers and trade union representatives will interview at the Ministry of Munitions

with reference to the wages award of the Committee on Production, whereby workmen were granted 5s. per week increase and boys 2s. 6d., both in the steel and tin-plate operations. Mr. F. W. Gilbertson, with Mr. H. Clement, represented the Tin-Platers' Association, while Mr. F. Rees and Mr. L. Jones represented the Siemens steel producers; and there were also present officials from six of the men's unions. It was pointed out that the award was most unsatisfactory, women being excluded, and its operation in other respects being impracticable. Careful consideration will, it is understood, be given to the representations made; and meetings of the Tin-Plate Conciliation Board and of the Steel Board, it was decided, should be summoned. The matter is of exceptional importance, because the allocation of larger supplies of steel prefigures material development of the tin-plate works; and there is indication of reconstruction which will embody the best labour-saving machinery.

Two good seams have been struck by the Cefn-y-Bryn Colliery Company, who have been for some months past sinking near Port Talbot. The coal won is the bituminous variety, and is classed as a high quality. Mr. E. G. Davies (Port Talbot), with Mr. R. L. Morgan and Mr. D. R. Evans (of Swansea) are the enterprisers, Mr. E. Evans being in charge of the mining work.

A striking example of the enormous rates of freight is reported from Cardiff. On Tuesday, a Spanish vessel was fixed at a freight rate of £17 10s. per ton for carrying coal to Barcelona, her capacity being over 2,500 tons. The total earnings for this single voyage will be more than £45,000—probably as much as the steamer is worth, even after allowing for the increased values that have arisen since war broke out. This is an advance of £5 upon the preceding fixture, which was at the rate of £12 10s. a few weeks back. Before the war, the ordinary rate would have been about 7s. 6d. per ton. Part of the reason for this enormous rate is that shipments to Spain are restricted to Spanish vessels, and that very few of these are on offer. In cases where the current rates of freight operate, the price, although very high, is quite different. For example, the Inter-Allied Chartering Committee have fixed £5 per ton for coal to Gibraltar. Another noteworthy fact is that the cargo is not of best large, but is through-and-through, so that while the consumer is charged up to about £20 per ton for his coal, he will not get the pick of the market; but, at least, he cannot blame the British shipowner for profiteering at his expense.

It is significant of the progress of the Blaenavon Company, which, after some unfavourable experiences, is now doing good business in the iron works as well as in the collieries, that the company have obtained Treasury permission to issue 75 ordinary shares of £1 each at par. The capital after these new shares have been taken up will still be less than £700,000. The collieries produce close upon three-quarters of a million tons per annum; and, in addition to the blast furnaces and steel works, the company have coke ovens and by-product plant. There are developments in progress which will materially add to the output of steel and pig iron, four new steel furnaces being added, of which one is already in operation.

A curious case has come before the county court at Bridgend. The plaintiff was a collier in the service of North's Navigation Company, and he sued for compensation on account of an injury alleged to have been sustained from being stung on the eye by an insect called "Russian bug," said to be imported with the pitwood. The insect is termed by the miners "Shonny Two-legs," and the plaintiff alleged that in the stables at St. John's Colliery, Maesteg, he had been bitten and kept from work for some time. The contention of the defendant company was that the injury was not due to a bite, but was an ordinary cyst. His Honour Judge Bryn Roberts, in giving his decision, stated that if complainant could have satisfied him that he had been stung by the insect introduced into the colliery with the timber, that would have been an accident within the Compensation Act, for which compensation could be awarded. The defendants' allegation, however, that it was due to a cyst would make it natural causes. In his opinion, there was much doubt as to the accuracy of the man's story. He was not satisfied that the insect had stung him; and, moreover, he was impressed by the statement that this particular insect had never been known to bite a man before with serious consequences. Judgment was therefore given for the defendant company, with costs.

Cardiff Chamber of Commerce on Wednesday, commenced a discussion upon the report of the Commissioners on industrial unrest and the recommendations of their own committee who had considered that report; but owing to pressure of other business, the matter had to be deferred for further consideration. Largely, the recommendations of the committee relate to colliery affairs.

Northumberland and Durham.

Sir Hugh Bell on Wages—A New Association—Mr. Cann's Comments on Slacking—Compensation Cases—Shot-Firing Fatality—Relief Fund Committee.

Sir Hugh Bell, at the general meeting of shareholders of the Horden Collieries Limited at Darlington, said he put the total wages paid by the Horden Collieries at 70 per cent. of the turnover. Therefore, people who imagined there was going to be an increase to a very large extent in the wages paid in the coal trade were, he thought, living in a fool's paradise. There was only one way in which that could be done, and that was increased production. There was no difficulty in getting increased wages now, because the coal trade was being carried on under an artificial system, and from this state of things there would be a serious revulsion.

The iron, steel, and metal merchants on the Tyne, Wear, and Tees have formed an association for the protection of their interests, in view of Government action taken or contemplated.

Mr. T. H. Cann, general secretary of the Durham Miners' Association, in his November circular, takes Mr. F. Pease to task for his recent remarks to the London School of Economics. Mr. Cann says that a more unfair and deliberately misleading impression was never created than that large numbers of miners were guilty of slacking.

At Durham County Court, Judge Bonsey gave his decision in the compensation claim brought by Mrs. Brett against the owners of Hamsteels Colliery in respect of the death of her husband, Thomas Brett, miner. His Honour stated that Brett complained of feeling ill while at work. On going home, he was unable to take his food. A doctor was called in, and immediately detected symptoms of carbon monoxide poisoning. Pneumonia supervened, and death occurred 15 days from the man leaving work. The respondents resisted the claim on the grounds that Brett did not die from carbon monoxide, and that, if he did, death was not the result of an accident within the meaning of the Act. The place where Brett was working was badly ventilated, and there was evidence that the outlet of air was impeded, if not entirely blocked, by a fall of

stone. To his mind, there was ample evidence of an accident in the ordinary sense of the word, and he found that the man died from carbon monoxide poisoning in consequence of inhaling that poisonous gas while at work at the coal face, and that the circumstances under which he inhaled it and under which it was there in a dangerous quantity were accidental. He found for the claimant for £300, without costs.

At the same court, John Archer claimed compensation from the Lambton and Hetton Collieries Limited. On his behalf, Mr. Heath stated that, in April 1915, whilst applicant was working at Lambton D pit, his head was injured by a fall of stone. After an absence of three weeks, he worked irregularly until November, when his nerves got the better of him, and he gave up. It was contended that he was suffering from neurasthenia as a result of the accident. Archer's neurasthenic condition was testified to by Drs. W. H. Condell and Gordon Bell, the latter of whom stated that his condition could have been caused by such an accident. For the respondents, Mr. Meynell argued that Archer was suffering from the result of disease, and disease only. He was being paid insurance benefit. He called Dr. Morgan, who said he had no doubt that claimant was suffering from diabetes. He did not think that the accident mentioned had anything to do with the man's condition, which was caused by diabetes. The judge, however, found in favour of the claimant, and awarded him £1 per week as from October 19 last.

Failure to heed warning not to leave his place until after the shot was fired appears to have been the cause of death of Wm. Robt. Merryweather (45), who was killed by a shot explosion at Adelaide Colliery, Shildon, where he was working as a driller. At the inquest, it was stated that he was found under a fall of coal which followed the firing of the shot. Evidence was given that he was warned as to the danger he ran if he left his place, and the men's inspector expressed the opinion that the casualty was an accident, and that deceased had sufficient warning. A verdict of "Accidentally killed" was returned.

A recent ballot has resulted in the appointment of the following as the Appeals Committee of the Northumberland and Durham Miners' Permanent Relief Fund:—Durham representatives: Messrs. Thos. Hughes, Wearmouth; J. Herriotts, Windlestone; Robt. Richardson, Ryhope; S. Tuttle, Shotton; Eli Cook, Haddon Hold; Thos. Craggs, Washington Glebe; J. Leonard, Bowden Close; J. Local, Wheatley Hill; Martin Peddy, Browney; and John Gibson, Horden. Northumberland representatives: Messrs. Peter McKay, Alnham; Patrick Carling, Elswick; Jas. Stringer, Burradon; John Carr, North Walbottle; and Geo. Middleton, Mickley. Cumberland representative, Mr. Robt. Brough, Aspatria. Cleveland representative, Mr. Robt. Tyson.

The Hartlepool Food Vigilance Committee has passed a resolution "emphatically protesting against the Coal Controller's action in fixing the whole of the extra 2s. 6d. per ton upon the householder," and expressing the opinion that the increase should have been borne by the coal owner and the wholesale merchant.

The committee of the Durham Aged Mine Workers' Homes Association, in a circular letter, appeal for the continued generous support of the public, and point out that, owing to many of the members of large contributing lodges working very slack time, there will be a falling-off of contributions from those sources.

On Saturday, December 8, Mr. Charles Fenwick celebrates the 32nd anniversary of his election as M.P. for the Wansbeck Division of Northumberland. To mark the anniversary, the executive and wages committee of the Northumberland Miners' Association intend to entertain him to a luncheon.

A special meeting of the members of Newcastle Chamber of Commerce, held on Wednesday of this week, to consider the Imports and Exports (Temporary Control) Bill, unanimously adopted a resolution adverse to the Bill.

Mr. Jas. Robson, compensation agent to the Durham Miners' Association in succession to the late Mr. Wm. House, has issued his first report, which covers 40 fatal and 70 non-fatal cases. A few of the most interesting cases were as follow:—Robt. Jameson (37), locomotive fireman at Brancepeth A, had a leg taken off in October 1913. In August 1916 he got an artificial leg, and started light work at bank. Owing to severe weather, he was unable to get to work between December 15 and January 2. He then worked until January 13, when, through the wintry conditions and his artificial limb being at fault, he lay idle until February 19. He successfully claimed full compensation at the rate of 17s. 7d. per week for the period he was off work.—Matthew Bates (19), putter and hewer, Waterhouses, got some small coal into his boot on March 16. He worked his full shift on Monday, March 19, and went to work on the 20th, but had to come home. He reported the accident to the overman, and claimed three weeks' compensation, which claim was resisted on the ground that no accident within the meaning of the Act occurred. The claim was allowed.—Owen Duffy (15), driver at Addison, scalded his arm while warming his bottle with a candle in the mine, and successfully claimed compensation.—Jos. Wilkinson, hewer at Westwood, whilst travelling to work on December 6 last, fell down about 40 yds. from the shaft and broke his leg. He alleged that the ice would not have been there had it not been for the bursting of a steam pipe. Claim allowed.—Geo. Bolam, hewer, Urpeth C pit, had his elbow damaged on December 7, 1914. He is now working light work at bank, and is paid 2s. 9d. per day basis and coals. He is not receiving any light work rate in cash, as his present average wage is more than his wage when injured, as per the county schedule, but owing to the pit working short time, he has only averaged five days per week at the light work, including overtime, and asked that his light work wage should be calculated at five days per week for compensation purposes. The claim was disallowed.—T. Mothersill, putter, Easington, was suffocated by gas last May. When he got into the flat he was told by the deputy to find a pair of ladders in the Cross-over district. He went to the 2nd North district, however, and enquired the way to the 3rd North district. Although the road was fenced off, he went under the fence a distance of four pillars, and was finally overcome by gas. The father was awarded £120.

Cleveland.

The Middlesbrough firm of Messrs. Dorman, Long and Company Limited have further added to their undertakings by acquiring properties at Middlesbrough of Sir B. Samuelson and Company Limited, comprising eight blast furnaces, large coke oven plant, collieries, and ironstone mines, the purchase price of which, it is reported, is £1,500,000. Messrs. Samuelson's iron works at Middlesbrough were established half a century ago, and have been a very prosperous undertaking. For some years past, under an agreement, all the Cleveland pig iron manufac-

tured by Messrs. Samuelson has been taken up by Messrs. Dorman, Long for use at their Britannia Works, Middlesbrough. The acquisition of the whole of Messrs. Samuelson's undertakings gives Messrs. Dorman, Long control of the whole pig iron output, including hæmatite iron.

Cumberland.

The Flinby Colliery Company are sinking to reach the lower seams in their new colliery at Risehow, near Maryport. The same company have also recently installed a new coal cutter at their Bertha Colliery, near Broughton Moor.

Yorkshire.

Fines for Neglecting Work—Hatfield Chase Minerals—Gas Fatality at Thornhill—Bradford Coal Merchants.

When eight employees of the Hickleton Main Colliery Company were prosecuted, at Doncaster last week, for neglect of work, it was definitely stated that the colliery company was tired of only claiming 10s. per day damage, and that in all future prosecutions £1 per day will be claimed. Peter Jones, a Thurnscoe miner, was fined £5 at Doncaster last week for refusing to build a pack in the Hickleton Colliery; James Mincher, miner, Swinton, was fined 50s. for refusing to set props in the Denaby Colliery; Robt. Cox, pit hand, Denaby, 30s. for damaging an electric lamp; and Henry Garland and Hy. Catte, Brodsworth, pony boys, 15s. and 25s. respectively for riding on their ponies.

An interesting statement was made at the meeting of the Hatfield Chase Corporation at Doncaster last week, which confirms hints previously thrown out in this column of the likelihood of a colliery being sunk at Finningley, near Doncaster. The chairman (Mr. James Milnthorpe) remarked that the past year would be memorable to the Corporation as the one in which a way out of all their financial difficulties had been found. They had definitely arranged to lease their coal in the Finningley Colliery area, and they had also arrived at a most satisfactory basis of agreement for their coal in the South Carr Colliery area. By these arrangements they hoped before long (after the conclusion of peace) to have an increasing income from minimum rents upon about 1,200 acres. They had made satisfactory arrangements for their indemnification against loss, and claims for loss, caused through subsidence of their land or drains. They had still about 1,000 more acres further north, and he hoped ere long to be able to announce that arrangements had been made for the leasing of their coal over that area. With a minimum rent in a few years time of £1 per acre on this 2,000 odd acres, the position of the Corporation should be most comfortable.

The colliery company which has taken up the Finningley minerals is the Sheepbridge Coal and Iron Company, of which Mr. Maurice Deacon is managing director. This company is already interested in successful new coal mines in the Doncaster district. It has acquired agreements for leases for the Barnsley seam of coal underlying a large area of land at Finningley, on the eastern boundary of the Rossington coal field. Finningley is between six and seven miles from Doncaster.

A gas fatality occurred last week at Ings pit, belonging to Inghams Thornhill Collieries Limited, and situated at Thornhill, two workmen losing their lives, and the lives of several others being endangered. George Knowles (35), and Victor Rhodes (18), by-workers, were removing, with air pipes, an accumulation of gas, and by some means were overcome by the fumes. The manager (Mr. Thos. Ramsay) and the under-manager (Mr. Arthur Fox) procured smoke helmets, and made for the place, where five men were known to be working. Knowles and Rhodes were found lying unconscious, and they subsequently died. Three other men—Seth Ramsden (deputy), Arthur Sanderson (miner), and Harold Sanderson (by-worker)—were also found suffering from the effects of gas. Hundreds of men were working in the pit at the time. This is the first coal gas accident at Ings pit.

A meeting of the Coal Merchants' section of the Bradford Chamber of Trade was held on Thursday of last week. Mr. Galloway read a letter convening a meeting representative of local coal merchants' associations of Yorkshire, to be held in Leeds on December 4. It was resolved that delegates be sent to the meeting. It was also resolved that when any merchant has received an intimation from his colliery that his supplies are to be reduced, to allow for the emergency coal being sent to the Corporation, a letter should be forwarded to the town clerk, pointing out the facts, and adding that this is in the public interest.

The Wombwell Main Colliery Company asked for and obtained the withdrawal of summonses against trammers for neglecting work, on the understanding that these defendants would amend. Messrs. Grayson Lowood and Company Limited claimed damages from several miners for absenteeism. The court regarded these as bad cases, and orders were made for sums up to £10.

Lancashire and Cheshire.

At a meeting of wholesale coal merchants and factors trading in Liverpool district, Mr. Arthur Leighton explained the formation of the North of England Coal Factors and Wholesale Merchants' Association, which has been formed at Leeds, where it was stated that it was desirable to form local committees in other centres, such as Liverpool, Manchester, Hull, Middlesbrough, Newcastle-on-Tyne, Barrow-in-Furness. The object of the meeting was to form a local committee on behalf of the Liverpool wholesale factors and merchants' interests. Several of those present agreed to their names being submitted to the executive with the view to ultimately forming a Liverpool centre.

A special meeting of the Lancashire and Cheshire Colliery Under-Managers' Association at Wigan on Saturday last discussed measures to be adopted failing a reply from the Coal Association and Controller of Coal Mines relative to applications made repeatedly since April 1916. The association asked that a deputation should be received for the purpose of discussing matters in dispute at a number of collieries. The meeting resolved that the association, as representing 86 per cent. of the under-managers in the two counties, should instruct members to tender notices. The resolution was passed with regret at the necessity of taking such a step in order to obtain what was granted to all other classes of workers.

Owing to the presence of water, the working of the Worsley Four-feet seam at the Clifton and Kersley Coal Company's Wet Earth Colliery, Clifton, near Manchester, has been abandoned for the present.

As a result of a conference between the Finance Committee of the Oldham Corporation, coal dealers, and representatives of the Co-operative Society, it is expected that coal prices in the town will be slightly reduced.

Notts and Derbyshire.

A Barlboro' miner, Corpl. F. Greaves, aged 27, well known to athletes in the Sheffield district, was included in the list of those who recently received the Victoria Cross. He enlisted in January 1915, and saw service in Gallipoli and Egypt, and has been in France since July 16. Prior to enlisting he worked at the Barlboro' No. 2 pit. Once previously he was recommended for the Military Medal for rescuing a wounded man under heavy fire.

The Midlands.

At the Oldbury Police Court on Tuesday, Charles Alexander Sadler, trading as the Speedwell Colliery Company, was summoned, as the owner of the colliery, for breaches of the Mines Regulation Act. The chief inspector of mines (Mr. J. R. Felton) said that on September 10 an inspector who visited the mine found a number of breaches of the Act occurring, mostly relative to the safety of the men underground. It was urged, for the defence, that none of the breaches jeopardised the lives of the men. The chairman of the magistrates said they had taken into consideration the shortage of labour, but in view of the fact that defendant had been previously warned, they thought he should have taken more care. They imposed a fine of £5 in respect of each of six summonses, £3 in respect of one summons, £2 each in respect of four summonses, and £1 in respect of another—a total of £42.

There is great satisfaction among Staffordshire colliery owners at the recent Order of the Coal Controller prohibiting householders from ordering supplies wherever they have a month's coal reserve in stock. This, it is said, has considerably eased the pressure at the Cannock Chase domestic collieries, and enabled better supplies to go to the factories. It is hoped that shortly London will be sufficiently filled up to allow quantities of coal to revert to the Cannock Chase district consumers. The Birmingham Chamber of Commerce issued a suitable form of declaration by their members, upon which consumers are asked to state approximately the quantity of coal they have, and how long it is likely to last.

Scotland.

Methil Shipments—"Combing Out"—Tobacco for Miner Soldiers.

At Methil, the coal shipment shows a decrease of several thousand tons, being 18,668 tons, against 24,565 tons in the previous week, and 24,595 tons in the corresponding week of last year. At Burntisland, the export of coal was 9,570 tons, as against 9,100 tons in the corresponding week of 1916. Consignments abroad were 3,900 tons of the total shipment. The imports included a cargo of bauxite ore.

Acting on information received from other districts in the British Miners' Federation that certain allowances were made to miners by surveyors of taxes for pit boots and clothing, the secretary of the Ayrshire County Union has been in communication with the surveyor of taxes for Ayrshire on the subject. A reply has now been received to the effect that £1 per quarter will be allowed on these heads, to begin from January 1918.

Within the next few weeks more is likely to be heard of the "combing out" of men who have entered the pits in Scotland since the outbreak of war. It is understood that in Scotland the Coal Controller has invited the co-operation of the local miners' officials to assist in the "combing out."

The appeal to miners on behalf of the Scottish Thick Black Tobacco Fund, which Mr. John Robertson, miners' agent, has addressed through the colliery managers of Scotland, has met with a response that far exceeds all expectations. Mr. Robertson is anxious to send the fighting miners attached to Scottish regiments a double supply of their favourite "thick black" at Christmas.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

Birmingham Railway Carriage and Wagon Company Limited.—Proposals to capitalise £168,700, forming part of the internal reserve fund, were submitted to the shareholders at a special meeting at Birmingham. Mr. Alfred R. Windle, who presided, said the whole of the sum they proposed to capitalise represented profit made before the war, and under normal trade conditions. He proposed that an additional ordinary share be allotted for every two now held, that the ordinary £10 shares be converted into £1 shares, and that 50,000 of such shares, being part of the unissued capital, be offered for subscription at par to such of the directors, officials, and employees of the company at such times and on such conditions as the board may decide. The resolution was carried.

British Electric Traction Company Limited.—The directors have declared the dividend on the 6 per cent. cumulative participating preference stock for the half-year ended September 30.

Brown (John) and Company Limited.—The directors have resolved to pay an interim dividend at the rate of 5 per cent. on the ordinary shares—namely, 1s. per fully-paid share and 9d. per partly-paid share, less income tax.

North Lonsdale Iron and Steel Company Limited.—Dividend of 9 per cent., making 15 per cent. for the year, as compared with 14 per cent. last year, 12½ per cent. for 1914-15, and 10 per cent. for each of the three years before that.

Ruston, Proctor and Company Limited.—The directors have declared a dividend of 5 per cent. per annum on the ordinary shares—the same as last year.

Udston Colliery Company Limited.—The accounts for the year ended August 31 last show a loss for the year of £1,449. The amount brought forward from last year, after deducting payment of excess profits duty for years 1915 and 1916, is £3,077, which leaves a balance at credit of profit and loss account of £1,628, which the directors recommend should be carried forward. For the previous 12 months a dividend of 12½ per cent., free of tax, was paid, £3,000 written off for depreciation of collieries and leases, and £750 for depreciation of wagons, £9,774 being carried forward.

United Wire Works Limited.—The report for the year ended September 30 last states that, after providing for depreciation, bad debts, and excess profits duty, the balance at the credit of profit and loss is £14,036. The board recommend that a dividend of 7½ per cent. be paid on the ordinary shares, free of income tax, and that £1,500 be carried to the general reserve fund, leaving £3,736 to be carried forward.

NEW COMPANIES.

Auxiliary Engineering Company Limited.—Private company. Registered November 23. To carry on the business of mechanical engineers, etc. Nominal capital, £5,000

in £1 shares. Subscribers: C. H. King (1 share), L. E. and A. W. Gardner.

Inchfield Moor Collieries Limited.—Private company. Registered office, Irwell terrace, Bacup. Registered November 21. To carry on the trade of coal and mining and stone quarrying in all their branches. Nominal capital, £1,000 in 200 £5 shares. Subscribers: A. Temperley and J. Taylor.

Scriven and Company Limited.—Private company. Registered November 17. To carry on the business of engineers, founders, etc. Nominal capital, £20,000 in £1 shares. Directors: J. W. Crosthwaite, G. D. Crosthwaite, J. Clark, A. E. Ineson, and three others. Qualification, £400.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

ASHFORD (MIDDLESEX), DECEMBER 6.—Coke for one school. Forms from F. G. Beeching, clerk, Managers of the West London School District.

ASHTON-UNDER-LYNE, DECEMBER 5.—Engine slack for Electricity Committee. Particulars from the borough electrical engineer, Wellington-road.

DOVER, DECEMBER 4.—1,200 chaldrons of coke from Yorkshire coal for the Town Council. Forms from the town clerk, Dover.

GRAVESEND, DECEMBER 12.—Coal for the Workhouse. Forms from the clerk, 13, Victoria-place, Gravesend.

KEIGHLEY, DECEMBER 15.—About 500 tons rough slack for Corporation Baths. Tenders to C. Foulds, superintendent.

MIDDLESBROUGH, DECEMBER 8.—Steam coal (six or 12 months) for Tees Conservancy Commissioners. Forms from the general manager, head offices, Middlesbrough.

SHEERNESS, DECEMBER 24.—1,000 tons good Yorkshire or Langwith nutty slack, to pass through a 1½ in. mesh, for the Urban District Council. Forms from the clerk, Council Offices, Trinity-road.

WESTMINSTER, DECEMBER 12.—Coal for Westminster Guardians. Forms from the clerk, Princes-row, London, S.W. 1.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

DUBLIN, DECEMBER 3.—Stores.—Iron and steel, castings, permanent way fastenings, oils, etc., for the Dublin and South-Eastern Railway. Forms (6d.) from the secretary, Westland Row Station, Dublin.

DUNDEE, DECEMBER 12.—Various.—Timber, iron, steel, oils, etc., for the Harbour Trust. Specifications from the general manager, Trust Offices.

MIDDLESBROUGH, DECEMBER 8.—Stores.—Castings, bolts, nuts, etc. (12 months), for the Tees Conservancy Commissioners. Forms from the general manager, head offices, Middlesbrough.

TRIMDON GRANGE (DURHAM).—Stores.—Timber, oils, grease, iron, firebricks, etc. (six months), for Trimdon Coal Company Limited. Forms from I. Penny, Deaf Hill Colliery, Trimdon Grange, S.O.

WESTMINSTER, DECEMBER 6.—Electric Wire.—Electric wire and cable and electric bell fittings (12 months). Forms from the Controller of Supplies, H.M. Office of Works, Charles-street, Westminster.

METALLURGICAL COKE AS WAR MATERIAL.

In pursuance of the powers conferred upon him by Regulation 30A of the Defence of the Realm Regulations, the Minister of Munitions has made an Order that the war material to which that regulation applies shall, on and after September 17, include metallurgical coke of the following classes and descriptions:—

SCOTTISH, NOTTINGHAMSHIRE, LINCOLNSHIRE, CUMBERLAND.

With reference to the above Order of November 27, 1917, the Minister of Munitions gives notice that the General Permit of November 1, 1916, under the Orders of July 7 and October 31, 1916, shall, on and after September 17, 1917, take effect as if the war material referred to in the above Order of November 27, 1917, were included in the Order of July 7, 1916, and the undermentioned materials and prices were specified in the schedule to the said General Permit, the prices where the material is already specified in such schedule to be in substitution for the prices contained in such schedule, and as if the references to South Yorkshire and West Yorkshire blast furnace coke in the said schedule were cancelled; provided always that condition 2 of the said General Permit shall not apply to any sale or purchase of any of the undermentioned materials under a contract in writing entered into prior to September 17, 1917, at a price not contravening that permitted up to that date.

Maximum prices above referred to for metallurgical coke:—

	Per ton net f. o. t. makers' overs. £ s. d.
Durham and Northumberland blast furnace coke.....	1 13 0
Ditto foundry coke.....	1 18 0
South Wales and Monmouthshire blast furnace coke.....	1 17 6
Ditto foundry coke.....	2 10 0
Lancashire, Staffordshire, Yorkshire, Nottinghamshire, Derbyshire, Lincolnshire, Midland Counties blast furnace coke.....	1 12 0
Scottish blast furnace coke.....	1 15 0
Ditto foundry coke.....	2 5 0
Delivered West Coast blast furnaces.	
Cumberland blast furnace coke.....	1 17 9

THE FREIGHT MARKET.

With the tonnage offering very sparsely in the out-
 going market, business has been conducted on
 the lines this week. On the north-east coast,
 business has been mainly for Swedish destinations, at
 Gothenburg and 197½ kr. to Stockholm, for Tyne
 rates which reveal a reduction of about 2½ kr. in
 each instance. London has been done at 21s. Orders for
 most directions are very numerous, but the cargo space on
 offer is very small. Bilbao or Santander are still quoted
 at 160s., Lisbon is listed at 95s., Oporto at 105s., the coal-
 ing stations are mentioned at 100s. for Gibraltar and 200s.
 for Port Said, and the Spanish Mediterranean is quoted at
 up to 300s. to Barcelona. Even these high rates fail to
 tempt neutral owners for the nonce, however. At South
 Wales, little business has been done for destinations out-
 side the French Atlantic ports. It is noteworthy that a
 small steamer has been fixed for Christiania at 180 kr.,
 Cardiff or Swansea loading, and that Monte Video is
 reported done at 130s. There is a strong enquiry for
 vessels for neutral destinations. Fixtures, at Newcastle,
 for Stockholm and Gothenburg, at 200 kr. and 190 kr.
 respectively, have been arranged for Methil loading.

Homewards, the River Plate is quiet, at the old rates of
 145s. from up-river and 140s. from down-river ports to the
 United Kingdom. At the United States, coal freights are
 steady, at 125s. from Virginia to Buenos Ayres, with
 33 dols. for Rio discharge. On net form, Northern Range
 to West Italy is quoted at 360s. On Committee account,
 heavy grain is workable at 45s. from Northern Range to
 France, with 70s. quoted for West Italy. At the Far
 East, Madras Coast to Marseilles with kernels is quoted at
 the recently advanced rate of 550s. Haiphong-Saigon to
 French ports with rice is steady, at 500s. Kurrachee to
 the United Kingdom is steady, at 250s., with 275s.
 quoted for Bombay to the same destination. Bombay to
 Mediterranean on d.w. basis is mentioned at 400s. There
 is a keen demand at firm figures for tonnage for the car-
 riage of ore and phosphates from the Mediterranean ports.

Tyne to Gothenburg, 1,900 and 2,800, 190 kr.; London,
 1,100, 21s.; Stockholm, 2,600, 197½ kr.; and Treport, 200,
 51s., coke.

Cardiff to Brest, 1,100, 45s., neutral; Cherbourg, 1,500,
 23s.; Caen, 600, 700, 950, 48s., neutral; Christiania, small
 steamer, 180 kr.; Havre, 1,350, 45s. 9d., neutral; Monte
 Video, 2,500, 130s.; Rouen, 1,500, 48s. 9d., neutral; St.
 Malo, 700, 24s.; and St. Nazaire, 3,300, 61s. 6d., neutral.

Swansea to Rouen, 1,600, fuel, 49s. 6d., neutral; 1,250,
 1,300, and 1,500, 48s. 9d., neutral; St. Malo, 700, 22s.;
 1,300, 45s. 9d., neutral; and Christiania, 500, 180 kr.,
 neutral.

Newport to Nantes, 1,400, 30s.; Bordeaux, 2,500, 69s.,
 neutral; and Rouen, 1,800, 48s. 9d., neutral.

Methil to Stockholm, 1,850, 200 kr.; and Gothenburg,
 2,500, 190 kr.

Burysport to Guernsey, 350, 42s.

LATER.—Since the above was written, the following
 additional fixtures have been announced:—

Tyne to Gibraltar, 5,800 and 6,000, 100s.; and Rouen,
 1,500, 53s. 3d., neutral.

Cardiff to Barcelona, 2,500, 350s.; Granville, 150, 100s.,
 sail; Havre, 1,300, 45s. 9d., neutral; Monte Video, option
 Buenos Ayres, 2,500, 130s.; and Rouen, 1,300 and 1,500,
 48s. 9d., neutral.

Swansea to St. Malo, 1,350, 45s. 9d., neutral; and
 Rouen, 1,600, 49s. 6d., fuel, neutral.

Ardrossan to Gibraltar, 100s.

Hull to Gothenburg, 2,500, 195 kr.

OBITUARY.

One of the best known men on the London Coal
 Exchange, Mr. John Edward Shaw, aged 61, was killed on
 Friday of last week, when endeavouring to cross the rail-
 way lines at Croydon Station. He had been for many
 years manager for Messrs. Rickett, Cockerell and Com-
 pany's South London business, and was crossing from his
 office to join a train when he was run over and killed.

Prof. René Nicklès, Director of the Nancy Geological
 Institute, whose death is reported, at the age of 58, was
 the pioneer of the search for coal in the Department of
 Meurthe-et-Moselle, and marked out the sites for the bore-
 holes which proved the existence of the Lorraine coal field.

Second-Lieut. L. P. Sidney, who has been killed in
 action, was the son of Mr. L. P. Sidney, assistant secre-
 tary of the Iron and Steel Institute.

The death occurred on Saturday, in his 78th year, of
 Mr. James Compton Merryweather, head of the firm of
 Merryweather and Sons, fire engine manufacturers, of Long
 Acre and Greenwich.

Mr. Thomas Kay, who has died at Tudhoe, at the age
 of 77 years, was for between 40 and 50 years manager of
 the Tudhoe Brick Works of the Weardale Steel, Coal and
 Coke Company Limited.

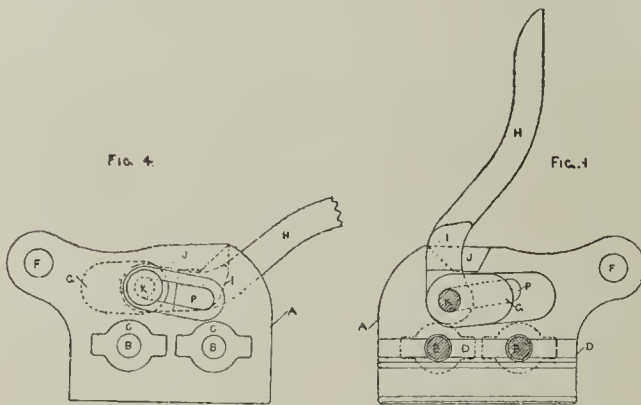
Capt. Frank Thornton, R.E., who died in France from
 an accident which occurred on November 14, was under-
 manager at Eldon Colliery until he enlisted over two
 years ago.

We are informed that Messrs. Ferranti Limited, elec-
 trical and general engineers, Kingsway, London, recently
 received the following contracts:—Manchester Corporation,
 annual contract for meters, annual contract for current
 transformers, three 500 k.v.a. three-phase transformers;
 Kilmarnock Corporation, one 100 k.v.a. three-phase trans-
 former; Birmingham Corporation, one 100 k.v.a. three-
 phase transformer; Darlington Corporation, one 400 k.v.a.
 three-phase transformers; Messrs. Hal Williams and Com-
 pany (for Messrs. Clayton and Shuttleworth Limited), one
 375 k.v.a. three-phase transformer.

Coal Conciliation Board.—The Coal Conciliation Board
 for England and North Wales met at the Savoy Hotel,
 London, on Thursday, to endeavour to settle the dispute
 at the West Cannock Colliery, Staffordshire. The meet-
 ing was held at the request of the Coal Controller. The
 matter in dispute was the tonnage rate to be paid for coal
 won in a new seam at the West Cannock Colliery. The
 Board is of the opinion that a new seam is what is known
 as the "Top Hard" field as the Top Hard, the price of
 coal is 10s. per ton. The colliery company contend
 that it is part of the lower Eight-foot seam,
 and should be paid 11s. per ton. The Midland Federation
 of Coal Owners, on the other hand, contend that it is
 part of the seam, which has now been
 exhausted, though the other seams are
 still open. The Board failed to reach a settlement.

ABSTRACTS OF PATENT SPECIFICATIONS
RECENTLY ACCEPTED.

109379. *Improvements in Haulage Clips.* T. Moorley,
 The Great Northern Hotel, Shirebrook.—This invention
 has for its object improvements in haulage clips for colliery
 tubs or wagons so as to render them more efficient in
 gripping power. Fig. 1 is a sectional elevation of the
 improved haulage clip before gripping the rope; fig. 4 is a
 side elevation of the clip in action. In these figures, A, A
 are the gripping cheeks loosely held together by the hinge
 pins B, B, having conical heads and washers C, C, the
 cheeks being formed with a hinge part D, and a gripping
 claw E. The eye F is for receiving the hook for securing
 the clip to the wagon. G is the wedge-shaped plug hinged
 to the end of the lever H, which is formed with a wedge

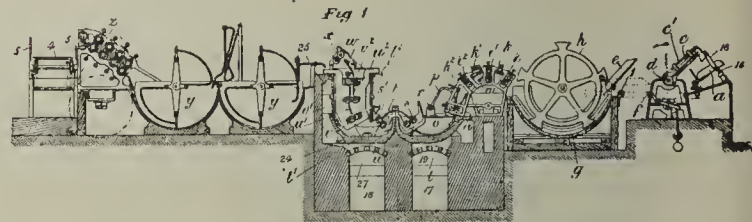


piece I on each side, and slides down against the end of
 the recess J in the gripping cheeks when the lever H is
 pulled down into the position shown in fig. 4. The action
 of these wedge pieces I, I, and the horizontal movement of
 the wedge plug G between the cheeks A, A, forces the
 upper part of the same apart, and closes the lower parts
 firmly on to the haulage rope R. The hinge pin K slides
 in slots P formed in the cheeks A, and acts as a fulcrum
 for the lever H. In some cases loose renewable faces T, T
 may be attached to the gripping part E of the cheeks A.
 (Three claims.)

109419. *Improvements in Smelting Furnaces.* H. A.
 Gill, 55 and 56, Chancery-lane, London, W.C. (A com-
 munication from Vereinigte Hüttenwerke Burbach-Eich-
 Dülldingen Aktiengesellschaft, also known as Acieries
 Réunies de Burbach-Eich-Dudelange, Soc. Anon., Düdelin-
 gen, Luxemburg, and Burbach, nr. Saarbrücken, Germany.)
 —This invention relates to the construction and operation
 of tilting smelting furnaces, such as are used for the smelt-
 ing of ferro-manganese, spiegeliron, ferro-silicon, and other
 like alloys, preferably with the use of liquid fuel. Tilt-
 ing smelting furnaces for metals are already known, which
 are divided into two spaces, one behind the other, one of
 these spaces serving for the smelting of the metallic
 material supplied, while the other serves for rapidly heat-
 ing the smelted metal up to a temperature suitable for
 casting. The metal is allowed to flow from the first into
 the second space through an opening in the intervening
 wall, which opening is brought into a suitable position for
 this purpose in a certain position of the tilting furnace.
 As distinguished from such known arrangements, the fur-
 nace forming the subject of the present invention is
 divided into two portions or spaces one behind the other,
 the first space being so arranged that not only can the
 material to be smelted be introduced easily into it, but
 said material can also be pushed onward into the second
 space which constitutes the actual smelting portion of the
 furnace. The material is not brought to a smelting tem-
 perature therefore in the first portion of the furnace, but it
 is only heated therein as a preliminary step to as high a
 temperature as is convenient, being then pushed on by
 mechanical means into the smelting space. By this arrange-
 ment, on the one hand, there is secured a much better
 utilisation of the hot gases than takes place when the
 material is smelted at once in the first portion of the fur-
 nace; and, on the other hand, owing to the particular
 arrangement of the feeding door or feeding opening, the
 whole interior area of the furnace can be seen or inspected
 as required, and the furnace is readily accessible for repairs
 and so forth. The thrusting in of the charges also pre-
 sents the advantage, as distinguished from the known
 method of allowing the metal to smelt out, that a definite
 composition of the casting metal can always be reckoned
 upon, although the charges may probably be composed of
 mixtures of alloys or metals of different consistency, and
 which may have different fusion temperatures. A further
 advantage of the new manner of working consists in the
 fact that, owing to the separate preliminary heating of the
 solid material and the subsequent thrusting of this highly
 heated material into the actual smelting space of the fur-
 nace, the whole smelting process can take place with a
 minimum of waste due to burning. The object of the pre-
 sent invention is attained by arranging the sole of the
 preliminary heating chamber so that it stands above the
 sole of the smelting chamber, and arranging the opening or
 door for the feeding in of the charges to the preliminary
 heating space, and for pushing forward the heated charges
 to be smelted from the said space into the smelting space
 in the front wall of the preliminary heating space, that is
 to say, in the wall which lies opposite to that where the
 burner is placed. (Three claims.)

109302. *Improvements in Machinery Employed in the
 Manufacture of Tin-Plates, etc.* R. B. Thomas, The Glade,
 Englefield Green, Surrey; H. S. Thomas, Hazelwood,
 Cardiff-road, Llandaff, Glamorgan; and W. R. Davies,
 Forest-Lyn, Healdon, Whitchurch, Glamorgan. — This
 invention consists of the further improvements hereinafter
 described in tin-plate making machinery or apparatus of
 the kind described, represented and claimed in the Specifi-
 cation of Letters Patent No. 28450/13, the object being
 still further to increase the efficiency of the improved
 machinery or apparatus forming the subject matter of a
 pending Patent Application, No. 12666/16. Fig. 1 repre-
 sents in longitudinal section a complete continuous tinning
 machine or apparatus containing the improvements consti-
 tuting the invention. The machine represented has a width
 proper to permit a series of six plates or sheets abreast to
 be fed simultaneously therein. a are the spring supports or
 tables arranged at the front of the machine for the recep-
 tion of the piles of white annealed plates or sheets to be
 tinned. b are the sucker feeding devices of the kind
 patented on the Specification of Letters Patent No. 14851
 of 1913. Each of the sucker devices b, on the motion of
 the arms c in the direction of the arrow, effected by the
 partial rotation of the rocking shaft d in the forward
 direction, transfers a plate or sheet from one of the piles

of plates or sheets on the tables a on to one of the pivoted
 plate receiving tables e when the latter are in the hori-
 zontal or nearly horizontal position indicated in dotted
 lines. The plate receiving tables e are gapped for the pur-
 pose of permitting the arms c to pass therethrough, and
 leave the plates or sheets carried over by the suckers b
 on the tilting tables e. The plates or sheets are detached
 or released from the suckers b when or immediately before
 they reach the tilting tables e by the action of a lever c¹
 on the back of the arm c, which lever c¹ is brought into
 pressing contact with the weighted tappet lever f below
 the receiving tilting table e, the said lever c¹ being thereby
 made to open a valve in the suction cup b, and admit air
 thereto, thus relieving the suction on the plate or sheet.
 Slightly above the level to which the suckers b are carried
 for the release of the plates or sheets is a water delivery
 pipe 1 having jets positioned to direct streams of water
 into the cups b, and thereby wet the same prior to their
 backward motion for the purpose of again bringing them
 into pressing contact with the piles of plates or sheets at
 the front of the machine. If thought necessary or desir-
 able, a cock may be arranged at one end of the water
 delivery pipe 1, which can be turned on by an arm on the
 rocking shaft d and turned off by a weighted lever on the
 plug of the cock, the water being thereby caused to flow
 only when the cups b are situated below the jets of the
 water delivery pipe 1. A series of white annealed plates
 having been transferred to the tilting tables e, the said
 tables are tilted, as represented in full lines in fig. 1, and
 the plates or sheets slide from off the tilted tables e into
 the pickling bath g of the machine. The plates or sheets
 are carried through the pickling acid in the trough g by
 the usual snugs or hook-like projections on the peripheries
 of the wheels h rotating in the said trough g. From the
 said trough g the plates or sheets are carried by the wheels
 h into the first pair of guiding or transferring rolls i, and
 by the series of fixed or stationary guides k, k¹, k², and
 intermediate pairs of guiding and transferring rolls i¹, i²,
 the plates or sheets are transferred to the tin pot l. The
 rolls i, i¹, i², as well as the other rolls hereinafter described
 are preferably made in two halves or parts, the presented
 ends of which are connected together by couplings 2
 situated between the middle housings 3, 3 of the rolls. The
 couplings 2 may be of any ordinary construction, hence it
 is not necessary to further describe or represent the same.
 During the passage of the plates or sheets between the
 pickling bath g and the tin pot l, the said plates or sheets
 are swilled by jets of water directed on to the upper and
 under surfaces of the same by perforated water delivery
 pipes m, m, the water running off the plates or sheets
 being mainly received in the trough n situated under the
 rolls i, i¹, i². Over the entrance end of the tin pot l is a
 pair of rolls o, o, running at a speed somewhat greater than



the other rolls of the machine, the object of running the
 rolls o at the said greater speed being to effect a quick
 passage of the plates or sheets received by the rolls o
 through the flux on the surface of the molten tin in the tin
 pot l, so as to get the said plates or sheets into the molten
 metal before they have had time to become unduly heated
 or dry, as it is found that thereby a considerable economy
 in the consumption of tin is effected. The plates or sheets
 after they have left the rolls o are pushed through the
 molten tin in the tin pot l by the hook-shaped or forked
 ends of the curved parts of arms p on the rocking shaft r.
 The plates or sheets are transferred from the tin pot l to
 the soaking pot l¹ by the guide rolls s, stationary guides t,
 and guide rolls s¹. The plates or sheets are guided and
 carried through the soaking pot l¹ and grease pot l² by
 guides u, u¹, u², and pairs of rolls v, v¹, v², and are trans-
 ferred by a top guide w and additional pair of rolls x to
 the branning machine y, and by the appliances of the
 branning machine, which differ in no essential respect from
 well-known branning machines, to a set of cleaning or
 dusting rolls z. The cleaning or dusting rolls z deliver the
 series of plates or sheets on to an endless travelling con-
 veyor 4 having guards or fences 5 adjacent the edges of the
 same to prevent the plates or sheets from passing over the
 said edges. At that end of the conveyor 4 to which the
 plates or sheets are carried by the travelling motion of the
 same a second series of cleaning or dusting rolls 6 is pre-
 ferably arranged, by the action of which a polishing or
 cleaning of the plates or sheets in a direction at right angles
 to that effected by the cleaning or dusting rolls z is
 obtained, the plates or sheets being thereby more efficiently
 dusted or cleaned than is usual, and further being collected
 into a single pile ready for transit, storage, or other oper-
 ation. (Ten claims.)

109862. *Improvements in Mine Signalling Apparatus.*
 R. W. Hall, Fairlawn, Leeholme, Bishop Auckland; and
 D. Pearce, 3, Sandringham-terrace, Leeholme, Bishop
 Auckland, Durham.—The object of this invention is to
 prevent complication of signals when men are to ascend or
 descend the pit; it will be hereinafter more particularly
 described for such use, but may be adapted for other
 analogous purposes. In the drawings, fig. 1 is an eleva-
 tion of a partly-obscured dial with fingered pointer to be
 hereinafter further described; fig. 2 is an elevation of
 another partly-obscured dial and fingered pointer; fig. 3 is
 a side elevation of the working parts behind the fingered
 dials shown in figs. 1 and 2, looking in the direction of the
 arrow on fig. 4; fig. 4 is a front elevation of the working
 parts behind the dials illustrated on figs. 1 and 2; and
 fig. 5 is an elevation of a dial with pointer and electric
 contacts in connection therewith to be hereinafter further
 described. In conjunction with a bell, not shown upon the
 drawings, a ratchet a is moved one step for each stroke of
 said bell by the pawl b. This movement causes the rota-
 tion, step by step, of a spindle c, upon which the ratchet
 is mounted; two of such complete devices are employed
 in the engine room, each operating a pointer over a speci-
 ally prepared dial, shown on figs. 1 and 2, having the
 portions of the faces horizontally scored thereon blackened
 or otherwise obscured, and suitably lettered and/or
 marked. Each spindle has an entirely independent
 motion, one being operated by the banksman, and the
 other by the onsetter for use only when winding men. Each
 pointer is cut and shaped in a special manner to become
 visible at desired positions in front of the suitably marked
 indicating dial which contains the spindle in action. The
 spindle c inside the one indicating dial d is operated by

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

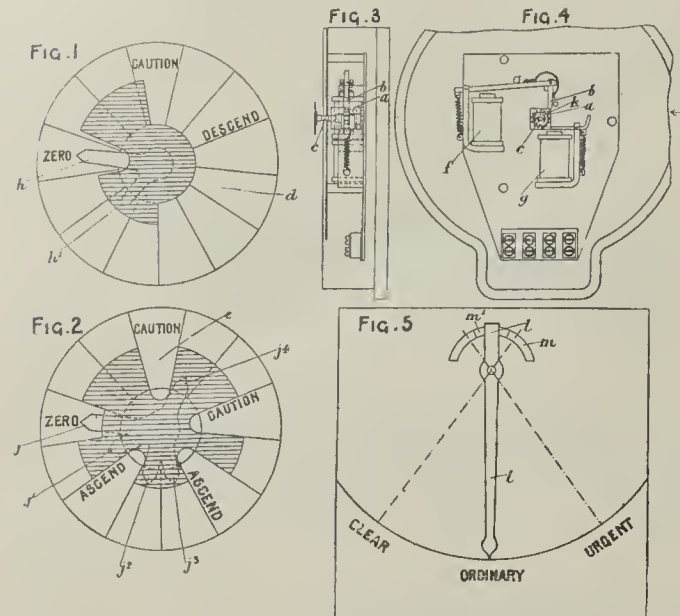
("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

depend upon the closing of the switch at the pit top by the man, and the spindle inside the other indicating the position of the cage by the current sent by the closing of the switch at the pit bottom, or at any intermediate level, by the man. Each spindle and pointer associated with the cage is duly referred to previously is prevented from returning to its normal position until the right click, provided for the purpose, is released by the core of another solenoid *g* by any suitable electrical or mechanical releasing device. The pointer of the dial *d* is in the form of two fingers *h*, *h'*; the other pointer operating over the dial *e* is operated by the onsetter either at the shaft bottom or



at any one of the intermediate levels, and is in the form of five fingers, *j*, *j'*, *j''*, *j'''*, *j''''*. When the banksman wishes to indicate that men are about to descend, he rings three through the solenoid *f* which, through the medium of the ratchet and pawl, causes one of the fingers *h*, *h'*, of the pointers on the spindle of the indication dial *d* to show "caution"; the onsetter repeats this signal of three rings on the dial *e* in the winding engine room, and so causes one of the fingers *j* of the pointer to also show "caution." Should the onsetter, having received an indication that men are about to descend, wish to signal that other men are about to ascend, then, in addition to acknowledging the receipt of the banksman's signal, he gives by means of his ringing key other three bell strokes, and so causes the fingers *j* and *j'* of the pointer of the indication dial *e* in the engine room to each show at "caution." When the men are in the cage and ready to descend, the banksman signals two on the indication dial *d* in the engine room, and the upper finger *h* of the pointer then shows "descend" and the other "caution." The onsetter at the shaft bottom, or at that particular intermediate level, who has been given control of the cage, signals one to the banksman and on the indication dial *e* in the engine room, and one finger shows at "caution" and another at "ascend," and the other fingers are out of sight. All compulsory signals (other than those statutory signals specially marked in the mining Regulations for winding men, and to which this invention relates) are shown on other indication dials also placed in the winding engine room in the usual way. On these latter indication dials words are not employed, but figures are used in any well-known manner. There is one such indication dial in the engine house for the banksman and also one for the onsetters, to be operated from each or any level; there is only one pointer on each spindle inside each of these indication dials; each spindle when in action is moved and held in the same manner by similar means as those described in connection with the two indication dials placed in the winding engine-room to be used only for winding men. The pointers inside these two latter indication dials, to which the invention relates, remain at the word "caution" until the cage has made a short portion of a journey through the shaft when they and any other signals are wiped off by the releasing device before referred to. (Four claims.)

The Coppée Company (Great Britain) Limited, King's House, Kingsway, London, W.C.2, recently received an order from Messrs. North's Navigation Collieries (1889) Limited for a battery of 50 regenerative ovens with by-product plant of sufficient size to treat gases from 100 ovens. The order also includes for a coal handling plant and storage plant, and it is in addition to the 160 ovens and two washeries erected by the Coppée Company which have been in operation at Messrs. North's collieries for some years. Orders have also been received from the Dundee Coal Company, of Natal, to proceed with the plans for 30 by-product ovens and a 40 tons per hour washery, and the plant will be erected as soon as conditions are more normal. The Coppée Company have at the present time orders for over 400 ovens to be built and five washeries, together with several benzol plants and tar distillation plants.

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- (Aktieselskab Rogforbrænderen). Fire bridge with automatic regulation of supply of secondary air. (17170)
Aldridge, J. G. W. Charging machines for gas retorts, etc. (17189)
Alldays and Onions Pneumatic Engineering Company. Gaseous or liquid fuel burners. (17139)
Alley, S. E. Steam engines. (17354)
Bagley, S. A., and Bransom, T. Gas producer and purifier. (17264)
Bates, W. R. Revolving machine with internal conveyor for drying, carbonising, purifying, screening, etc. (17064)
Booth, H. S. Rotary engines. (17212)
British-Thomson Houston Company. Dynamo electric machines. (17173)
British Westinghouse Electric and Manufacturing Company. Electrical control systems. (17218)
Brookfield, D. Smelting furnaces, etc. (17367)
Brotherhood Limited, P., and Bryant, C. W. Pumps. (17363)
Burgoyne, E. T. Haulage clips. (16984)
Buxton, W. Internal combustion engines. (17199)
Cape, H. L. Dynamo electric machine. (17224)
Carey, R. F. Engines, motors, pumps, etc. (17168)
Cumisky, W. J. Internal combustion engines. (17284)
Derihon, E. Internal combustion engines. (16990)
Dingley, G. Process of manufacturing railway couplings. (17291)
East, W. Steam motors and the generation of steam. (17235)
Firth, H. Internal combustion engines. (17199)
Gaunt, J. Smelting furnaces, etc. (17367)
Glover, S. Vertical retorts for continuous carbonisation of coal, etc. (17103)
Grimes, S. A. J. Transporters, trucks, etc. (17345)
Hawkes, C. J., and Newman, A. W. Internal combustion engines. (17180)
Head, Wrightson and Company, and Wrightson, T. G. Blast furnace stoves. (17368)
Helps, G. Manufacture and treatment of coal gas. (17341)
Hemingway, H. W. Desulphurisation of gases, etc., containing sulphuretted hydrogen. (17165)
Hiller, H. K. Distillation of coal, etc., for manufacture of motor gas and utilisation of residual products. (17054)
Jeffares, W. Two-stroke internal combustion engines. (17263)
Lancia and Company. Internal combustion engines. (17319)
Limeburn, C. G., and Rushmores Limited. Compressed air and other fluid pressure engines. (17318)
Lucas, H. Dynamo electric machine. (17224)
Macropoulos, A. D. (Macropoulos, C. D.). Rotary rectifier of alternating current. (17277)
Merton, A. M. M. (Merton, T. D.), and Rowley, F. Method of roasting in mechanically rabbled roasting furnaces. (17233)
Nicholson, A. Gaseous or liquid fuel burners. (17139)
Okassa, R. F. E. Steam boilers. (17026)
Pease, E. L. Heat treatment of coal, etc., for production of oils, combustible gases, ammonia, etc. (17093)
Pollock, A. A. Dynamo electric machines. (17173)
Popper, E. Fuel. (17083)
Pradeau, C. W. Internal combustion engines. (17006)
Remington, A. A. Multi-cylinder internal combustion engines. (17360)
Renfree, T. R. Oil cooled electrical transformers. (17019)
Ringquist, J. M. Blast furnace stoves. (17368)
Sellers, J. C. Manufacture and treatment of steel. (17243)
Smith, F. G. Gas producer, etc., fire grates. (17229)
(Soc. Anon. Italiana G. Ansaldo and Company). Elevator for handling coal, grain, etc., in bulk. (17025)
Soc. J. Munier et Cie. Hoists for charging blast furnaces, etc. (17240)
Soc. J. Munier et Cie. Elevators for blast furnaces, kilns, etc. (17299)
Soc. J. Munier et Cie. Blast furnace skips. (17370)
Sutcliffe, E. R. Furnaces. (17372)
Tearsley, R. A. Internal combustion engines. (17228)
Turner, C. Processes of fractional and of destructive distillation. (17298)
Tylor and Sons, J. Smelting furnaces, etc. (17367)
Usines G. Derihon Soc. Anon. Internal combustion engines. (16990)
Voorwinde, W. Safety hook for lifting devices. (17288)
Wellman, Seaver and Head. Gas producer, etc., firegrates. (17229)
West, J., and Wild, W. Vertical retorts for continuous carbonisation of coal, etc. (17103)
Wooler, W. Mechanism for cutting mine cables. (17131)

Complete Specifications Accepted.

(To be published on December 13.)

[NOTE.—The number following the application is that which the specification will finally bear.]

1916.
11564. Turner, A. Electric metallurgical furnaces. (111120)
16203. St. Stephens, R. de H., and Climax Rock Drill and Engineering Works. Valve gear for percussion rock drills, tools, and other reciprocating engines. (111140)
16296. Baumann, K. Steam turbines. (111153)
16536. Oldham, O. Miners' electric safety lamps. (111165)
17393. Forster, J. P. Electrically operated signal indicators for use in mine haulage, winding, and the like operations. (111184)

1917.

291. Saunders, S. Fire lighters, and means for starting same. (111193)
1463. Pritchard, D. Automatic stop block for the safe working of trams or tubs in mines or quarries. (111205)
1661. Hearson, C. E. Electric furnaces. (111207)
2380. Bamford, W. Apparatus for the removal of dust and ash from boiler flues and the like. (111215)
4252. Evans, J. L. Closing end or door for colliery trams or corves. (111223)
5733. Gill, H. A. (General Briquetting Company). Methods of and apparatus for exerting pressures or producing striking impulses. (111238)
7989. Falcke, E. Manufacture of fire lighters. (111248)
8051. Steurs, J. B. Burners for heavy oils for use in oil furnaces. (111249)
8806. Growder, J. Swivel for use in well drilling. (111253)
9402. Koppers, H. Doors for coke ovens and the like. (108306)
9957. Mohn, T., and National Gas Engine Company. Gas engine driven air compressors. (111260)
11226. British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Electric motor control systems. (111265)
12682. Westinghouse Electric and Manufacturing Company. Underfeed stokers. (109803)
14232. Compagnie Générale d'Electricité. Steam turbines. (111273)

Complete Specification Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
12433. Smith, C. H. Briquettes, and method of making the same. (111285)

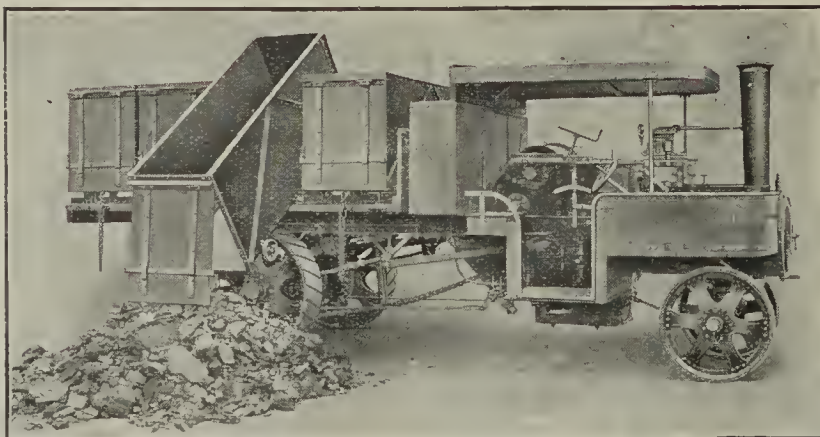
PUBLICATIONS RECEIVED.

"South Wales and Monmouthshire School of Mines—Report upon the Work of Session 1916-1917"; "Monthly Bulletin of the Canadian Mining Institute" (No. 67), November 1917; "Transactions of the Institution of Mining Engineers" (Vol. 54, Part 2), November 1917 (London: Published at the offices of the institution, Albany-building, 19, Victoria-street, Westminster, S.W. 1), price 6s.; "Proceedings of the South Wales Institute of Engineers" (Vol. 33, No. 2), issued November 26, 1917, edited by the secretary (published by the institute, Park-place, Cardiff), price 5s.; "The Mining Congress Journal" (Vol. 3, No. 11), November 1917, 20c. per copy; "Russia—Britain's Great Opportunity!" (Vol. 2, No. 1), November 1917, price 6d. net; "Bulletin of the American Institute of Engineers" (No. 131), November 1917; "The Iowa Engineer" (Vol. 18, No. 1), October 1917; United States Bureau of Mines—Department of the Interior (Bulletin 138), "Coking of Illinois Coals," by F. K. Oritz; "Northern Coal, Iron and Steel Companies, showing the capital of each company, last balance sheets, profits and dividends over a number of years, etc." (published by the Business Statistics Company Limited, Baltic House, Cardiff).

Peruvian Coal Fields.—The Peruvian Minister of Fomento has appointed two committees for the purpose of reporting on the practicability of developing with local means the rich coal fields that are known to exist in Central and Northern Peru. Enrique Duenas, chairman of the first committee, is to make an exhaustive study of the soft coal deposits at Oyón, in the vicinity of the mines of the Cerro de Pasco Copper Company. It has been proposed to extend the North-Western Railway of Peru from its present terminus at Sayan to this field. Carlos Portella (chairman of the second committee) is to report on the anthracite field of the Santa Valley. The Santa Valley terminates at the port of Chimbote, and the present railway extends to within a few kilometres of the coal field it is now proposed to develop. The high prices demanded for fuel of all kinds, and especially for steam coal in Peru, has aroused considerable local interest in the coal deposits, which for a great many years have been known to exist.

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COAL AND SHIPPING.

By F. J. WARDEN-STEVENS,
M.I.M.E., A.M.I.E.E., &c.

XXIV.—Coal Cargo Vessels.

A foreword to this number of the series will perhaps be advisable on account of the abnormal conditions existing, and the effect of such conditions on coal shipping. In former days, a craft with little or no reputation was accepted as suitable for a coal cargo, and losses at sea by foundering or fire were frequently recorded; whilst little, if any, consideration was given to facilities for loading and discharge, so that the condition of the coal on delivery was frequently much deteriorated. With the development of oversea commerce, coal has become a useful export for a more valuable return cargo, and instead of an outward

increased, and will aid the clearance of vessels, at the same time reducing to some extent the congestion in the docks and on the main quays, although, of course, some extra handling may be entailed. That these questions of increasing the rate of handling cargoes and the despatch of vessels, as well as the reduction of congestion at ports, are really of national importance, particularly now and in view of after war conditions, will be evident, and also that they have a bearing on our subject. It has already been mentioned that coal cargoes are mostly carried by vessels constructed for carrying general cargoes, and not con-

nary winches and tackle, the coal being loaded into skips or baskets by manual labour from shore at the port. If discharging can be effected alongside a quay, shore cranes can be requisitioned for more rapid handling, but at many ports coal is discharged at anchorage, or, at all events, at an isolated position where the port equipment may not be available, unless the coal trade is extensive; or yet, again, coal may be discharged at private wharves.

Improved Methods of Discharging.

It is not the object of this article to refer to shore equipment for discharging coal cargoes, but to indicate more particularly methods of unloading by the vessel's own gear, although mention will be made of auxiliary means for discharging afloat. When we have to consider improved methods of discharging an average "tramp" cargo steamer, to accelerate despatch, one of the first steps is to provide more suitable winches than are frequently available; and these should preferably be of the double barrel and higher speed type, which enables the loads to be handled either in self-discharging skips or grabs, and facilitates the outward travel of the loads from the hatchway to the vessel's side. Transporter beams provide a means of more rapid working with skips by straight-line traverse than with swinging derricks. Such improvements are not confined to the handling of coal cargoes, for a vessel with such equipment can still handle general cargoes, and grabs can be utilised to some extent for bulk cargo.

As regards auxiliary means to facilitate discharge afloat, perhaps the simplest equipment is a winch barge—that is, a barge equipped with several winches. These barges can be brought alongside the vessel, the winches being used in addition to those of the ship, such equipment being also suitable for bunkering. For the handling of small coal, a portable elevator is another equipment which can be provided at the port of discharge, or it can be carried by the vessel and used as an auxiliary to the ship's winches. These portable elevators can be rigged over the hatchways, and delivery of the coal outboard effected through chutes. Equipment of this nature is also applicable for bunkering, though appliances of this kind are hardly suitable for a cargo having a considerable portion of large coal. As regards the method of operation, the elevator should preferably be electrically operated, and have a self-contained motor at its head, power being obtained from the vessel's electrical plant or from a barge electrical plant at the port. If the trade of the port justifies the outlay, floating equipment can, of course, be provided in the form of floating cranes to work with grabs.

Shovel System of Discharging Colliers.

Yet another method of making an average "tramp" steamer capable of rapid discharge of a coal cargo with her own gear is by the adoption of the mechanical shovel, which is a most ingenious system and almost

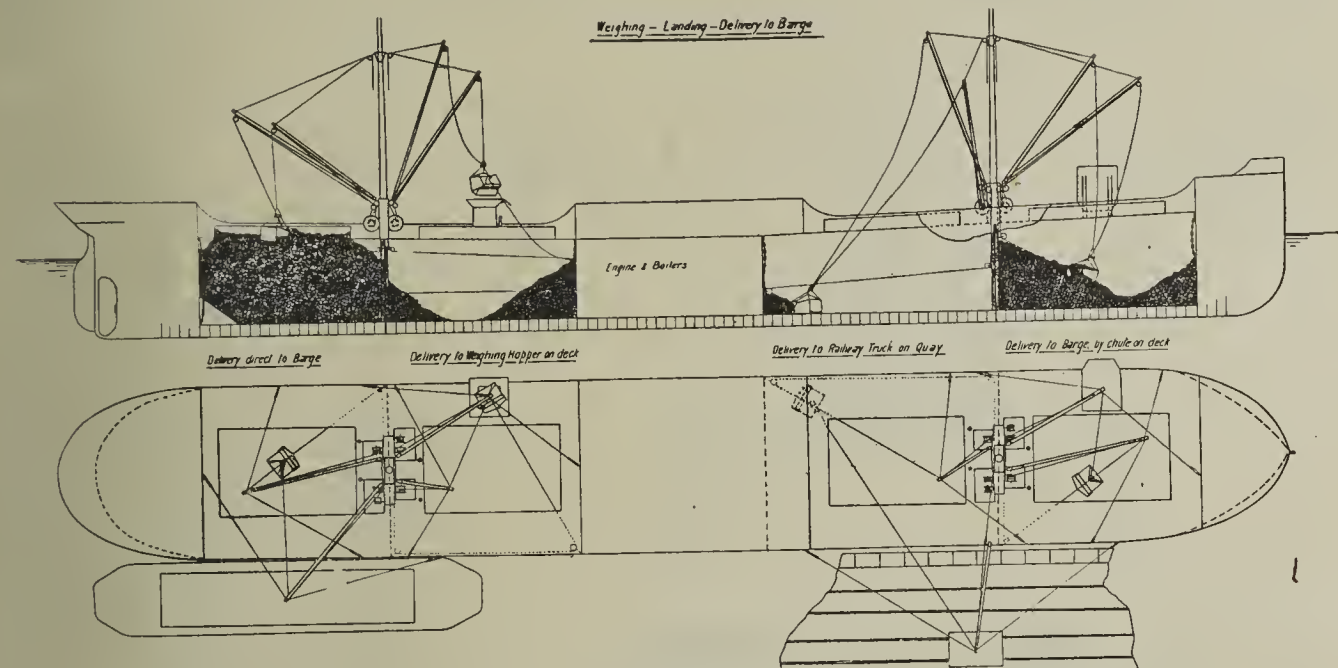


FIG. 1.—MECHANICAL SHOVEL EQUIPMENT FOR STEAMER, DISCHARGING COAL.

voyage being made in ballast, coal is frequently carried at a low freight, thus taking the place of ballast. This has assisted in developing coal exports from the United Kingdom, and has also been the means of increasing imports from overseas at a lower freight rate than would otherwise have been obtainable; in fact, coal exports have been increased by aiding the development of general imports. For this reason, coal cargoes have been carried by all sorts and conditions of vessels, and the bulk of the coal exports is dealt with by the general cargo steamers, which, in pre-war days, represented over one-half of the total British registered tonnage, whilst coal made up about 75 per cent. of the total tonnage of exports.

The calamities of war have brought about shortage of tonnage, high freights, diverted cargoes, restricted exports, etc., so that to refer to discrimination in the chartering of a steamer for a coal cargo seems out of place, and doubtless a considerable period must elapse after the cessation of hostilities before conditions approach the pre-war normal state again. In view of the enormous demands for cargo space, the scarcity, and therefore value, of tonnage must make anything in the nature of a selection of the fittest altogether out of the question. It will be rather a matter of appreciating the opportunity to take what can be obtained; whilst coal cannot take the place of ballast, at a low freight, but must pay average cargo rates, there being enough cargoes available in all directions to remove any necessity for ballast.

Clearance at Ports.

Before proceeding to consider advantageous features in vessels for carrying coal cargoes, it will be opportune to refer to the despatch of vessels, which is greatly affected by the handling of the cargo. It will be evident that shortage of tonnage means necessity of increasing the speed of loading and discharge; in other words, to reduce the time lost from entering to clearing at a port—the "turning round" period. Not only does this affect the ship owner, but, from the dock owner's point of view, increase of cargo to be handled means congestion, with consequent confusion and delays. This leads to the necessity for devising methods and facilities for the handling of cargo with greater despatch, and under conditions which do not permit of immediately obtaining extensive equipment or of increasing the dock area or length of quayside; so that other means obtainable with less difficulty and delay must be considered.

At some ports the provision of temporary, or perhaps permanent, jetties and stagings, with storage grounds and sheds alongside, would assist in relieving the demands on the existing quayside accommodation; and in the case of ample waterways, loading and discharging at anchorage from and to lighters can be

finned to a definite route, in other words, by the usual "tramp" steamer. There are, of course, some vessels employed particularly in the coal trade, but even those vessels take other cargoes one way, unless confined to one route; a short one, in which the time saved in steaming one way in ballast more than counter-balances the value of an outward, or return, cargo. In the case of vessels engaged particularly in the coal trade, they are, of course, generally selected, or should be, because of possessing advantages for handling the cargo—that is, with holds clear of

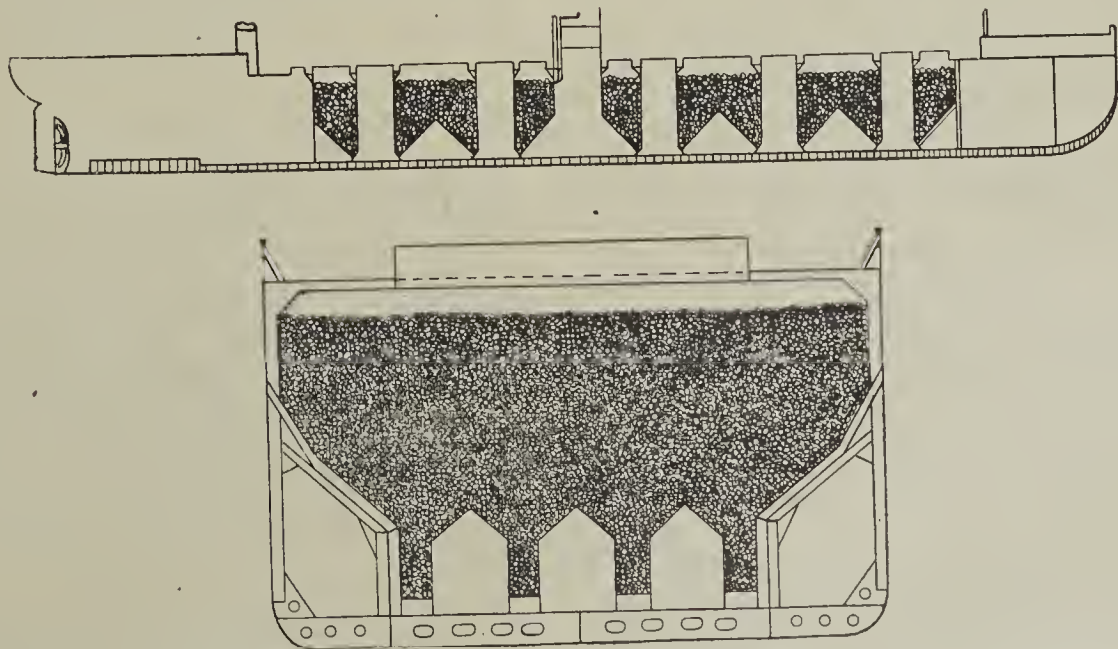


FIG. 2.—SPECIALLY-CONSTRUCTED VESSEL FOR COAL AND ORE, DISCHARGED BY SKIPS.

obstruction, and with large hatchways; or they are altered, as far as possible, to provide these facilities, which are not disadvantageous, if and when the vessel is required for general cargo. On the other hand, a vessel built for general cargo may be at a disadvantage in these respects for coal cargoes, and have divided or obstructed holds and small hatchways.

When we come to consider vessels specially designed for coal cargoes, provided with self-trimming holds, and perhaps mechanical equipment only suitable for coal, or, at all events, bulk cargoes, such vessels are generally only practicable for short voyages; otherwise, on account of infrequent use, the capital charges attendant on special equipment would not be justified. The method of discharging coal from the average "tramp" steamer will be effected by the vessel's ordi-

eliminates the necessity of trimmers in the holds. This shovel fills itself by horizontal motion, since it can be dragged along the hold underneath the deck, whereas a grab has a range of action limited to the vicinity of the hatchway, the coal having to be trimmed towards it.

The application of this shovel system is quite a simple matter. Beyond two derricks—one at each end of the hatch and the other at the position of the shovel—and two winches for the operation of each shovel, all that is necessary is to fit short chain bights at the corners of the holds, for the purpose of attaching a block for guiding the drag rope. This wire rope is attached to the front part of the shovel, which is hinged, and automatically tilts downwards as it is filled by being dragged along the coal towards the

block. When filled, and the shovel is about to be tilted, the front automatically tilts upwards, thus tilting the coal in the shovel. The tilting is effected by the arrangement of short lifting chains attached to the shovel, one connected to the front part and two attached to the back corners of the hinged bottom discharge door—all three being connected together, at their further ends, for attaching to the lifting rope of the winch. Three other short chains are also attached to the shovel, one being connected to the front part and the other two to levers at the back, whilst the connecting rope is led over the outboard derrick to the other drum of a double barrel winch. Thus, when the shovel is lifted and travelled to the position of delivery, the lifting rope is released, and thereby the discharge door is allowed to fall open, but the shovel is held in position by the second or outboard rope; and by means of the levers the door is automatically locked when the shovel is being filled, both ropes of the double barrel winch being slackened, and the second winch coming into operation for dragging. The back of the shovel is fitted with a roller to avoid damage to the bottom of the hold at the end of discharge when the shovel is drawn back towards the hatchway.

Small hatchways and 'tween decks are not obstacles to the working of this system, and it could be operated by the vessel's crew, if necessary, without the aid of shore assistance at a port, in the event of labour opposition arising there, on account of the great reduction of the number of men necessary to discharge the cargo by this system. It may, however, be pointed out that a vessel's charter party usually provides for the receivers to discharge the cargo. These shovels have been proved to last for five or six years, the cost of the wire rope renewals to amount to about $\frac{1}{4}$ d. per ton, and the cost of labour about $1\frac{1}{2}$ d. per ton. A vessel fitted with eight shovels can discharge a cargo of 4,000 tons in about 15 hours, whilst labour is reduced to about two men to each shovel, in addition to the winchmen. Fig. 1 shows the application of the system for delivery either to barge or quay. Thus, an average "tramp" steamer can be provided for the more expeditious handling of coal or other bulk cargoes, and without the aid of port equipment; also without cargo space being occupied by equipment and without hindrance to the handling of general cargo. In fact, it affords improvement in that direction as well, the winches providing for quicker handling and for outboard travel with stationary instead of swinging derricks.

A special winch of this description for general cargo handling may be described as follows: The shaft of the winch is fitted with two clutches, which are operated by a single lever, one position of this lever serving for the lifting or lowering of the loads, whilst the other position provides for the horizontal travel between the derricks. There are two drums for the respective motions, the ropes from which are led to the derricks, and are then shackled, at their other end, to one hook. The winch allows for the slack of the outboard derrick rope being taken in when cargo is being lifted, and at the same speed. When the load is being moved horizontally, the lifting rope is paid out at the same time as the outboard rope is taken in; and when the load is being lowered, both ropes are paid out at equal speeds. The ropes are led from the underside of one drum, and from the upper side of the other; and, therefore, when lifting, and the slack is taken in, the drums are revolved in opposite directions, by means of a special reversing gear, which enables one drum to be driven by the other. For this purpose, an endless rope is passed over two pulleys, and acts automatically, by friction; and only a slight tension of this rope is necessary, there being no load on the outboard rope. When the winch is reversed by the movement of the lever, so as to bring the two clutches into gear, both drums revolve in the same direction for moving the load horizontally. This type of winch is as easily worked as an ordinary one, there being only the steam stop valve and the lever to attend to. The pinions and clutches are constructed of cast steel, the clutches work on square shafts, and the gear wheels have double helical teeth. Another construction of this type of winch, with only one drum, is designed for use with one swinging derrick instead of two fixed ones.

Specially Designed Colliers.

We may now proceed to consider specially designed and equipped coal carrying vessels (colliers) for working solely in the coal trade. Such vessels have, as essential features, large holds free of obstructions and with almost continuous hatchways, and frequently the propelling machinery is situated aft. Unless provided with the special discharging equipment referred to later, they have long derricks or steel gantries suitable for rigging transporter beams or working with grabs.

One of the first vessels specially designed for coal cargoes was constructed as far back as 1852, and had a carrying capacity of about 650 tons at a speed of about eight knots, the machinery being situated aft so as to allow of a free hold, which was worked from a mast, at each end, rigged with derricks. One comparative recent type of collier, carrying about 6,000 tons, is provided with three hatchways, two measuring 26 ft. square and one having a length of 72 ft. with a breadth of 26 ft. This vessel has a length of 320 ft., a beam of 49 ft., and a depth of 24 ft. The equipment includes electrically-operated cranes working with grabs of two tons capacity. Another modern collier is equipped with eight transporter beams.

The desirability of providing large holds without obstructions, and of having longitudinal bulkheads has led to alterations being made to allow of longitudinal, instead of transverse, bulkheads for the hull, providing at the same time with great strength. The Isherwood construction has met with great favour in this direction, and examples of colliers constructed to that system are numerous, including the large American "Lord Strathcona" and the Italian vessel referred to later. With this construction deeper beams between the hatchways

can take the place of side pillars in the holds, the hatchways being strengthened by girder sides (coamings) and supported by beams instead of pillars. The cargo capacity of the vessel is considerably increased, not only without increase of draught, but also without additional cost of construction, whilst greater strength is obtained. An objection to longitudinal framing for a vessel to carry coal and other bulk cargoes has been raised, to the effect that lodgments exist to a greater extent than with a transverse framing, but this has been found quite unimportant. During the last few years no less than 25 colliers have been constructed with Isherwood framing for the hull; and these vessels represent an aggregate coal cargo carrying capacity of 255,000 tons, some 14 of them carrying over 10,000 tons each. The s.s. "Rose Castle," and her sister ship, the "Lord Strathcona" (two of the largest vessels ever built for coal or ore cargoes), two special colliers for the Panama Canal service, as well as several United States naval colliers, are also constructed on this system.

Trolley and Skip Hoist Equipment.

The classes of special equipment applied to colliers may be divided briefly into the conveyor, the trolley or skip hoist, and the grab mast transfer; and an example of each type of collier equipment may be indicated.

The latest example of what may be termed the trolley hoist collier equipment is that of a large Italian vessel which has been designed particularly for bulk cargoes. This vessel has a cargo capacity of about 12,400 tons, carried in six holds, and is equipped with 20 hoists. The holds are clear of pillars or other obstructions, and there are no 'tween decks. The bottoms of the holds are sloped for self-trimming—the vessel having eight inclines athwartships (which provide two longitudinal tunnels for the discharge of

particularly for the carrying of iron ore, but equally applicable for coal cargoes. (Fig. 2.) The floors of the holds are sloped fore and aft and also athwartships, and between each pair of holds there is a shaft which provides for the travel of a skip, the lower part of the bulkhead being recessed to allow the skip to be set under the discharge chute from the inclined floor of the hold by which it is filled. The skips, which have a capacity of two tons (ore), are handled by deck cranes, the skip being tilted and discharged by hauling in an attached cable. This vessel has an ore cargo capacity of about 8,000 tons, whilst another similar vessel carries 11,000 tons. The cargo of the former can be discharged with a labour gang of 15 men in 47 hours.

Conveyor Equipment.

An example of a conveyor-equipped collier is afforded by a vessel which is 314 ft. in length, 44 ft. in breadth, and 24 ft. deep, and carries a cargo of about 3,700 tons, with a loaded draught of about 19 ft. The hold is made self-trimming by means of sloping floors, which provide tunnels for conveyors extending fore and aft, delivery of the coal on to the conveyors being effected by sliding doors along the sloping floors of the hold. These main conveyors incline aft, and deliver to other conveyors inclined in the opposite direction—forward—discharge being effected therefrom by adjustable chutes. The hold is provided with large, almost continuous, hatchways, extending to within about 4 ft. of the sides of the vessel, and thus allowing of rapid loading without trimming. The conveyors are travelled at a speed of about 80 ft. per minute by means of independent compound engines, and are fed by opening only two of the doors at a time. The rate of discharge with this equipment is about 500 tons per hour, but with small coal the delivery can be considerably increased; whilst, on account of the low labour item, the working cost amounts to only about $\frac{1}{4}$ d. per ton, only eight men being necessary.

The type of conveyor used with this equipment is of special construction—wire ropes fitted with steel blocks having axles and wheels, which travel on angle guides, the axles carrying steel trays. Any overloading of the conveyor is prevented by opening only one door of the hold for discharge to each conveyor at a time. As to the classes of coal handled with this system, trials have shown that large Welsh steam coal can be dealt with at the rate of 200 tons per hour by each conveyor, or 400 tons discharged; whilst double that delivery can be effected with Durham unscreened coal. To avoid stoppages in the case of large Welsh coal, an additional slide door is fitted adjoining the regular discharge door. The equipment is easily accessible, and is kept well under control by means of signals operated at each of the discharge doors, so that the officer in charge on the bridge can regulate the delivery, the weight of which is checked automatically.

Grab Mast Transfer.

Some of the large colliers of American construction are specially equipped for handling their cargoes with grabs, and the holds are constructed with self-trimming floors, and have extra large hatchways, the dimensions of which are about 32 ft. by 12 ft. 6 in. The handling gear consists of steel trestle frames, which are braced together in pairs, and these support booms and cable tracks for the traverse of the grab trolleys. In addition to the derrick booms, of which there are 12

on each side of the vessel, supported by six trestle frames, there is a fore-and-aft girder track for a grab trolley, which serves to transfer coal from the hold to the main bunker situated at the after part of the vessel.

The grab trolleys consist of a pair of upper sheaves, which travel on the cable, and four lower sheaves to lead the operating cables for opening, closing, and holding the grab. The cable tracks provide for an outboard travel, 20 ft. from the side of the vessel on each side, and allow of 20 ft. clearance of the grab above the deck. The grabs have a capacity of one ton, and are each operated by two double cylinder steam winches, one being for traversing, and the other having two drums, for hoisting, opening, and closing respectively. Each grab can discharge 100 tons of coal per hour, or a total of 1,200 tons an hour can be handled. The arrangement of the transfer tackle is illustrated in fig. 3. The operation of the grab is effected from a platform supported in the column frames at a height of about 25 ft. above the deck, the levers being connected with the winch valves and clutches by means of shafts and bell cranks. The cargo is carried amidships, where there is only one deck, although fore and aft there are four and five decks respectively.

There are 13 holds, but four are used for oil, and four of the remainder can be utilised for either coal or oil, as required; and, in addition, there are three bunkers with a combined capacity of 2,250 tons. The total cargo carrying capacity of this collier is about 11,400 tons of coal and 405,600 gals. of oil, or 9,850 tons of coal and 966,250 gals. of oil. It has an overall length of 540 ft., is 65 ft. in breadth, and has a loaded draught of 27 ft. The propelling machinery is unique, comprising steam turbine generators operating electric motors which drive the shafts of two screw

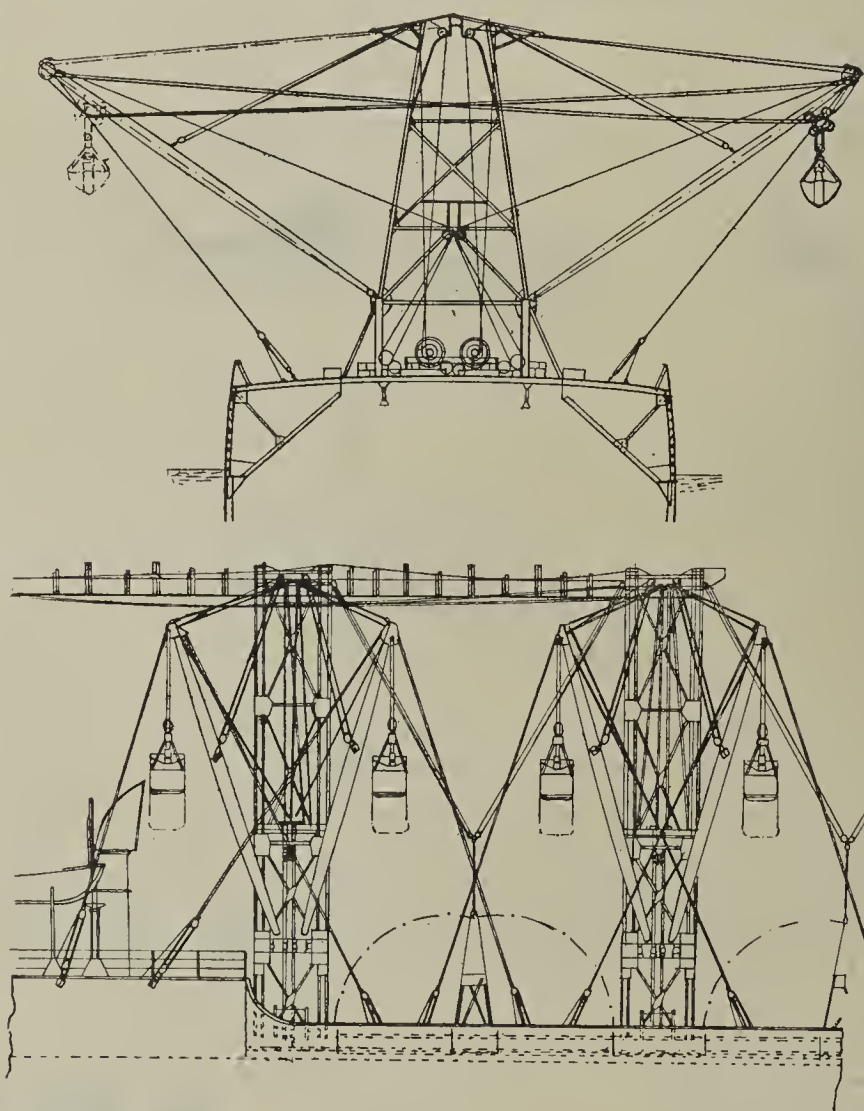


FIG. 3.—GRAB-MAST TRANSFER SYSTEM OF DISCHARGING COLLIER.

the coal cargo), longitudinal tanks for fuel oil on the outsides, and, at the centre, the propeller shaft tunnel with a tank on both sides for oil cargo.

Along each of the two first-named tunnels are two narrow-gauge rail tracks for the trolleys, which are loaded from gate valves fitted along the sloping walls of the tunnel forming the bottom of the holds. These trolleys are travelled along the tunnels to vertical shafts of rectangular section, there being four shafts to each of the four main holds and two each for both the fore and aft holds. The trolleys are hoisted up these shafts to the deck, and thence, up a steel pillar frame, on a platform which can be stopped at the required elevation and the trolley tipped, the coal being discharged into an adjustable chute and delivered.

These 20 hoists are each provided with a steam winch, and the equipment is capable of discharging the whole cargo in about 48 hours. In addition to the coal cargo capacity, there is bunker accommodation for about 1,000 tons of coal, and oil to the extent of 4,000 tons can be carried in the double-bottom tanks. The vessel has a speed of about 10 knots when fully loaded, with a power consumption of about 3,000 indicated horse-power, the bunker consumption being about 50 tons per day. The measurements of the vessel over all are about 512 ft. in length, 66 ft. in breadth, and 34 ft. in depth, with a draught of 26 ft. when fully loaded. The machinery consists of a quadruple expansion engine of 4,000 indicated horse-power, two double- and two single-ended boilers which provide steam under forced draught at a pressure of 200 lb.

A somewhat similar design of equipment for self-discharging, as applied to this vessel, has, it should be mentioned, been previously introduced for bunkering barges. An example of the skip system is that provided in some of the large ore carriers, designed

propellers, a speed of 14 knots being attained with 5,500 brake horse-power.

Coal Exports and Freights.

Reverting to the export of coal, the weight of coal cargoes in relation to total exports from the United Kingdom has already been mentioned, and it may be added that, in value, coal represents over 10 per cent. of the exported products; whilst the proportion of coal export to production is over one-third, about one-fifth of the exports comprising bunkers. Further statistics concerning the shipment of coal are of interest, although approximate figures and those under pre-war conditions will suffice. The proportion of coal cargoes shipped from the United Kingdom in relation to the world's total tonnage shipments of coal is about 75 per cent. Cargoes shipped from British possessions include about 4,000,000 tons per annum from Australia, about 1,500,000 tons from South Africa, approaching 1,000,000 tons from India, and over 250,000 tons from New Zealand. Of shipments from foreign countries, cargoes of German coal have exceeded 10,000,000 tons per annum, and those from the United States over 4,000,000 tons; whilst Japan is responsible for cargoes amounting to about 3,500,000 tons, and shipments from France and Belgium exceeded 1,000,000 tons per annum in each case. These figures serve to indicate the prominence of coal cargo shipments, and we may now turn to the destinations of these shipments in view of return cargoes and freights.

Shipments from the United Kingdom to France and Mediterranean ports comprise the largest total tonnage, with Baltic and North Sea ports next in importance, amounting together to something like seven-eighths of the total coal cargoes shipped; and these ports represent comparatively short-distance voyages. The only long-distance shipments of considerable tonnage are to South America, where return cargoes are generally available, and thus reduce freights, as already indicated. The effect of restricted coal exports from Wales in 1915 was to reduce the general imports considerably, as well as lower prices and stop some of the pits. Freight rates vary so frequently, according to the demands for tonnage, that only comparative and average figures can be of interest. This shows that distance is not the only consideration, the chief factor being the return cargoes available. For example, the distance to Lisbon is about 875 miles, and the average freight rate there for coal from Cardiff in 1913 was 7s.; whereas to Buenos Ayres, a distance of 6,150 miles, the average rate that year was only 12s. 10d.

The relatively low rate in the latter case was probably not only due, however, to the availability of a valuable return cargo, but partly to the cost of delays in entering and clearing, which is comparatively lower in the case of long-distance voyages, because the lost time bears a smaller proportion to the period taken for the round voyage. The two ports referred to are only taken as examples for a comparison of the freights for long and short distances. Short voyages, however, allow of a greater turnover for an equal working cost, and therefore long-distance freights are considerably advanced if there is a good demand for tonnage, both out and home, for a short run. Referring again to the two ports named above, in 1912 the average rate to Lisbon was only 3d. higher, whereas to Buenos Ayres it was 20s. 6d.—an increase of 7s. 8d. On the other hand, to Bombay, which (*via* Suez) is about the same distance as Buenos Ayres, the average freight rate was about the same in 1913 (12s. 9d.), notwithstanding the Suez Canal charges, and only 3d. higher in 1912; Singapore, an even greater distance—8,140 miles, also *via* the Suez Canal—called for about the same average freight in 1913 as Bombay, but a rise of nearly 3s. in 1912. It should be borne in mind that the labour item works out relatively low in the case of vessels to Far Eastern ports. These figures serve to indicate that there is no regularity in freight rates, since they depend chiefly on the supply of and demand for tonnage; but that coal exports have a very great effect is beyond question, and on this account, in view of increased oversea commerce generally, coal exports are more likely to increase than decrease in the near future.

In concluding this article, some mention should perhaps be made regarding the spontaneous ignition of coal cargoes, although the question has been dealt with generally in a previous number* of this series, and in connection with the land storage of coal. Ventilation of the holds of vessels when carrying coal cargoes has been generally condemned, although the desirability of an exit for accumulated gases is appreciated. Of the 103 vessels reported in 1911 with their cargo or bunker coal on fire, 24 cases were coal cargoes and the remainder were bunker coal. This indicates that the trouble of spontaneous ignition more frequently occurs with bunker than cargo coal, a circumstance attributed partly to the fact that, in the former case, the coal is subjected to frequent disturbance and access of air, as well as to higher temperature in some bunkers, due to the proximity of the boilers.

* *Colliery Guardian*, September 7, 1917, p. 443.

SOUTH WALES INSTITUTE OF ENGINEERS.

A general meeting of the South Wales Institute of Engineers took place at Cardiff on Friday, Nov. 30, Mr. HUGH BRAMWELL (the president) in the chair.

The following were elected to the institute:—Messrs. G. Garces, Coli Canca, Colombia, South America; L. G. Hill, Acocks Green, Birmingham; B. Jones, Blaina, Mon.; H. W. Widdowson, Penarth, Cardiff; and A. G. W. Wynne, Cardiff. Mr. D. J. Davies, Cilfynydd, was elected an associate.

Coal Briquetting, with Special Reference to Anthracite Coal.

Discussion was resumed on the paper treating of this subject* by Mr. J. A. YEADON (Leeds), the PRESIDENT remarking, in opening, that as South Wales was the largest briquette making district in the country, they ought to be able to speak authoritatively on the subject.

Mr. W. O'CONNOR said it was highly important that the question of double pressure as against single pressure should be threshed out. He found that nearly all briquettes produced on the Continent were made by double pressure, whereas in this country single pressure was the method more generally adopted. It was a point upon which the institute should try to get an authoritative pronouncement. With regard to the use of anthracite duff, only a small percentage of this was employed in the making of patent fuel, which was largely exported; and an investigation ought to be made with a view to the mixing of a preponderating amount of anthracite duff, so that the large quantities of this duff that were now wasted might be commercially utilised. It had been mentioned that patent fuel originated in the simple practice of burning small coal mixed with clay; and it was possible the solution of the problem of using anthracite duff would be found on those primitive lines. Experience showed that the percentage of clay could be materially varied without appreciably altering the results obtained in household fires. It seemed to him that much depended upon the viscosity or stickiness of the clay as to the proportion used. Another point was that the degree of fineness of the coal did not make any material difference; that the finest coal dust procurable burned almost equally as well as coarser coal particles. Ten or 20 per cent. of bituminous coal mixed with clay materially improved the fuel; and with only about 10 per cent. of clay and the rest bituminous coal, the residue kept the original shape of the block, and if used with a mechanical stoker could easily be got rid of. He agreed with Mr. Cleaves that a small mixture of bituminous coal with anthracite duff greatly improved the fuel, which might be used under steam boilers either in the form of briquettes or in the natural state. It was not generally known that in the year 1850 Mr. Budd patented, and, he believed, successfully employed at Ystalyfera, a coke made of a mixture of anthracite coal, bituminous coal, and a small proportion of pitch. He also recalled that, about the year 1870, plants were put up to mix some of the dry coals of the Aberdare district with gas tar, and this material was used in coke ovens most successfully for some years. In reference to the question of binder, a persistent effort was made at fuel works at the North Dock, Swansea, to substitute naphthalene for pitch; but he believed a pitch binder was subsequently adopted. Abroad, he had seen briquettes made of paper pulp waste mixed with imported anthracite duff, and they burned very well. He had also seen, at Swansea, briquettes made—as mentioned by Mr. Yeadon—without the addition of any agglomerate, the coal being heated up to a temperature of 500 or 600 degs. Fahr.; and he believed they were quite up to average quality. This process was deprecated in some quarters on the ground that many of the volatile constituents of the coal escaped; but he did not think this was a material disqualification.

Mr. EDGAR EVANS (Rhondda Laboratories) said an interesting feature of Mr. Yeadon's paper had reference to the making of briquettes of small coke "breeze" from coke ovens, and it would be valuable to be furnished with details, especially as to the repair costs of the grinding plant, because they were dealing with a very hard substance—much harder than gas works coke. Briquetting with brown coal without a binder had been extensively carried on in Germany, a pressure of about 10 tons to the square inch being employed. Experiments were being conducted with the briquetting of coke, and it was premature to say much at present; but if the vital question of cost could be overcome, there were great possibilities for this particular process. As far as the briquetting of anthracite was concerned, the first question was that of getting clean anthracite duff. This, of course, did not apply to breaker duff; but here there was greater difficulty than appeared to be the case. Some time ago a truck of breaker anthracite duff was tested at Llwynypia, and it proved a most remarkable product. It contained about five different coals and quite as many shales—all differing in specific gravity and ash content. Twenty-five per cent. of shale could be easily washed out, but it was impossible to deal with the rest in that way, whilst they could not wash out below 10 per cent. of ash. On investigation, it was found that the bulk of the substance of the duff itself consisted of bastard coal—hard, black, lustrous—containing 10 per cent. of fixed ash which could not be removed by the most efficient washing machine yet devised. With regard to a binder, anthracite could not be briquetted by pressure alone. The ideal binder was intimately connected with the chemistry of coal itself. The whole question of briquetting was a most important one. It had a direct bearing upon fuel economy, and in the interests of the coal industry and the nation it was of vital consequence that a satisfactory solution should be come to.

* *Colliery Guardian*, September 28, 1917, p. 594.

The discussion was continued by Mr. JOSEPH CANKSHAW, Mr. GEORGE HANN, and Mr. OLIVER SHUTTARD, the last-named remarking that the first problem to be solved in briquetting was to dry the coal in large quantities and at such a cost to make the matter a commercial success; and a vote of thanks was passed to Mr. Yeadon.

MAXIMUM PRICES FOR STEEL.

The Minister of Munitions has ordered, under the Defence of the Realm Regulations, that war material to which Regulation 30A applies shall include steel slabs, plates, strips, and pieces cut from plates, suitable for re-rolling, and all open annealed steel plates, sheets and black plate produced in steel mills.

The general permit of November 1, 1916, shall henceforth take effect as if the war material referred to in the Order were included in the Order of October 31, 1916, and the following material and prices were specified in the schedule to the said general permit. Provided always that condition 2 of the said general permit shall not apply to any sale or purchase of the war material referred to in the new Order under a contract in writing entered into prior to the date of this notice (November 30), and that the proviso contained in the said condition that such condition shall not apply to any sale by a manufacturer of finished steel rolled from steel purchased by him or to a sale or purchase of material the export of which has been sanctioned shall not apply to any sale or purchase of the war material referred to in the new Order. Provided also that nothing herein contained shall affect or prejudice the provisions of the Order of the Minister of Munitions as to control of steel supplies, dated November 20, 1916.

MAXIMUM PRICES ABOVE REFERRED TO FOR

	Per ton.
Steel—slabs, plates, strips and pieces cut from plates, suitable for re-rolling	£ s. d. 10 7 6
STEEL PLATES, SHEETS, AND BLACK PLATE, ALL OPEN ANNEALED, PRODUCED IN SHEET MILLS.	
	Per ton.
	£ s. d.
Above $\frac{3}{16}$ in. thick	16 0 0
$\frac{3}{16}$ in. and under to 16 gauge inclusive	16 5 0
Under 16 gauge to 20 gauge	16 15 0
Under 20 gauge to 24 gauge	17 0 0
Under 24 gauge to 26 gauge	18 0 0

The maximum prices for defective steel plates, sheets, and black plate above mentioned will be £1 per ton less than the above prices.

	Per ton.
	£ s. d.
Extras for sizes, &c., as follow:—	
Over 4 ft. wide up to and including 5 ft.	0 10 0
Over 5 ft. wide up to and including 6 ft.	1 0 0
Re-shearing to exact sizes	0 10 0
Close annealing	0 10 0
Cold rolling	1 0 0
Hydraulically flattening	1 0 0
Mangling	0 10 0
Pickling	1 10 0
Special Welsh finish or equal, 16 gauge and thinner	1 10 0
Lots of less than 5 cwt. of a size	0 10 0
Painting one coat both sides ordinary paint:—	
20 gauge and thicker	1 0 0
21 to 24 gauge inclusive	1 10 0
25 gauge and thinner	2 10 0
Circled, curved, tapered, and thin plates to sketch, to be subject to arrangement.	
Bundling, no extra.	

EXTRAS FOR LENGTHS.

Exceed- ing.	Not exceed- ing.	12 gauge and thicker.	13 to 16 gauge incl.	17 to 20 gauge incl.	21 to 24 gauge incl.
Ft.	Ft.	s. d.	s.	s.	s.
9	10	nil	nil	5	10
10	12	nil	5	10	20
12	14	nil	10	15	35
14	16	2 6	20	25	45
16	18	5 0	30	35	60
18	20	7 6	40	45	80

Corrugated sheets, no extra.

These prices and extras are applicable to all orders for home trade and export. The above-mentioned maximum prices and extras do not apply to separate and independent orders involving the sale of less than 2 tons.

All the foregoing prices are net f.o.t. producers' works.

All communications with reference to the above Order should be addressed to the Controller of Iron and Steel Production (Room 367), Ministry of Munitions of War, Whitehall-place, London, S.W. 1.

American Anthracite Price Raised.—President Wilson has ordered an increase of 35c. per ton for all anthracite delivered at the mine throughout the country in order to meet the increases in miners' wages.

Causes of German Coal Shortage.—The *Labour Gazette* states that the chief causes of the present inadequate output of coal in Germany are discussed in an article in *Die Konjunktur* of August 30:—"Among those given are the underfeeding of the miners, their lack of experience and training, the unsatisfactory terms of the collective piece-work contracts, lack of zeal in the workers, defective ventilation, poor blasting materials, defective tram lines, and general shortage of trams, timber, and other materials. By way of illustrating the decline in the standard of efficiency of the mining staffs, the following figures are given: At the outbreak of war the Prussian mines had at their disposal a total of 767,177 fairly well-trained workers, of whom 7,205 were women and 31,290 were lads under 16. In the first quarter of 1917 the total number of workers in the Prussian mines (exclusive of prisoners of war) was 593,722, of whom 40,842 were women and 41,197 lads under 16. Thus the percentage of women and lads had risen from 5.02 to 13.82. During the second quarter of 1917, the total number of workers has increased somewhat, but if prisoners of war be included, it falls but little on the peace-time number. Thus there is quantity but not quality. At the present time, quite one-sixth of the employed in and about the mines are made up of women and lads, lacking both in physical strength and in training. But even among the men a large proportion are unskilled people, recruited from every conceivable vocation. If the prisoners of war be included, the effect is to reduce the average efficiency of the mass still further."

Truck Deliveries of Coal in London.—The Board of Trade has called the attention of consumers within the Metropolitan coal area to the fact that deliveries of coal by truck are not now permitted except with the consent of the local coal overseer. It is an offence to order coal by truck direct from the colliery, unless the colliery has registered as a coal merchant, and has accepted a requisition under the Order. Even then, assent to a truck delivery is required. Arrangements are being made for a return to the local coal overseers of all trucks of coal consigned to private consumers at stations within the Metropolitan coal area, so that action may be taken to prevent abuse. Country houses requiring a considerable quantity of coal, or where the cartage is undertaken by the consumer, or where the house is some distance away from the coal depot, may (on application to the local coal overseer) obtain coal by the truck in fulfilment of an approved requisition for the house.

MINING ACCIDENTS AND LABOUR IN 1916.*

The total number of persons employed at mines and quarries under the Quarries Act in the United Kingdom and the Isle of Man during the year 1916 was 1,065,714, of whom 1,017,518 were employed in or about mines, and 48,196 in or about quarries. Of the 1,017,518 persons employed at mines 804,769 worked underground, and 212,749 above ground; of the latter, 9,947 were females. Compared with the preceding year there is an increase of 38,227 males working underground, and an increase of 3,532 males and of 2,286 females working above ground, making a total increase of 44,045 persons, the increase at mines under the Coal Mines Act being 44,421.

Table A gives a general summary of the number of persons employed at mines and quarries:—

TABLE A.—PERSONS EMPLOYED AT MINES under the Coal and Metalliferous Mines Regulation Acts and at QUARRIES under the Quarries Act respectively, classified according to age and sex.

Act.	No. of mines or quarries at work.	Under-ground in mines and inside at quarries.	Above ground at mines and outside at quarries.		Total under and above ground.	Comparison of total No. employed with that of preceding year.
		Males.	Males.	Females.		
Coal Mines Act.....	2,847	792,911	195,430	9,722	998,063	+ 44,421
Metalliferous Mines Act	468	11,858	7,372	225	19,455	— 376
Quarries Act	5,476	30,767*	17,274	155	48,196	— 13,931
Total in 1916	8,791	835,536*	220,076	10,102	1,065,714	+ 30,114
Total in 1915	10,132	806,571†	221,270	7,759	1,035,600	— 200,763

* Including 58 females employed inside quarries.

† Including two females employed inside quarries.

Table B gives statistics relating to employment in coal mines according to counties:—

TABLE B.—PERSONS EMPLOYED, CLASSIFIED ACCORDING TO THE PRINCIPAL MINERALS AND THE COUNTIES IN WHICH CHIEFLY WORKED.

Counties where chiefly worked.	Under-ground. Males.*	Above ground.		Total under and above ground.
		Males.	Females.	
York	113,506...	32,530 ..	167...	146,203
Glamorgan	118,154...	22,944...	212...	141,310
Durham	101,570 ..	27,344...	281...	129,195
Lancaster	73,379 ..	17,442 ..	3,278 ..	94,099
Monmouth	49,408 ..	8,427 ..	87 ..	57,922
Northumberland	35,256 ..	9,352 ..	109 ..	44,717
Derby	45,193 ..	11,892 ..	33 ..	57,118
Stafford	41,309 ..	13,600 ..	130 ..	58,039
Lanark	43,238 ..	9,315 ..	2,134 ..	54,687
Nottingham	32,216 ..	8,535 ..	24 ..	40,775
Fife	17,999 ..	3,364 ..	1,211 ..	22,574
Other counties	108,168 ..	28,027 ..	1,962 ..	138,157
Total in 1916	782,396...	192,772...	9,628...	984,796
Total in 1915	743,550...	188,582...	7,472...	939,604

* Including females employed inside quarries.

Accidents.—In 1916, 1,344 separate fatal accidents occurred in and about the mines and quarries of the United Kingdom, causing the loss of 1,394 lives. Compared with the previous year, there was an increase of 46 in the number of fatal accidents, and of 2 in the number of lives lost. Of the 1,344 separate fatal accidents, 1,289 causing the loss of 1,336 lives happened at mines, and 55 causing the loss of 58 lives happened at quarries. At mines there was, as compared with the previous year, an increase of 61 in the number of fatal accidents and of 18 in the number of deaths. The death rates for the year were 1.469 per 1,000 persons employed underground, 0.724 per 1,000 persons employed on the surface, and 1.313 per 1,000 persons employed under and above ground at all mines.

TABLE C.—FATAL ACCIDENTS AND DEATHS AT ALL MINES under the Coal and Metalliferous Mines Regulation Acts, arranged according to place or cause.

Place or cause of the accident.	Coal Mines Act.				Metalliferous Mines Act.			
	Separate accidents.	Per cent. of total accidents.	Deaths from accidents.	Per cent. of total No. of deaths.	Separate accidents.	Per cent. of total accidents.	Deaths from accidents.	Per cent. of total No. of deaths.
I. Underground accidents:								
1. Explosions of firedamp or coal dust	8	0.6	22	1.7	16.2	137.8	—	—
2. Falls of ground	689	54.4	706	53.8	599.0	614.6	12	56.6
3. Shaft accidents	44	3.5	44	3.3	68.8	79.0	1	4.5
4. Miscellaneous	379	2.9	391	29.8	361.2	378.6	5	22.7
II. Surface accidents	147	11.6	150	11.4	149.6	152.0	4	18.2
Total	1,267	100.0	1,313	100.0	1,194.8	1,362.0	22	100.0

In classifying the accidents according to place or cause, it was found (Table C) that in 1916, 53.8 per cent. of the deaths were due to falls of ground, 29.6 per cent. to miscellaneous causes underground, 1.7 per cent. to explosions of firedamp or coal dust, 3.4 per cent. to falls of ground, and 11.5 to accidents on the surface.

Explosions of firedamp or Coal Dust.—There were 8 separate explosions of firedamp or coal dust, causing the loss of 22 lives. Compared with the preceding year there was a decrease of 8 in the number of accidents, and of 19 in the number of deaths. The

Report of the General Report on Mines and Quarries for 1916, edited by Mr. W. Walker, acting Chief Inspector of Mines.

death-rate from explosions of firedamp or coal dust per 1,000 persons employed underground in 1916 was 0.027, whilst the average death-rate from this cause during the last 10 years was 0.190. Of the 112 fatal and non-fatal explosions, 96 were caused by naked lights, 1 by matches or smoking, 6 in connection with safety lamps, 6 by shot firing, and 3 by miscellaneous or unknown causes. Of the 96 explosions caused by naked lights, 5 had fatal results to 18 persons. So long as mines which occasionally produce firedamp are worked with naked lights, explosions of this class will continue to occur, and existing rules are inadequate to prevent them.

The Scotch and the South Wales Divisions, though employing only about 54 per cent. of the number of men employed in the remaining divisions, and producing only 53 per cent. of the output, had more than three times as many explosions from the use of naked lights.

Falls of Ground.—719 persons were killed by falls of ground at all mines under the Coal and Metalliferous

might be considerably reduced if the handling of explosives and firing of shots were confined to special shot-lighters of the semi-official class to a greater extent than at present. Suffocation by natural gases caused 5 fatal accidents, by which 6 lives were lost. Underground fires produced 2 fatal accidents, resulting in 3 deaths. Four accidents, involving the loss of 9 lives, were caused by irruptions of water. By underground haulage there were 262 fatal accidents, resulting in 266 deaths. The number of accidents was the same as in the preceding year, but the number of deaths increased by 1. These accidents occur from such a variety of causes, and under such varying conditions, that no really satisfactory method of subdividing them has yet been devised. There were 4 fatal accidents by which 4 persons were killed through the use of electricity in mines; a decrease of 4 in the number of accidents and deaths as compared with 1915. By machinery underground there were 16 fatal accidents and a similar number of deaths; and under the heading of sundries underground, there were 69 fatal accidents causing 69 deaths.

Surface Accidents.

At all mines classed under the Coal and Metalliferous Mines Regulation Acts there were 151 separate fatal accidents on the surface, involving the loss of 154 lives. There was an increase of 20 in the number of fatal accidents and deaths as compared with the preceding year. The death rate per 1,000 persons employed above ground was 0.724, and surface accidents account for 11.5 per cent. of the deaths in and about all mines. One accident caused 4 deaths, and 150 caused one death each.

There were 31 fatal accidents by machinery on the surface. As in previous years, many of these accidents would apparently have been prevented by the more secure fencing of the moving parts of engines, revolving shafts, gearing, etc., and were it made a practice not to oil or clean machinery whilst in motion. No lives were lost by explosions of boilers on the surface at mines during the year; 70 persons were killed on surface railways, sidings, or tramways, an increase of seven in the number of deaths as compared with the preceding year. There were six fatal accidents on the surface due to electricity, and 44 miscellaneous fatal accidents, causing 47 deaths. One accident by which four persons were killed was caused by an explosion in an explosives store.

Table D gives the number of deaths from accidents in 1916, and the death-rate per 1,000 persons employed and per 1,000,000 tons of mineral raised in and about mines under the Coal Mines Act in the different inspection divisions.

TABLE D.

Inspection division.	Number of deaths.			Death-rate from accidents per 1,000 persons employed.			Number of deaths per 1,000,000 tons of mineral raised.	
	1916.			1916.			1916.	1915.
	Under-ground.	Above-ground.	Total.	Under-ground.	Above-ground.	Total.	1916.	1915.
1. Scotland	162	32	194	1.62	1.19	1.53	1.22	4.84
2. Northern	180	26	206	1.20	0.63	1.08	1.23	3.97
3. York and North Midland	255	40	295	1.36	0.77	1.23	1.16	4.31
4. Lancashire, North Wales and Ireland	149	10	159	1.70	0.42	1.42	1.30	6.32
5. South Wales	295	27	322	1.65	0.77	1.50	1.63	6.17
6. Midland and Southern	122	15	137	1.38	0.58	1.20	1.71	4.69
Total for the U.K.	1,163	150	1,313	1.47	0.73	1.32	1.36	4.92

deaths. Compared only with fatal accidents and deaths underground, the percentages were 61.6 of the accidents and 60.8 of the deaths.

Shaft Accidents.—45 fatal accidents, each causing one death, or 3.4 per cent. of the total number of deaths in and about all mines under the Coal and Metalliferous Mines Regulation Acts, were caused by shaft accidents. All the accidents, except one, occurred in mines under the Coal Mines Act. The death-rate from shaft

During the year 1916 there were 180 prosecutions of owners, agents, managers, and under-managers for offences under the Coal and Metalliferous Mines Regulation Acts, resulting in 120 convictions. There were also 1,112 prosecutions of under-officials and workmen for offences under the Coal and Metalliferous Mines Regulation Acts, resulting in 1,043 convictions, of which seven were for interfering with the ventilation, 36 for contravention of provisions about safety lamps, 258 for contravention of provisions about matches and smoking, 59 for contravention of rules about explosives, 31 for contravention of provisions about timbering, 129 for contravention of provisions about trams or tubs, 30 for contravention of provisions as to travelling on haulage roads or travelling or working on roads or working places not made secure, four for contravention of rules as to electricity, 33 for disobeying orders, five for failure to report presence of inflammable gas to firemen, etc., 136 for contravention of rules as to care and treatment or cruelty to animals, 64 for being about the mine in a state of intoxication, and 251 for miscellaneous offences.

In addition there were 15 prosecutions of workmen under the Cruelty to Animals Act, resulting in 15 convictions.

Reserves for Retailers.—The Coal Controller has consented to the application of the Bethnal Green Borough Council for the establishment of a reserve stock of 500 tons of coal, on condition that it is retailed in small quantities when the merchants' stocks are inadequate, and that the prices be those laid down in the Maximum Prices Order. The Controller offers to find coal, but cannot undertake any cartage, handling, or distribution. The Controller has agreed to provide Birmingham with a further supply of coal on conditions relating to distribution and reserve.

After-War Employment of Returned Miners.—A joint conference between the Miners' Federation of Great Britain and the Mining Association of Great Britain was held on Wednesday at the Midland Grand Hotel, London, relative to demobilisation problems. The placing of miners in employment on their return from service with H.M. Forces was dealt with. It was agreed to appoint a joint committee of six on each side to go fully into the matter. The committee will consist of Sir Thos. R. Ratcliffe-Ellis, and five of the Mining Association members; Messrs. R. Smillie, T. Ashton, N. J. Batey, W. Carter, H. Smith, and V. Hartshorn. Several letters from the Coal Controller were read relative to miners who migrate from one colliery to another, and a deputation consisting of the chairman, vice-chairman, and the secretary, met him on Thursday on the point.

MINE MANAGERS' EXAMINATIONS.

We have received from the Secretary of the Board for Mining Examinations copies of the questions set at the examinations for certificates of competency as managers and under-managers of mines and for certificates of qualification as surveyors of mines, which were held by the Board on November 20 and 21 at Edinburgh, Newcastle, Sheffield, Cardiff, Wigan, and Birmingham.

The text of the papers is given below. [NOTE.—The figures in parentheses against each question indicate the maximum number of marks obtainable.]

For First-Class (Managers') Certificate of Competency.

SUBJECT No. 1.—Winning and Working.

(Six questions only to be answered. No. 3 is compulsory.)

1. Give an account of the geological history of a piece of coal. (40)
2. Sketch and describe in detail how you would lay a wedging curb on which 100 yds. of tubbing has to be built. How would you prepare the bed? Give a large-scale sketch across a segment of the curb, with dimensions. State how you would keep the bed comparatively dry whilst the curb is being fixed. (40)
3. COMPULSORY QUESTION.—Given a horizontal seam of rather friable coal, 3 ft. 6 in. thick, with a strong roof and a soft floor. As sufficient colliers cannot be got, it has been decided to use mechanical coal cutters. Describe the kind of machine you would use in case the coal is holed near the roof, and how the machine would be arranged to cut at this level. Also, say what machine you would adopt if the holing were done in the floor. Give your reasons for and against the two methods. Make a sketch of the face, which is 150 yds. long, showing the drawing roads, the packs, and the method of timbering. (50)
4. A coal seam 2 ft. thick dips 1 in 4, and is worked longwall. The plan (fig. 1) shows a main incline at right angles to the haulage level, and from this incline there are

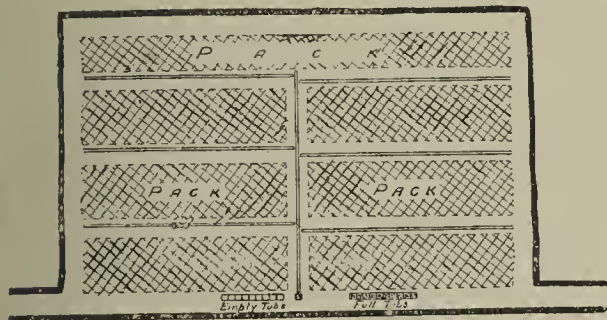


FIG. 1.

three levels 12 yds. apart on each side of the incline. Face conveyors being unsuitable, it is decided to instal a large conveyor in the incline, and smaller conveyors on the levels, feeding on to the main conveyor as shown. What type and width of conveyors would you instal, and how would they be worked? State fully what advantages, if any, you would expect to derive from this method. (40)

5. A shaft, 21 ft. diameter inside the brickwork, has been sunk to a depth of 100 yds., and it has been decided to put down a borehole another 100 yards deep in the centre of the shaft before any more sinking is done. The hole is to start 9 in. diameter. Would you bore with a rope or with rods? Give your reasons. Describe, with sketch, how you would arrange the boring plant, which is to be power-driven from the bottom of the shaft. (40)

6. What is the difference between high- and low-tension detonators? Draw a section of each, and say which you prefer, and why. Since the war, what are the wires of detonators generally made of. (40)

7. A slant incline dips 1 in 6, and its direction is 45 degs. S.W.; various levels are driven in a direction due west from the incline. An endless rope system of haulage is to be installed in the slant and on the levels. Describe, with sketches, the arrangements you would make for (a) keeping the various ropes tight; (b) transferring tubs from the levels to the slant, and vice versa; and (c) attaching tubs to the rope. (40)

SUBJECT No. 2.—Theory and Practice of Ventilation.

(Six questions only to be answered. No. 2 is compulsory.)

1. Indicate by means of the usual symbols how you would ventilate the workings of the mine shown on the accompanying plan (fig. 2) with five splits of air. (30)

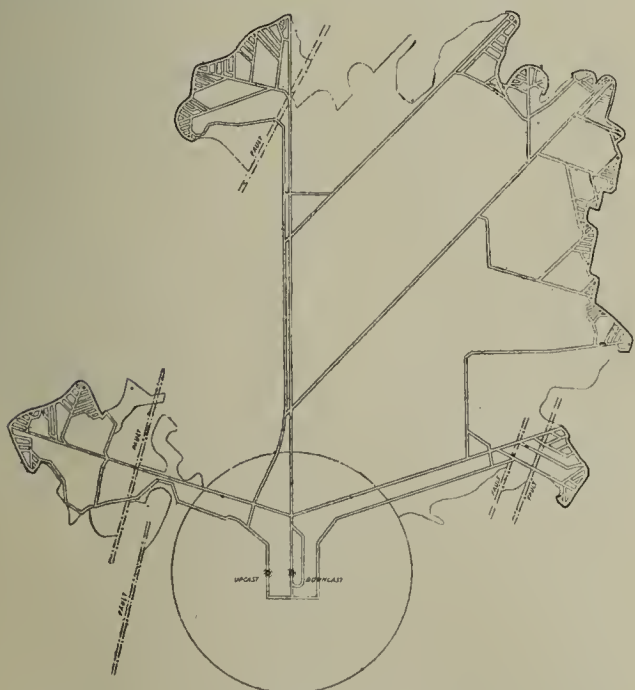


FIG. 2.—SUBJECT NO. 2. VENTILATION.

(Plan referred to in Question No. 1 First Class, and Question No. 1 Second Class.)

The open working faces requiring to be ventilated are distinguished by a thick black line; the open airways and haulage roads, by two parallel lines. All the rest of the space within the edge of the solid coal is filled with stowing. There are to be five splits of air.

2. COMPULSORY QUESTION.—At about what depth in the coal measures of this country do the fluctuations of temperature at the surface cease to cause fluctuations in the

temperature of the strata? What is approximately the temperature at that depth? What is the average rate of increase (geothermic gradient—feet per 1 deg. Fahr.) below that depth? With the data contained in your answers, calculate the theoretical temperature at a depth of 2,400 ft. (50)

3. The average temperature of the air in one shaft is 75 degs. Fahr., and in another connected with it at the bottom 45 degs. Fahr. Each shaft is 400 yds. deep. Assuming the weight of a cubic foot of air at 32 degs. Fahr. to be 0.08 lb., what is the pressure, expressed in pounds per square foot and in inches of water, which tends to force air down the one shaft and up the other? (30)

4. Why do some explosives produce more carbon monoxide than others when burnt, or detonated, under exactly the same conditions? What ingredients are contained in gunpowder, and what are the products of its combustion? (30)

5. Sketch a miner's electric lamp in sectional elevation, showing the details of its construction on a scale of about one-half its natural size. (30)

6. How are the following gases formed in mines: Carbon monoxide, carbon dioxide, sulphuretted hydrogen? Which of them is most poisonous, and which, if any, not poisonous? By what means can you detect the presence or absence of each? Give the chemical symbols for each. (30)

7. What is the equivalent orifice of a mine through which 200,000 cu. ft. of air is passing per minute, with a water gauge of 3 in.; and what would be its equivalent orifice with the same quantity of air if its water gauge were 5 in.? (30)

SUBJECT No. 3.—Explosions in Mines, Underground Fires, and Inundations.

(Five questions only to be answered.)

1. You take a new appointment as manager at a colliery which is old, extensive, dry, and dusty. Dangerous coal dust conditions require immediate attention. Describe the steps you would take to make the workings safe. (30)
2. A serious explosion has extended to the bottom of both shafts. What are the dangers likely to be encountered by the first exploring party, and what should be the nature of their first investigation and report? (25)
3. Make a sketch plan of a small district of workings, suitable for a seam specially liable to outbreaks of gob-fire. Show the roads, the ventilation, the face, and any special features, and explain the advantages claimed for your method. (25)
4. A district in which a gob-fire is approaching the critical stage is being closed by stoppings; one in the intake airway, and the other in the return. Discuss the question as to whether the stoppings should be closed simultaneously, or one before the other. (25)
5. Sketch and describe the general arrangements of a central rescue station. (25)
6. Workings to the rise are approaching the outcrop under irregular deposits of quicksand. What precautions should be taken? (25)

SUBJECT No. 4.—Machinery.

(Five questions only to be answered.)

1. Describe carefully the construction of a dustproof tram (tub or wagon), indicating the materials used and the design. Illustrate your answer by one or more sketches. (28)
2. What is a "relay" in electrical language? How are relays used in connection with electric bell circuits, and for what purpose? (28)
3. In a straight and roughly level range of steam pipes 150 ft. long and 6 in. bore, how would you prevent loss of heat; how would you remove any water due to condensation; and how would you accommodate the expansion and contraction of this long line? At what points in the range would you anchor the pipes to fixed foundations? A sketch will be useful in answering this question. (28)

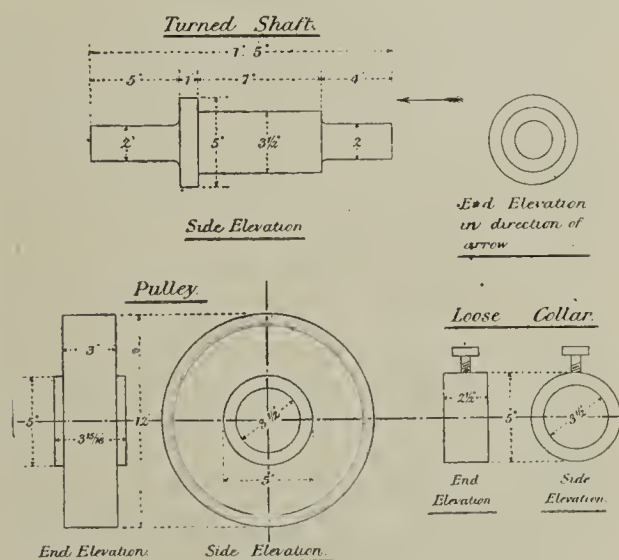


FIG. 3.—SUBJECT NO. 4. MACHINERY.

Question No. 4 (First Class).

4. The drawings on the separate sheet (fig. 3) show a piece of turned shafting, a pulley, and a loose collar. The pulley is bored to run loose on the shaft bearing against the solid collar, and being kept in position by the loose collar with set screw. Make in your answer book one drawing showing, by side elevation, the shaft with the pulley and loose collar on it in correct positions. Make the drawing one-quarter full size, and show the chief dimensions. (38)

5. Why is coal washing practised? Describe one form of coal washer, and state the principle of its action. State also if it will take small coal as it comes from the screens, and, if not, what must be done to it before it is fed to the washer. (28)

6. A shaft is 200 yds. deep. It is equipped with two cages, each weighing two tons and each carrying two trams. Each tram takes 4 cwt., and carries 8 cwt. of coal or 14 cwt. of dirt. The ropes are 1 in. diameter, weighing 5 lb. per yard. A winding engine is available with two cylinders 16 in. diameter by 36 in. stroke, and a drum 9 ft. diameter on the crank shaft. The steam pressure is 80 lb. per square inch. Show, by calculation, whether the engine will be suitable for the work, or whether the cylinders ought to be larger or could be smaller. (28)

SUBJECT No. 5.—Surveying, Levelling, and Drawing.

(Five questions only to be answered. Candidates for surveyors' certificates must answer Questions 1 to 5.)

1. COMPULSORY QUESTION FOR SURVEYORS. Plan No. 1 (fig. 4), on a scale of 1/2 in. to 100 ft., shows spot levels. Draw on the plan contours at 80, 85, 90, and 95 ft. above datum; and plot a section along the line E D F with the verticals to a scale 10 times that of the plan. (30)
2. The line A B on Plan No. 1 (fig. 4) represents the centre line of a projected colliery railway. The railway will be level, and the formation level is 70. Plot cross sections at C and D on the scale you would use in such a case. The width of the cutting at formation level is to

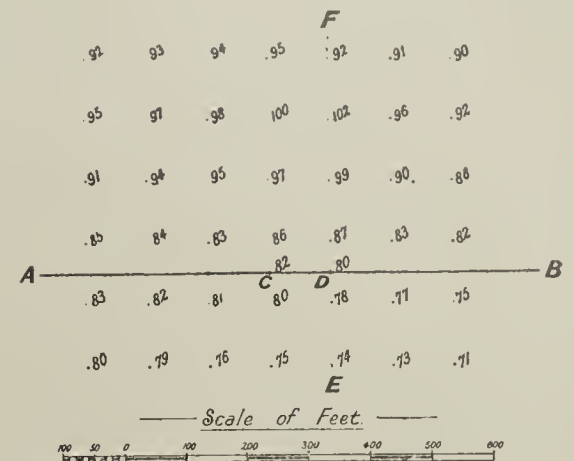


FIG. 4.—SUBJECT NO. 5. SURVEYING, &C.

Plan referred to in Questions Nos. 1 and 2 (First Class) and 6 and 7 (Second Class).

be 14 ft., and the slopes 1 vertical to 1 1/2 horizontal. Calculate the quantity of cutting between C and D. (32)

3. As surveyor at a colliery you are instructed to observe and record the rate and amount, as well as the lateral extent, of subsidence of the surface resulting from the working of a coal seam; and, generally, to record the movement of the surface. State clearly in detail how you would carry out the work. (26)

4. A shaft has been sunk to a seam dipping at 4 degs. It is proposed to continue the sinking and win out the seam one mile to the dip by driving a cross cut mine, or cross measures drift, in the direction of the full dip, rising from the shaft at a gradient of 1 in 144. What distance must the shaft be sunk below the level of the seam? (26)

5. If, on taking up your duties as surveyor at a colliery, you find the theodolite provided to be a non-transit instrument, what tests would you apply to the instrument? State in detail the method of applying the tests in the case of any two of them. (26)

6. Construct a scale of one-tenth full size, showing feet and inches. The scale must be drawn and figured, with the fewest possible divisions, so that any distance in feet and inches, up to 5 ft., can be taken off with dividers at one setting. (26)

7. What is the equivalent in inches to a mile of scales of 1/100, 1/200, 1/400, 1/800, 1/1600. (26)

SUBJECT No. 6.—General Management and Mining Legislation.

(Five questions only to be answered. No. 1 is compulsory.)

1. COMPULSORY QUESTION.—Give your idea of the different classes of workmen you would consider necessary on the surface to deal with an output of 2,000 tons in one coal drawing shift, and the approximate number of hands in each class. What officials or foremen would you require to supervise? (30)
2. Describe what is meant by the term "concentric system," as explained in the Electrical Regulations under the Act, and what are the stipulations in connection therewith. (25)
3. Describe in full detail the required treatment of safety lamps, from the time they are given out to a workman until they are again given out to the workman on the following day. (25)
4. How often, and by whom, have steam boilers to be examined? What other requirements are there in the Coal Mines Act concerning steam boilers? (25)
5. What steps are to be taken on the abandonment of a mine? (25)
6. Percentages of gas are, in several cases, mentioned in the Coal Mines Act, each carrying certain restrictions. Give a list of those cases, with the attendant Regulations. (25)

For Second-Class (Under-Managers') Certificate of Competency.

SUBJECT No. 1.—Mine Working.

(Five questions only to be answered. No. 1 is compulsory.)

1. COMPULSORY QUESTION.—Sketch a district of longwall advancing and longwall retreating methods of working respectively. Under what circumstances would you adopt each? (60)
2. Sketch and describe in detail how you would lay a water ring in a sinking pit. Give a large-scale section across a segment of the ring, with dimensions. (60)
3. What are the various appliances for drilling a shot-hole in coal? Describe the tools and boring rods required. State how you would charge, stem, and fire one of these holes. (60)
4. A heading has been set out by the surveyor. You are instructed to keep it straight, and maintain an even gradient of 9 in. per yard. How would you carry out these instructions? (60)
5. In endless rope haulage, what are the various arrangements for keeping the rope tight? (60)
6. In the event of a sudden outburst of gas in a district of a mine during a working shift, what course would you pursue as the under-manager? (60)

SUBJECT No. 2.—Theory and Practice of Ventilation.

(Six questions only to be answered. No. 5 is compulsory.)

1. Indicate by means of the usual symbols how you would ventilate the workings of a mine shown on the accompanying plan (fig. 2) with five splits of air. (50)
2. On what conditions does natural ventilation depend? Describe a case in which the force which tends to produce natural ventilation helps, and another in which it hinders artificial ventilation. (50)
3. Describe what takes place in the workings of a mine when the barometer falls and rises respectively. Give the reasons for your answers, and state what precautions, if any, you would adopt in the one case or the other. (50)

4. Compare the merits and demerits of a miner's electric lamp and an oil safety lamp. Which do you prefer, and why?

ANSWERS TO QUESTIONS.—Sketch the top of an upcast shaft, showing a fan drift, a fan, a means of covering the shaft so as to admit of winding being carried out, and a means of reversing the direction of the air current in case of need. (50)

6. What sizes of airways would you recommend for 5,000, 50,000, and 100,000 cu. ft. of air per minute respectively, and what would be the velocity in each airway? (50)

7. What horse-power is required to draw a current of air amounting to 75,000 cu. ft. per minute through the workings of a mine with a water gauge of 3 in., and what would the water gauge be in the same mine if the quantity of air were increased to 100,000 cu. ft. per minute? (50)

SUBJECT No. 3.—Explosions in Mines, Underground Fires, and Inundations.

(Five questions only to be answered.)

1. When using stone dust in roads very subject to deposits of coal dust, how would you know when you had used sufficient stone dust? (20)

2. Enumerate the possible causes of an explosion of coal dust in a mine free from firedamp. (20)

3. Assume that a fire occurs during working hours near the downcast pit bottom under such circumstances that you cannot get your men out at once by either shaft. As underground manager you are in the pit in charge and on the spot. What would you do? (20)

4. Make a sketch of a small working district with which you are familiar. Assume that an explosion has occurred, imprisoning men at the face. You are in charge of the work of rescue, using rescue apparatus, from a base at the entrance to the district. Describe the operations. (20)

5. You are yourself about to use rescue apparatus. What examination would you make of it before putting it on, and, when on, what further test would you make before commencing work? (20)

6. What is the cause of spontaneous combustion in mines, and where is it most likely to take place? (20)

SUBJECT No. 4.—Machinery.

(Five questions only to be answered.)

1. In a steam engine, how is the piston secured to the piston rod; how is the piston rod secured to the cross-head; and how is the slide valve held in position on the valve rod? Illustrate your answer by simple sketches. (20)

2. Sketch and describe a good method of holding trams (tubs or wagons) in position on a cage. Set down the advantages of the particular device you describe. (20)

3. Name the instruments used for the following purposes: To measure electric current; to measure electric potential or pressure; to measure electric power. What is meant by the term "electrical resistance"? (20)

4. Name and briefly describe the kind of valve or cock used for the following positions: (a) For blowing off a Lancashire boiler; (b) in a steam pipe about 9 in. bore and with high pressure; (c) on a compressed air hose leading air to a coal-cutting machine. (20)

5. What is a steam trap? Describe one form of steam trap, and explain in detail how it acts automatically. (20)

6. Describe a portable pump for draining an advancing incline, the quantity of water being 100 gals. per minute. (20)

SUBJECT No. 5.—Arithmetic and Surveying.

(Five questions only to be answered, at least two of them being from the part headed "Surveying.")

ARITHMETIC.

1. If in a coal seam 40 in. thick the area worked be 13 acres 3 poles 29 poles or perches (statute measures), and the royalty £25 per foot thick per acre, what is the amount due? (20)

2. A haulage rope which cost £180, after hauling 300 tons of coal per day for three years of 250 working days each, is found to be worn out. What was the cost of the rope per ton hauled? (20)

3. If 55 seconds be occupied in raising each cage carrying eight men, including the time required to fill and empty each cage, what time allowance would you claim for changing shifts composed of 480 men each? (20)

4. Add the following areas, and reduce the total to square yards:—

13 acres	3 roods	25 perches	13 square yards
9 "	2 "	10 "	7½ "
3 "	1 "	19 "	29 "
7 "	2 "	39 "	11 "

The areas are in Imperial or statute acres. (20)

SURVEYING.

5. How many square links and how many statute acres are contained in a square of 93 yds. 2 ft. side? (20)

6. Plan No. 1 (fig. 4) on a scale of ½ in. to 100 ft. shows spot levels. Draw on the plan approximate contour lines (lines of level course) at 80 ft. and 95 ft. above datum. (20)

7. Plot a section along the line EF on Plan No. 1 (fig. 4) to a scale of ½ in. to 100 ft. for horizontals, and ½ in. to 10 ft. for verticals of section. (20)

SUBJECT No. 6.—Mines Act: General and Special Regulations and Orders, and Writing Reports.

(Five questions only to be answered.)

1. A large fall has occurred on a haulage road, cutting off access to one-tenth of the total working places of the colliery. Two or three days will be required to clear it away. Labour is short. Describe how you would organise the men for clearing it away, and state what steps you would take to avoid loss of output as much as possible. (20)

2. State the provisions concerning the use of electric safety lamps underground, and the limits within which such use is permissible. (20)

3. What are the duties and responsibilities of an onsetter? (20)

4. (a) State the general conditions under which explosives may be taken underground, giving the diameter of cartridges allowable. (b) State fully the conditions under which detonators may be taken underground. (20)

5. State the necessary qualifications of a deputy, fireman, or examiner. (20)

6. What are the precautions to be observed in the use of inflammable material both underground and on the surface? (20)

MINING STUDENTS' ASSOCIATIONS IN SOUTH WALES.

The second of the Students' Associations of the South Wales Institute of Engineers was inaugurated by Mr. Hugh Bramwell, president of the institute, at the School of Mines, Crumlin, Monmouthshire, on Saturday, December 1. There was a large attendance of students at this admirably equipped school, and warm interest was manifested in the project in speeches delivered by prominent Monmouthshire colliery managers like Mr. A. S. Tallis (Tredegar) and Mr. W. O'Connor, F.G.S. (Argoed), and by Mr. W. W. Hood (Cardiff), Mr. J. Dyer Lewis (chief inspector of mines), and Mr. T. Greenland Davies (H.M. inspector of mines). Among other local gentlemen present were Mr. W. H. Routledge, Abergavenny (formerly general manager of Messrs. Partridge, Jones and Company), Mr. J. Fox Tallis (Llantarnam Grange), and Messrs. V. Phillips and Holland (of Navigation Collieries, Crumlin). Mr. JAMES DOBBIE (vice-principal) presided, and was accompanied on the platform by Principal George Knox (principal of the Glamorgan and Monmouthshire School of Mines). The chairman read letters of regret for inability to attend the gathering, and of appreciation of the project, from Dr. Holland (principal of the Newport Technical Schools), Mr. W. Stephen Davies (agent of the Tredegar Coal and Iron Company), Mr. John Paton, Mr. W. R. Watkins, and Dr. Henry K. Jordan, D.Sc. (former president of the South Wales Institute of Engineers), the last of whom predicted a great future for the students if they would whole-heartedly seize the splendid opportunities that were offered to them.

The CHAIRMAN pointed out that although the members of these students' associations would consist at first chiefly of pupils at the Schools of Mines at Treforest and Crumlin, because these were to be their headquarters, yet membership was in no way limited to such students. They would welcome engineering students who were being trained under any scheme or authority in Glamorgan and Monmouthshire, and these would be upon exactly the same footing as other members, and enjoy the same privileges.

In the course of his inaugural address, Mr. HUGH BRAMWELL directed the students' attention to the importance of evolving a new applicability to an existing mechanical or engineering idea. There were, he said, thousands of ideas floating about, ready for useful application, but rarely a new one. He cited, for example, the patent corrugated umbrella frame, which was the strongest form of strut capable of being bent in one direction without injury to the material. The same principle was applied to corrugated tubes for the Lancashire boiler and marine tank boiler as being the strongest form of tube, in relation to resistance to collapse, that could be bent into a circular form. The idea was as old as the hills, yet how usefully it had been applied.

Cards of associate membership of the South Wales Institute of Engineers were presented by Mr. Bramwell to 55 members of the Students' Association, who afterwards elected their office bearers.

A cordial vote of thanks was passed to Mr. Bramwell, proposed by Mr. O'CONNOR, seconded by Principal Knox.

STORAGE OF COAL (IN BULK).

The British Fire Prevention Committee has issued a special warning on the storage of coal in bulk, with special reference to spontaneous combustion, the following precautions being included:—

(a) Stacks should not be higher than 10 ft.

(b) Iron perforated pipes 3 or 4 inches in. diameter, or, failing these, either suitable earthenware pipes or ducts formed of incombustible material should be inserted vertically in the stacks as they are built up. The lower ends of these pipes or ducts should be at different heights from the ground throughout the stacks. There should be one pipe or duct to about every 300 sq. ft. of surface.

(c) A thermometer should be lowered occasionally through these pipes or ducts to ascertain the temperature at the centre of the stack.

(d) If wet, very small, very soft, or impure coal is received, it should be dumped around the edges of the stack, or in some location where the air can get to it freely, and where other coal will not be packed on top of it.

Matches should always be used carefully, and should not be thrown down until extinguished. Safety matches are preferable to any others. The funnels of steam lorries, etc., should be fitted with spark arresters, and similarly the flue pipes to any stoves near the coal stacks.

When a coal yard is working at pressure, more than ordinary care should be taken to keep the premises clean, and to see that there is no accumulation of waste or rubbish. Oily rags from lorries especially should be placed in iron or metal-lined receptacles, and removed every night. Particular care should be taken to guard against any hot ashes from steam lorries, or accumulation of petrol or oil drippings from motor vehicles generally.

Fire appliances should be installed, and properly overhauled weekly by a competent employee or watchman, and kept ready for instant use. Additional fire appliances above the usual supply should be provided where the pressure of work is exceptional. In large yards hydrants with an ample supply of hose to cover the whole premises should be provided. Particular care should be taken in frosty weather to prevent mains, hydrants, or hand fire appliances being affected.

Coal should not be stacked against buildings, boundary walls, or wood fences, etc., as the pressure may be considerable, and such structures collapse with serious results.

Buckets of water should always be available, also buckets or bins of dry sand with scoops where oil or spirit is used.

THE ECONOMICS OF COAL PRODUCTION.

Before the Society of Chemical Industry (London section) on Tuesday, December 4, Prof. HENRY LOUIS, M.A., read a paper on this subject, of which the following is an abstract:—

The cost of coal is a matter of serious concern, not only to every manufacturer, but to every citizen of the United Kingdom, because the main foundation of Britain's greatness is an abundant and cheap coal supply. Our future depends wholly upon our ability to maintain this, and it can only be adequately discussed when the significance of the various items that go to make up the cost of coal to the consumer are known. These items are: Value of coal in the seam; wages; materials; administration; profit of colliery proprietor; and distribution to the consumer.

The proportions of these have been estimated. Wages form the largest item, and this can probably only be reduced by increasing the efficiency of the coal miners; administration may be reduced somewhat; cost of materials, royalty, and profit probably admit of but little reduction; the cost of distribution offers a more promising field.

It is suggested that the federation of individual collieries into large units, revival of inland navigation, elimination of waste, and the utilisation of small coal, are the most likely methods of keeping down the cost of coal, and of thus maintaining British industrial supremacy.

DISCUSSION.

Dr. CHAS. H. CARPENTER (South Metropolitan Gas Company) said that the author had touched the focus of this question when he said that labour was the key of the whole trouble. The restriction of output by the workman was one of the most serious problems that had to be faced, the men appearing to think that their future prosperity depended upon restricted output; and that the less they did the more employment there would be for them. Another trouble to-day in coal mining was the shortage of male labour, and although the work upon the picking belts was not so heavy as that which women were performing elsewhere, yet the men at the mines refused to allow women to be used on the picking belts. The consequence was that, notwithstanding that the cost of bringing coal to the Thames had risen from 3s. 6d. per ton to about 20s., there was an enormous amount of gross being transported because of refusal to allow women to work on the picking belts. If the working man took that short-sighted view, he was afraid there was no hope, and, whether we won the war or lost it, we should lose our future unless we could change the attitude of labour to these problems. At the same time, he was afraid that sufficient trouble had not been taken to teach labour its responsibility in this matter. For the most part, our education had been on the cheapest lines, and yet it was vital to the progress of the nation as a whole; so that, however we might blame labour, we must bear a great deal of the blame ourselves. Employers must alter their views, and take a greater interest, and also get the men to take a greater interest in the prosperity of their trade and industries than they had done in the past. As regards the part played by the coal industry in the national interest, he believed the authorities now were alive to the fact that the coal industry was a national one, and responsible people concerned with reconstruction saw that one of the most important aspects of it related to coal. Too much had been left to private enterprise in the past. He believed, for instance, that there was no record of the various borings that had been made in different parts of the country, and the State appeared to have no knowledge whatever with regard to them. That, of course, was clearly wrong. The State ought to be in touch with every development which was going on throughout the kingdom. He believed, also, that there would be some method by which all minerals, including coal, throughout the Empire would be kept in touch with some central department. The difficulty with regard to the use of coal cutters was not altogether due to the mine owners. There was the prejudice with regard to their use by the men, and the general view of labour towards the introduction of machinery made it very difficult for the capitalist to make up his mind to put down machinery. He believed the attitude in the States was quite different, and it would be interesting to know why the workmen there were so much more enlightened in that respect than our own.

Mr. ARNOLD LUPTON said that as the coal owners' profits did not average more than 5 per cent., as shown by the paper, and as the percentage of wages of the total selling price had so largely increased, it was obvious that labour could not get much more out of the colliery proprietor. The only thing, therefore, was a reduction of wages. He agreed that there would be British decadence if we did not get cheap coal, but it would only be so if our coal was dearer than that of other countries. At present, the price was higher than in America; but we should get along very well, because we had only to economise a little for the price to fall. As a matter of fact, we had only just begun to work our coal supplies. We had not yet got out more than 5 per cent. of our total available supplies, and that left us 95 per cent.; and even if China or America had got 100 per cent., the difference was very small; and he looked forward to the future in that respect with confidence. The case was different with regard to royalties. Possible openings for new coal mines were becoming very scarce, and, that being so, land owners were getting to know the value of their properties. Indeed, 1s. 6d. had been paid already, instead of an average of 6½d. per ton; and it might even be 10s. a ton. As to the State having information of all borings, he did not feel at all inclined to give away information that might have cost thousands of pounds to obtain; as it would disturb the confidence of capital, and they would lose more than they gained. Perhaps the way out of the difficulty would be to buy out the coal owners at a fair price.

Edited.—The *London Gazette* announces the appointment of S. C. Jones and J. Arnold, and S. Cym. Jones and Arnold, civil engineers, Great Western Chambers, Neath; and W. Mason and J. R. Sheen, trading as merchants, Great Yarmouth and

Prof. J. S. S. BRAME said the export of coal was a very important question for consideration, as we exported about one-third of our production; this course must bring us appreciably nearer to the day when we should not have the cheap coal so essential for our national well being. As to the decline in output per person employed, Prof. Louis looked to increased production as the salvation of the situation; but that surely would bring about a fall in prices, and then he could not see how high wages could be maintained. Reference had also been made to combines, but there were one or two points of advantage in these which had not been mentioned. Of the coal raised, about 7 per cent. was used on the collieries—i.e., about 20 million tons per annum. If there was efficient management, through combination, it would be possible, by means of electrical distribution, to utilise much of this low value coal, and so operate the pits at a much lower cost, thereby economising on the 7 per cent. Another advantage would be the introduction of electric coal-cutting machines driven from the power stations at the pits, and yet another source of economy would be the by-products. As to briquetting, where there was a low volatile content, probably the return from the briquettes would not justify the expense. What was wanted was a briquetting agent, other than pitch, suitable for highly bituminous coals.

Mr. W. H. QUARRELL said the question of wagons was a serious one, because the number was getting less. Then there was the question of tubs and dust. They must agree that the officials had been fairly lenient with them on this matter, but the recent Clifton prosecution had enlightened them. With regard to Prof. Louis' figure of 8.65 per cent. profit, in some instances with which he was concerned the figure worked out to rather under 5 per cent. As to price, it was not without interest to know that although the price of a good class coal in London was 29s. 6d., and a kitchen coal 27s. 6d., the price of coal in Frankfurt was 53s. 4d. As to the output per man in this country as compared with other countries, he had the figures for America: they were 596 tons per man in 1897, and rose to 660 tons in 1912; whereas in this country they were 275 tons in 1897 and 244 tons in 1912. The co-operative purchasing of materials was of extreme importance, and it would be of enormous value to have central buying depots for districts in order to standardise the appliances used, etc. To his mind, the feature of future successful working of collieries was the working of the thin seam. Recently in Lancashire, Mr. Jackson, a colliery manager of great experience, said that in 1910 he put some of his best men to work a 2 ft. seam, and the most he got was one ton per man per day, and, under present-day conditions, he would not expect to get more than three-quarters of a ton per man per day. Another very important point was that the collieries of this country had grown up on a rule of thumb and rough and ready management, and the mistake had been that they had not called in the man of science early enough.

Maj. J. E. MORGANS said that perhaps one means of increasing output would be not to reduce wages, but to give the men a guarantee that their rate would not be decreased with increased output. That was one of the reasons why in America the output per shift per man was as high as it is. Then, also, the thickness of the seam had a lot to do with the output per man. The seams in English pits were often so thin that it was not possible to introduce the simple coal-cutting machines that were in vogue in America. A most important point was, however, that whether a man earned £5 or £10 per week, his rate should not be decreased because his earnings were increasing. As to the output from thin seams mentioned by a previous speaker, he could assure him that there were plenty of collieries working on thinner seams than 2 ft., and were getting a very much larger output per man than had been mentioned, and had been doing so for years.

Mr. WALTER REID suggested the production of power at the pits, without bringing the coal up to the surface, namely—by gasifying it in a producer down below. He knew that Prof. Louis would raise objections to it on the score of danger, and that the Government would not allow it, but, at the same time, it was quite possible from the scientific and practical point of view to transmit power in this way, instead of transporting coal all over the district to generate power on the spot where it was actually wanted. Perhaps a central establishment might be able to use all the dust that was produced, not for briquetting, but for producing by-products and power on the spot. Dust ought to be utilised at a central position.

Mr. J. R. COWBURN said that, according to the paper, wayleaves cost ½d. per ton, and royalties 6d., so that the man whose surface was not disturbed got a higher rate than the man who was deprived of a certain amount of the area of his land entirely.

Mr. NORMAN SWINDEN said that what had happened in America in connection with the increasing output per man was the introduction of a new and more scientific system of management. That was the outcome of some very marvellous researches by Mr. Taylor, who studied the various operations, and so reduced them that the output had been increased anything from nine to 40 times, according to the conditions. He himself was at present engaged in working out bonuses, and could assure them that it was quite possible to show a substantial decrease in cost, at the same time almost doubling the men's wages. The point to be borne in mind was that they must obtain the confidence of the men, and give them to understand that no attempt would be made to cut the rate because they were earning heavy wages. It was possible for the men to double their wages and the cost to come down one-third.

Prof. Louis, replying to the discussion, said that he did not hold the workman solely to blame, the employer being at least equally in fault, in present conditions, with the men for the position in which we found ourselves. The question why royalties were 6d. and wayleaves ½d. implied a misconception between the two

things. As to railway rates, legislation would not reduce them, for even if the country took over the railways and carried coal for nothing, that would not reduce the cost, which would come out of the pocket of the consumer in some form. Such arguments were based entirely upon an economic fallacy. Prof. Brame had suggested that bituminous coal was not suitable for briquetting, but most of the coal briquetted on the Continent was bituminous, and 90 per cent. of the coal briquetted in South Wales was steam coal. He did not agree that the profits on the sale of briquettes would be very small, and that the business would not be remunerative, because the material that was dealt with had practically no value. There were accumulations of coal dust which were simply of no value at present. The suggestion that coal dust and fine coal might be used for power production had often been made before, but it was a question bristling with difficulties. So far as he knew, there had not been made a single gas producer that would satisfactorily deal with duff. Mr. Reid had suggested that it would be more economical to generate electricity either underground or at the pit's mouth, and to transport electricity rather than coal; but electricity could not be transported for nothing, and it became a question of calculation whether it was cheaper to burn coal at the pit or at some other place where the electricity was required. Generally speaking, for very short distances it was cheaper to transmit electricity, but over very long distances it was cheaper to carry coal in trucks. It was a man's duty to do a fair day's work, and we must go on impressing that on the nation. The proper attitude was to base wages not upon prices, but upon output, but the question was a difficult one, and he did not see the solution to it yet. The point was to devise a system which would impress upon the workman that his interests were bound up with output.

A NOTE ON THE MICROSCOPIC EXAMINATION OF COAL.

[CONTRIBUTED.]

The phrase "microscopic examination of coal" has appeared in print more during the last few years than in all previous time, and it has even outcropped in the unlikely places. This is most encouraging to those to whom the subject is one of promise, for it indicates that perhaps, at last, the work which lies behind the phrase will be attacked seriously. It should be done, for it is a great work.

Only when a microscopic examination of all our coals is correlated with and interwoven with the results of a profound chemical knowledge of them all, will one begin to know what each type of coal actually is, and what potentialities of force or special products each contains. But to realise this and to talk of, or even to have begun to work on a "microscopic examination of coal" is to have taken only the first step in a long and arduous upward climb.

It may interest both those who hope to do some of the climbing (the researchers), and those who wish to obtain the fruits growing in the orchards of knowledge (the coal owners and the community at large), if we consider one of the fundamental facts of the position. Coal is opaque; and in order to be able to perceive the structures composing coal, it is necessary to look at them with a microscope, for which it is essential that the substance should be transparent. This may be achieved either by rendering small fragments transparent by special treatment, as did so many of the earlier Continental workers on coal, or, as is now more generally the fashion, by cutting very thin slices of the coal. These sections reveal the fact that certain parts of the coal are sufficiently transparent for microscopic examination without further treatment. All that is necessary is to have the slice so thin that one set of transparent structures does not overlap, and thus block out and blur, another set of structures which it may superimpose. According to the direction of the cut, the area examined will give samples of the horizontal or the vertical distribution of the substances composing the coal. Those generally visible are portions of plants, which the trained palaeobotanist can (or cannot) recognise, and also sometimes mineral crystals which are familiar or unfamiliar to mineralogists. Thus, a microscopic examination of a lump of coal of which we have a good section, may reveal, for instance, that a certain few inches of the coal consist almost entirely of macrospores embedded in partly decayed microspores, whereas a band an inch above it consists of wood, with a number of iron sulphide crystals scattered through it, and so on.

Although the knowledge gained in this way is still far from complete, serious and accurate attempts should be made to correlate such evidence with the commercial products of the same seam or parts of seams.

Mr. James Lomax, who cuts remarkably large and handsome microscopic sections of coal, has done much of this kind of work, and makes up boxes of sections with neat little glass cases of the cokes from corresponding coals. This work may be of considerable practical value as a preliminary indication of the results to be expected.

But if work of such a kind is to be carried to the point of yielding detailed scientific results, there are serious and sometimes unrecognised difficulties to be overcome.

First we must remember that the revelation of the microscope is of a slice of coal roughly the thickness of a piece of paper. When one has a microscopic slide of a portion of coal, showing, let us say, a mass of wood or a layer of leaves of a certain type, it does not do to assume that the adjacent portions of the coal will contain similar leaves or wood. They may do and, if there is a very persistent band in the coal, probably will. But it must always be borne in mind that a few inches or even a few millimetres away the actual structures in the coal may differ fundamentally.

Coal is like a plum pudding—a substance with a distinctive character of its own, but one which is made

up of agglomerated masses of highly divergent structure liable to change abruptly every few millimetres. This is, therefore, no scientific certainty that the structure seen in a slide extend sufficiently through the whole mass of the coal to influence its coking properties—save in the instances of well-marked, persistent bands such as spore bands, for example, where there may be every justification for the presumption that the section and the adjacent coal are substantially similar.

The basis of accurate and detailed scientific work which aims at answering fundamentally the questions concerning the part played by the various substances present in coal must be the chemical determination of the same identical portions as are microscopically recognisable.

This may be accomplished either by micro-chemical technique capable of dealing with the uncovered section itself, or by isolating sufficient definitely recognisable structures from coal to be treated by ordinary chemical means. As things are at present, the chemist handles in coal a mixture of widely various substances, while the microscopist examines individual parts of that mixture. Some bridge over the hiatus between these two types of work is needed.

MODIFIED PERMIT FOR PIG IRON DEALINGS.

With reference to the Order made by the Minister of Munitions on July 7, 1916, applying Regulation 30A of the Defence of the Realm Regulations to war material consisting of certain classes and descriptions of metallurgical coke, pig iron, and steel, and to the General Permit for dealing in such war material issued by the Minister of Munitions on November 1, 1916, the Minister of Munitions has given notice: (1) That the said General Permit is modified by the insertion in the schedule thereto of the following, the prices for the articles hereunder specified being in addition to, or, where such articles are already specified in such schedule, in substitution for the prices contained in such schedule:

Maximum Prices for Pig Iron Above Referred to.

HÆMATITE PIG IRON.—EAST COAST AND WEST COAST.

The expression "Mixed numbers" where used in relation to East Coast and West Coast pig iron in the schedule to the said General Permit shall mean equal quantities of Nos. 1, 2, and 3, having an average analysis within the following limits:—

	East Coast.	West Coast.
	Per cent.	Per cent.
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Manganese, not exceeding ...	1½	1½
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Phosphorus ..	0.06	0.45

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Silicon 5 per cent. and less than 6 per cent.	10/-
Silicon 6 per cent. and less than 7 per cent.	15/-

All the above additions to the schedule of the General Permit shall take effect from the date of this notice, and none of such additions shall be deemed to prejudice or interfere with the carrying out of any contract in writing for sale or purchase of the above-mentioned war material entered into prior to such date at prices lawful at the date of such contract.

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Another Order applies Regulation 30A to tungsten ores, molybdenite, and products therefrom. Holders are required to supply returns.

Russian Coal Finance.—Previous to the war, the best Russian colliery properties were owned by foreigners, three-quarters of the coal production in the Donetz basin being by colliery companies operating chiefly with foreign capital. In this respect the war has brought about a revolution in the coal industry. The Russian commercial banks which formerly held aloof from financing coal concerns have now entirely changed their attitude, and the Petrograd commercial banks have acquired a number of coal and anthracite concerns which were previously in private ownership. These concerns have been converted into share companies, and the banks have also gradually acquired a large part of the business of the old share companies, new large share issues being made in order to extend working operations. The Petrograd commercial banks have guaranteed the issues of new shares for the following coal companies:—Selesnevsky Coal Company, which is financed by the Azoff-Don Commercial Bank; the Kuznetsky Coal Company, by the International Commercial Bank; the Bokovo Coal Company, by the Russo-Asiatic Bank; the Grushevsky Anthracite Mines Company by the Private Commercial Bank; the Petrograd Trading Bank. Some of these companies, particularly the Kuznetsky Coal Company and the Bokovo Coal Company, are about to make a supplementary issue of shares, as is also the Donetz Darioff Coal Company, which is financed by the Russian Trading and Transport Bank. In connection with the scarcity of fuel, all these companies propose in the near future to increase their coal production considerably.

CONTENTS.

ARTICLES:—	PAGE
When Products and Coal Supplies.....	1087
Mineral Rights Duty.....	1087
ES:—	
Coal and Shipping.....	1079
Maximum Prices for Steel.....	1081
Mining Accidents and Labour in 1916.....	1082
Mine Managers' Examinations.....	1083
Mining Students' Associations in South Wales.....	1084
Storage of Coal (in Bulk).....	1084
The Economics of Coal Production.....	1084
A Note on the Microscopic Examination of Coal.....	1085
Modified Permit for Pig Iron Dealings.....	1085
South Wales Mining Timber Trade.....	1091
The Iron Ores of Lorraine.....	1091
The Control and Prices of Timber.....	1091
University Education in Relation to Mining Engineering.....	1093
The American Coal Trade.....	1093
Recent Developments in By-product Coking.....	1095
Obituary.....	1095
Labour and Wages.....	1095
Miners' Exemptions.....	1096
Open Contracts.....	1098
The Freight Market.....	1098
Abstracts of Patent Specifications Recently Accepted.....	1098
New Patents Connected with the Coal and Iron Trades.....	1100
Government Publications.....	1100
Publications Received.....	1100
REPORTS OF MEETINGS:—	
South Wales Institute of Engineers.....	1081
THE COAL AND IRON TRADES.....	1088-1091
The London Coal Trade.....	1091
The Tin-plate Trade.....	1091
The By-Products Trade.....	1091
PARLIAMENTARY INTELLIGENCE.....	1092
INDIAN AND COLONIAL NOTES.....	1092
NOTES FROM THE COAL FIELDS.....	1093
LAW INTELLIGENCE.....	1095
COAL, IRON AND ENGINEERING COMPANIES.....	1096
MISCELLANEA:—	
Truck Deliveries of Coal in London—American Anthracite Price Raised—Causes of German Coal Shortage.....	1081
Reserves for Retailers—After-War Employment of Returned Miners.....	1082
Partnerships Dissolved.....	1084
Russian Coal Finance.....	1085
Coke for Motor Vehicles—Staffordshire Iron and Steel Institute—North of England Iron and Steel Prices—London Coal Trade.....	1091
Middlesbrough Iron and Steel Shipments—Distribution of Mining Labour.....	1092
Iron and Steel Wages in the Midlands.....	1095
Engineering Works' Canteens.....	1096
Gas Traction.....	1100

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The Colliery Guardian

AND
Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.
HUBERT GREENWELL, F.S.S., Assoc.M.I.M.E.
 (At present on Active Service).

LONDON, FRIDAY, DECEMBER 7, 1917.

The colder weather has stimulated the London trade, but as the bulk of the larger houses are well supplied, the present tonnage is largely devoted to the poorer class neighbourhoods. Railborne and seaborne qualities are arriving in fairly good quantities.

Until the transport trouble is lessened, trade in Northumberland and Durham appears unlikely to show a better tone. The collieries are working irregularly, and the shipments to neutral ports have

declined considerably. The home demand is well sustained. Best smithies are very scarce, and dear for export at prices up to 33s. 6d. Some ease in slacks is noticeable in Lancashire, but the house coal demand is strong. Large steam coal continues in good request in Hull, especially for neutral destinations, and up to 35s. is quoted for best South Yorkshire hards. Gas coal is very scarce. Stocks of bituminous are accumulating in South Wales, as practically no business is being done outside official requirements. Small coal is abundant. The outlook in Scotland is unpromising, on account of the deficiency of shipping.

Anthracite has a firm tone in Swansea, and large and machine-made varieties are in excellent demand. Peas are offered freely in Llanelli. Patent fuel is quoted 30s. f.o.b.

Tonnage is eagerly sought in the Tyne chartering market, but available vessels are very few in number. Rates for all ports are firm, and offers for Portuguese destinations advanced 5s. Swedish ports also are enquired for on the north-east coast. Humber to London is quoted 21s. The tone is strong in South Wales, but tonnage appears to be increasingly difficult to secure, and recent fixtures have been confined to scheduled ports.

The scheme of calling up men who have entered the coal mining industry since August 4, 1914, has been set in motion. All such men are now available for recruitment subject to applications for exemption on the ground of mistake. The colliery recruiting Courts will decide points in dispute.

Northumberland coal owners and representatives of the Northumberland miners had a further conference in Newcastle last Friday, respecting the miners' application for an increase in the minimum wage rate. The meeting was adjourned until December 15.

The Association of Mining Electrical Engineers (West of Scotland Branch) has arranged to visit the works of Messrs. Mavor and Coulson, 47, Broadstreet, Bridgeton, Glasgow, on Saturday, December 15, at 3 p.m.

The Mining Institute of Scotland will hold a meeting to-morrow (Saturday), commencing at 3 p.m., in the Royal Technical College, Glasgow. Mr. G. Gibbs' paper on "A Fresh Aspect of Intensive Mining in Thin Seams" will be discussed, and if time permits Mr. D. M. Mowat will open a discussion on "Capital Charges Contrasted with Current Expenses."

A meeting of the North of England Institute of Mining and Mechanical Engineers will be held in the Wood Memorial Hall, Newcastle, to-morrow (Saturday), commencing at 2 p.m. Several papers will be open for discussion.

A meeting of the Manchester Geological and Mining Society will be held at 5, John Dalton-street, Manchester, on December 11, commencing at 4 p.m. A paper on "Geology of Manchester as Revealed by Borings," by Dr. Hickling, will be read.

Nitrogen Products and Coal Supplies.

AN interesting statement has recently been made by the Ministry of Munitions with regard to the work done by the Nitrogen Products Committee of the Munitions Inventions Department. The questions which have been under investigation by that body have a far-reaching importance not only in respect to the production of explosives, but also in its relation to the future of agriculture in this country, and indeed throughout the world. Many will remember the alarming statement of that veteran chemist, Sir WILLIAM CROOKES, in 1898. He predicted a shortage in the world's wheat supply owing to a deficiency in fertilisers. At that time practically only two sources of nitrogenous fertilisers suitable for agricultural use were available—viz., Chili saltpetre and ammonium sulphate. In 1913, the world's consumption of Chili nitrate was 2½ million tons, and of ammonium sulphate about 1½ million tons, and the requirements are increasing by 100 per cent. every decade. It is not surprising, therefore, that attention has been given to the possibility of increasing the supply from other sources. Sir WILLIAM CROOKES himself turned his attention to the problem of nitrogen fixation from the air; but, as the Ministry of Munitions reminds us, it was left to other countries to follow up his idea. In this

country nothing was done beyond the recovery of ammonia as by-product of coal distillation at gas works, and at a relatively small number of coke ovens. To some extent this want of enterprise may perhaps be attributed to the prevalent belief that fixation of atmospheric nitrogen could only be commercially profitable where an abundance of cheap water-power was available, and it was in countries like Norway where the practical development of this idea was expected to be alone possible. Electric arc processes, such as those of Birkeland-Eyde and the calcium cyanamide process, accordingly were at first exploited in Norway but suffered from the enormous consumption of power involved. Thus the Birkeland-Eyde process consumed 28.3 kilowatts of energy per pound of nitrogen fixed, and even the more economical cyanamide process consumed 11.0 kilowatts.

In the meantime German chemists were turning their attention to the discovery of a workable process of producing nitrates which would be independent of water power. Amongst these we may first mention the Ostwald method of oxidising ammonia by catalytic agencies. This process is particularly interesting because it is possibly applicable to the production of nitric acid from the ammonia produced in gas works and by-product coking plants.

The Nitrogen Products Committee has given close attention to the question of ammonia oxidation, and as a result several large chemical works in this country are using this method to take the place of the nitre pots used in the manufacture of sulphuric acid. These nitre pots consumed annually about 18,000 tons of Chili saltpetre, and in these times of tonnage scarcity the saving of this amount is an appreciable advantage. The cost of the Ostwald process is given as £2 10s. per ton of pure nitric acid, which includes 17s. 6d. for the cost of liberating ammonia from cyanamide—an expense which would presumably be saved in the cases where the ammonia is directly produced from gas retorts or coke ovens. We have, however, still to learn whether this process will become commercially applicable in coke-oven practice.

A more promising procedure, invented by Prof. HABER, in Germany, is that of the synthesis of ammonia by the direct union of hydrogen and nitrogen at a high temperature and under very great pressures. It is said that by this means ammonium sulphate can be produced at a cost of £6 2s. per ton, corresponding to about 3½d. per pound of nitrogen. Very little appears to be known in this country of the working details of the Haber process; but the Committee above mentioned have had it under close investigation, and a method has now been evolved which is said to have increased its efficiency far beyond anything hitherto attained in German practice. It is highly interesting to note that a semi-technical Haber unit is now in operation in this country, and we may expect that it will not be long before it is established on a commercial basis. The possibilities of the production of cyanamide are also under consideration, and there is every reason to believe that we are on the eve of important departures in the artificial production of nitrogen products in Great Britain.

All methods of nitrogen fixation, however, depend commercially upon cheap electric power, and the Committee is turning its attention to the possibility of reducing the cost of electricity from coal in addition to an increased recovery of ammonia and other by-products. It is known, for example, that ammonia is available as a leading product in the distillation of lignite, or in a Mond plant producing power-gas from coal or peat. In America, the possibilities of the latter method have recently been examined by Dr. T. H. NORTON, who advocates the establishment of an experimental Mond plant of 5,000 horse-power, operating on waste coal, and others of lower capacity for dealing with lignite and peat respectively. There is reason to believe that where coal is cheap this will prove the most advantageous means for obtaining ammonia.

In the meantime it is worth recalling that the production of ammonia from various kinds of coal varies considerably with the temperature of distillation. According to experiments made a few years back by OSKAR SIMMERBACH, the maximum yield of ammonia from Upper Silesian coal occurred at 900 degs. Cent., whilst with Westphalian coal it took place at 850 degs. Cent., and Saar coal required

only 800 degs. Cent. It is, of course, known that concentrated ammonia dissociates at about 710 degs. Cent., but in a dilute state, as evolved in coal distillation, this decomposition apparently occurs only at temperatures exceeding 900 degs. Cent.

The whole question of nitrogen recovery from coal is assuming a prominent place in industrial chemistry of to-day. There can be no doubt that the question has been too long neglected, and one of the few benefits which the war has brought us is that we have been compelled to give our attention to it. Nor is it in this country alone that activity is being manifested in this direction. The whole question of the relationship of electro-chemical industries to coal supplies is being actively discussed in the United States, where the conditions are somewhat different from those in either Germany or Great Britain, owing to the fact that there are not only large coal supplies but also unlimited water power. It might, perhaps, be thought that the Niagara Falls would be selected, without hesitation, as the source of cheap power for these purposes. There is, in fact, already established there the Cyanamide Company of America, which is operating on a 27,000 horse-power scale. But there are divided opinions about the relative advantages of water power or steam plants for the production of electrical energy, and some engineers incline to the view that it would be better to erect large central stations near the coal fields, where it is believed that the cost of developing electricity would not be higher than 14 dollars per horse-power year.

These questions, however, will eventually be solved by experience, as will also the problem of the best process to adopt in the production of nitrates. For the present it is enough to note that Great Britain is not again going to leave this matter to other countries to develop, and also that coal is certain to play an important part in its development.

Excess Mineral Rights Duty.

LAST week we reported the Referee's decision in the case of a dispute between the Duke of Northumberland and the Commissioners of Inland Revenue with respect to six assessments to Excess Mineral Rights Duty. The Duke of Northumberland appealed against the amounts claimed by the Commissioners on the ground that the sum demanded was excessive and was computed upon wrong data. The matter is of considerable importance to mineral owners and deserves attention not only because the Referee did not uphold the Commissioners' claim, but also as an example of the manner in which a simple matter of the plainest common sense can be obscured by the fog of legal argument.

The matter in dispute, plainly stated, was as follows. In order to arrive at the excess profit for any accounting period, it is necessary to determine the pre-war standard, as defined in the Finance Act. In estimating the amount of profit under the Mineral Rights Duty it is permissible to deduct the amount of income tax payable for the current year in order to arrive at the net profit upon which the Mineral Rights Duty is charged. But in the case of excess profit two distinct profits are involved, viz., the standard profit and the profit for the accounting period. In order to arrive at a just comparison, therefore, it is evident that each of these amounts should be reduced by the income tax payable upon them respectively. In the present case, the pre-war rate of income tax was 1s. 2d. in the £, and the income tax for the accounting period was 4s. in the £. The Commissioners claimed that income tax at the higher rate should be deducted both from the pre-war standard as well as from the profit for the accounting year. The result of this procedure would be greatly to increase the apparent excess profit by the simple expedient of reducing the profit of the standard period. For it is needless to point out that the lower the standard profit the higher the excess profit must be. When, however, we are comparing the net profits of any two years, in order to arrive at a just result, it is surely necessary to consider each year independently. If it is desired to compare the 1913 profits with those of 1916, an accountant would, we think, deduct the 1913 income tax from the former and the 1916 income tax from the latter. The Commissioners, however, wished to deduct the 1916 income tax from each.

The referee was not long in arriving at the conclusion that the Commissioners' view was wrong, and the only sound thing about this matter is the fact that it should have gone to appeal at all. It is worth while considering the line of argument by which the Commissioners endeavoured to support their claim. In the first place, they contended that in order to arrive at the comparative yearly profits, no income tax should be deducted from either period. Apparently, however, this question has already been decided in the Appeal Court by Lord Justice BUCKLEY in the case of the Duke of Beaufort v. the Commissioners of Inland Revenue, in May 1913. It is true that in this case the question of excess profits was not concerned, but only the Mineral Rights Duty; but clearly the same principle is involved in each case; and, as a matter of fact, this point was not pressed in the present instance. Nor could it have been, because deduction of income tax was allowed in the printed claims sent in by the Commissioners. Why, then, was it necessary for this point to have been raised at all?

Conceding this much, however, it was then contended for the Commissioners that as the period for the accounting year ended on September 30, 1916, at which time the income tax for the year had not been fixed, the Commissioners could only base their claim on the gross amount, and the income tax payable on the last half year, being then unknown, could not be claimed as a deduction. Proceeding on these lines, but without any visible logic, it was contended that the only definite factor, apart from the tonnages, for the deduction of income tax in comparing the accounting with the pre-war year, was the amount per £ paid in the accounting year, which should be equally applied to the pre-war year, and that no other figure could properly be applied, as in both years the correct income tax for the year ending September 30 could not be ascertained at that date, when the Commissioners were entitled to call for the returns and to assess the amount liable to Excess Mineral Rights Duty.

All this fog of argument seems to imply that because the returns were called for at a certain date, when they could not be correctly made out, since the data were not wholly available, the Commissioners were entitled to apply the accounting year rate of income tax to the pre-war period. We cannot call this argument ingenious, because it seems to lack every element of reason. In any case, the income tax rate for the pre-war year was known, and that for the first half of the accounting year was also known on the date in question, while the rate payable for the second half year was known a short time after. There could have been no conceivable difficulty, therefore, in assessing the net amount of profit in each case, and ordinary people will see no reason why it should have been necessary to have submitted this question to a referee in order to get justice done.

THE IRISH COAL TRADE.

THURSDAY, DECEMBER 6.

Dublin.

Business generally continues active in the port, prices remaining unchanged, although freights have been slightly advanced since last report. Stocks are now very low, owing to the shortage of steamers and ports being closed, but large quantities of coal are awaiting shipment at the other side if vessels can be chartered. Current quotations in the city are as follow:—Best Orrell, 48s. 6d. per ton; best Arley, 47s. 6d.; best Wigan, 46s. 6d.; Pemberton Wigan, 44s. 6d.; best Whitehaven, 46s. 6d.; best kitchen coal, 45s. 6d., all less 1s. per ton discount for cash; Scotch steam coal, 39s. per ton; Welsh steam, 50s.; coke, 46s. 6d. per ton delivered. Prices of Irish coals from the Wolfhill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton, all f.o.r. Athy, the nearest railway connection with the mines. At the Castlecomer Collieries, co. Kilkenny, best large coal is 28s. 4d. per ton at the pithead.

Belfast.

Local trade has improved since the month opened, and a good demand in all departments is reported, although the continued shortage of tonnage is making it still more difficult to get on sufficient supplies, and stocks are considerably run down as a consequence. Freights, already very high, still tend in an upward direction. Prices of household coals are without further change, viz.:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Scotch steam coal is approximately 31s. 6d. per ton for the inferior sorts, while the better qualities are as high as 37s. 6d. to 40s. per ton. The coke is roughly from 42s. 6d. to 45s. per ton. The main coal field at Ballycastle, which was worked last week after 10 months' sinking, is now tapped is about 4 ft. thick, and is the most important in the whole coal field, and is of a high quality of highly bituminous coal to be compared with the Irish coal fields. It is described as being of a high quality, and is much superior to the Scotch coal, and it is expected that it will be some time before the seam will be fully developed.

THE COAL AND IRON TRADES.

THURSDAY, DECEMBER 6.

Scotland.—Western District.

COAL.

The Scotch coal trade shows little change. The volume of business is still restricted, and prospects of an early improvement are not bright. In the west of Scotland the industrial demand and household requirements still provide a certain amount of steady business, but the collieries are not overburdened with orders. Shipments for the week amounted to 72,269 tons, against 120,051 in the preceding week and 90,421 tons in the corresponding week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	20/-25/
Eil	26/6-28/	26/6-28/	22/6-25/
Splint.....	28/-30/	28/-30/	25/-32/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The various departments of the Scotch iron trade continue to show unusual activity. Makers generally have difficulty in meeting demands for home consumption, and consequently exports have fallen to meagre dimensions. The position with regard to fixed prices still causes some uneasiness, but there is now more confidence that an equitable basis will shortly be arrived at. In the pig iron trade the demand for hematite still occupies first place, and everything produced is quickly taken up. On the other hand, foundry iron is difficult to secure, particularly No. 3 grade. As regards exports, makers have practically nothing to offer, and, while prices in some instances are being named, quotations generally are only approximate. Monkland and Carnbroe, f.a.s. at Glasgow, Nos. 1, 140s., Nos. 3, 135s.; Govan, No. 1, 135s., No. 3, 130s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 150s., Nos. 3, 145s.; Glengarnock, at Ardrossan, No. 1, 140s., No. 3, 135s.; Eglinton, at Ardrossan or Troon, and Dalzellington, at Ayr, Nos. 1, 145s., Nos. 3, 135s.; Shotts and Carron, at Leith, No. 1, 150s., No. 3, 145s. per ton. In the malleable bar iron trade makers are finding it almost impossible to do anything outside of war work, and while the export quotation is nominally £16 per ton for ordinary Crown bars, much higher prices could be obtained for guaranteed deliveries. Black sheets, too, are also very scarce, and, like galvanised material, are practically a Government monopoly. The engineering trades are excessively busy.

Scotland.—Eastern District.

COAL.

The coal trade in the Lothians is still in an unsatisfactory condition, and the outlook is not promising. Clearances amounted to 17,591 tons, against 17,422 in the preceding week and 17,668 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	27/-28/
Secondary qualities.....	25/6	25/6	26/-27/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The situation in Fifeshire is also discouraging. Local requirements are quite inadequate to clear available supplies, and the miners are suffering from an overdose of idle time. The shipments for the week amounted to 34,223 tons, against 28,219 in the preceding week and 57,056 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	30/-35/
Unscreened do.....	24/-25/	24/-25/	28/-30/
First-class steam coal.....	28/	28/	28/-32/6
Third-class do.	24/	24/	20/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The prices quoted are subject to an increase of 2s. 6d. per ton apart from French and Italian business.

The aggregate shipments from Scottish ports during the past week amounted to 124,083 tons, compared with 165,692 in the preceding week and 160,145 tons in the corresponding week last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

A week ago we reported that, thanks to the demand on official account and the arrival of a sufficiency of requisitioned vessels, the steam collieries were fairly busy, and that prospects were quite good. Unfortunately, this state of affairs has not been maintained, and prospects have altered decidedly for the worse. Throughout the week the activities of gas coal pits were hampered by reason of tonnage shortage, and now both Northumberland and Durham collieries are suffering to an abnormal extent. The tonnage scarcity set in anew towards the end of last week, and at the time of writing is so great as to have rendered a very large proportion of the pits in the two counties totally idle, and to have caused considerable irregularity of working at the other collieries. The official request for fuel supplies is much less than it was a week ago. Altogether the position of that great portion of the coal trade which is dependent on shipping as its means of transport, has rarely been worse for many months than it is just now. Under the circumstances, prices remain at the scheduled minimum figures. Excepting in those few cases in which purchases by neutral buyers are to be accompanied by the requisite tonnage to carry away the cargoes, export business is practically at a standstill. There is a very fair demand for coal—gas sorts, smithies and coking

coal—for inland consumption, and this, of course, is saving the market from the utter collapse which would otherwise be its fate. There is, too, a strong enquiry for special smithies on neutral account, and prices are again quoted at up to 33s. 6d., which is an advance of 1s. on the week. This description of fuel is scarce. There is a brisk demand for household coal on inland account. Ordinary bunkers are inactive, but specials are in fair enquiry at from 30s. to 32s. 6d. The home market for coke is sufficiently good to absorb practically the entire output, and prices of all descriptions are firmly maintained. The contract to supply the Norwegian State Railways with 18,500 tons of best steam coals over January-February has been divided between two local merchant firms, for options of Northumberland and Durham coals, at the scheduled minima, plus 5 per cent. for merchants' profit. It is interesting to note that, in order to assist in the absorption of the excessively large quantity of steam smalls which is being produced, the licensing authorities are now requiring shippers to take a proportion of small coal along with the large, an arrangement which naturally finds favour with the colliery owners.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/
Do. Tynes (Bowers, &c.)	29/6-32/	29/6-32/	27/6-30/
Secondary, Blyths	25/6-28/	25/6-28/	25/-27/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	25/-27/6
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	20/
Do. Tynes.....	18/6-21/	18/6-21/	17/6
Do. specials.....	20/6-23/	20/6-23/	21/
Other sorts:—			
Smithies.....	25/-33/6	25/-32/6	20/
Best gas coals (New Pelton or Holmside)	25/-27/6	25/-27/6	24/-26/
Secondary gas coals (Pelaw Main or similar)	23/6-26/	23/6-26/	18/-20/
Special gas coals	26/6-29/	26/6-29/	25/-27/6
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	17/-19/
Do. do.			
Northumbrians	26/6-27/6	26/6-27/6	18/-20/
Coking coals	24/-27/6	24/-27/6	18/-20/
Do. smalls	24/-27/6	24/-27/6	17/-18/
House coals	28/6-32/	28/6-32/	27/6-30/
Coke, foundry	42/6-45/	42/6-45/	38/-42/6
Do. blast-furnace	42/6-45/	42/6-45/	34/-36/
Do. gas	35/-37/6	35/-37/6	33/-35/

Sunderland.

The coal market is still dull and featureless. Arrivals of shipping at the week end were scanty, and both steam and gas collieries are feeling severely the pinch of the dearth of boats. Work at the pits is very irregular. The enquiry from abroad is very meagre. Collieries find their chief outlet in requisition shipments and in the home trade, deliveries in connection with which continue fairly good. Bunkers and steam smalls are still weak spots in the market, both classes being difficult to dispose of. In fact, all classes of coal are offering very freely at minimum figures, but few buyers are able to take advantage of circumstances so favourable to their interest. Coke of all makes is steady, and the production is fully absorbed. The Norwegian State Railways have placed their contract for 18,500 tons best steams Northumberland or Durham at buyers' option at schedule prices plus 5 per cent. delivery January and February. Quotations are as follow:—

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	30/
Secondary do.	25/-27/6	25/-27/6	26/
House coals:—			
Best house coals	32/6	32/6	30/
Ordinary do.	30/6	30/6	23/
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	30/
South Hetton do.	31/-32/6	31/-32/6	30/
Lambton unscreened ...	26/6	26/6	18/
South Hetton do.	26/6	26/6	18/
Do. treble nuts	22/6	22/6	21/
Coking coals unscreened	27/6	27/6	17/6
Do. smalls	27/6	27/6	17/
Smithies.....	27/6	27/6	18/
Peas and nuts	27/-28/6	27/-28/6	20/
Best bunkers.....	27/6	27/6	18/6
Ordinary bunkers.....	26/6	26/6	16/6
Coke:—			
Foundry coke	42/6-45/	42/6-45/	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke.....	35/-37/6	35/-37/6	31/

Middlesbrough-on-Tees.

COAL.

Quietness continues to characterise the fuel trade, and the market generally is unchanged. Tonnage is irregular and backward. Enquiry on behalf of neutrals is very small just now, but home demand is heavy. Best Durham gas coals are 27s. 6d., seconds 26s., and Wear specials 29s. Steam smalls range from 21s. to 22s. 6d. Unscreened Durham bunkers run from 26s. 6d. to 27s. 6d. Coking coal continues to be well taken up at round about 27s. 6d. Export business in coke is quiet. For neutrals beehive and patent oven still stood at 45s., and gas house product is strong at 37s. 6d. Demand for coke on home account keeps large, and as the supply is plentiful a considerable amount of business is passing. Average blastfurnace kinds are 33s. at the ovens, and qualities low in phosphorus 35s. 6d. at the ovens, whilst foundry coke is 38s.

IRON.

The principal topic in commercial circles this week is the advance in pig iron prices. At the time of writing, formal official announcement of the change has not been made, but it can be authoritatively stated that home fixed maximum prices of Cleveland pig have been raised 2s. 6d., and export quotations advanced 14s., whilst a rise of 6s. 6d. has occurred in the export price of hematite, all the advances being retrospective to September 17. These alterations make the market rates as follow:—For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge each 95s., and No. 1 99s.; and for shipment to the Allies No. 3 116s. 6d., No. 4 foundry 115s. 6d., No. 4 forge 114s. 6d., and No. 1 121s. 6d., and mixed numbers of east coast

hematite 147s. 6d. for export to the Allies. The quotation of hematite for home consumption remains at 122s. 6d. It is claimed that the advance in the home price of Cleveland pig is justified by normal increase in cost of production, irrespective of conditions brought about by increased price of fuel, and that the latter is a separate matter for adjustment between the Government and the manufacturers. In hematite also, so far as home sales are concerned, the altered conditions will have to be arranged between the Ministry of Munitions and the makers. Export business in both Cleveland and hematite iron is quiet. There is rather more passing in foreign ore, and deliveries against running contracts are now on a fairly satisfactory scale. Government requirements and shipyard needs continue to absorb practically the whole of the manufactured iron and steel works, and consequently little or no effort is made to transact ordinary commercial business. No announcement has yet been made as to the anticipated rearrangement of prices.

Cumberland.

Maryport.

COAL.

Some slackness is noticeable in the coal trade in this locality this week, and for the present, at any rate, the output is again more adequate for requirements. The home market is very steady, and the call for fuel for manufacturing and domestic purposes is undiminished, but the Irish shipping trade is quieter, and at the moment more coal is being sent to the docks than can be dealt with. The situation throughout the coal field is not quite so satisfactory as it was a week ago. Business in the house coal trade is exceedingly brisk. Manufacturing fuel is in strong demand. Coking fuels are in request, but a big proportion of the output is retained for use locally at the coke ovens. Locomotive fuel is firm. Business in the Irish market may be said to be a shade easier than it has been for some months. Shipments for November have been 10,280 tons, compared with 8,030 for October and 10,880 tons at the corresponding period of last year. There has been no change in either home or export quotations. Current prices are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls "	19/2	19/2	16/8
Do. peas "	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) ..	31/	31/	25/
Do. (for foreign-going steamers)	31/	31/	30/
Best works fuel	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	21/6	21/6	19/

IRON.

All the plants between Maryport and Carnforth are working at their fullest capacity. The market for iron is firmer, and there is a very heavy demand for both ordinary and special brands. Quotations are unchanged. The Cumberland iron ore industry is tremendously brisk, and outputs are now increasing. Practically all the production is required for the furnaces in Cumberland and the Furness district. The imports of foreign iron ore for November amounted to 21,500 tons.

South-West Lancashire.

COAL.

The drop in the temperature will probably have the effect of altering the easier tone of the inland household coal market which was noted last week, although at the moment its condition still remains as then reported. With regard to shipping, the increasing scarcity of steamers has been a marked feature recently, and there is no improvement to report. The situation is a very difficult one for all concerned. Supplies of coal are, on the whole, rather more than sufficient for requirements. Prices are according to the official schedule. The coastwise and cross-channel trade at the moment is subject to various interruptions, which are interfering with the shipment of coal to the merchants on the other side who are in urgent need of it. Slacks move away as produced, and for the better grades pressure is being felt.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net)	26/	26/ upwds.	25/6
Medium	21/6-22/6	21/6-22/6	19/ -20/
Do. (f.o.b. Garston, net)	25/	25/ upwds.	24/6
Kitchen	20/6	20/6	18/
Do. (f.o.b. Garston, net)	24/	24/	24/ upwds
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	22/6-23/
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

The attendance on the Manchester Coal Exchange on Tuesday was about as usual. The demand for house coal, and the better qualities of steam and furnace fuel continues keen, but the commoner qualities and fine slacks are rather easier. There is pressure for gas fuel in places, the redistribution scheme not having found its level. There is a good enquiry for coal for shipment.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/ -23/
Medium	22/ -23/	22/ -23/	19/6-21/
Common	20/6-21/	20/6-21/	18/ -18/6
Furnace coal	20/ -20/6	20/ -20/6	17/6-18/
Bunker (f.o.b. Partington) ..	—*	—*	25/ -26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

The whole district is full of work, but it is extremely awkward to get fixed prices for anything, and until the matter of the advance in the maximum prices of pig iron is completed this difficulty will still remain. There is a report that there is a small advance of 2s. 6d. on Cleveland and 5s. on Lincolnshire foundry forge and basic having been agreed to, but it is felt that these prices will not cover the heavy costs that are now ruling in consequence of the fuel and wages having been put to a very high figure. Maximum prices were fixed for cinder—viz., 30s. f.o.t. makers' works.

Yorkshire and Derbyshire.

Leeds.

COAL.

The market on Tuesday was moderately well attended, and was as firm as ever in tone. The spell of cold weather has quickened the demand. Generally speaking, the collieries are not in a position to make much response to any access of orders or pressure for the more rapid fulfilment of orders already booked. The pits continue to work full time, but the output is in many instances barely what it was a month or so ago. There is increased pressure from London and district for supplies of house coal, the wintry soap having so stimulated consumption by the public that in many cases in which it had been possible to lay down stocks deliveries are now insufficient to meet the public demand, and the collieries are urgently asked for heavier supplies. There was keen enquiry on the market for prompt parcels, but few collieries have much, if anything, to offer. Comparatively little shipping is taking place in the coastwise trade at the Humber ports, freights still ruling very high. The collieries are being required to send heavily increased deliveries of house coal into the Birmingham district. In the local markets the demand has increased under the influence of the colder weather, and merchants are busily employed, deliveries from the collieries being, on the whole, fairly satisfactory. Pit prices:—Haigh Moor selected 22s. 6d. to 23s. 6d., Silkstone best 22s. to 22s. 6d., Silkstone house 21s. to 21s. 6d., other qualities 19s. 6d. to 20s. 6d. If there is any change in regard to gas coal, it is that enquiry for supplies goes keener. Many gas engineers have feelings of apprehension as to the future, and those who hold reasonably safe stocks are regarded as very fortunate. Very little in the way of manufacturing fuels is to be secured. The demand is very heavy, and supplies are generally from hand to mouth, all the output going quickly into consumption. Coking slacks are still short, and washed furnace coke is unchanged, the demand being heavy.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/ -21/
Wallsend & London best	21/ -21/6	21/ -21/6	19/ -20/
Silkstone best	21/ -21/6	21/ -21/6	19/ -20/
Do. house	20/ -20/6	20/ -20/6	17/ -18/
House nuts	18/6-19/6	18/6-19/6	16/ -17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/ -24/
Silkstone best	24/ -25/	24/ -25/	22/ -23/
Do. house	23/ -24/	23/ -24/	20/ -21/
Other qualities	20/6-22/6	20/6-22/6	19/ -20/
Gas coal:—			
Prices at pit:			
Screened gas coal	18/ -18/6	18/ -18/6	16/ -17/
Gas nuts	17/ -18/	17/ -18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/ -16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/ -18/
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/ -17/
Small nuts	16/6-17/6	16/6-17/6	15/ -16/
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/ -16/
Best rough slacks	15/6-16/6	15/6-16/6	14/ -15/
Small do.	13/6-14/6	13/6-14/6	12/ -13/
Coking smalls	14/ -15/	14/ -15/	12/6-13/6
Coke:—			
Price at ovens			
Furnace coke	32/	32/	25/8

Barnsley.

COAL.

Although the production is still maintained, the arrangements for delivery so completely absorb output that it is practically impossible to entertain the idea of giving extra supplies. On the other hand, special deliveries by order of the Coal Controller have still to be made to meet emergencies, but this can only be done by reducing supplies in other directions. However, on the whole the efforts of the district committees in regard to the distribution are working satisfactorily, although, of course, it is not possible to secure the particular grade of fuel which may be required in different cases. During the week the renewal of the railway companies' contracts for steam coal has been completed without any difficulty on the basis of 18s. 6d. per ton for Barnsley hards, which includes the increase of 2s. 6d. per ton recently allowed. Although the tonnage required for shipment again has not been so large, owing to the lack of tonnage, the production has been easily disposed of, owing to the continued enormous consumption for home purposes. The supplies for the purposes of the Admiralty are also on an extensive scale, and the railway companies are always pressing for their requirements under the contracts. The position is unaltered so far as steam nuts are concerned, the bulk of the output being taken by the munition and other industries engaged on war productions. The short supply of gas coal has not been improved, but concerns with an unexpected increased demand have a good case for preferential supplies. In some districts gas coal has been brought from Durham, but the tonnage rates and other matter make the transaction unsatisfactory as far as cost is

concerned. Ordinary slacks move off with greater facility, but no material improvement has been effected in regard to the slacks required for coke making. A strong effort is required to obtain anything like a sufficient tonnage to keep the ovens in full operation, and there has been no other alternative but to crush larger coal in case of emergency. The demand for furnace coke continues to be exceedingly brisk, and cannot be fully met. Greater satisfaction appears to be now obtained in regard to deliveries of house coal apart from London and the south, though of course the tonnage does not permit of more than satisfying the immediate requirement of customers.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkstone	22/6-24/6	22/6-24/6	20/ -22/
Best Barnsley softs	21/ -21/6	21/ -21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/ -17/6
Best house nuts	18/6-19/6	18/6-19/6	16/ -17/
Secondary do.	18/ -18/6	18/ -18/6	15/6-16/
Steam coals:—			
Best hard coals	20/ -21/	20/ -21/	17/6-18/6
Secondary do.	19/ -20/	19/ -20/	16/6-17/6
Best washed nuts	18/9-19/	18/9-19/	16/3-16/6
Secondary do.	18/ -18/9	18/ -18/9	15/9-16/3
Best slack	15/ -15/6	15/ -15/6	12/6-13/
Secondary do.	13/ -13/6	13/ -13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/ -19/6	19/ -19/6	16/6-17/6
Unscreened do.	18/ -18/6	18/ -18/6	15/6-16/
Gas nuts	18/9	18/9	16/
Furnace coke	32/	32/	25/8

Hull.

COAL.

Business continues pretty much on the same lines without any material expansion, and without additional difficulties. It is satisfactory that supplies are constant and good, and that shipment is fairly prompt and up to the limits of available shipping. Were more vessels obtainable, it is quite possible that much more business could be done despite the high and all but ruinous freight rates. Large steam coal continues a good market, and anything left over, after Admiralty and other official requirements have been satisfied, meets with good enquiry from neutrals, who are paying up to 35s. for best South Yorkshire hards for prompt shipment. France is a big buyer of West Yorkshire screened sorts, at full maximum rates. Gas coal is scarce, and nuts and industrial fuels are hardly to be had for export, and no Derbyshire fuels of any sort.

Chesterfield.

COAL.

The demand for coal continues much in excess of the available supply. The colder weather has accentuated the call for fuel for domestic use and collieries are pressed on every side for deliveries. Manufacturing concerns are also urgently needing fuel of every quality suitable for iron and steel works, especially cobbles and nuts for gas-producers. Slack for steam raising purposes is in steady demand. Railway companies are pressing for good deliveries of locomotive coal in view of the Christmas holidays. Gas companies are also anxious to secure sufficient supplies of coal to carry them safely through this period. There is nothing new to report in connection with the export trade, the position of which is unchanged so far as the shipment of Derbyshire coal is concerned. This branch of the trade is dead for the time being. The coke market continues firm and active, all the production going steadily into consumption.

IRON.

All classes of iron are in active demand, and all establishments are working at high pressure.

Nottingham.

COAL.

With the prevalence of colder weather the business done by local coal merchants in household fuel is steadily increasing, but it is not by any means brisk considering the time of the year. This quieter demand is attributable to so many householders having secured stocks in the late summer. The output of this class of coal at the collieries is well maintained, and though merchants are ordering liberally to replenish stocks, supplies are more readily obtainable than was the case a year ago. The greatest activity is in the steam coal branch. Owners have a difficulty to meet ordinary contract obligations, and the position is such that very little fuel is obtainable in the open market. In view of the heavy demand for steam nuts, manufacturing firms have to fall back upon what other class of hards they can secure. An active tone pervades the slack market, and the grade of slack most difficult to obtain is that used in the making of coke.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/ -22/	21/ -22/	18/6-20/
Good house coals	20/ -21/	20/ -21/	18/ -18/6
Secondary do.	18/6-19/6	18/6-19/6	17/ -18/
Best hard coals	18/3-19/	18/3-19/	17/ -18/
Secondary do.	17/ -18/	17/ -18/	16/ -17/
Slacks (best hards)	14/6-15/	14/6-15/	12/ -13/
Do. (second)	13/ -13/6	13/ -13/6	10/6-11/6
Do. (soft)	13/	13/	11/

Leicestershire.

COAL.

Groat unsettlement continues regarding the output by reason of the raising of fresh points in regard to the enginemmen. Six weeks ago, after a strike, it was decided that all enginemmen should leave the Notts and Derby local union and join the national organisation. Since then the men concerned have been working on a day-to-day agreement. It appears that a few men have joined the Notts and Derby local union, and trouble is threatened if they do not join the National Union of Enginemmen. At the week-end business was completely upset, as the "period of grace" had expired without any agreement for normal conditions being resumed. Large quantities of coal were held up in consequence. The temporary suspension of business caused great inconvenience not only to the management of collieries, but also to merchants expecting their ordinary deliveries. The demand for London and district is very heavy, and embraces all grades of household, main and deep cobbles, and nuts and

for mechanical stokers. Country coal merchants are making larger deliveries, as the consumption for the larger centres of population is rapidly increasing. There are no stocks of any kind at present, and the whole of the output at the pits is being sold day by day.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/
Second, hand picked	19/-20/	19/-20/	15/6-17/
Deep screened cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/
Small nuts	17/-18/	17/-18/	14/6-15/6
Deep breeze	15/3-16/	15/3-16/	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/
Main nuts for London kitcheners	16/-17/6	16/-17/6	14/-15/
Stams, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Stams, seconds	15/6-17/	15/6-17/	13/6-15/
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

The frost and snow at the beginning of the week delayed deliveries, a serious matter in these days of short staffs. Pressure all round continues to be very heavy, and the collieries are hard pressed. Slacks are getting scarcer. Demand usually increases at this time of the year, and good qualities are very tight. Smudge is fairly plentiful. Nuts and smalls generally are in active request, and works engaged upon Government contracts make a heavy call upon supplies. Iron works also want them in large quantities for gas making. The colder weather is stimulating demand for house coal. Supplies coming forward do not permit of the accumulation of stocks.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep	24/6	24/6	22/
Do. seconds deep	22/6	22/6	20/
Do. best shallow	21/6	21/6	19/
Do. seconds do.	20/6	20/6	18/
Best hard	21/	21/	18/6
Forge coal	18/6	18/6	16/
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder	21/6	21/6	19/
Do. hand-picked			
cobs	20/6	20/6	18/
Best hard spires	22/6	22/6	20/
Forge (steam)	18/6	18/6	16/
D.S. nuts (steam)	17/	17/	14/6
Small (do.)	17/	17/	14/6

IRON.

A gratifying feature of the Wages Board returns for September and October is the indication they afford that the workers of the district are putting in good value. The figures are those of 17 firms only, but they furnish an index to the general experience. The total output of these firms amounts to 31,504 tons, an increase of nearly 1,500 tons over the preceding two months. Bar iron constituted nearly 69 per cent. of the total, and hoops and strip just over 25 per cent., the balance being made up of angles and tees, plates and sheets. The selling price of £15 7s. 2d. is nearly 1s. 6d. above that for August and September, but is not sufficient to carry with it, under the sliding scale, an advance in wages, which remain at 18s. a ton for puddling, a figure unprecedented in the history of the trade. A substantial share of the standard bars is allotted to agricultural implement makers, who require iron of standard quality and finish. Merchant bars, which are used for a tremendous variety of purposes, are in continuous demand, and makers have about three months' work on hand. The maximum of £15 10s., less 2½ per cent., for marked bars has been in operation since August of last year, and of £13 15s. net for merchant bars since March 1916. Mean-time cost of production has increased appreciably, and makers are beginning to get a bit restive. The average net selling price for all descriptions worked out at £14 19s. 6d. Nuts and bolts command £14 10s. delivered in the Black Country. This is a slightly higher figure than prevailed some weeks ago, and is in some measure caused by the high cost of the puddled iron, which is not obtainable under £12 15s. The heavy export demand for small sizes is neutralised by the equally insistent call for home requirements. Tube discounts have remained stationary for a long time, and the houses making smaller tubes feel a grievance. The larger houses are under Government control, and the authorities do not look with particular favour on any attempt to raise values. Pig iron is being sold more freely than recently, houses which could not be persuaded to do business a few weeks ago having returned to the market, but they have inserted a more straight proviso in the contract notes, which stipulates that any advance shall take effect from the date of the advance, and not, as formerly, on undelivered balances of contracts.

Devon, Cornwall, and South Coast.

Plymouth.

COAL.

Messrs. Wade and Son report an average arrival of house, steam and gas coal, without any strong pressure for supplies, which are coming to hand in sufficient quantities to keep up with the orders that are being received. The difficulty about obtaining stocks is still nearly as great as ever, and as mid-winter is now at hand this will be keenly felt in the near future. While a few merchants have been able to place a fair quantity of coal into stock, the majority have been unable to do so, and are therefore, dependent on day to day deliveries. It is entertained that the new supply of coal will help matters in the near future, but is not obtainable in the No. 13 area at present, as there are scarcely any stocks of the old course of trade. The situation is an imperative one, and further limitations in the number

Forest of Dean.

Lydney.

COAL.

Conditions are practically unchanged in the house coal trade. The heavy demand shows no signs of abating, the general tone of the market being exceedingly firm. Full time is worked, and there are no stocks of any description. Consumers are still experiencing a difficulty in procuring sufficient supplies of steam and manufacturing fuel. All the pits are as busy as possible.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/
Forest	25/6	25/6	23/
Rubble	25/9	25/9	23/3
Nuts	24/	24/	21/6
Rough slack	15/6	15/6	13/
Steam coal:—			
Large	22/6-23/6	22/6-23/6	20/
Small	18/-19/	18/-18/6	16/-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE WELSH COAL AND IRON TRADES.

THURSDAY, DECEMBER 6.

Monmouthshire, South Wales, &c.

Newport.

COAL.

Lack of tonnage is now the greatest obstacle to the improvement in the coal trade of this district. In steam coal things have been remarkably quiet during the past week. There are some heavy stocks, particularly of small coal, which has become a great drug in the market. A good enquiry for gas and house coals is current. Coke has been scarce and would command a higher price than that in the Controller's schedule. Patent fuel was plentiful, and the price had a drooping tendency. Work at the collieries has been very intermittent on account of the lack of wagons.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large	32/6	32/6	27/-28/
Western-valleys, ordin'y	31/6	31/6	26/-27/
Best Eastern-valleys	31/6	31/6	25/-26/
Secondary do.	30/6	30/6	24/-25/
Best small coals	23/6	23/6	18/-19/
Secondary do.	22/6	22/6	15/-17/
Inferior do.	20/6	20/6	12/-14/
Screenings	25/6	25/6	18/-19/
Through coals	29/6	29/6	—
Best washed nuts	32/6	32/6	—
Other sorts:—			
Best house coal, at pit	35/6	35/6	24/6-26/6
Secondary do. do.	33/3	33/3	22/-24/
Patent fuel	32/6	32/6	36/-38/
Furnace coke	47/6	47/6	47/6-52/6
Foundry coke	47/6	47/6	57/6-65/

IRON.

There is no change in the iron and steel markets of the district. The tin-plate trade shows a steady tone and gives evidence of improving its condition as time goes on. All the works in the district are maintaining a good output. As the bulk of the work is on Government account, prices are purely nominal. Pitwood arrivals have been only moderate and the price is still maintained at 75s.

Cardiff.

COAL.

The market shows no sign of improvement. It is becoming more apparent week by week that the quantity of tonnage available for commercial purposes is a long way from being sufficient to meet requirements. A week or so ago the stormy weather interfered with arrivals, and this was looked upon as a temporary lull which should give place to increased briskness as the days rolled on. There was a slight improvement certainly, but the vessels available for cargo purposes were much below anticipations and competent authorities on 'Change state that last week was the worst week so far as tonnage is concerned since the commencement of the war. Interest is being taken in the Commission appointed to investigate and suggest remedial measures, but it is generally felt that little will be done unless very strong action is taken, and the action of the Controller in objecting to the appointment of a larger and more representative committee is meeting with criticism. It is feared that the present committee will hesitate to recommend measures which a more powerful body might suggest, and that little real good will be done beyond the collection of data. Although no actual figures are available at the moment, it is contended that the coal field is producing 25 per cent. more coal than can be disposed of by the existing transport facilities. In other words, in order to maintain a steady output for the Admiralty and official Allied orders, the collieries need not work more than four and a-half days a week. This fact is evidently being brought to the notice of the military authorities, for the exemption certificates of all workmen who became engaged in mining operations since August 4, 1914, have been cancelled. This, of course, is subject to the usual personal rights of appeal, but it is evident that by the operation of this regulation a large number of men will be released for military service. Stocks accumulate, especially smalls and inferior grades, notwithstanding that banking is being heavily resorted to in certain instances. Even this, however, has not been sufficient to release sufficient wagons to keep the collieries going, and frequent stoppages are reported throughout the coal field. To add to the difficulties, a strike of shopmen employed by the Taff Vale Railway Company took place at Cardiff, on Monday, and for some hours shipments were interrupted at Penarth owing to the tips being rendered idle. The dispute was one of principle, the shopmen claiming the same advance in war bonus as the traffic men, and it was only on the promise of Mr. E. A. Prosser, the general manager of the Taff Vale, Rhymney and Cardiff Railways, to bring the matter before the Railway Executive that the men resumed work. Still, the effect of the stoppage, slight as it was, re-acted on the collieries, and stoppages were numerous on Tuesday owing to inability to clear wagons which had been despatched to the docks. In Monmouthshire the inland demand has eased the situation, and the distribution

scheme is now working more smoothly than was anticipated. There is an active enquiry for bituminous and gas making coals, and the various coke ovens are also turning out maximum outputs. Patent fuel is plentiful, and the shipments would be considerably heavier if only the requisite tonnage could be obtained. All transactions continue to be on the basis of the Controller's fixed schedule, plus the extra 2s. 6d. per ton to meet the increase in miners' wages. Pitwood is still scarce, and Admiralty collieries have the first call on the cargoes that are being landed. No announcement has yet been made as to the fixing of maximum rates, and in the meantime importers are securing 70s. to 75s. per ton ex ship for best French fir.

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	27/-30/
Ordinary	30/	30/	25/-26/
Steam smalls No. 1	21/6	21/6	19/-20/
Do. 2	21/	21/	—
Do. 3	20/6	20/6	17/-19/
Do. 4	20/	20/	—
Do. 5	19/6	19/6	15/-17/
Do. 6	19/	19/	—
Do. 7	18/6	18/6	15/-17/
Do. 8	18/	18/	—
Best dry coals	30/	30/	26/-27/6
Ordinary dries	28/6	28/6	24/-26/
Best washed nut	30/	30/	27/6-30/
Seconds	28/6	28/6	27/-28/
Best washed peas	27/6	27/6	26/-27/
Seconds	26/6	26/6	25/-26/
Monmouthshire:—			
Black Veins	30/	30/	29/-30/
Western-valleys	29/	29/	28/-29/
Eastern-valleys	29/	29/	27/-28/
Inferior do.	28/	28/	23/-26/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda:—			
Bituminous large	30/9	30/9	29/-30/
Small	26/	26/	20/-22/
No. 2 Rhondda:—			
Large	27/	27/	28/-30/
Through-and-through	22/-23/6	22/-23/6	20/-22/6
Small	17/-19/	17/-19/	18/-20/
Best patent fuel	30/	30/	39/-40/
Seconds	30/	30/	37/6-39/
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	55/-60/
Furnace coke	47/6	47/6	50/-55/
Pitwood (ex-ship)	70/-75/	70/-75/	48/-50/

Nominal.

IRON.

The tin-plate trade continues very firm, but as most makers have contracted for their output several months ahead, they are reluctant to entertain new business, especially as the prices of raw material show a tendency to increase. Since last week block tin has further advanced, and the quotation now exceeds £293 per ton, which is a record. It is predicted that £300 will be reached before the year is out, and present indications show that this is very probable. This means that Bessemer standard cokes are 1s. 3d. per box higher than the controlled rate of 30s., with other sizes in proportion. Permits are now being more freely granted for the utilisation of wasters, the reduction in the accumulated stocks of these plates making a considerable difference to makers, who are being inconvenienced both physically and financially by the holding up of these particular grades. Shipments last week amounted to 15,050 boxes, against 27,543 boxes received from works, thus leaving 99,000 boxes in stock in the docks warehouses and vans, against 86,511 boxes the preceding week, and 137,164 boxes at the corresponding date last year. The award of the Committee of Production as to the bonus of tinplate workmen not proving acceptable, the joint committee of owners and workmen met on Thursday last and arrived at a mutual settlement by which it has been agreed that workmen earning up to 20s. per week should receive 52½ per cent., from 20s. 1d. up to 60s. 6s. per cent. and over 60s. per week, a bonus of 50 per cent. This of course is subject to the sanction of the Ministry of Munitions. It is not improbable that a similar course will be followed in the iron and steel trades. In the latter all works are being maintained at maximum pressure, and the demand both for pig iron and finished steel continues unabated. There is also an increasing enquiry for steel for shipbuilding purposes, for which extensions and additions are rapidly being made at the various works in the district. The galvanised sheet trade is unchanged, all works being busy on black plates. Spelter remains steady at £54. Iron ore supplies are satisfactory, and outputs are well maintained. In scrap metals there is a brisk demand, all material changing hands at maximum rates. In all other departments prices are nominal.

Swansea.

COAL.

A capital attendance assembled on 'Change, and the anthracite coal market exhibited a firm tone. Large was in excellent demand, as were also machine-made varieties. Peas were more freely offered. Rubbly culm and duff were devoid of feature, and were in very poor demand. Steam coals were easy all round.

Llanelli.

COAL.

The tonnage position is far from satisfactory, and stocks of many qualities of coal are therefore accumulating. Many of the collieries are not working full time owing to the difficulty of securing a satisfactory supply of empty wagons. Large anthracite qualities are maintaining their active position, and supplies of the better grades are difficult to secure. Cobbles are also in good demand, and sellers well booked up. Nuts and beans are very firm, and inland buyers in particular find it difficult to get their orders placed. Prompt delivery is out of the question, and orders are on hand several weeks before coal is sent forward. Peas are not in satisfactory demand, and supplies are offering very freely. Culm and duff are very weak, and the heavy stocks at colliery and also in trucks are increas-

ing each week. Steam coals in particular are a weak section of the market, and practically all qualities are easily obtainable. Large kinds have not such a firm tone as compared with a few weeks back. Even the better grades lack support. Throughs are in poor demand and stocks accumulating. Smalls generally are weak, and as stocks on hand are very heavy, sellers are worried over the long delays which ensue before wagons are cleared. House coals are very firm, and manufacturing coals are also in good demand, with local works taking practically all quantities offering.

Prices f.o.b.

	Current prices.	Last week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	29 6-32/
Seconds	27/6	27/6	27 6-30/
Thirds	25/6	25/6	24/-25/
Red Vein large.....	42/6	42/6	37 6-40/
Machine-made cobbles.....	41/	41/	—
Seconds	39/	39/	—
Thirds	36/	36/	—
Red Vein cobbles.....	42/6	42/6	—
Machine-made nuts.....	41/	41/	—
Seconds	39/	39/	—
Thirds	36/	36/	—
Red Vein nuts	—	—	—
Machine - broken - beans (best).....	35/	35/	28/6-29/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/-22/
Rubbly culm.....	13/	13/	10/6-11/6
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	27/-28/6
Seconds	27/	27/	—
Cargo through	23/6	23/6	19/6-22/6
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Smalls	19/	19/	13/6-17/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls... ..	24/	24/	17/-19/6
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

THE LONDON COAL TRADE.

THURSDAY, DECEMBER 6.

The colder weather has greatly stimulated the demand for house coal in the London district, but a fair supply has been coming forward. The daily execution of the orders received has checked the putting of more coal on the ground, and all the railborne coal brought forward has been easily dealt with. Some of the depots in the north of London are well supplied, and merchants are cancelling back orders, so that it is evident a fair supply is in hand; but the southern depots, and especially the stations outside the London area, are still very short of supplies and are pressing for coal. At the depots a good deal of activity is noticeable, and although the days are shorter, the weather has been favourable for getting the deliveries well in hand, and the loaded wagons are promptly unloaded and returned to the colliery. Steam coals and hard screened cobbles are particularly wanted, and the supply is very short. The heavy orders from the munition works and from the railway companies entirely absorb the diminished output, and there are practically no offers for this class of coal on the market. Slacks are moving freely, especially the better qualities of nutty slacks. Fine slacks are difficult to sell. In the seaborne market the supply has been fairly good; 22 cargoes arrived in the River Thames for Monday's market, and 20 for Wednesday, but all were contract cargoes. Gas coals have been well maintained, and the huge supplies in many of the gas works make it a much more satisfactory outlook than in many of the previous years, especially as the turn of the year usually ushers in a diminished demand for gas, both for lighting and heating purposes. The temperature has been well below freezing point practically all the week in London.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, NOVEMBER 30.—There was a good enquiry for seaborne house coal. The weather continuing cold, there was a firm tone, but no sales reported. Supply scarce. Cargoes 11.

MONDAY, DECEMBER 3.—There was a good demand for seaborne house coal at market, but no cargoes on offer. Cargoes 22.

WEDNESDAY, DECEMBER 5.—There was a very poor attendance on market, which ruled quiet. No sales reported. Cargoes 20.

Coke for Motor Vehicles.—Some of the authorities are viewing with apprehension the gas bag motor vehicles which are to be seen so frequently now in the streets of London, and it is understood that steps have already been taken to stop the practice so far as it is applied to motors which are not used for military or other national purposes. Coke fuel has been taken up lately with a view to its adaptation for use in ordinary buses. Experiments at Chelmsford with a patent coke apparatus for superseding oil for generating steam is said to have proved highly satisfactory, and it is reported that the same amount of work and the same distance can be covered by an expenditure of 5s. in coke, which would cost 24s. in oil. Mr. T. Clarkson, of the National Steam Car Association, has invented a coke furnace, and it has been decided to apply it to all the company's buses running in the London area. With coke, it is estimated that 25 minutes will be sufficient to get up steam, and once this is secured, a run of fully 40 miles can be made at an average speed of 12 miles an hour without a stop. In the Midlands and in the Yorkshire district special powers are being applied for "To make further provision with reference to the supply of gas produced from coke ovens (hereinafter referred to as coke oven gas), and to authorise the companies to supply this coke oven gas for lighting purposes and such other purposes as may be found useful."

SOUTH WALES MINING TIMBER TRADE.

A deputation to the Deputy Controller received the answer that the Department thought that the Powell Duffryn Colliery Company should be allowed to import supplies of pitwood direct in order to cover a deficiency in its original statement of requirements. The Pitwood Importers' Company opposes the concession, and stated that the colliery company has repeatedly refused offers from merchants who import pitwood. Pitwood merchants view with alarm the tendency of the Government to allow colliery companies to import direct. For if one receives the concession other colliery firms will ask for the same. Apparently there is a tendency to do away with the services of the merchant in this as in other directions. Pitwood importers' business has now been whittled down to very small dimensions. A Pitwood Importers Syndicate exists for importing supplies of pitwood direct to the South Wales collieries. Its agents are Messrs Lysberg Limited, who with Messrs. F. P. Thomas and Company constitute the Admiralty Pitwood Committee for the supply of pitwood to Admiralty collieries. The collieries supplied by the Syndicate (and therefore by the Admiralty Committee) include many South Wales colliery companies. To meet the lessened supplies of foreign wood arriving, the Monmouthshire and South Wales Coal Owners' Pitwood Association was formed to exploit, develop, fell and transport home-grown timber to the members of the association, who number over two-thirds of the companies forming the Coal Owners' Association of Monmouthshire and South Wales. Mr. Finlay A. Gibson, the secretary, has created large and regular deliveries of home-grown wood to the collieries. This, together with the Admiralty Pitwood Committee's efforts, cut down to a minimum the business of pitwood importers and merchants, and apparently the day is not far distant when collieries will secure their supplies direct.

Imports of Foreign Mining Timber.

The imports of foreign mining timber for the week ending November 30 amounted to 8,536 loads, of which 5,093 loads were received by the agents supplying the Admiralty contracts, while 3,443 loads were divided amongst the approved importers. The actual consignments were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Nov. 24	William Mathwin	500
" 24	W. A. Williams and Company	48
" 24	Lysberg Limited	1,800
" 26	Morgan and Cadogan.....	480
" 28	Lysberg Limited	720
" 28	Lysberg Limited	693
" 29	F. Thomas and Company	1,500
" 29	Morgan and Cadogan.....	300
" 29	W. H. Williams and Company	120
" 29	W. H. Williams and Company	215
" 30	Lysberg Limited	1,380
" 30	Mathew Thompson and Co. ...	780

Total... .. 8,536

There were no imports reported at Newport, Swansea or Port Talbot. Market prices were strongly maintained at 75s. per ton ex-ship, and doubtless this will continue until the fixed price of 65s. per ton come into operation. Home-grown timber was in exceptionally good demand, and the very best sorts commanded 75s., although inferior was purchasable at from 65s. per ton upwards. Very shortly an Allocation Committee will be formed for the equitable distribution of supplies. This committee will be composed of Mr. Finlay A. Gibson, colliery representatives and Mr. W. St. D. Jenkins, the Assistant Director of Navy Contracts.

THE TIN-PLATE TRADE.

Liverpool.

With tin in the neighbourhood of £290 per ton, makers of tin-plate are entitled to charge about 31s. 3d. per basis box for cokes, f.o.t. at works, net cash; and whilst most of them are asking this figure, some works are willing to accept about 6d. a box less for January delivery. The enquiry in the last few days has fallen off, and it is evident that some of the mills can do with a few more orders on their books. Wasters are in demand, butterne-plates meet with a poor enquiry, and well below the official maximum is being quoted with a view to tempting orders.

THE BY-PRODUCTS TRADE.

Tar Products.—Tar has improved slightly in value, and pitch is still in demand. The London quotation for the latter is 48s. f.o.b., and the higher tendency is also shown in the provincial quotations. The oft-repeated statements as to prospects becoming brighter when shipping facilities are better might be applied to many commodities. The present outlook for improved shipping arrangements is not particularly promising. The winter obviously affects the position also, so that it is satisfactory to find the tone so strong, despite accumulations of stock. Solvent naphtha continues in request at 4s. 3d. to 4s. 6d. per gallon net in bulk at maker's works. Forward sales for near months are restricted by the limited supplies still open to buyers. Hardly any of the other by-products have moved materially in price. Current quotations are:—Coal tar, 26s. 9d. to 30s. 9d. Pitch, east coast, 20s. to 25s.; west coast, Manchester, 18s. 6d. to 19s. 6d.; Liverpool, 19s. 6d. to 20s. 6d.; Clyde, 19s. 6d. to 20s. 6d. nominal. Benzol, 90 per cent., north, 10½d. to 11½d.; 50-90 per cent. naked, north, 1s. 3d. to 1s. 4d. Toluol, naked, north, 2s. 3d. Coal tar crude naphtha, in bulk, north, 7½d. to 8½d. Solvent naphtha, naked, north, 3s. 6d. to 3s. 8d. Heavy naphtha, north, 1s. 8d. to 1s. 10d. Heavy oils, in bulk, north, 4½d. to 4½d. Creosote, in bulk, north, 3½d. to 4½d. Carbolic acid, 60 per cent., east and west coasts, 3s. 4d., naked. Naphthalene salts, 80s. to 90s., in bags. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia.—A steady business in sulphate is passing at official prices. The Nitrogen Products Committee has reported in favour of the construction of a factory for cyanamide or for sulphate. The Committee is in favour of practically testing the production of synthetic ammonia, a subject which is receiving the attention of the United States Government.

Besides £5 per annum allowed as rebate from miners' income tax for oil, candles, and gear, a further allowance of £4 per annum has been conceded for clothing dating from July last.

THE IRON ORES OF LORRAINE.

Prof. FEARNSIDES lectured before the Sheffield Society of Engineers and Metallurgists, at Sheffield University on Saturday evening, on "What Alsace Lorraine Means to Sheffield." Mr. G. BLAKE WALKER presided.

Prof. FEARNSIDES said the Germans were undoubtedly fighting for the coal fields of North-Eastern France and the iron of Lorraine. The output of iron ore from Lorraine—that is, the German output—had risen from practically zero in 1870 to 20 million tons at the outbreak of war, more than the annual production of Great Britain and Ireland, and it now had the greatest output of all the German iron fields. That was what Lorraine meant to Germany. On account of their great excess of iron over coal, French eyes were turned longingly towards the great Saar coal field. A good deal more than half our imports of iron ore came from Lorraine, and the ore was of a very similar type to that obtained in the Northampton area, that is, it was a basic ore, but Sheffield, as the home of high-class steel, did not like basic phosphoric ores. If, however, Sheffield could not have acid material, she would have to make use of the supplies of basic ore. In the period 1904-13, while the British output had increased from five to seven million tons, that of Germany had risen from nearly 10 to 20 million tons per annum, while that of France and Belgium had increased on a similar scale, simply because these countries were making use of the basic material. We had plenty in England exactly similar to that obtained from Lorraine, and it was really very near the coal. In Cleveland, Northamptonshire, and Lincolnshire there was an almost illimitable supply. He wished to emphasise the importance of using this basic material. His object was to show the tremendous supplies of Lorraine, and we had similar supplies in this country. Given supplies of basic material, and that which came from coal—power—there was no reason why we should look in any way backwards. The map showed that we had great supplies of basic iron ore within 50 miles of great supplies of coal, so it looked as if we would be able to face the future with confidence.

THE CONTROL AND PRICES OF TIMBER.

The Board of Trade announces two Orders under the Defence of the Realm Acts. The first fixes maximum prices for home-grown timber at all stages from the standing tree to the plank, and the second prohibits the export of native timber from Ireland without a permit, for which application must be made to the Assistant Controller of Timber Supplies (Ireland), 6, Hume-street, Dublin. It is emphasised that as regards standing timber the maximum prices are intended to apply to timber of the best quality in the most accessible positions. Prices for other timber should be based upon the maximum rates, having regard to the usual factors of quality, accessibility, haulage and other conditions.

The maximum prices per cu. ft. fixed by the Order for standing trees include the following:—Larch 1s. 4d., Scots pine and Douglas fir 11d., spruce and other firs 10d., poplar 1s. 3d. For timber felled and trimmed lying in the wood these prices may be increased up to 10 per cent. The Order also fixes maximum prices for timber in the round, sawn, or converted state. The maximum price for larch logs is 2s. 6d. per cu. ft. (selected lengths and diameters 3s.); Scots pine and Douglas fir logs 2s. 1d. (selected lengths and diameters 2s. 4d.); spruce logs 2s. (selected lengths and diameters 2s. 3d.), less allowance of 10 per cent. of volume for bark.

Staffordshire Iron and Steel Institute.—A paper on "Grey Cast Iron," by Mr. J. E. Hurst, of London, will be read at a meeting of the institute to-morrow (Saturday), in the Technical School, Suffolk-street, Birmingham. The chair will be taken at 6.30 p.m.

North of England Iron and Steel Prices.—During the two months ended October 31, the sales of manufactured iron by firms associated with the Board of Conciliation and Arbitration for the Manufactured Iron and Steel Trade of the North of England amounted to 8,462 tons, at an average net selling price of £13 15s. 4-29d. per ton, as compared with 7,855 tons, at £13 13s. 4-43d., for the previous two months. In accordance with the sliding scale, wages for December and January are unaltered.

London Coal Trade.—The attention of the Minister of National Service has been called by the Metropolitan Coal Distribution Branch of the Board of Trade to the serious condition of the coal trade in London and the neighbouring areas; and he has given instructions not to call up, during the winter months, certain men employed in the trade as carmen, loaders, or craftsmen, or on the administrative staffs. In addition to these classes, however, a certain proportion of the trade—in some districts of London a very material proportion—is carried on by men variously known as "master coal carmen," "coal hawkers," or "coal dealers," who serve a useful function, especially in supplying coal to working class customers from trolleys. It is impossible to give general protection to men of this description, as many of them may not be engaged in the coal trade for the whole of their time; but Mr. Hayes Fisher has been asked to recommend this class of men to the favourable consideration of tribunals, in so far as they are principally and usually engaged in the coal trade. It is suggested that, as a general rule, men so engaged might reasonably receive exemption until the end of February or the middle of March; though tribunals will, of course, exercise their discretion in individual cases, especially in regard to young men of high medical fitness. Coal hawkers, dealers, master carmen, and other men engaged in the coal trade should, as far as possible, be kept together, in order that they may be dealt with on a general and comprehensive plan; and, where there is evidence of waste of man-power owing to overlapping exemptions, the tribunal should exercise their right of refusing exemption to a certain proportion of the applicants in order to put pressure upon the remainder to organise themselves with a view to utilising their collective man-power to the best advantage.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—December 3.

House went into Committee on the Coal Mines Controversy (Confirmation) Bill.

Mr. H. SAMUEL spoke in support of the new clause which Mr. Runciman had moved on his behalf the last time the Bill was in Committee:—

Provided that it shall be the duty of the Coal Controller to provide from any funds receivable by him by virtue of his control of mines for the fulfilment of any financial obligations imposed upon him by the said agreement without recourse to moneys to be provided by Parliament.

He said that the clause brought before the Committee a point of considerable constitutional importance. The Bill imposed on the Coal Controller the duty of making good certain profits to coal owners. These profits were to be paid, it was anticipated, out of the funds in the hands of the Coal Controller, and the clause provided that it should be his duty to pay them out of those funds, and not ask Parliament subsequently for money to make good any deficit. The Government ought to take one of two courses—either say that the scheme should be self-contained, or say that it might involve a charge upon public funds, in which case they ought to put the ordinary financial clause in the Bill and move a corresponding resolution.

Sir GORDON HEWART (Solicitor-General) said the view of the Government had already been stated that whether they looked to the provisions of the Bill, the clauses of the agreement, or the intentions of those concerned, it was clearly intended that the agreement should be self-contained and self-sufficient. It was contemplated that the payments which were to be made under the name of coal mines excess payments would suffice to provide the money which the Coal Controller might have to disburse under clause 4. The four reasons on which that view was based were:—(1) That the Coal Controller was to receive 15 per cent. of the profits after 80 per cent. of excess profits; (2) that he was to have control of prices; (3) that the only circumstances in which he can be called on to pay considerable sums under the head of guarantee would be circumstances in which the coal mines, a good many of them, had failed to come up to their profit standard; and (4) that, under the provisions of the agreement, the Coal Controller would have it in his power to determine the agreement if it appeared that it was likely to defeat the expectations of those who were responsible for it. While he held, therefore, that a financial resolution was superfluous for this Bill, the Government had never excluded the remote contingency that they might have to come to the House for the provision of funds. The purpose of the proposed clause was merely an academic attempt to impale the Government on the horns of a dilemma.

Mr. LEIF JONES said that no doubt the Coal Controller meant the scheme to be self-supporting, but he was not entirely master of the situation. The demand for a cheap loaf and the fixing of the price had compelled the Wheat Commission to convert an expected surplus into a deficit. There might be a parallel experience with coal. In the absence of a financial resolution, the clause would be valuable as a direction to the Coal Controller and an indication of the wishes of Parliament.

Mr. PRINGLE complained that no estimates had been furnished to the House by the Government in connection with the Bill.

Sir JOSEPH WALTON said if the Government accepted the proposed new clause they would be committing a distinct breach of faith with the coal owners. Many of the coal owners had communicated with him to say that the Government, having broken their part of the bargain, which they would do if they abandoned the guarantee, they (the owners) ought not to be bound by the conditions imposed upon them by the agreement. The amendment, if accepted, would debar the Government from inserting in the Bill, if necessary, proper provision for the compensation of the coal miners. There should be a Government guarantee which should not only provide compensation to the coal owner through losses from Government interference, but that should also provide fair and equitable compensation for the miner who suffered by the Government interference. If the hopes and expectations of the Government and the Coal Controller were unfortunately disappointed, and there was a deficit, the burden should be equitably shared by all taxpayers.

Sir F. BANBURY asked for a guarantee that in the event of its being found necessary to come to Parliament for financial aid, the Government would bring in a Bill for the purpose.

Sir G. HEWART having given the guarantee, the proposed clause was withdrawn.

It was agreed that the Defence of the Realm Regulation on which the Bill is based means the Regulation now in force.

Sir J. WALTON moved the omission of the schedule which embodies the agreement with the coal owners. He said a fairer arrangement would be that the money should be paid out of the public Treasury, and that all who were assessable to excess profits should be treated alike.

Sir C. CORY seconded the amendment. He thought they were proceeding on extremely dangerous lines by accepting a Bill of this kind, where the agreement which formed the real substance of the Bill was not in the Bill, and could not be discussed in that House. He objected to the method of procedure which had brought about this agreement. The Mining Association which gave its authority to the consultative committee to make this agreement acted *ultra vires*, and, by having agreed to this Bill before it came into that House, they had put themselves outside the possibility of inserting any amendments in the Bill. Moreover, this proceeding of the Mining Association precluded any people who had nothing whatever to do with the Mining Association from having a say in the matter. There were burdens which were not in any way met under this guarantee. In regard to the pre-war standard, the guarantee only made it up subject to the output being kept up. If the output was reduced through no fault of the coal owner, but entirely due to the action of the Controller, he had a reduction in his pre-war profit standard, and that was not made up.

He asked the Committee to pass the schedule, but the Bill could not exist. It had not been the intention of the Government to deal with every individual owner. All they could do was to go to the only large body of coal owners—a body which was assessed 15 per cent. of the owners. He was not satisfied with all the actions of the Coal Controller, but he thought that what had been done was in the national interest.

Mr. W. F. ROCH regarded it as almost an insult to the House that Mr. Wardle had not attempted to answer questions put to him as to the meaning of some parts of the agreement, but had contented himself with saying that these were matters which the Law Courts or the Board of Referees could in case of difference determine. How could members approve of a schedule embodying an agreement which they did not understand and the Government could not explain?

Mr. PRINGLE also described the reply as almost an insult on the part of the hon. member, who by some freak of fortune had become Secretary to the Board of Trade.

The SOLICITOR-GENERAL admitted the agreement was by no means free from difficulty, but its terms did represent the agreement at which the parties had arrived. Of course, there were coal owners who did not accept the agreement, and that was why the Bill was necessary. A coal owner's decreased output would be dealt with so far as it was due to the action of the Controller. An owner was not entitled to a specific reduction where the decrease had taken place by reason of causes not due to the Controller's action. There might be, for instance, considerable delays of railway wagons at the port. No doubt there might be cases in which delay at the port was due to action on the part of the Coal Controller, and if that were so, such delay would not be due to causes common to the whole of the coal industry under his control. But it would depend on a question of fact in each case. It was to be assumed that the Controller would behave reasonably in all such matters. In his (Sir G. Hewart's) opinion, coal mines excess payments were—and would be treated as—an allowable deduction in arriving at profits for the purpose of income tax, but not for excess profits too.

The schedule was agreed to.

Non-Ferrous Metal Industry Bill.

On the second reading of the Non-Ferrous Metal Industry Bill.

Sir A. STANLEY (President of the Board of Trade) explained that the measure was brought forward in conformity with the resolution of the Paris Economic Conference imposing on the Allied Governments the duty of making their countries independent of our present enemies as regards the control of essential commodities. Of these, none were more important than the non-ferrous metals, especially spelter, lead, copper, aluminium, and tin. He thought none of us realised before the war how we had allowed ourselves to become dependent for these vital materials on sources of supply controlled, either directly or indirectly, by Germany. The Bill provided that no company, firm, or individual should carry on the business of extracting, smelting, dressing, refining, or dealing by way of wholesale trade in metals or metallic ore to which the Bill applied, unless licensed to do so by the Board of Trade. Any company proposing to carry on such a business would, on making application in the prescribed manner, and on payment of the prescribed fee, be entitled to a licence. These licences were renewable. The Bill made provision for an appeal to the High Court against the decision of the licensing authorities if a licence should be refused, but this appeal could only be on a question of fact as to whether the applicant came within the conditions set forth in the schedule. Power was given to the Board to require information and inspection of documents. The Bill would remain in force for five years after the war.

The Bill was opposed by several members on the ground that it established bureaucratic control.

Dr. ADDISON, in replying, stated that the Government wanted to make it obligatory that there should be some authority which should have the power to say whether it was expedient that certain companies should have a licence. The debate was adjourned.

December 4.

Bristol Channel Transport Facilities.

Mr. TILLET asked the President of the Board of Trade whether railway trucks were being used to carry coal from the Forest of Dean coal field into Somerset, Devon, and Cornwall, and that at the same time numbers of vessels remained idle in the port of Lydney, Gloucestershire, from 11 to 16 days; and whether he would call a conference with the Bristol Channel tow owners with a view of utilising trows and reserving the railway trucks for more urgent traffic.

Mr. WARDLE said he understood that the merchants diverted this traffic to the railway route mainly on account of the increases in the freights charged by the owners of the vessels. The Port and Transit Executive Committee had this question under consideration, and would call a conference.

December 5.

The Coal Controller's Haulage Scheme.

Mr. DENMAN asked whether the Coal Controller was endeavouring to prevent the Carlisle Electricity Committee from buying their whole supply of coal at a colliery 23 miles distant, and to compel them to take from a colliery nearly twice as far away coal less suitable and more expensive; and what national advantages were alleged as an offset to the increased railway transport involved in the Coal Controller's scheme.

Mr. WARDLE replied that the coal transport arrangements were directed towards securing the maximum economy of railway transport, and a reduction of over 50 miles had been effected in the haulage of coal to the Carlisle electricity works. It was necessary at the same time to secure an equitable distribution of trade among the different collieries, and for this reason a portion of the Carlisle supply was brought from a colliery 40 miles distant, though even this compared with the average distance of 100 miles before the transport scheme operated.

Middlesbrough Iron and Steel Shipments.—Official returns show that the shipments of pig iron from the port of Middlesbrough during November were 15,927 tons below the October clearances, the loadings last month amounting to only 23,638 tons, as compared with 29,412 tons for October. There was also a considerable decrease in the shipments of manufactured iron and steel. In October the despatches reached 31,365 tons—an increase of 24,380 tons on the September return—but November clearances were given at only 16,308 tons, or a decrease of 15,057 tons. The aggregate shipments of pig iron, manufactured iron, and steel for November were returned at only 39,946 tons, as compared with 60,777 tons for the previous month, or a decrease of 20,831 tons.

INDIAN AND COLONIAL NOTES.

Australia.

Strikes in New South Wales.—Coal miners in New South Wales are, much to their astonishment and chagrin, "up against it." For years they have indulged in strike after strike, culminating in the great one of 1916, by which they obtained the eight-hour bank to bank, big increase of wages, and practically every privilege they could think of; but it was on the clear understanding that industrial peace was to be observed by them—at least, until the end of the war. Despite this, they evidently regarded the agreement as a "scrap of paper," and directly the recent railway strike occurred, they lost little time in declaring that, although they had absolutely no grievance against the colliery proprietors, they would not hew a ton of coal until the Government conceded the demands of the railway employees. The Government's reply was to commandeer the whole of the coal mines of the State, and call for free labour to work such mines as might be required to meet pressing requirements. At the present time, 14 mines are being thus worked, and soon an output of 10,000 tons of coal will be attained. The railwaymen have gone back to work on the Government terms. Hundreds lost their billets, which are now occupied by loyal labour. The engineers are working alongside non-unionists, and under the much abused card system, which was ostensibly the cause of the original dispute, other unions which ceased work in sympathy and in support of the much vaunted cry of "Solidarity," have declared the strike off. The wharf labourers have returned to duty, only to find that there is little or no work for them to do, the limited amount of labour required being performed by volunteers; but the seamen and coal miners refuse to give in. Their leaders are in a quandary, knowing full well that theirs is a lost cause, but are stoutly standing out for the best terms available. After so many years of practical immunity from any kind of penalty for striking, they cannot understand having to fight a Government which has sufficient backbone to declare that the "loyal labour" introduced in time of need shall be thoroughly protected. The Government is steadily pursuing its policy of utilising volunteer labour for selected mines.

State Mining.—The State coal mine, which has been closed owing to the decision of the Government not to proceed with the scheme during the present period of financial stress, is being taken over by the Railway Commissioners, who will work it as an adjunct to the Railway Department. Coal has been costing the Commissioners 10s. 7d. per ton, but the Department estimates that with a mine of its own, it will be able to effect a saving of about 4s. per ton.

Mining in New South Wales.—In many of the coal mines of New South Wales old unionists and free labourers are working alongside, for although numbers of the men who volunteered to help the Government in its hour of need have returned to their homes, many have decided to take up the work of coal mining permanently. During the strike there were very few breaches of the peace, and credit must be given to the general body of men for their orderly behaviour; much also is due the Government for its firm and decided action in arresting prominent agitators and severely dealing with known members of the notorious I.W.W. Association. The coal traffic in Newcastle district is congested, owing to the scarcity of shipping, and in order to relieve this state of affairs, the Railway Department has commenced stacking coal.

Canada.

As a result of the difficulties in procuring a supply of coke during the recent strike at the Crow's Nest Pass mines, the Granby Consolidated Mining, Smelting, and Power Company has decided to make its own coke for the smelter at Anyox, British Columbia. It has purchased coal lands on Vancouver Island, and will erect a coke and by-products plant at Anyox. An expenditure of about 1,000,000 dols. will be required within the next 18 months.

The Canadian Collieries Limited has struck coal in the new mine being opened by them at South Wellington, four miles from Nanaimo, British Columbia. The seam was tapped by a slope 12 ft. from the surface, and development is being rapidly pushed. The daily output is expected shortly to reach 1,000 tons.

Six Months' Output.—Returns from the leading coal mine operators of Canada for the six months ended June 30 show a total production of 6,154,420 short tons. Nova Scotia led the other provinces with an output of 3,058,216 tons, Alberta being second with 1,763,506 tons, and British Columbia third with 1,100,190 tons. The exports averaged about 130,000 tons per month, being considerably lower than last year, while the imports of both bituminous and anthracite showed an increase. The total coke production was 580,997 tons.

Control of Imports.—Mr. C. A. Magrath, Canadian Fuel Controller, has issued regulations respecting the importation and sale of coal, which became effective on Nov. 1. All importers and dealers in coal must be licensed, and every mine operator must enter into an agreement with the Fuel Controller, fixing the maximum prices per ton to be charged for the output of his mine. Brokers are allowed a maximum profit of 30c. per ton, and retail dealers 50c. over and above reasonable overhead charges. Every two weeks an average will be struck by dealers of the cost of all coal on hand, which will be the governing price for the following period of two weeks. Stringent regulations are made respecting the hoarding of coal. Excepting between the months of April and September inclusive, no consumer shall obtain any quantity of coal in excess of an estimated supply for two months, with a maximum allowance of three tons; and in cases of emergency the Controller has the power to requisition any quantity of coal in the possession of any consumer in excess of the legal supply. For this purpose, the mayor, or head of any municipality, may act as agent of the Fuel Controller. Coal dealers generally approve of the regulations, which will tend to eliminate speculation, and put the trade on a sound basis, while giving them reasonable profits.

Distribution of Mining Labour.—A deputation representing the Miners' Federation of Great Britain was received by the Coal Controller at Whitehall on Thursday, on the question of the transfer of miners from districts where there is a surplus of labour to areas where the industry has been depleted by the withdrawal of men for service with the Forces. Statistics were put forward indicating the availability of men in the respective districts throughout the country, and it is understood that the machinery which is now being set up at the labour exchanges in the coal mining industry will be used in the scheme.

UNIVERSITY EDUCATION IN RELATION TO MINING ENGINEERING.*

By WILLIAM RIPPER, C.H., D.Eng., D.Sc., M.I.C.E.

In the mining department of the University of Sheffield an endeavour is made to train the more capable types of students to deal with the development of new problems requiring high scientific skill on the part of those engaged in such work. Work such as this can only be undertaken by men who have received a sound scientific training for a sufficiently long period to give them the necessary knowledge and confidence to attack these problems on their own initiative.

In the interests of the mining industry, it is of extreme importance that there should be built up, in this centre of the local coal field, a department for training efficiently the best possible type of student to go out into the industry afterwards and be responsible for the introduction of every possible form of improved method. The essential features of such a department are the provision of a scientific staff, well equipped and efficiently conducted laboratories, as well as the provision of complete courses of study which are fundamental to the subject.

In the mining department of the university it is believed that such provision is already made, and that excellent opportunities are there to be found for obtaining the training required.

The other essential factor in the success of the work is the provision of a sufficient number of properly-trained students to present themselves for such training. Hitherto, the supply of students of the type indicated has been altogether inadequate. We believe we are never again going to return to pre-war conditions, and we are therefore now considering how to provide our universities with a larger number of well-trained students to ensure a regular supply to the industry of a sufficiency of highly-trained men.

Rothervale Colliery Scheme.

One of the most valuable steps in this direction is that recently taken by the directors of the Rothervale Colliery, who have formulated a scheme for the training of youths intended to fill official positions as deputies and foremen, both in the underground and surface departments of their mines, and have arranged to select 12 boys annually and to give them a thorough training (both practical and theoretical), in order to fit them for the positions which it is anticipated that they will eventually occupy.

The inauguration of the scheme is, the author believes, due to the difficulties which the company have experienced in securing officials of the required standard of education and intelligence, and they hope that the new arrangements that they now propose will produce men having these qualifications. The period of training proposed extends over five years at the colliery, and aims at the training of officials for the mining, mechanical, and electrical engineering side of the enterprises of the company. The boys will not be financially handicapped during their period of training (as a matter of fact, they are being treated very generously), and it is expressly stipulated that the boys' training shall be under the personal supervision of the chief officials—the mine manager and the chief engineer—that each boy shall undergo the complete training in the section he chooses as laid down in the scheme, and that he shall not be kept to one particular occupation in that section, although he may show marked ability for that particular occupation.

With regard to the selection of the boys for training, the company stipulate that they must have previously attended two years at a secondary school.

Combined with their practical training at the mine, they are also given facilities for obtaining a suitable theoretical training at the university by taking a part-week course for two days a week during the first two years of the course.

The course at the university has been arranged to give them instruction both of a practical and theoretical nature in certain subjects which are deemed to be of primary importance to them. The subjects comprise mining, mining chemistry, mine surveying, mining laboratory, including mining drawing, mathematics, applied mechanics, heat engines, electrical engineering, machine drawing, building construction, and geology.

The university recognises that it is at the collieries that the greatest lessons are to be learnt, but the knowledge of the fundamental principles of engineering science to be obtained at the university will make them capable of assimilating with much greater ease the practical knowledge that can be acquired at the colliery.

The university course is of three years' duration. In the first two years all students take the same subjects, but in the third year the work is specialised in order to meet the requirements of those who are to take up positions in the various departments—that is, in the mine, or in the mechanical and electrical engineering departments. In the third year, two courses have been instituted, one for those intending to become mine officials, and the other for those proposing to become officials in the mechanical and electrical departments. It is to be hoped that it will be possible to arrange eventually for these young men to take the three years' university course instead of the two years' course; but the two years' course is the one at present favoured by the Rothervale Company.

Fortunately, this excellent scheme is not confined to the Rothervale Company only, as several other colliery companies have similar schemes at the present moment under discussion, and great results are certain to follow therefrom.

Need for Secondary Schools.

Colliery companies, however—as, indeed, is the case in all other branches of industry—are met at the outset with a very serious difficulty, namely—the

absence of sufficiently well educated boys to come forward to the higher work. It is obvious that the first essential is that the candidate should have received a good secondary school education, otherwise he is utterly unfit to undertake studies of an advanced kind.

Now, it is well known that the one great deficiency in our English educational system is the lack of supply of boys to the industries who have received a secondary education. This lack is due to two causes—first, the absence of secondary schools; and, secondly, the absence of a keen desire on the part of our people generally for secondary education. Considering how greatly our industries depend upon the supply of better-trained men, if the progress in those industries which we know to be necessary is really to be made, every scientific industry in the country should protest against the holding up of the Education Bill, which at the moment is more essential than anything else to secure the future well-being of the wealth-producing forces of the country. Delay in the provision of improved secondary education can no longer be tolerated; and the Government should be urged to proceed forthwith with the Education Bill for the purpose of providing our industries with a better trained type of student to deal with the scientific problems of the industry urgently awaiting attention. There is no doubt that it will be some time even now before such provision will actually be realised, and on that account all our efforts will be very severely handicapped. The day of apathy and indifference in regard to secondary education in this country is, it may be hoped, now past, and, whether we will or no, we shall have to deal effectively with this subject, and make it at the earliest possible moment an accomplished fact of our educational system.

In the meantime, much can be done along the lines of the continuation schools, so well provided for in the new Bill, and it is to be hoped that employers will offer every possible facility for the attendance of youths at these schools. There will, of course, be many difficulties to overcome in connection with them; but if we all approach it in the right spirit, and make up our minds to do our best to make the provision of opportunity as complete as possible, there is no doubt about the eventual success of the movement.

We look forward to the time when there will be an adequate number of youths coming forward to the university with the necessary ability and previous training to enable them to take full advantage of the university courses, and afterwards to be competent to fill the higher positions of responsibility which the industry affords, and especially to provide a certain small number of exceptional students competent to devote themselves to questions of scientific research which will more and more frequently arise as the problem of carrying on becomes more and more difficult. The universities are prepared to do their part to the full. All that now remains is that the industry and the public generally shall provide the means of supplying an adequate number of well-trained youths to take advantage of it.

THE AMERICAN COAL TRADE.

A cable message announces that the official price of anthracite has been increased. Mail advices indicate a critical state of things. The *Black Diamond* (November 17) reports that car shortage and lack of labour make the task of the Fuel Administration doubly hard. Supplies everywhere are short. Retail coal merchants are organising into small associations for the purpose of aiding the Government in the important work of distribution. These organisations have had a good effect in restricting the hoarding of coal and in the prevention of duplicate orders. These duplicate orders have in a great measure caused a demand which was far from actual, and when filled, resulted in the consumer having a great deal more coal than he could possibly use.

All localities report shortage, and all of them find that irregular car supply is the principal cause. Another factor, that of explosives, now enters the situation to the further confusion of the trade. The law says that no enemy alien shall be allowed to have any explosive. Many miners can be considered barred from obtaining explosives under this law, which is now threatening a nation-wide crippling of the coal mining industry, if not a complete tie-up of certain coal mines.

The bituminous market appears more confused than ever. Rulings regarding shipments, deliveries, etc., are made almost daily and revised the next. This sawing has everybody "up in the air" continually, and most of the trade are thoroughly disgusted with the way the Administration is handling matters. Some manufacturers are actually suffering for supplies, but those working on Government orders are kept supplied. The supply of New River and Pocahontas standing and running to Hampton Roads ports continues to decrease. The congestion at the piers is bad and demurrage charges, in some instances, are very large. The one desire seems to be to supply Government boats no matter how other interests may need coal. At all Atlantic seaboard ports there is such a demand for coal that it taxes present facilities.

Exports of coal to Italy during the past seven years (fiscal years ending June 30 in each case):—1911, 194,015 tons; 1912, 276,467 tons; 1913, 332,264 tons; 1914, 776,422 tons; 1915, 1,628,279 tons; 1916, 2,797,506 tons; 1917, 1,099,508 tons.

The increasing shortage of furnace coke is giving much concern to pig iron manufacturers. The new coke prices allow maximum of 6 dols. for furnace, 7 dols. for foundry and 7.30 dols. for crushed. Practically no spot coke is to be had.

According to the *Review of the River Plate*, an important discovery of coal is reported from the district of Picunlufú, near Zapala (Neuquén Territory). The coal is said to have been met with at a depth of only 8 m., the seam being 80 cm. thick.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Checkweigher Removed for Interfering with Management—Fines for Inadequate Timbering—Subsidence at Tredegar—Coal Owners and Controller.

A case of considerable importance came before the Swansea magistrates on Thursday of last week, when a checkweigher at the Copper pit, Morriston, was summoned for interfering with workmen and with the management. The workmen's committee, it appeared, had desired that their secretary should be allowed to go up from the pit at 1.30 instead of 3 o'clock in order to attend a meeting of the nightmen, and the under-manager, to whom the request was made, stated that he would consult the manager about it. After the committee had left him, the defendant came up and said, "Why do you refuse to allow this man to come up at 1.30?" and when the under-manager answered, "I did not refuse," the defendant, it was stated in court, became abusive, and said they were not going to put up with such nonsense, and himself then told the secretary, "You go home and come back in the afternoon." The secretary left, and was not at work that day. A second charge against defendant was that he interfered with a man belonging to the Gas Workers' Union, asking him if he had paid his Federation fee, and telling him that in default of payment he would not let him go down the mine. The labourer left the employment rather than raise any difficulty. The magistrates held that sufficient grounds had been shown for his removal from the position of checkweigher from the Copper pit Colliery, and made an order that he should be removed; and, upon application, allowed 5gs. to the prosecution as costs.

The question raised in the foregoing paragraph as to the transfer of a man from one union to another came before Sir George Askwith at the Board of Trade, when a deputation from the Federation submitted to him the points as to the non-unionist question. There is in existence an agreement that, for the period of the war, no change shall take place in the position of the different unions at the pits; but it is now stated that the Gas Workers' Union, the Labourers' Union, and a third, which are concerned, have come to an arrangement with the Miners' Federation that such of their members as have a transfer card are to be admitted into the Federation. The arrangement arrived at does not include enginemen, craftsmen, and surface workers, as to which there is a determination on the part of, at any rate, the enginemen to maintain their separate organisation.

The charges against the management of the Main Colliery Company again came before the Neath Bench on Friday of last week. In all there were 71 summonses for alleged breaches of the Coal Mines Act; but only 48 were dealt with previously, when Mr. Kenshole, who defended, submitted that he had no case to answer, as the pit was idle on the date stated. During the adjournment the summonses were amended in this respect. The defendants were the agent (Mr. Price) and the manager (Mr. Westmaeott). Mr. Owen and Mr. Waldin, H.M. inspectors, gave evidence as to finding a shortage of timber; and the defence was a denial that any shortage of timber existed. Mr. Westmaeott stated that no complaints of shortage had been made to him during the past 12 months. Mr. Kenshole, on behalf of the defendants, submitted a circular from the Home Office, issued in March, which appealed to colliery owners to economise in the use of pit timber; and he contended that the agent and manager had discharged their responsibility to supply sufficient timber, and that they were not to blame if other officials did not properly distribute it. The magistrates held that the charges had been made out, and they imposed a fine of £1 upon each defendant in respect of 24 summonses for not providing adequate support to the roof, and £10 on the summonses for not supplying sufficient timber—making a total of £34 against each defendant. There was also a summons against the agent for not notifying the appointment of a temporary manager; and in respect of this a fine of £2 was imposed. Further summonses against both defendants for not withdrawing men from dangerous places were withdrawn. There were other summonses making up the total to 71, but the hearing of these was adjourned.

The Bwlfa Company, owners of pits at Cwmdare, Aberdare, have had an offer to purchase the property; but after submission to shareholders, the offer has not been accepted by the necessary majority. The company is a private one, with a very low capitalisation, and the offer was to pay £105 for each £10 ordinary, and £25 for each £10 preference share. Out of the total of £130,000, there is £90,000 in preference and £40,000 in ordinary shares; and it is stated that as much as 155 per cent. per annum has been paid on the ordinary. This, however, was in the boom year of 1900. The output is about 500,000 tons per annum, and there is a good acreage as yet undeveloped.

The Tredegar Council is still very much concerned at the great leakage of gas due to subsidence affecting the mains. It was reported at the last meeting that, although public lighting was very much restricted, there was still a very large consumption of coal, and this was attributed to a great extent to the leakages which are due to subsidence. The gas manager stated that in pre-war days 17 per cent. of the make in leakages was considered normal for a colliery district; but now it had reached 34½ per cent. Taking the normal figure, it meant that the Council was losing £1,570 per annum in excess of the normal from that cause alone; and because of this expenditure and the heavier cost of labour there had been a loss of £3,000 on the past year's working. The price of coal had gone up from 14s. 4d. to 18s. 6d. per ton, and this totalled £1,555 on the year. A committee was appointed to consider whether the district suffering most from subsidence should be cut off from the gas supply; and, it being stated that the law did not protect the Council in respect of subsidence, a proposal was made that the matter should be brought before the local members of Parliament.

The food question has assumed a very serious character in the colliery district of Abertillery, and it was stated at a meeting of the Trades and Labour Council by two members of colliery lodges that men working in the pits had been found to be without food while at work. One having stated that there was little or none at home. The general question discussed was as to workmen being idle through depression in the coal trade; and one speaker stated that few men in the district were working more than three days a week, so that where there were children in the family the high cost of living made them short of food. A deputation was appointed to wait on the District Council and urge them to take up the question of providing employment for colliers who were idle.

* From a paper read before the Midland Institute of Mining, Civil and Mechanical Engineers on December 6.

The trade at Swansea Docks, consequent mainly upon the coal shipments, showed a very unsatisfactory week, there being a decrease of 20,000 tons as compared with the corresponding week of 1916. Coal shipments were just over 40,000 tons, but patent fuel was as low as 100 tons.

Manufacturers and exporters in South Wales are now receiving, through their local organisations, the confidential information as to trade conditions overseas which is collected by the consuls and forwarded by them to the Board of Trade. High expectations are entertained as to the value of this information; and full recognition is given to the change of policy which this indicates in regard to the national collection and distribution of intelligence that will help home producers in their competition with foreigners, especially after the war, when shipping is available.

The Coal Controller has agreed to increase the flat rate for house coal from South Wales to the south-eastern district of England, and instead of being 20s. per ton it will be 25s. per ton. There has been considerable effort made to secure a revision of the previous rate; and the recent grant of 2s. 6d. to the miners materially strengthened the position of those who sought the authorisation of a higher figure.

In the Swansea Valley the Tirbach Colliery Company have won a vein of the best anthracite in the lower measures. This colliery is near Ystalyfera, and local anticipations run high as to developments that are foreshadowed.

The action against the owners of Pwllbach Colliery, Ystalyfera, came once more before the court on Wednesday. Originally, the action came on at Glamorgan Assizes, being the claim of a butcher for injunction and damages on account of injury sustained through coal dust. It went to the Court of Appeal, and thence to the House of Lords, the plaintiff finally succeeding; and the matter came before the Chancery Court on Wednesday for assessment of damages. These will be determined next month.

Northumberland and Durham.

Dawdon Memorial Service — Fire at Washery — Miners Support Mr. Straker—Wages of Colliery Officials.

Of over 2,000 miners employed at Dawdon Colliery prior to the war, about 800 have joined H.M. Forces. Of these, 112 have fallen in action. A memorial service in respect of these men was held at the church of St. Hild and St. Helen, Dawdon, last Sunday, and, on the same occasion, the Dowager Marchioness of Londonderry unveiled two windows which had been placed in the church to the memory of the late Marquis of Londonderry.

A fire broke out at the washery of Messrs. Bolekow, Vaughan and Company's Dean Bank Colliery, Ferryhill, on Saturday night last, spread to part of the screening plant, and did considerable damage. The Northern Collieries' fire brigade from Crook succeeded in limiting the flames to the region of their outbreak, and saved the rest of the colliery premises. The damage done is estimated at several hundreds of pounds, but the working of the colliery was not affected by the blaze.

Mr. Wm. Straker faced the critics of his recent advocacy of conscription of wealth, at a meeting held at Ashington last Sunday, at which he was present at the request of the local miners. He gave reasons for "the faith that was in him," and said that, although he had always held that the war should have been avoided, he had probably done more to assist the country than had his detractors. A motion congratulating him on the stand he had taken and expressing conviction that the financial method advocated by him was in the best interests of the nation, was carried unanimously by a crowded meeting.

At the 20th quarterly meeting of members of the Northern Colliery Officials' Association, held at Newcastle on Saturday, the action of the Coal Controller in omitting colliery officials from participation in the recent wages award, and refusing a hearing to a deputation, was strongly condemned. The secretary (Mr. Robt. Nuttall) stated that the Controller's action had, however, served to strengthen the unity in their ranks, and had resulted in 30 local officials joining the association. The Whitley Report was considered, and the announcement that the Committee was in favour of all grades having their own trade organisations, and all sections of the trade being organised for the purpose of being represented on the industrial councils, was welcomed. It was agreed that the claims of the association should be pushed forward.

Mr. George Daykin, who has been under-manager of the Brockwell and Harvey seams at Auckland Park Colliery for 17 years, has been appointed manager of Carterthorne Colliery.

Robert Benson, who was killed at Auckland Park Colliery recently, met his death in rather a peculiar way. He was engaged in shunting operations, when his foot got fastened in the points, and before he could get it released he was run over by several trucks. He was so severely injured about the lower part of the body that death ensued about an hour later.

Presiding over the annual meeting, held at Newcastle on Friday of last week, of shareholders in the Weardale Steel, Coal and Coke Company Limited, Lord Furness regretted the reduction in profits on the year by £47,420, and stated that that fall was due to many causes, to some extent by the exceptional circumstances of the war, and to some extent by the framing of regulations by those not sufficiently conversant with the inner workings of such businesses. The output of coal from the company's collieries was 89,323 tons less during the year than in 1916, and 419,359 tons less than in 1915—a marked reduction, largely due to shortage of labour, and to lost time. The pits worked 46 days less than during the previous year. The Finance Act and Coal Mines Control bore heavily on the company, and it was to be hoped that their rulers would weigh well the consequences of further onerous legislation in connection with such industries. A complete and fair understanding between Capital and Labour, working together without friction or distrust for the benefit of all, was, in his opinion, a policy more likely to prove effective and advantageous to the State and the community. The report, showing a net profit of £152,633, and recommending payment of dividends totalling 12 per cent. on the preferred ordinary and 19½ per cent. on the deferred ordinary shares, less tax, was adopted. The dividends are the same as those paid a year ago. Lord Furness and Sir John Barwick were appointed directors.

The Northumberland Colliery Officials' Mutual Aid Association held its annual meeting on Saturday, December 1, at Newcastle. Between 30 and 40 delegates were present, representing the two counties of Northumberland and Durham. The progress of the association was stated to be satisfactory, and in the last three months upwards of 100 new members had been added.

At a council meeting of the Durham Miners' Association held on Saturday last, elected Mr. Jas. Robson as

president and compensation agent, in succession to the late Mr. Wm. House; re-elected Mr. T. H. Cann as general secretary; re-elected Mr. W. Whiteley as insurance secretary, and appointed him financial secretary also, in succession to Mr. W. P. Richardson, who was now appointed executive committee secretary, a post vacated by Mr. Robson; re-chose Mr. Thos. Trotter as general treasurer; and re-elected Mr. Jos. Batey as joint committee secretary.

Old customs die hard, and thus the observance of laying the pit idle for a day when a fatality has occurred in the workings is still very general in these two counties. Such a case occurred at Elemore Colliery the other day. In so far as the custom shows the miners' respect for their fallen comrades, it is to be honoured, but, surely, at a time when hundreds of ex-miners weekly die on the field of battle, and when it is imperative, in the national interests, that the production of coal should continue as steadily as possible, there might be some waiving of this old method of expressing sorrow at the inevitable, and some newer way, less wasteful of the national resources, adopted. There is the further point that local collieries have worked none too regularly of late, because of tonnage shortage, and that it is to the interests of the miners' families themselves that no day on which work can be done should be lost.

Cleveland.

Presenting the annual financial statement of the Tees Conservancy Commissioners for the year ended October 31 last to a meeting of Commissioners this week, Sir Hugh Bell stated that they showed a deficit of £3,836, which, under the circumstances, was fairly satisfactory. The gross receipts of the Commission had shown an almost invariable decline since war commenced, and had fallen from £145,429 in 1913 to £84,641 in the year just ended. During the year, 935 fewer ships, representing a falling-off of over 500,000 tons, had used the river. He sought to justify the Commission's decision to abolish rebates on the river dues by stating that, whilst their own position enabled them to meet their financial obligations without serious difficulty, he thought they were bound by their relations with neighbouring ports not to differentiate too much from their conditions. The Wear and Tyne rates had both been increased. He thought the Tees Commission had made the change in the way least likely to affect their credit or their customers. There had been a falling-off of about 250,000 tons in the export of iron and steel, but this was less to be deplored, as we found plenty of use for iron and steel in our own country.

The directors of Dorman, Long and Company Limited state that they have provisionally completed arrangements for the acquisition of the entire share capital of Sir B. Samuelson and Company Limited, and application has been made to the Treasury for its approval of the scheme. The directors hope that matters will be so far advanced that at the meeting on the 17th inst., particulars can be supplied to the shareholders. It has been previously stated that Messrs. Dorman, Long and Company were about to acquire the properties of Sir B. Samuelson and Company, comprising eight blast furnaces, large coke oven plant, collieries, and ironstone mines.

Cumberland.

The small coasting steamer "Cliffburn," 270 tons register, which usually trades between Maryport and Irish ports with coals, has recently been purchased by Mr. W. E. Fisher, ship broker, Maryport, and coal shipper for the Brayton Domain Collieries.

Yorkshire.

It was stated at a meeting of the Leeds Corporation General Purposes Committee last week that the committee now holds a stock of coal of 2,000 tons, which will be distributed to hawkers for sale to poor people in the city if a shortage takes place during this winter.

A fire, which caused damage estimated at about £500, occurred last Saturday week at the premises of the Premier Patent Fuel Company's Works, Jossey-lane, Bentley, near Doncaster. It is supposed that the fire was caused by the overheating of the engine.

The announcement that the Government has appointed a Commission to visit the North of England coal fields, with a view to effecting an improvement regarding the practice of miners absenting themselves from work, has aroused considerable interest in Yorkshire. Absenteeism has been particularly bad in some parts of the county, and the prosecutions before the magistrates, as the result of the failure of the absentee boards, seem to have had little or no effect.

At the meeting of the Goole Chamber of Commerce and Shipping, last week, the position of the port was stated to be anything but satisfactory. The war had enormously reduced traffic, and the spacious docks now presented a melancholy spectacle of emptiness and disuse. It was stated the future development of the port lay in three directions—the improvement and deepening of the navigable channel to the port; the cultivation of a large import as well as export trade; and the establishment of local works and industries in the town.

Lancashire and Cheshire.

Among the suggested candidates for nomination at the next General Election by the Lancashire and Cheshire Miners' Federation (in addition to Mr. S. Walsh, M.P., and Mr. J. Sutton, M.P.), are Mr. T. Greenall (president of the Federation), Mr. J. McGurk, Mr. H. Twist, and Mr. S. Blackledge. So far, no definite decision in the matter has been arrived at, but it is practically settled that 10 or 12 seats will be contested.

Notts and Derbyshire.

There are already signs in Nottinghamshire that miners intend making a bid for further direct Parliamentary representation. Mr. William Carter, the assistant secretary, will try conclusions in the Mansfield Division. The newer element in the situation is provided by the creation of a fifth Notts constituency, carved mainly out of the Rushcliffe Division, with Hucknall Torkard, one of the oldest colliery towns in Nottinghamshire, as its centre; and for this newly-constituted area it is also intended to present a strong claim in the miners' interest. It is understood that one of the other officials of the men's organisation is to be recommended for the seat.

The Nottingham Corporation on Monday appointed a committee to urge the Government that, in the contemplated establishment of centres for the generation and distribution of electricity in the county, the city's position should receive adequate attention. Mr. A. R. Atkey, in introducing the resolution, insisted upon the wastefulness of present methods of using coal. To illustrate the loss of valuable ingredients, recent experiments in regard to 200 tons of coal yielded: Smokeless fuel, 120 tons; breeze, 16 tons; sulphate of ammonia, 3½ tons; benzol, 662 gals.;

toluol, 182 gals.; xylol, 41 gals.; heavy naphtha, 165 gals.; carbolic acid, 48 gals.; cresylic acid, 507 gals.; creosote oil, 460 gals.; lubricating oil, 190 gals.; pitch, 9 tons; gas (of 300 British thermal units), 5,600,000 cu. ft.; gas (of 140 British thermal units), 4,900,000 cu. ft. It was not a matter for private enterprise, but one which the Government should take up in the national interest; and he understood that the Government would give preference in the scheme which was now being matured to those municipalities that were awake to the possibilities of the situation. The proposed committee would serve to establish a means of communication between the Government and the city authorities as to any scheme which might be evolved.

The Midlands.

A further slight reduction in the quantity of water pumped in South Staffordshire is recorded in the monthly reports of the engineers to the Mines Drainage Commission, which were issued on Saturday. The general manager and engineer for the Tipton district (Mr. Edmund Howl) reports a rainfall for the month of 2.01 in. The pumping had been 10,815,200 gals. per 24 hours, as compared with 11,179,600 gals. for October, and 11,564,700 gals. in the corresponding period last year. There was no change at the Moat pound in respect to the quantity of water. The old engine was being worked on the day turns, and the Gospel Oak Mond gas-driven plant full time to assist the Moat new engine. There was an increase of water compared with October at the Bradley engine, while at Deepfields it was now necessary to work the new engine at full speed. At Herberts Park, the iron pump rods, bucket, and clack had been taken out for periodical examination, and replaced. There was no change at the Leabrook and Park Lane Mond gas-driven plants; while the Crown Meadow engine was standing for repairs to the bottom lift. The underground level men had been engaged in repairing No. 8 Gospel Oak shaft, one of the shafts giving access to Moat levels. Mr. S. B. Priest (surface drainage engineer) reports that the electrically-driven surface pumps have been maintained in good order. Joint clearing had been done on Bilston Brook and its branches, and on Hockley Brook, Priorfield, and Hardingsfield courses. Churchbridge and Rowley canal feeders had been cleared, and mining damage had been repaired at the Old Dock course and Himley Brook. In the Kingswinford district clearing had been continued on Low Town and Pensnett courses, while in the Old Hill district clearing had been done on Buffery watercourse and on Netherton Brook. In reference to the Old Hill district, Mr. W. B. Collis (the engineer) reports that the mine water in the northern portion of that district had slightly increased during the month, but had been well kept down.

Kent.

The amount of coal raised at the Tilmanstone and Snowdown collieries last week was nearly 6,000 tons.

Negotiations are reported to be in progress for the sale of the Wingham and Stour Valley Colliery, which has surface equipment, but is not sunk to any great depth.

The French Forges de Chatillon Company, which holds an agreement for the purchase of the Guilford Colliery, near Dover, may complete the purchase within six months of the termination of the war. The chairman informed the shareholders that there had been many enquiries of a genuine character for coal areas in Kent during the last few months.

The Dover Electricity Department's engineer, reporting to the Electricity Committee of the Corporation, stated that he had received a request for 2s. 6d. per ton extra from various collieries supplying coal to the works, including the Kentish collieries. The engineer was of opinion that the 2s. 6d. extra was not due in the case of the Kentish collieries, as their prices had been previously increased to a larger extent than the northern coals. He is in communication with the Board of Trade on the question.

Scotland.

Coal Shipments—Electrical Power in Mines—Retail Prices —A Certificate Case.

The coal shipment at Methil for the past week shows a fairly good increase. The exports totalled 23,598 tons, against 18,568 tons in the previous week. From Burntisland the shipment aggregated 7,790 tons, as compared with 20,800 tons in the corresponding period of 1916.

The coal shipments during the past week from the Clyde totalled 72,269 tons, as compared with 120,061 tons during the previous week, and 90,421 tons for the corresponding period last year. From the Firth of Forth the shipments were 17,591 tons, against 17,422 tons for the previous week, and 17,668 tons a year ago; and from Fife ports 34,223 tons against 28,219 tons for the previous week, and 57,056 tons a year ago.

Mr. R. Kirby, general manager of the Wemyss Collieries, in the course of his presidential address at Denbeath to the East of Scotland branch of the Association of Mining Electrical Engineers, said that unfortunately no figures were available of the total horse-power of all machinery used about the mines, so that the proportion of the total machinery horse-power which was electrical was not known—but it was a very considerable fraction of the whole, and it was increasing rapidly. He did not believe in driving every machine about a mine by electricity. A first-class steam winder or a well-designed steam-driven pump was hard to beat when placed within reasonable distance of the boilers. But there was no doubt that thousands of horses and ponies could be substituted in the mines by small electrically-driven rope haulages; and the field for electrically-driven coal cutters was still open for competition by makers, who had done very well during the last few years in the way of improving their machines, but who, he hoped, might do still more in the future to produce plant reasonably free from breakdowns.

The Coal Merchants' Association of Scotland have adjusted the scale of prices, which they propose to submit to the Glasgow Corporation in terms of the Retail Coal Prices Order. The prices per bag are as follow:—Black-band caking coal, 2s. 1d.; Ell coal, 1s. 11½d.; Lower Drumgray, 1s. 11d.; and kitchen coal, 1s. 10d. These prices are based on estimates of what the merchant pays per ton to the coal owners, his working costs (stated at 11s. 4d.), and the profits officially allowed him. The working costs allowed by the Controller amount to 10s. 3d. only, but the local authority, it is stated, has power to vary the amount.

A prosecution with regard to exemptions granted by the colliery recruiting courts has been disposed of by Sheriff Shennan at Hamilton, when a Cleland man who had not worked at a pit since March last was convicted of having failed to notify the authorities of the change of circumstances. On behalf of the accused, it was contended that, though his illness was of some duration, he did not cease to be employed at the pit, the practice being that when a man stopped work because of illness he did not lose his

certificate. Sheriff Shennan, in finding the charge proved, said it was clear to him that the certificate ought to have been sent in. If he had put in a fresh application, it would then have been open to the tribunal to grant the certificate.

RECENT DEVELOPMENTS IN BY-PRODUCT COKING.*

By GEORGE BLAKE WALKER, M.Inst.C.E.

Since the paper written by the author in 1900, when coke ovens of the retort type were little in use in this country, a revolution has taken place in the system of coking, and large numbers of plants of ovens of the retort type with recovery of by-products are in existence, and are being constantly added to. The war has stimulated the demand for hydrocarbon explosives, and these are now commandeered by the Government, coking plants being under the control of the Ministry of Munitions.

Although the principle of external heating of the retort oven, as originally introduced by Evence Coppée, remains the same, considerable modifications in detail have been gradually introduced by various builders as the result of experience. The object of these modifications has been chiefly to increase the rapidity of the coking process by the application of more intense heat, and by the heating of the air for combustion; convenience and economy in operation have also received a good deal of attention. The recovery of by-products has been greatly developed, and, in particular, many experiments with more or less success have been made for achieving the "direct" recovery of sulphate of ammonia. One of the most important developments has been the utilisation of the surplus gases in internal combustion engines, and for town illumination, metallurgical furnaces, and other manufacturing purposes.

The author describes the principal features of half-a-dozen of the most successful types of oven in use in this country, and the recovery plants associated with them, and cites figures showing the economies obtained by the "direct" recovery of sulphate of ammonia, here and in Germany. He also compares the relative value of the surplus gases used in producing steam (utilised through turbines) and in internal combustion engines, to the advantage of the latter.

* Abstract of paper read before the Institution of Civil Engineers on Tuesday, December 4.

LAW INTELLIGENCE.

December 4.

Before Mr. POLLOCK, Official Referee.

Spanish Iron Ore.

Bolckow, Vaughan and Company Limited v. Campania Minera de Tierra Minera, and the North-Eastern Steel Company v. same.—The plaintiffs, in both cases, are steel manufacturers of Middlesbrough, who claimed damages for alleged breach of contract to deliver iron ore by the defendants, a Spanish mine-owning company.

The Official Referee having upheld the objection of Mr. Mackinnon, K.C., to certain questions put by Mr. Compston to Mr. Ritchie (Messrs. Bolckow's works manager) as to the use by the plaintiffs of certain substitutes for the Sagunto Rubio ore of the defendants, at a cost much less than that of the Sagunto ore.

Mr. Compston said that that would undermine the main defence, and, therefore, asked to be allowed the opportunity of considering his position.

A consultation took place, with the result that Mr. Mackinnon stated that a settlement had been arrived at, by which the plaintiffs in the Bolckow action would take judgment for £17,500, and in the case of the North-Eastern Steel Company there would be judgment for the plaintiffs for £8,750.

Judgment was entered for the plaintiffs accordingly.

OBITUARY.

Col. F. J. Trump, at one time assistant mines inspector for Cardiff district, was killed in action on Sunday in France. His father was Mr. H. Trump, general manager of the Rhymney Iron Company.

News has been received of the death from wounds of Capt. A. P. Nimmo. For some years deceased was mining engineer at Prestonlinks Colliery, owned by Edinburgh Collieries Company.

Ald. G. H. Wraith, the oldest official of the Weardale Steel, Coal and Coke Company Limited, died last Sunday, after a brief illness, at his residence, Moor House, Spennymoor. Mr. Wraith had resided in that district for about 50 years. When the late Lord Furness purchased the old Weardale Coal Company from Messrs. Baring Brothers in 1899, Mr. Wraith was appointed general manager, and later was given a seat on the board of directors. He took an active interest in public affairs, was chairman of the Spennymoor bench of magistrates, chairman of the Higher Elementary Education Committee, and a member of the local military tribunal.

The death is announced of Mr. G. R. Martyn, of Newport, head of the firm of Martyn, Martyn and Company, coal exporters, iron ore importers, and ship owners. He had been ill for some considerable time, chiefly through heart ailment. Before establishing his own firm, he was associated with the ship owning firm of Messrs. Cory and Sons, Cardiff. The deceased gentleman was president of the Newport Chamber of Commerce in 1897, and was also one of the Newport Harbour Commissioners.

Iron and Steel Wages in the Midlands.—The Midlands Iron and Steel Wages Board states that in accordance with the sliding scale arrangements, the wages for puddling during the months of December and January will be 17s. 6d. per ton, and all other mill and forge wages will remain unaltered. These wages will take effect from December 3, and continue until February 2. In addition to the puddling rate of 17s. 6d. per ton under the sliding scale, there will be 6d. per ton bonus given to the puddlers by resolution of the Wages Board which met July 15, 1912. The bonus applies to puddlers only, and will make the total puddling rate 18s. per ton.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The Federation executive met on Saturday in Cardiff, and dealt with a number of routine matters. Among the more important items was a report from the deputation which met Sir G. Askwith and discussed with him the difficulty concerning employment of men belonging to other trade unions, especially the relation of the non-unionist agreement to the cases of such men. It was decided to communicate further with Sir G. Askwith. A dispute which has arisen at the Oakwood Colliery is to be brought to the notice of the Coal Controller. The solicitor to the Federation was instructed to investigate the question of the liability of craftsmen in respect of unemployment insurance.

The railwaymen of South Wales held several meetings on Sunday, and in each district, except Cardiff, accepted the 6s. per week increase of wages as a settlement of their claims; but in Cardiff, although the traffic men passed a similar resolution, the craftsmen engaged in the machinery and other shops decided to strike—their reason being that the grant to them was only 5s., and they being unwilling to leave the question of the other 1s. to arbitration. About 2,000 men were idle on the Taff, Rhymney and Cardiff undertakings, and tipping operations at the docks were seriously interfered with, as some of the tippers were also involved. After negotiations during Monday with Mr. Prosser, who now manages the three undertakings named, the matter was left in his hands, he promising to approach the Railway Executive and do his best to obtain remedy of the grievance. As a result of this, work was resumed on Tuesday morning.

The blastfurnacemen of the Dowlais Iron Works, with the cokemen and kindred trades, made claim for an adjustment of tonnage rates, and for abolition of reductions to which they had been subject; and employees in other mechanical departments at the works also applied for an increase in their rates of wages. To deal with this, an arbitration tribunal sat in Cardiff on Tuesday and took evidence. Amongst those who attended were Mr. Howell Jones, the general manager, Mr. T. V. Jones, works manager, Mr. R. Evans, blast furnace manager, and Mr. T. Phillips, secretary of the company; whilst three trade unionist representatives submitted the case of the men. No decision was announced, the arbitrators stating that they would make their award in due course.

The summonses against Ammanford colliers, 150 in number, and also against 20 men employed at Gelyceidrim Colliery, for stopping work by refusing to fill trucks of the Gwaun-cae-gurwen Company during the strike, were mentioned again on Monday in the Ammanford Court; and the hearing was, by assent of both sides, adjourned *sine die*.

As a result of discussion at a Conciliation Board joint committee on Tuesday, two questions that are at issue are being referred to the Coal Controller. One was whether a man who worked a week of six days and undertook, at the request of the management, to work on the Sunday, should get the extra 1s. 6d. per day. Another point was—if a man met with an accident early in the week which compelled him to lie idle for the rest of the week, and he received no compensation, was he entitled to the war wage? The joint committee discussed also the position of a man who lost a quarter in the morning and worked back the time later in the week so as to qualify for the war wage, the employers' representatives insisting that the man must work the actual time lost, and not merely quarter of another shift which might be shorter than the morning shift; also that the time lost can be made up in this way only by arrangement with the management. Another question raised by the workmen should, it was suggested by the employers, be referred to the Controller, but the men's representatives declined to submit it. This was as to men not being paid six times 1s. 6d. when they had worked five nights.

The colliery examiners' strike is responsible for another question that came before the joint committee. At one colliery there was work only on Tuesday during the examiners' strike, and the owners' representatives on the joint committee agreed that the men were entitled to the war wage for Monday and Wednesday.

The Tin-plate Trade Conciliation Board met in Swansea, and discussed the position which has arisen upon the unsatisfactory wages award of the Committee on Production, both employers and workmen having submitted objections to it. This award gave 5s. a week addition to men, and this is in addition to existing war bonuses of 42½ per cent to 57½ per cent. in different classes. The women employed had no extra grant made to them. The employers had previously offered a varying bonus (dependent on present wage rates) of from 50 to 60 per cent., the men having sought a previous flat rate, which would have raised all earnings by 100 per cent. Mr. F. W. Gibbins (president of the Employers' Association) was in the chair, and the men's representatives were from six trade unions which are concerned. After discussion, the employers made an offer of a flat rate of 55½ per cent. all round, but the men declined this, proposing that the rate should be 75 per cent., and this the employers would not agree to. A joint committee afterwards discussed the question, and sat late into the night, with the result that an agreement was reached whereby on earnings up to 20s. 52½ per cent. will be the bonus, between 20s. and 60s. 65 per cent., and on earnings of 60s. and upwards 50 per cent.

The steel workers also have a similar difficulty, and there was a joint meeting on the same day in Swansea representing the Siemens Steel Association of employers, and the Steel Smelters' Association of workmen, the award of the Committee on Production on war bonus being unsatisfactory to the men. Mr. Herbert Eccles presided, and Mr. Tom Griffiths submitted the claim of the men. The employers made an offer which proved to be unacceptable, and it was decided to prepare a joint case which would be submitted to the Ministry of Munitions.

North of England.

A large gathering of miners from the collieries of Birtley New Pit, Ouston, Harraton, Bewick Main, Kibblesworth, Allerdone, Springwell Vale Pit, Heworth, Washington Glebe, Washington F Pit, Usworth, North Biddick, Felling, Fallonsby and the Betty was held on Saturday to discuss the question of a fair distribution of work amongst the pits of the County of Durham and the feeding of necessitous school children by the State. A resolution demanding these reforms was passed.

It has been agreed by the North of England Steamship Owners' Association, the North of England Trimmers' and Teemers' Association and the National Union of Railwaymen that a further 17½ per cent. should be added to the war bonus already granted to the coal trimmers, making 60 per cent. in all over and above their total earnings under the respective tariffs at present in force between Amble

and the Hartlepoons inclusive. It was agreed that the increase should operate in the following manner:—more than half loaded on Saturday, December 1, at the previous rates, and vessels less than half loaded on Saturday, December 1, and finishing on Monday, December 2, and thereafter, to come within the new rate.

A special meeting of the council of the Cumberland Miners' Association was held at the Miners' Association offices at Workington, on Tuesday, Mr. J. Dickinson presiding. Several subjects were dealt with, after which they were considered by the Cumberland Coal Trade Conciliation Board. Mr. R. Steel, of Whitehaven, presided over the deliberations of the Conciliation Board. There was a representative attendance, including the joint secretaries, Messrs. T. P. Martin and T. Cape. The miners' request that Canon Sutton's award of December 19, 1916, should be applied to men working in abnormal places, was considered at some length, and, after two retirements, it was decided to submit the question to a neutral chairman, to be chosen by the Coal Controller. Several questions arising under the Coal Controller's award of October 3 were dealt with, and it was agreed that matters of detail not involving principles as set out in the award, should be submitted to a joint committee of five from each side. With respect to the men's request that they should receive their pay tickets one clear day before pay day, it appeared that while the owners were in harmony with the men on the principle, it was a matter needing more consideration. The colliery companies being considerably understaffed and seriously handicapped in getting clerical work done, they expressed their willingness to consider this and the question of issuing a uniform pay ticket within 6 months of the declaration of peace. No decision emerged from a discussion of the question of limiting trailing to 100 yds. It was agreed that the pits should be idle on Christmas Day, Boxing Day and New Year's Day.

Federated Area.

The dispute over the employment of non-union labour at Brierley Hill Colliery, Notts, is still dragging on, and over 700 miners have been on strike for a month. At a meeting of the council of the Notts Miners' Association last week it was resolved to continue the pay of the men, and to make a levy of 6d. per full member, and 3d. per half member, at every colliery in the county of those on strike. Certain recommendations were made at a meeting in London a few days ago between the coal owners and the Chief Inspector of Mines, but these the council could not advise the men to accept.

At the meeting of the Miners' Association it was also reported that a strike had been avoided at the Hucknall Torkard collieries, that notices had been withdrawn, and that the men would continue at work. The threatened trouble arose over a proposed alteration in the system of working, and had been averted as a result of a lengthy interview.

After being on strike for five weeks, in order to compel non-unionists to join the Notts Miners' Association, the men, numbering 1,000, employed at the Sutton Colliery, belonging to the Blackwall Colliery Company, decided at a meeting on Saturday to accept the latest offer of the management and return to work. The agreement between the management and the Notts Miners' Association that has brought the strike to an end states that during the period of the war only members of the union shall be engaged at the colliery, the management agreeing to this step owing to the necessity of producing at the present time all available coal.

Forest of Dean.

The strike at Park Colliery, Lydney, which commenced on Monday, resulted in the 350 men agreeing to return to work on Thursday. The colliery management received the trade union agent and local officials of men's association on Wednesday and definitely refused their request to reinstate the discharged workmen, in support of whom the men lay down tools. It was pointed out that if the strike continued, local tin-plate works, munitions and other factories would stand for want of fuel. The agent pointed out to a mass meeting of men that they had acted contrary to their own articles, as they should have consulted the executive and taken a ballot whether to strike or not. The men resolved, failing satisfaction, to take the steps towards putting in notices.

Scotland.

The strike at Udston Colliery, Hamilton, is ended, the manager having agreed to allow the old rate to stand until a special examination can be made of the places proposed to be affected by the alteration in rates.

The result of the examination of the disputed section at Kepplehill Colliery, Shotts, was put before both parties last week, but they were unable to come to an arrangement. Work meanwhile is proceeding, and the manager has expressed his willingness to favourably consider a proposal that there should be arbitration.

The strike at Knowton Colliery, Shotts, is happily at an end. The manager has acquiesced in a suggestion that the points at issue should be referred to an arbiter, and arrangements for the arbitration are being made forthwith.

In the West Lothian district work is proceeding with steadiness and regularity at the majority of the collieries. The men are working on an average from nine to 11 days per fortnight.

Work has been resumed at Easton Colliery, West Lothian, which has been closed to the miners since the middle of November, owing to a breakdown of machinery. The workmen who were thrown idle in consequence of the enforced stoppage are to be paid at the war-wage rate.

The arbiters' award has now been received in the dispute at Blairmuckhill Colliery, Harthill, Lanarkshire. They have fixed the tonnage rate at 3s. 7d., and work is now proceeding steadily at the colliery.

During the past fortnight work has been consistently good in the Mid and East Lothian districts. Practically full time has been secured at 80 per cent. of the collieries.

At a meeting of the Stirlingshire Miners' Board, the question of contracting for coal in common places in one of the collieries in the county was considered. Instructions were given the agents to see that no violation of union policy was permitted.

At the majority of the collieries throughout Mid and East Lothian, the initial difficulties regarding the payment of war-wage have been largely got over. There are one or two cases outstanding, but if these cannot be settled locally they will be referred to the Coal Controller who is the final arbiter.

In the Dennyloanhead district of Stirlingshire contracting at local collieries has led to friction. Meetings have been held between representatives of the men and the owners, but no satisfactory settlement has been arrived at. The national executive of the Mineworkers Union has been asked to intervene.

Blacksmiths in the Auchinleck, Lugar and Cumnock Ayrshire have been awarded a special increase of 2d. It will be recalled that on October 17 an advance of 2d. per shift was offered, but refused by the miners. The larger advance now conceded is to date from October 17.

The miners employed at Streethead Pit belonging to the Galston Colliery Company, Ayrshire, have entered into an arrangement which will remove any friction between them and the management. A fathomage rate has been set up, and both sides are satisfied with the amount fixed.

The engine winders employed at the Argyll Colliery, Campbeltown, are asking the assistance of the miners' union to compel the management to pay the standard rate of wages. The engine keepers claim that they are 1s. per day below the standard rate.

Iron, Steel and Engineering Trades.

The ironstone miners in Raasay Island have been complaining for some time about their conditions. They are so far away from other mining associations that they have no organisation as miners, but their case was taken up by the Highland Land League and public attention drawn to their complaints through that body. It is stated that a large number of German prisoners are engaged in the ironstone mines at Raasay and the native population resent this. The National Union of Scottish Mine Workers at a meeting decided to send a deputation so that they might have information of the position of affairs.

MINERS' EXEMPTIONS.

On November 22, in connection with the further de-certification of coal miners who entered the industry since the outbreak of war, an Order was made by the Home Secretary (supplementing a previous Order made on May 12, 1917) in the following terms:—"I hereby withdraw all certificates of exemption issued on grounds of employment to persons of military age employed at coal mines who entered the coal mining industry after August 4, 1914, and were of military age at that date, and are engaged as (a) winding enginemen; (b) pumpmen; (c) electricians; (d) fitters and mechanics (including blacksmiths, joiners, and wagon and tub makers and repairers)."

The position now is that persons who were of military age on August 4, 1914, and who have entered the coal mining industry since that date, will be available for recruitment, subject to the following arrangements respecting applications for exemption:—

(a) Application may be made by a man to the colliery recruiting court on the ground that a mistake has been made as to his age or the date of his entry into the coal mining industry, and that he is accordingly not covered by the terms of the Home Secretary's De-certification Orders of May 12 and November 22, 1917.

(b) Application by an employer to the colliery recruiting court on the grounds mentioned in (a), or on the grounds that a man is indispensable to the working of the mine; but an application on the ground of indispensability can only be made when the man is engaged as a stoker or is in one of the excepted classes above mentioned, and is placed in the new medical grade 2 or 3, that is to say, is not in the old medical category "A." The word "pumpmen" only includes for this purpose men engaged in working mechanical pumps.

(c) All such applications by or on behalf of a man to the colliery recruiting court must be made not later than seven days from the issue of the notice calling the man up for service, and must be made on the special form provided for the purpose (Form 26), which can be obtained from the inspector of mines.

(d) The right of application to a local tribunal on personal grounds in accordance with the regulations or instructions is, of course, not affected.

Engineering Works' Canteens.—At a meeting of the Manchester Association of Engineers on Saturday last, a paper on "The Establishment and Management of Engineering Works' Canteens" was read by Mr. Arthur F. Agar, organising inspector of the Canteens Committee, Central Control Board (Liquor Traffic). He said that although the canteen movement was instituted as a war measure, its success had shown that it supplied a permanent need. Up to the present, the Committee had knowledge of 700 canteens in existence in docks, national factories, and controlled establishments—figures which proved the efficiency of the Committee's methods. In estimating the probable outlay on a canteen, they generally took as a basis for calculating the cost of the building only about 5d. per foot cube, exclusive of central heating and lighting, and the complete equipment should cost approximately 47s. per head for 100 persons seated, 32s. per head for 500 persons seated, and 30s. per head for 1,000 persons seated. Taking a canteen seating 500 as an example, the total cost, including the building and its equipment, should be in the neighbourhood of £7 per seat. Smaller canteens cost rather more proportionately, and, of course, the nature of the site had a lot to do with the cost. On the question of food economy, he mentioned that some little time ago he made special visits of investigation to industrial canteens, to see whether there was any undue waste of foodstuffs. He was glad to say he found the percentage of waste very small. The canteen movement had undoubtedly come to stay, and when the war was over he looked forward to the time when every fairly large employer of labour would include a canteen in his works' programme as a matter of course. It was a sound business proposition, not a benevolent experiment, and it marked a distinct development of the better relations between employer and employed. The employer by reason of better time-keeping and efficient workers, and it was a saving of the housing problem. With a canteen was not restricted to establishing a canteen, but hopelessly overcrowded neighbourhoods, those sites which afforded scope for a canteen and more roomy workshops. For the tangible expression of his employer's concern to improve his conditions of his own free will.

COAL, IRON AND ENGINEERING COMPANIES. REPORTS AND DIVIDENDS.

Broomhill Collieries Limited.—The 17th annual meeting of the Broomhill Collieries Limited was held on Nov. 30 at the registered office, Collingwood Buildings, Newcastle-upon-Tyne.

Lord Furness, who presided, said:—"It is again my duty and pleasure to meet you for the purpose of moving the adoption of the report and accounts, which I am sanguine you will consider fairly satisfactory. You are aware that since March 1 last the collieries of the United Kingdom have been under the control of the Controller of Mines, and your board conduct the affairs of the company subject to his directions and decisions. Most of you will doubtless have read the debate in Parliament on this subject, from which you will have gathered that the control is of a somewhat complicated nature. Put broadly, it means that colliery companies are entitled to their pre-war standard, provided the pre-war output is maintained. If they earn more, they are entitled to 5 per cent. of the surplus, less, of course, income tax, leaving them what represents 3½ per cent. above their pre-war standard, the balance going to the State. Should they not make their standard profit, the State guarantees, under somewhat complicated and rather vague conditions, to make up the deficiency. I do not intend to weary you with criticisms on this course, because it has been adopted, and we have to fall into line. It is one of the regulations of commerce and enterprise which have been brought about by the exceptional circumstances created by war. Parliament having decided that this upheaval and unprecedented interference with trade is necessary, whatever our views may be, it is obviously our duty cheerfully to do all that we possibly can loyally to carry out the regulations, both in the spirit and the letter, recognising the stern fact that the money for the war has to be found, and that, in addition, our rulers have a most difficult task before them. We can only hope that after the war we shall again enjoy freedom from Government intervention in the conduct of our businesses, and that enterprise, industry, and initiative will once more be allowed to reap their own reward. You will have seen the announcement in the Press of the recent advance of 1s. 6d. per man per day in wages, and 9d. for boys under 16 years of age, whether the pits are working or not. This is another innovation which we have been instructed to adopt. It is true that the selling price of coal has been increased by 2s. 6d. per ton for some portion of the output, but the coals which go to France and Italy are not subject to this advance; consequently, the contracts we have with France do not participate in this benefit. Both France and Italy have suffered most severely, and I for one cordially approve of their exemption under this head, more especially seeing the present price of coal to private consumers in Italy is something like £20 per ton, and in France anything from £5 to £10 per ton for gas, manufacturing and household coal varying according to quality. I deeply deplore the fact, which you will have observed from the report, that we have lost no fewer than 98 of the 833 employees who enlisted from our collieries; and I regret that during the year the s.s. "Broomhill" was sunk, two of the crew being killed by enemy gunfire. In addition, two of our head office staff have fallen in action. To the relatives of these brave men who have died in their country's cause we extend our heartfelt sympathy. I would here like to repeat what I believe I stated on a former occasion, namely—that our North-country miners have the finest reputation for willingness to work, for endurance, and bravery. When I recently visited the front, I heard nothing but praise of them on all sides. All honour to them; we are proud of their valour and courage. To our great regret, Mr. Merivale, who has usually been present on these occasions, died in November of last year. He, for a long period—I think nearly 50 years—had been mining agent for Broomhill. Mr. Merivale was a distinguished mining engineer, of great ability, possessed of a genial temperament, and very popular with his men. Indeed, he was highly esteemed and respected by all who came in contact with him, and his loss will be greatly felt by the company. Mr. J. H. B. Forster, of Spennymoor, has consented to fill the vacancy created by Mr. Merivale's death, and your directors are satisfied they could not have found a more worthy and capable successor. Turning now to the balance-sheet, you will observe that the financial position is satisfactory. A very large proportion of our liquid resources, namely, £144,250, is invested in Government Stock, War Loan, Treasury Bills, and National Bonds; whilst the reserve fund now stands at £100,000. We have not made any deduction in the values on the asset side, because we have already in the balance-sheets of past years made ample provision for the depreciation of our property, and it is the opinion of your board, and also of your auditors, that this has already been sufficiently provided for. The sinking fund, which is usually written off the assets, is shown on the debit side, and in reality increases the reserve fund by this amount, making it £116,250. At the present time business is difficult. Our principal trade was formerly with Scandinavia, but under present conditions it is much curtailed. With regard to inland trade, owing to our geographical position so far north, and the heavy railway freightage, we are precluded from participating in this to any appreciable extent. Consequently, the bulk of our output is exported, and unfortunately we are seriously affected by the present shortage of tonnage, which makes it impossible for us to work full time. The "Broomhill" was under Government charter when she was lost, and the value recovered and placed to reserve, has not been taken into account in the profit and loss account. The Ministry of Shipping, in whose hands the supply of tonnage is very largely placed, are doing all they can to make the best use of the tonnage available, and to meet the requirements of the collieries which are dependent upon export business. I hope it may be our good fortune to meet again next year with a satisfactory report, but under existing circumstances it would be futile to attempt anything like a forecast. In conclusion, I would like to add just one word in regard to the employees—including both the indoor and outdoor officials and staffs—who, notwithstanding the serious depletion in their numbers, have continued to meet the increased pressure of work in such a splendid manner. We extend to them our appreciation of their labours. I now have pleasure in moving the adoption of the report and accounts for the year ended June 30 last.

Sir John S. Barwick, Bart., seconded the motion, which was carried.

A final dividend of 15 per cent. on the ordinary share capital (making 20 per cent. for the year) was declared.

The re-election of the retiring directors, the Right Hon. Lord Furness and Sir John S. Barwick, Bart., also of the Right Hon. Lord Gainford and Mr. J. H. Beckingham, was confirmed, as was the re-appointment of the auditors, Messrs. Holmes, Spence and Company.

A vote of thanks to the chairman concluded the meeting.

Arncliffe Coal Company Limited.—The report for the year ended September 30 last states that after meeting the interest on debentures, all charges on revenue (including excess profits duty), the dividend on the preference shares, and interim dividend on the ordinary shares, and setting aside the sum of £10,000 for depreciation and a further sum of £10,000 to meet increased liability to income tax, the accounts show an available balance of £30,444, inclusive of the balance of £25,607 brought from last year. It is proposed that a dividend at the rate of 21s. per share, free of income tax, be paid on the ordinary shares, making, with the interim dividend referred to, 40s. per share for the year. The duplicating of the electric plant has now been completed, and is giving full satisfaction. Want of shipping facilities has materially restricted the output of the colliery, and costs have been further materially increased through advances in wages and in prices of furnishings and timber. After payment of the dividend now proposed, there will remain a balance of £22,644 to be carried forward to next year's account.

Bell Brothers Limited.—The report for the year ended December 31, states that the company's operations resulted in a profit, after providing for liability under the Revenue Acts, of £173,085, to which must be added the balance of undivided profit brought from the year 1915, amounting to £22,545, making £195,630. Out of the above, an interim dividend of 5 per cent. on ordinary shares was paid, while £65,798 was written off for extensions and improvements. Since December 31, 1916, a final dividend on ordinary shares of 5 per cent. for the year 1916, declared at the ordinary general meeting held June 12, 1917, was paid, leaving a balance to be carried forward of £38,115.

Dickson and Mann Limited.—Dividend of 12 per cent., less tax, on preference shares for two years ended September 30, 1915.

Dinnington Main Coal Company Limited.—The directors have declared an interim dividend of 1s. 6d. per share, free of income tax.

Dominion Steel Corporation Limited.—The directors have declared a dividend at the rate of 1½ per cent. on the common shares.

Dorman, Long and Company Limited.—The directors state that the accounts for the past year will not be ready for presentation at the annual meeting of shareholders, but a final dividend of 4 per cent. will be proposed on the ordinary shares, making 8 per cent. for the 12 months, free of income tax. As already announced, the board recommend that £240,406 of the reserve fund be capitalised, and that one new ordinary share be allotted to proprietors for every 5½ such shares now held.

Gwaun-cae-Gurwen Colliery Company Limited.—Including £24,495 brought forward, the accounts for the year ended September 30 show a net profit of £57,026. Further dividend of 11½ per cent., making 15 per cent. for the year, as compared with 20 per cent. for the previous year; carrying forward £31,692.

Nantyglo and Blaina Iron Works Company Limited.—The report for the year ended September 30 last states that the net amount received from royalties and wayleaves is £33,536, and from rent of land and houses and other sources of income £6,387, making a total of £39,924. Since the last report there have been paid two instalments of dividend "on account of arrears of dividend" upon the preference shares, amounting to £35,000, namely—on April 13 £3 per share, and £4 on November 14, making together £7 per share. The output of coal and other minerals has been 1,227,753 tons. The amount allowed for depreciation of properties for the year is £4,000, which, with the income from investments, £1,264, has been added to reserve for depreciation account.

Thornycroft (John I.) and Company Limited.—The directors recommend a final dividend of 10 per cent., making 17½ per cent. for the year ended July 31. The ordinary shares received 10 per cent. for each of the two preceding years, 8 per cent. for 1913-14, and 2½ per cent. for 1912-13.

Warwickshire Coal Company Limited.—The accounts for the year ended June 30 show a profit of £1,709, thus reducing the debit balance brought forward to £15,256.

NEW COMPANIES.

Armoraduct British Company Limited.—Public company. Registered office, Bathurst Works, Witton, Birmingham. Registered November 26. To carry on the business of engineers, founders, etc. Nominal capital, £50,000 in £1 shares. Minimum subscription to precede allotment, 100 shares. Directors: H. A. March, W. H. Glassey, C. G. Bushell, A. D. Tipper, and two others.

Baker Cramer Engineering Company Limited.—Private company. Registered office, Old Mills, Camp-road, Leeds. Registered November 28. To carry on the business of engineers, founders, etc. Nominal capital, £5,000 in £1 ordinary shares. Directors: F. W. B. Cramer and W. T. Baker. Qualification, 10 shares.

Fuller (H.) and Company Limited.—Private company. Registered office, 87, Fargate, Sheffield. Registered November 23. To carry on the business of iron masters, steel makers, engineers, etc. Nominal capital, £500 in £1 shares. Subscribers: R. A. Bedford and L. J. Clegg.

General Foundry Supplies Company (London) Limited.—Private company. Registered office, 119, High Holborn, W.C. Registered November 26. To acquire the business of coal, coke, ganister, limestone, and other materials. Nominal capital, £6,000 in £10 shares. Directors: T. E. W. N., and T. H. Gray. Qualification, £250.

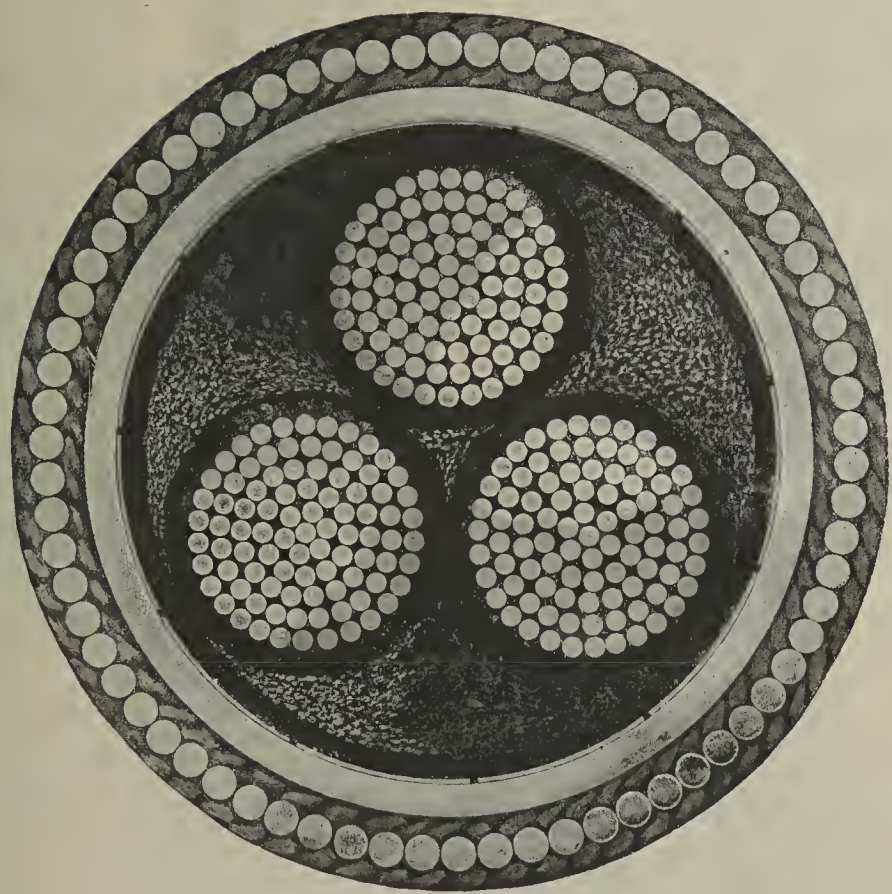
Jackson (J.) Limited.—Private company. Registered office, Bramley, Guildford. Registered November 28. To carry on business as iron founders, mechanical engineers, etc. Nominal capital, £10,000 in £1 shares. Directors and subscribers: W. D. and J. H. Warren. Qualification, £50.

Renton (B. M.) and Company Limited.—Private company. Registered November 28. To carry on in any part of the world the business of steel and iron merchants, steel makers, etc. Nominal capital, £10,000 in £1 ordinary shares. Director, T. B. Bottomley (Dove, near Sheffield). Qualification, 1,250 shares.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

At Shildon tribunal, an applicant for exemption described himself as a putter and ploughman, and explained that he had left the pit to manage a farm of 16 acres for a brother who had met with an accident. The military representative argued that the man had ceased to be a putter. The agricultural representative countered this by stating that, had the brother not broken his leg, applicant would still have been in the pit. Two months' exemption was allowed.

HENLEY'S COLLIERY CABLES



3 Core, '8 sq. in., 3,000 Volt, Paper Insulation, Lead Covered, G.S. Wire Armoured and Served Cable, supplied to the POWELL DUFFRYN STEAM COAL CO., Ltd.—(Actual size).

THE name of Henley has been associated with the Electrical Industry since 1837. For the greater part of the 79 years that has since elapsed we have confined our energies to the manufacture of Electric Cables. That is to say, we have made Electric Cables since their inception. We have *studied* them and we continue to study them. The great reputation we have gained has been built upon the quality of our Electric Cables only. It is reasonable then to suggest that our Customers benefit from our unique experience; that it pays to buy Henley's Cables. Many of the largest collieries in the United Kingdom who are our customers evidently think so.

We shall always be pleased to quote you — or advise you if you wish.



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59/61, Waterloo Street, Glasgow.
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30, Mosley Street, Newcastle-upon-Tyne.
247/9, Deansgate, Manchester.
91, Whitechapel, Liverpool.

165/7, Edmund Street, Birmingham.
88, Albion Street, Leeds.
56, Victoria Street, Bristol.
20, West Bute Street, Cardiff.

CONTRACTS OPEN FOR COAL AND COKE.

Contracts advertised in this issue received too late for inclusion in this column, see LEADER and LAST pages.

Abstracts of Contracts Open.

CHELTHAM, DECEMBER 20.—Coal for the Guardians. Forms from the Workhouse.

EDINBURGH, DECEMBER 15.—Coal for the Royal Edinburgh Hospital for Sick Children. Forms from the matron.

GRAVESEND, DECEMBER 12.—Coal for the Workhouse. Forms from the clerk, 13, Victoria-place, Gravesend.

KEIGHLEY, DECEMBER 15.—About 500 tons rough slack for Corporation Baths. Tenders to C. Foulds, superintendent.

KETTERING, DECEMBER 12.—Coal and coke for the Guardians. Forms from the clerk, Union Offices.

MELTON (SUFFOLK).—Coal for St. Audry's Hospital for Mental Diseases. Forms from the clerk.

SHEERNESS, DECEMBER 24.—1,000 tons good Yorkshire or Langwith nutty slack, to pass through a 1½ in. mesh, for the Urban District Council. Forms from the clerk, Council Offices, Trinity-road.

SOUTHAM, DECEMBER 18.—Cobbles and coke for the Guardians. Forms from the clerk, Market-hill, Southam.

STAINES, DECEMBER 17.—Coal and coke for the Staines Guardians. Forms from F. Hutchinson, clerk, Ashford.

STONE (STAFFS), DECEMBER 11.—Coal and coke for the Guardians. Forms from the clerk, High-street, Stone.

STOURBRIDGE.—Anthracite (not nuts) in truck loads. P. Mountford and Company, Stourbridge.

TOWCESTER, DECEMBER 11.—Coals for the Guardians. Forms from the clerk, Workhouse.

WESTMINSTER, DECEMBER 12.—Coal for Westminster Guardians. Forms from the clerk, Princes-row, London, S.W. 1.

WHALLEY (LANCS), DECEMBER 12.—Steam slack and house coal for Queen Mary's Military Hospital. Forms from the steward.

WOLVERHAMPTON, DECEMBER 18.—Coal, slack, and coke for the Guardians. Forms from the clerk, Union Offices.

WOOLWICH, DECEMBER 13.—Coal and coke for Woolwich Guardians. Forms from the clerk, Workhouse, Plumstead.

YOUGHAL (IRELAND), DECEMBER 11.—Best steam lump and house coal (six or 12 months) for Youghal Auxiliary Asylum. Forms from the Asylum.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

DUNDEE, DECEMBER 12.—Various.—Timber, iron, steel, oils, etc., for the Harbour Trust. Specifications from the general manager, Trust Offices.

LEICESTER, DECEMBER 12.—Stores.—Iron and steel, etc. (12 months) for the Highways and Sewerage Committee. Forms (10s., returnable) from the borough engineer.

THE FREIGHT MARKET.

The volume of business transacted in the outward freight markets of this country continues to decrease. To some extent, of course, this is due to enemy inroads on our own and neutral shipping; to a large extent, it is because of the increasing control which the State is exercising over our tonnage, and the lessened number of "free" vessels which are therefore available for ordinary chartering. This week, there appears to have been a marked falling-off in the official requisitioning of fuel for overseas delivery, and although the neutral enquiry is as strong as ever, neutrals are not sending their boats forward, and consequently cannot have their demands for coal and coke satisfied. Nowadays, foreign consumers must provide their own carriers for cargoes. This condition of things is one over which the collieries of the country have no control, and it is hitting them very hard, particularly so at the time of writing. However, it is all part of the fortunes of war, and must be borne. On the north-east coast, apart from a little business for French Atlantic ports, chartering has been wholly confined to the taking up of vessels for Swedish ports, at 190 kr. for Gothenburg, and 200 kr. for Stockholm, the former of which is on a parity with last week's rate, whilst the latter shows an advance of 2½ kr. There has been absolutely nothing doing in other directions, although quotations are as strong as ever, as the following rates demonstrate:—Tyne to London, 21s.; Bilbao or Santander, 160s.; Lisbon, 95s. to 100s.; Oporto, 105s. to 110s.; Gibraltar, 100s.; Port Said, 200s.; and Barcelona, 300s. At Cardiff, the only fixture arranged for other than "limitation" directions is one for Dakar at 90s. At Swansea, also, scheduled ports absorb all vessels fixed. There is a very strong tone at South Wales so far as neutral directions are concerned, but even the high rates on offer fail to tempt neutral ship owners.

Homewards, the River Plate is steady, at 145s. from up-river and 140s. from down-river ports to the United Kingdom. At the United States, coal freights from Virginia to the River Plate continue quoted at 125s., with 33 dols. for Rio discharge. Tonnage on net form basis is steady, at 260s. from the Northern Range to French Atlantic, with 360s. quoted for West Italian discharge. On Committee account, for heavy grain cargoes, Northern Range to the United Kingdom is quoted at 40s., with 45s. to France, and 70s. to West Italy. At the Far East, Madras Coast to Marseilles with kernels is steady, at 550s. Saigon-Haiphong to French Atlantic is steady, at 500s. for rice cargoes. Kurrachee to the United Kingdom on scale is unaltered, at 250s. Bombay to the same destination is unchanged, at 275s. on d.w. basis. Mediterranean and Bay of ports are taking up as much tonnage as they can get, and rates are firmly upheld.

Tyne to Gothenburg, 2,300, 190 kr., option Stockholm, 1,700, 190 kr., 700, 46s., coke.

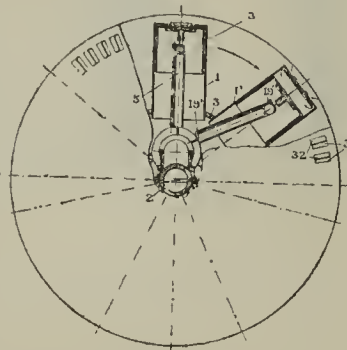
Tyne to Havre, 3,100, 90s.; Havre, 2,000, 45s. 9d., 1,700, 61s. 6d., neutral; Rouen, 1,300, 8s. 9d., neutral; 1,300, 74s. 3d., coke, 1,400 and 1,150, 43s. 6d., neutral; 1,400, 45s., neutral.

Tyne to Caen, 1,400, 43s. 6d., neutral; and Caen, 1,400, 43s. 6d., neutral; and 700, 48s., neutral.

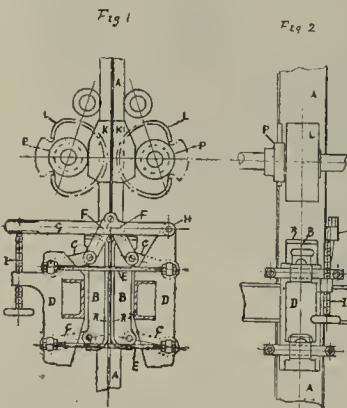
Tyne, Blyth, or Methil to Gothenburg, 1,600, 190 kr.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

101210. *Improvements in Rotary Compressors.* R. Algrin, 23, Rue George Sand, Paris. — This invention relates to rotary compressors of the type wherein the cylinders are radially disposed around a stationary hollow crank shaft, the air compressed in the cylinders being conducted to the hollow crank shaft for distribution. The diagram is a side view of a compressor from which the compressed air is forced through the head of the piston, the casing being partly broken away, and the cylinders being shown in section so as to show the construction of the system. The compressor comprises a plurality of cylinders 1, 1', disposed radially around a stationary hollow crank shaft 2. The cylinders 1 are connected together by the casing 3. The whole construction formed by the cylinders and the casing can turn around the axis of the crank shaft 2, the operation being effected by means of any suitable driving member 42 secured to the casing 3. The apparatus operates as follows:—When one of the cylinders is in the position of cylinder 1 in the drawing, the piston is in the upper dead centre position, leaving between its head and the head of the cylinder a clearance space which should be as small as possible. As the cylinder in question turns around the stationary shaft 2 in the direction of the arrow, the piston moves away from the head of the cylinder; this movement produces a reduction in pressure in the space, thus causing the diaphragm 6 (or inlet valve) to open as indicated in the diagram as regards cylinder 1', and the air enters the cylinder in the direction of the arrows. When, during the rotation of the cylinder, the piston reaches the lower dead centre position, suction ceases, and the inlet valve or diaphragm closes on its seat, thus closing the air inlet ports. From this moment, the piston, continuing its movement, moves towards the head of the cylinder, and at the end of its stroke again occupies the position shown in the cylinder 1. During this return stroke of the piston, the air enclosed between the head of the piston and the head of the cylinder is compressed; when a sufficient degree of compression has been attained, the valve 8 opens, and the compressed air passes into the interior of the piston, and subsequently into the interior of the casing 3, and into the engine cylinders. The interior of the casing 3 communicates with the compressed air ducts leading to the engine cylinders by means of its hollow crank shaft 2, and its hollow bearing 41. The introduction of compressed air into the casing serves the purpose of causing the connecting rods to operate under tension in such a manner as to obviate hammering at the joints due to forces in opposite directions, which would come into play if this plan were not adopted. The constructions of compressors described are particularly suitable for the supply of air to engines of the two-stroke cycle type, but are also suitable for other purposes, such as for gas turbines and the like. (Six claims.)



109380. *Improvements in Stamping Machines for Compressing Coal.* L. H. Sutton, Bowling Iron Works, Bradford. — This invention relates to an improved method of and means for holding up and controlling the motion of the stem of a stamping machine for compressing coal of the kind in which the stem of the stamp is lifted by friction rollers acting with only a part of their circumference and falls by gravity. Figs. 1 and 2 show diagrammatic drawings of the arrangement. A is the stem of the stamp; B B the shoes or blocks, which, as will be seen, are covered with the material R having a high coefficient of friction; C C C C, the toggle links connecting the said shoes or blocks with suitable brackets D D, which are fixed to the frame of the machine. E E are tie rods for adjusting the centres of the links C C C C. F F are the links connecting the shoes B B to the lever G. The said lever G is fulcrumed at H on the bracket D, which is fixed to the frame of the machine; its opposite end may be weighted, and is free to rise or fall or may be supported by the screw I. If the lever G is lifted and supported by the screw I, it is obvious the shoes or blocks B B will be lifted and released from contact with the stem A, due to the toggle motion of the links C C C C, and the stem A will be free to rise or fall by the action of the friction rollers L L. If the supporting screw I is lowered, and the lever G allowed to drop, the shoes or blocks B B will automatically grip the stem A, and prevent it falling by reason of the toggle action of the links C C C C, but they will allow the stem A to be raised by the friction rollers L L. To prevent the stem A from rising too high, the wedge piece K is fixed thereto in a suitable position, and as the stem A is lifted by the friction rollers L L, the wedge piece K of suitable width will come in contact with the loose collars P fitted on the shafts of the friction rollers L L, and will thrust them apart, so preventing the frictional surface of the rollers L L from further contact with the stem A. (Two claims.)

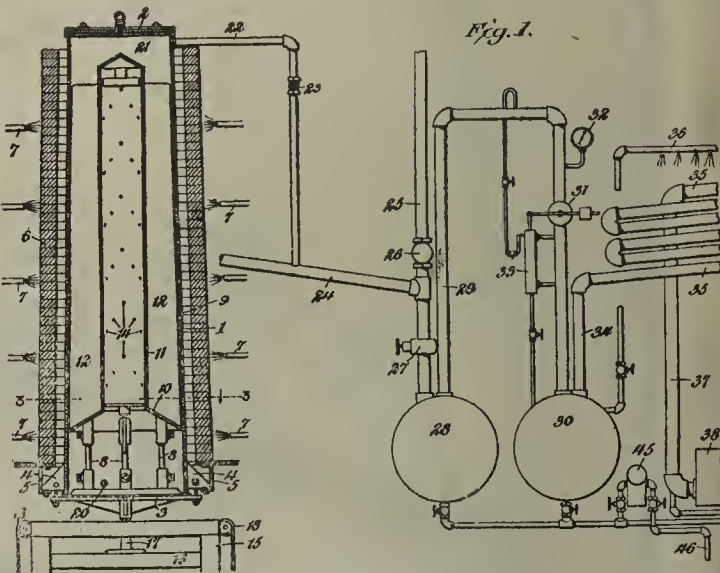


109469. *Improvements in Pumping Apparatus.* C. Bates, 73, Major-road, Stratford New Town, E.; and W. E. Cunis, 8, Fairfield-road, Old Charlton, S.E. — This invention relates to pumps, or water and other liquid raising devices of the kind in which air is exhausted therefrom, and a vacuum or partial vacuum is formed therein, to draw water or other liquid from its source of supply through a suction pipe into such pumps or devices, from whence it flows and is conducted or led to any required position or positions. The invention has for its objects to provide a pump of this character which shall have a continuous flow, and which, by harnessing the power generated

by the fluid in its course through the pump, shall be automatic so far as the requisite timed alternate actions of the pump valves are concerned.

109470. *Improvements in Centrifugal or Turbine Pumps.* H. Ellison, junr., Moor-lane House, Gomersal, near Leeds; and J. A. McLay, 10, North-parade, West Park, Leeds. — This invention relates to improvements in connection with centrifugal or turbine pumps (single- or multistage), more especially such as are employed in the pumping of acids or other liquors detrimental to the usual packings. The invention is designed to protect the gland packings from the action of the acid, and for this purpose the improvement consists essentially in the provision of an oil or grease chamber interposed between the pumping chamber and the gland. What the invention claims is: In centrifugal or turbine pumps as employed in the pumping of acids and like liquors, the provision of an oil or grease chamber interposed between the pumping chamber and the shaft gland, for the purpose of protecting the gland packings against the action of the acid or liquor. (One claim.)

109523. *Process of Obtaining Coke and By-products from Coal.* H. P. Bostaph and Bostaph Engineering Company, Detroit, County of Wayne, Michigan, U.S.A. — This invention has reference to a process of obtaining coke and by-products from coal, and its object is to produce coke containing such a percentage of volatile matter as to provide a smokeless fuel burning freely with a long flame, and also to produce condensable by-products of superior quality and of increased quantity. The drawing shows an apparatus with which the present invention may be practised. There is shown a columnar form shell 1 upright in the installed position and tapering from the bottom towards the top, such shell constituting the body portion of a retort particularly adapted to the practice of the present invention. The shell 1 is provided with an upper head 2 and a lower head 3, having means, which need not be specifically described, for fastening the heads tightly in place to seal them hermetically to the ends of the retort, but in such manner that they may be readily removed as needed. In the particular showing of the drawing, the shell 1 has brackets 4 at the lower end supporting the retort, upon channel beams 5 forming part of a suitable installation, since in practising the invention on a commercial scale a battery of retorts is provided, and suitable supporting structures are arranged for the accommodation of the retorts. Each retort is surrounded by a wall 6 of firebrick spaced a short distance, say, in the neighbourhood of 2 in., from the shell 1. The wall 6 constitutes a heat equalising envelope for the retort, and is heated by any suitable means, as, for instance, by hot products of combustion, which may be applied to the whole battery of retorts at once. The coal in relatively thin columns is subjected to



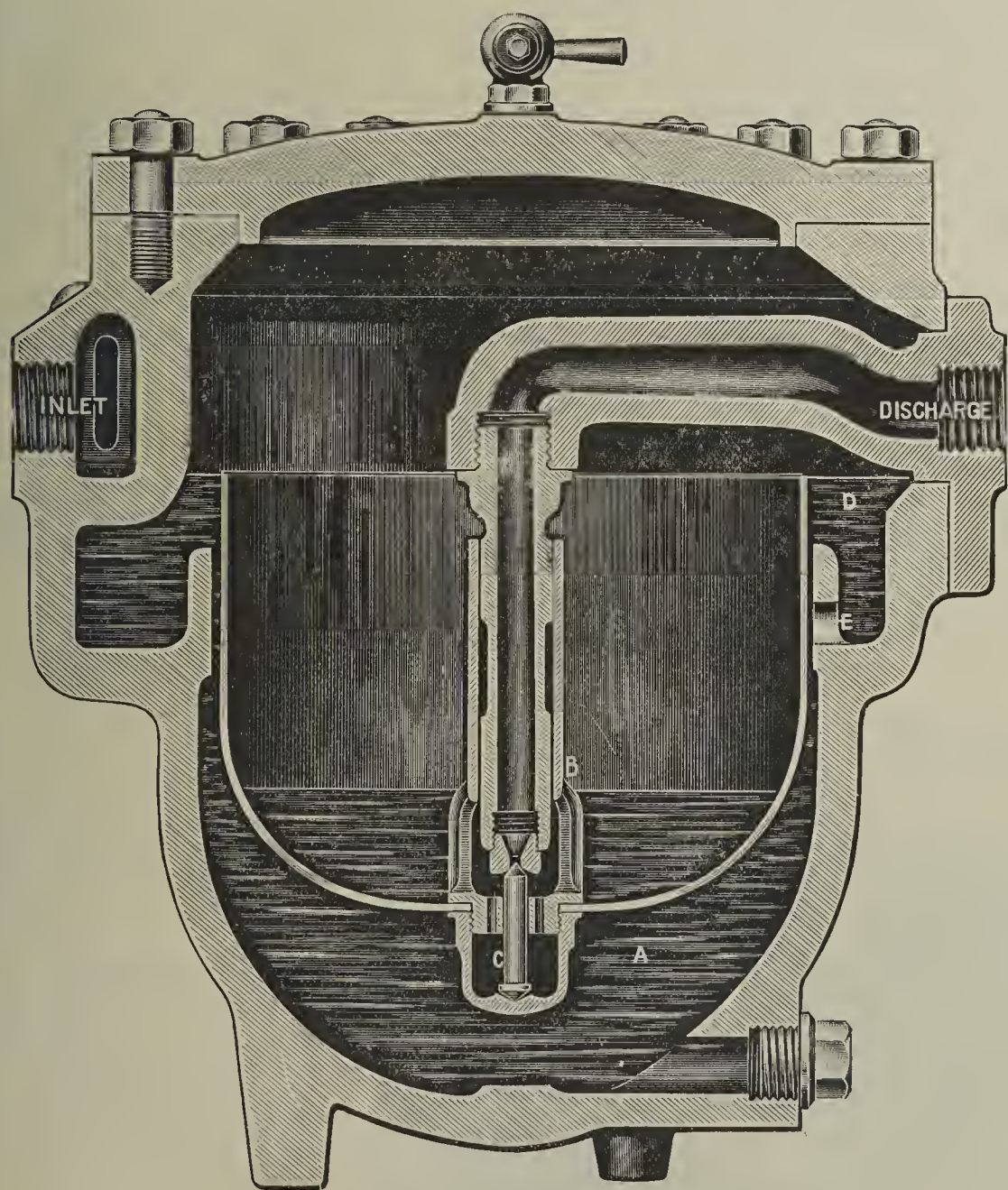
the action of heat directed first against one edge, that is, with the retort shown, the outer or peripheral edge, of each column of coal with the heat increasing in intensity from a minimum temperature to a maximum temperature. The heating progresses from the edge first affected toward the opposite edge, particularly along the sides of the coal column, since the walls of the coal tube have greater heat conductivity than the coal itself, and especially than coked portions of the coal. While the heating and consequent distillation is progressing through the mass of coal, sub-atmospheric pressure conditions are established by suction apparatus, such as a vacuum pump, so that the volatile matters driven off from the coal are withdrawn therefrom as rapidly as formed, and through the inner edge of each column of coal. The external surface of the retort is maintained at about the maximum temperature employed, while the core, after discharging the coke by being withdrawn from the retort, becomes reduced in temperature, so that when a fresh charge of coal is introduced into the retort, it is subjected at first to a considerably reduced temperature. The maximum temperature need not exceed about 1,100 degs. Fahr., and then the temperature of the interior of the retort, after discharging the coke and on the return of the core thereto, will be in the neighbourhood of 700 degs. Fahr., so that the thin mass of coal in each coal tube is subjected to distillation first along the outer edge with the distillation progressing toward the inner edge, and the heat to which the coal is subjected correspondingly increasing toward the maximum temperature employed. Cannel coals treated by the process of the present invention produce a smokeless fuel burning with a long flame and useful for steam as well as cupola purposes. The quantity of oils obtained from the cannel coal ranges from 2 to 2½ times as much as that obtained from bituminous coal, and the oils are somewhat more highly saturated with acids. The coke has a somewhat similar appearance to wood charcoal, but is much firmer and cleaner. The evolved gases, being quickly carried away through the numerous small openings distributed along each coal tube, say, at distances of about 6 in. from each other, are not burned, and hence when treated by a series of condensers, extractors, washing apparatus, and cooling coils, all of which apparatus, together with the retort, is subjected during the entire process to a relatively high vacuum, the character of the recovered by-products is markedly superior. Because of the treatment of the coal to gradually increasing temperatures within about the limits stated, unusually large quantities of light oils and gases are obtained. The entirely different natures of the oils and acids obtained by the present process from those obtained at higher temperatures is attributed to the fact that the temperatures are not allowed to become excessive. The coke produced retains all the fixed carbon which the coal originally carried. As an example of the actual prac-

HOPKINSON

BOILER MOUNTINGS & VALVES

FOR HIGH PRESSURE AND SUPERHEATED STEAM.

R.D.S. STEAM TRAP FOR ALL PRESSURES



HOPKINSON R.D.S. STEAM TRAP
FIGURE No. 9034.

VALVE & SEAT
OF HOPKINSON
PLATINUM
METAL.

CAST IRON OR
CAST STEEL
BODY & COVER.

RAPID DISCHARGE
OF WATER AND
SHARP CUT-OFF.

NO LEAKAGE.

J. HOPKINSON & CO. L^D. HUDDERSFIELD.

LONDON - GLASGOW - EDINBURGH - PARIS
CARDIFF - OLDHAM - BLACKPOOL - PETROGRAD

invention, certain cannel coals treated showed as: Moisture, 2.20 per cent.; volatile matter, 42.15; ash, 8.30; sulphur, 1.30 per cent. An the coke showed: Volatile matter, 11.27 per cent.; carbon, 74.44; ash, 14.29; sulphur, 1.31 per cent. Out of 1,200 lb. of coal there were obtained 854 lb. of coke and 33 gals. of crude oil condensates of dark brown colour, with a specific gravity of 0.995 at 15.5 degs. Cent., and flowing freely at 27 degs. Cent. (Seven claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

Alley, S. E. Tappet valve steam engines. (17580)
Atherton, T. R., Morris, O., and Tooth, H. L. Internal combustion turbine. (17822)
Bamber, H. W. Producer gas plants. (17740)
Barelay, S. F. Dynamo electric machines. (17775)
Barr, G. Inter-coolers for air compressors. (17503)
British Thomson-Houston Company. Regulating mechanism for dynamo electric machines. (17751)
British Thomson-Houston Company. Steam power plants. (17825)
Browse, C. W. E. Internal combustion turbines. (17744)
Bullivants' Aerial Ropeways Limited. Aerial, etc., ropeways or runways, etc. (17676)
Chinese-American Company. Internal combustion engine. (17583, 17585, 17586)
Clough, F. H. Regulating mechanism for dynamo electric machines. (17751)
Compagnie Générale d'Electricité. Steam turbines. (17627)
Drake, W. A., and Drakes Limited. Apparatus for charging retorts, roasting furnaces, etc. (17489)
Evans, A. G. Cooling towers, etc. (17541)
Fabry, R. Vertical heating flues for waste heat coke ovens with bottom burners. (17791)
Gains, J., Hall, A., and Moody, F. Electric furnaces. (17700)
Gardner, T. G., and Hepburn, G. D. Jib cranes. (17601)
Grammont, E. Electric furnaces. (17612, 17628)
Green, H. Internal combustion engines. (17390)
Hoffmann, O. K. Internal combustion, etc., engines. (17715)
Huntington, P. Internal combustion engines. (17789)
Jackson, J. T. Miners' safety lamps. (17716)
Key, T. H. R. Internal combustion engines. (17473)
Lamkin, A. E. Liquid fuel vaporisers. (17671)
Lindley, W. Drills or percussive tools for boring rock, etc. (17463)
Lindley, W. Mountings for drills for cuttings or boring holes in rock, etc. (17464)
McCallum, C. Motive power. (17652)
Mancini, U., and Novaretti, M. Elevators. (17815)
Marple, G. S. Gas generators for internal combustion engines. (17393)
Morley, W. H. U. Fire bars. (17651)
Quill, C. J. Alternating current rectifiers. (17772)
Reisert Ges., H. Process of softening water. (17607)

Samuelson, F. Steam power plants. (17825)
Selous, W. J. Motor power plant. (17606)
Siemens-Schuekertwerke. Winding or hoisting machinery. (17436)
Stamper, C. W. Means of discharging loads by a sliding and tipping movement. (17469)
Thrush, A. W. Propulsion of canal barges, etc., by internal combustion engines. (17781)
Townsend, W. W. Method of producing mixed coal gas and water gas. (17392)
Vallance, B. Aerial, etc., ropeways or runways, etc. (17676)
Vassiliadi, H. Mechanical underfeed stokers. (17441)
Vickers Limited. Dynamo electric machines. (17775)
Wait, H. H. Steam turbines. (17420)
Wait, H. H. Wheels for steam turbines. (17421)
Walker, A. C. C. Internal combustion, etc., engines. (17715)
Watkinson, W. H. Internal combustion engines. (17510)
White, J. W. Haulage systems. (17414)
White, J. W. Overhead wire ropeways, etc. (17415)
Whitehead, D. H. Two-stroke cycle internal combustion engines. (17526)
Wynne, E. W. Treatment of petroleum, etc. (17640)

Complete Specifications Accepted.

(To be published on December 20.)

[NOTE.—The number following the application is that which the specification will finally bear.]

11377. Creplet, L. J. Apparatus for automatically controlling from a distance variable speed or reversible engines. (101699)
13063. Evans, E. V., and South Metropolitan Gas Company. Manufacture of sulphate of ammonia. (111309)
15868. Wheateroft, I. H. Process of transforming oils into lighter oils. (111317)
16515. London Electric Supply Corporation, and Fox, A. G. Furnaces. (111320)
16534. Johnston, W. H., and Francis, C. E. Means for automatically tipping trucks and like vehicles. (111322)
16835. Davis and Son, J., and Davis, W. H. Mine signalling systems. (111339)
16992. Marks, E. C. R. (Mercury Manufacturing Company). Electric motor controllers. (111347)
17397. Reynolds, A. Manufacture of refractory bricks or the like for furnaces or the like. (111355)
1917.
699. Rodgeron, W. J. Hot air turbines. (111381)
1790. Sharp, W. Manufacture of fuel economiser blocks for open domestic fireplaces burning coal, coke, and the like. (111393)
2893. Flicker, H. Treatment of sewage for the purification thereof and the production of combustible gas therefrom. (111401)
4322. Gill, H. A. (Powdered Coal Engineering and Equipment Company). Apparatus for mixing powdered fuel and air. (111412)
4549. Thomas, W., and Mainwaring, A. E. Furnaces for generating heat. (111413)
4930. Matthews, C. W. Cleaners for boiler tubes and the like. (111418)

5424. Pearson, J., and Parker, L. E. Pulley block hoisting and lowering gear. (111421)
6244. Stuart, F. L. Apparatus for raising and conveying coal and like material. (111427)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that which the specification will finally bear.]

1917.
14550. Westinghouse Machine Company. Geared turbines. (111467)
16279. Akt.-Ges. Brown, Boveri et Cie. Process and apparatus for regulating shunt dynamos. (111477)
16289. Axien, J. H., and Jurgens, J. Rotary blowers. (111479)
16570. Mazzacurati, A. Pumps. (111482)
16665. Prat, L. Apparatus for creating or promoting draught in the flues of locomotive and like boilers. (111484)
16906. Pfelemer, F. Thermo electric generator. (111489)
17240. Soc. J. Munier et Cie. Hoists for charging blast furnaces, etc. (111492)

GOVERNMENT PUBLICATIONS.

* * Any of the following publications may be obtained on application at this office at the price named **post free**.

Colonial Reports (Annual): (No. 940). Straits Settlements Report for 1916. (London: Published by H.M. Stationery Office). Price 4d.

PUBLICATIONS RECEIVED.

The Manchester Steam Users' Association for the Prevention of Steam Boiler Explosions, and for the Attainment of Economy in the Application of Steam—"Memorandum by Chief Engineer for the Year 1916-17" (Manchester: Taylor, Garnett, Evans and Company Limited, Blackfriars-street); "Journal of the Western Society of Engineers" (Vol. 22, No. 5), May 1917, also (Vol. 22, No. 6), June 1917, 50c. a single number; New Zealand Department of Mines, New Zealand Geological Survey (Palaeontological Bulletin No. 4)—"The Cretaceous Faunas of the North-Eastern Part of the South Island of New Zealand," by Henry Woods, M.A., F.R.S. (Wellington: By authority, Marcus T. Marks, Government printer); "Journal of the Franklin Institute" (Vol. 184, No. 5), November 1917, single numbers 50c.

Gas Traction.—It is officially announced that the following appointments to the Gas Traction Committee have been made: Sir Boverton Redwood, Maj. Aston McNeill Cooper-Key, Sir Evan D. Jones, Mr. H. H. Law, C.B., Sir Arthur Churchman, Mr. W. Doig Gibb, Dr. Charles C. Carpenter, Mr. Edward S. Shrapnell-Smith, Mr. James Ollis, Lieut.-Col. R. K. Bagnall-Wild, Mr. F. W. Goodenough, Ald. William Kay, Mr. George W. Watson, and Mr. W. Worby Beaumont. The Committee will consider the employment of gas in substitution for petrol and petroleum products as a source of power, especially in motor vehicles.

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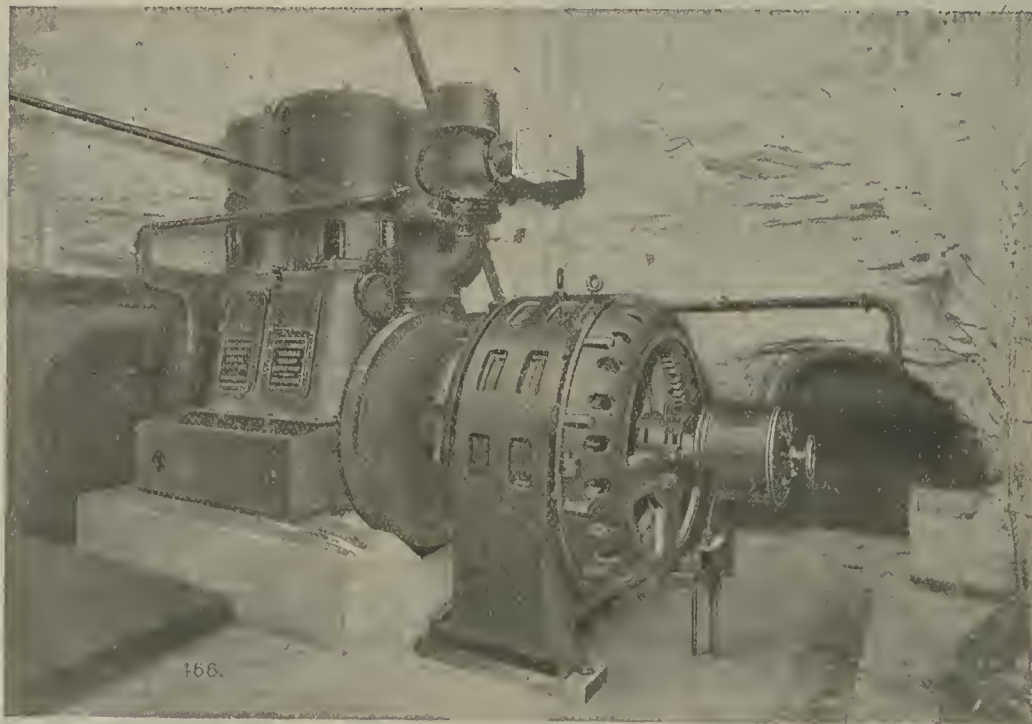
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AND

JOURNAL OF THE COAL AND IRON TRADES.

VOL. CXIV.

FRIDAY, DECEMBER 14, 1917.

No. 2972.

Notes on the Uniflow Steam Engine.*

By G. G. T. POOLE.

For the most economical working of the uniflow engine it is best to use high-pressure steam having a large degree of superheat. The question, however, naturally arises: Do collieries possess this necessary condition, and, if not, would it be of advantage to re-arrange the plant to enable them to obtain it? Several points would have to be considered and settled before this question could be finally answered. For instance:—

(a) Is the colliery large enough to warrant the re-arrangement of its surface plant?

(b) Is the estimated working life of the colliery sufficient to warrant the expenditure upon the re-arrangement?

(c) Is the motive power wholly steam or only partly steam?

(d) Are the power units large or small?

Taking the collieries of the present day (omitting new and recent improved installations), the steam pressure is usually from 50 to 80 lb. per square inch, although it is sometimes 100 lb. per square inch, with very little, if any, degree of superheat. It may, therefore, be asked: Would a uniflow engine under these conditions show any marked advantage over other types of engines? The author considers that steam pressure of 100 lb. per square inch should be the lowest used, and even at this pressure very good results should not be expected; for, in order to utilise the full advantages of the uniflow engine, the steam pressure should be from 120 lb. to, say, 180 lb. per square inch, with as high a degree of superheat as possible.

In the case of a colliery having a steam surface plant, and using small coal of a low calorific value for raising steam to an average pressure of about 70 lb. per square inch, would it be advantageous to use a superior grade of coal of a high calorific value for raising steam to a high pressure, and to use a high-class engine of a more economical type, such as the

disadvantage, but opinions differ as to its effectiveness and efficiency.

In the uniflow engine this difficulty is overcome by the steam flowing in one direction. The steam is admitted at each end of the cylinder through well-designed steamtight valves, and flows towards the centre of the cylinder. Exhaust ports are cast in the centre of the cylinder, and, as the piston uncovers these ports, the steam exhausts through them, and does not have to re-traverse the length of the cylinder and exhaust in the proximity of the inlet valve.

The temperature of the clearance surfaces at the inlet to the cylinder are thus kept at a constant temperature, with a consequent lack of initial condensation.

By referring to fig. 1, the above-mentioned action will be easily understood. The steam is admitted through the end cover A, and is passed into the cylinder B; during the expansion the cover (which acts as a jacket) exercises a heating action (due to the difference of temperature between the cover and the steam), which is chiefly transmitted to the steam in contact with the cover. As the steam expands, that which is close to the piston C will increase in wetness, due to adiabatic expansion, whilst the steam near the cover at B will be dry, and possibly possess a certain degree of superheat, depending upon the initial temperature of the incoming steam. On the piston uncovering the exhaust ports D, the steam is released, and the wettest portion is forced through these ports and into the exhaust chamber E. Upon the return stroke, when the piston closes the exhaust ports D, the steam which received heat from the cover during

clearance surfaces should be reduced to a minimum. Prof. Stumpf, in his book on "The Uniflow Steam Engine," states "that with a clearance of 2 per cent., cut-off at 8 per cent., condenser pressure 0.07 atmosphere, the most favourable compression is 90 per cent., and these conditions may be taken as normal for the Uniflow engine." He also states "that the steam consumption is 4 to 4.1 kilogs. per indicated horse-power hour"—that is, about 9 lb.

Owing to the small clearance volume, it is necessary to make extra provision for starting the engine, and this consists of an additional clearance chamber, which can be used or cut out as desired. This additional clearance space also provides a means of running the engine non-condensing, and is usually about 12 per cent.

The advantages claimed for the uniflow engine include: (a) Great economy in steam consumption; (b) high efficiency in working; (c) simplicity of construction; (d) fewer working parts, with high efficiency of lubrication and consequent reduction in repairs and renewals; (e) high vacuum in cylinder; (f) less space occupied than by other engines of the same power. It may also be mentioned that, owing to the length of the piston, there is no necessity for a tail rod and guide.

Applications.

The next consideration will be the uses to which a uniflow engine may be applied, and it must be admitted that, up to the present time, it has not been used in this country in all cases where steam engines are applicable, one chief exception being in the case of winding engines.

The author does not know of any colliery in this country in which the uniflow engine is used for winding purposes, and by examining the action of the engine, it would appear at first sight to be impossible to so use it, seeing that the early cut-off and excessive

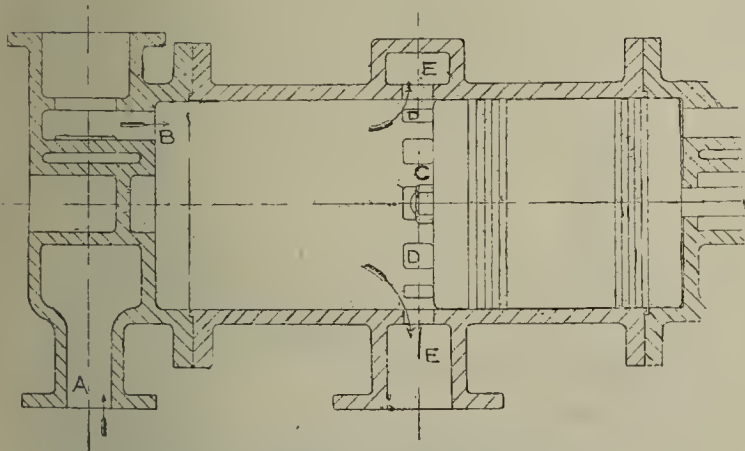


FIG. 1.—DIAGRAM OF CYLINDER.

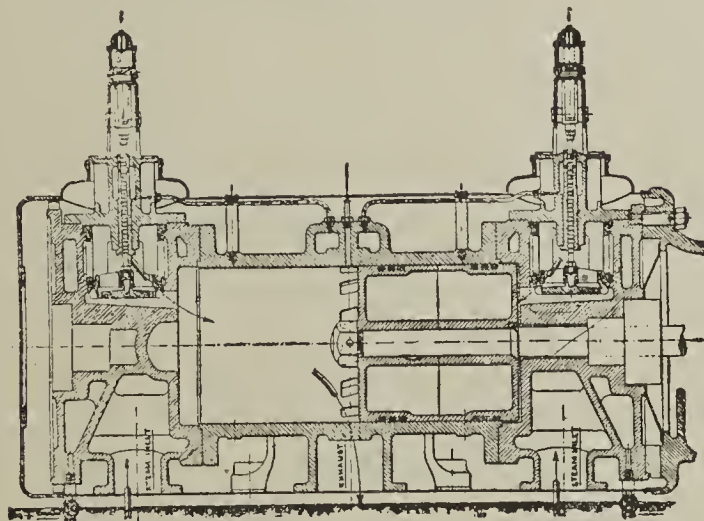


FIG. 2.—LONGITUDINAL SECTION OF CYLINDER AND VALVE GEAR.

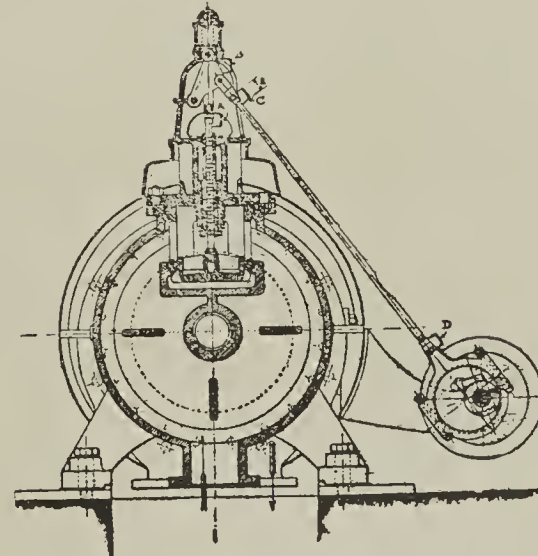


FIG. 3.—CROSS SECTION OF CYLINDER AND VALVE GEAR.

uniflow engine? This point the author considers should be seriously studied by mining engineers, seeing that of recent years, owing to the increase of by-product plants, small coal has become of increased marketable value, and in many cases is more profitable to sell than to use for steam raising purposes at the colliery.

An example of economy may be instanced in the case of a colliery generating its own electric current by means of a steam-driven generator. Three of the chief requirements for such an engine are: (a) Speed variation within very narrow limits; (b) economy in running; and (c) reliability from breakdown. In the uniflow engine these points are embodied; the economy in running is also far above that of ordinary high-class engines, and for a given power and steam pressure will occupy less floor room, as the power will be produced in one cylinder, whereas in other types, such as the tandem and cross-compound, two cylinders are required.

Method of Working.

The uniflow engine derives its name from its mode of action, namely, the flow of steam in one direction, and this is its chief characteristic. In ordinary steam engines the steam enters at one end of the cylinder, forces the piston forward, and flows to the other end; on the return stroke it flows in the opposite direction, and finally leaves the cylinder at the same end as which it entered. The disadvantage in this system is that the cylinder walls are constantly varying in temperature, and, owing to the exhaust steam leaving the cylinder at the same end as the incoming steam, the clearance surfaces are reduced in temperature, thus withdrawing a large amount of heat from the incoming steam, and causing thereby initial condensation and consequent loss in economy. Steam-jacketing of the cylinder has been resorted to in order to overcome this

expansion is trapped and compressed, the compression closely following an adiabatic for superheated steam; and during compression further heat is transmitted from the cover to the compressed steam. It will therefore be seen that the cylinder ends are practically at a constant temperature of a high degree (being that of incoming steam), whilst the centre of the cylinder is practically at a constant temperature of a low degree (being that of exhaust steam).

One great advantage in the uniflow engine is the entire absence of exhaust valves, with their corresponding links and operating gear. By the substitution of exhaust ports in the centre of the cylinder, in place of the exhaust valves at the ends of the cylinder, all leakage losses, additional clearance surfaces, and spaces in connection therewith, are avoided. The essential feature in working is to obtain a high temperature of steam, and if this is obtainable, no jacketing, other than the end covers, is necessary. If, however, steam is used with very little or no superheat, an additional jacket round the inlet ends of the cylinder is advisable. In considering the question of jacketing, it must be borne in mind that no jacketing whatever must take place where the exhaust occurs (known as the "neutral zone").

By referring to fig. 1, it will be seen that instead of compression beginning near the end of the stroke, it begins immediately the piston closes the exhaust ports, and consequently a much greater degree of compression is obtained.

Admission occurs as near as possible to the commencement of the working stroke, and is not given any appreciable lead, as in ordinary engines. Cut-off occurs at F, and varies up to 25 per cent. of the stroke, the average being from 7 to 12 per cent. Release occurs at G, when the piston uncovers the exhaust ports. Compression occurs at H, when the piston closes the exhaust ports.

The clearance volume when working condensing should be about 2 per cent., and in any case the

compression would prevent the stopping and starting of the engine in any position whatever (this being an essential requirement in the winding engine).

Again, as pointed out by the author in his paper on "The Prevention of Overwinding and Overspeeding in Shafts,"* the majority of so-called overwinding accidents are caused through excessive speeds, especially when coming to bank. Consequently it should be possible to control the speed of the engine at any point during the wind, and this would mean a special governor arrangement, with possible complicated attachments to an otherwise simple engine.

These and other difficulties have possibly prevented the application of the uniflow engine for winding purposes in this country; but it should be pointed out that in Germany this type of winding engine is in existence, and is working at many collieries. Prof. Stumpf gives particulars of these plants in his book, and mentions the manner in which various difficulties have been overcome; he also gives tests of their working, which show that in regard to economy they are well ahead of existing high-class steam winding plants of high powers.

The question, however, of adapting this type of engine to various purposes concerns mostly the designer, and therefore the author will leave this question of adaptability for his consideration, with the opinion that if a uniflow engine can be designed for winding purposes, which is reliable in working, with increased economy, and if the mining engineer will co-operate (as far as he is able with the conditions at his disposal) in the lay-out of his surface plant with this type of prime mover, the question of economy in the utilisation of power at collieries where steam is the chief motive power will have advanced very materially.

The Robey Engines.

The uniflow engine, besides being of simple construction, is also totally enclosed, this being necessary owing

* Paper read before the North of England Institute of Mining and Mechanical Engineers on December 8.

* Trans. Inst. M. E., 1914-1915, vol. xlix., page 355.

fact that forced lubrication is used throughout the engine. Messrs. Robey and Company of Lincoln, have now been makers of the engine for several years, and they claim to have produced an engine which is one of the foremost British makes. Large numbers have been supplied, and are giving the greatest satisfaction in working.

Their engine is fitted with a positive valve gear, having valves of the double-beat type, especially made to keep tight at all temperatures by means of a special design, and worked from a lay shaft driven from the crank shaft. The valve seat is an entirely separate casting from the cylinder, and is held in position in the cylinder by a bonnet cover, which is also an entirely separate casting. The governing of the engine is controlled by a shaft governor, which regulates the speed within very fine limits, and varies the cut-off to suit the load.

Figs. 2 and 3 show complete longitudinal and transverse sections of the cylinder and valve gear, revealing the simplicity of construction. In condensing engines

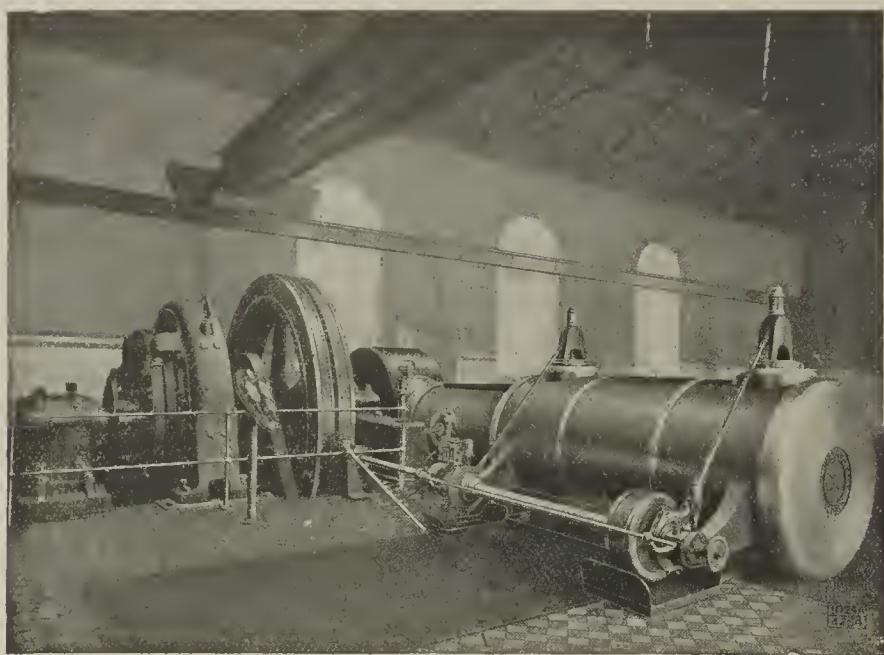


FIG. 4.—600/800 BRAKE-HORSE-POWER ROBEY UNIFLOW ENGINE.

special clearance valves are fitted, which connect the additional clearance spaces with the cylinder; these valves are opened when starting the engine, and also act as relief valves when the engine is working condensing.

The author has inspected a 600/800 b.h.p. uniflow engine driving a dynamo in makers' works power station, and its extreme simplicity in construction, smoothness in running, and neat finish were very conspicuous. This engine has now been running for 12 months, and is illustrated in fig. 4. It uses steam at a pressure of 180 lb. per square inch, superheated to 600 degs. Fahr. total temperature; the cylinder is 29 in. in diameter by 33 in. stroke, and the speed 140 revolutions per minute. He also had the opportunity of seeing a new installation of two 500/650 b.h.p. engines, each with cylinders 27½ in. in diameter by 30 in. stroke, running at 150 revolutions per minute; and two engines of 60/80 b.h.p., each with cylinders 12 in. in diameter by 14 in. stroke, running at 210 revolutions per minute.

These are all in one engine house, work at a steam pressure of 160 lb. per square inch, and maintain a vacuum of 27½ in., although working practically continuously and receiving very little attention. The large engines work day and night from Monday until Saturday, and the small ones continuously for weeks at a time. When seen, they had been running for six weeks without a stop.

Another very useful type of engine seen by the author is the Robey undertype uniflow engine. It is combined with a boiler, superheater, and jet condenser. The condenser and air pump are placed below ground, the latter being worked off the crank shaft. In order to secure the utmost benefit from the use of dry steam, the superheater is placed in the smokebox of the boiler. The engine is of 110/140 b.h.p., works at a steam pressure of 180 lb. per square inch, and runs at 190 revolutions per minute. All the Robey standard uniflow engines are built for a steam pressure of 180 lb. per square inch, and are suitable for the highest degrees of superheat; they are stated to give the lowest possible steam consumption when working under these conditions.

The Cole, Marchent and Morley Engine.

Messrs. Cole, Marchent and Morley Limited, of Bradford, have also been makers of the uniflow engine for several years, and produce a very high-class and economical engine. Their engine is fitted with balanced piston drop steam inlet valves, which they claim combines the small power required by drop valves with the quick cut-off obtained by Corliss valves, and also ensures a steamtight valve when closed. The valve is well suited for the use of superheated steam at a high temperature, and is operated by a cam gear worked by eccentrics from a lay shaft. Unlike other drop valves, it cuts off the steam whilst falling at its full velocity, and is drawn up steadily and quietly during the period of lap. The waste of steam due to wire drawing, owing to the valve having to be checked before finding its seat, is thus obviated.

The engine is governed by a shaft inertia governor and arrangements are provided for varying the speed about 5 per cent. above or below the normal speed while the engine is running.

The engine can be fitted with a flywheel, and the turning moment is suitable for driving machinery, including rolling mills, and for direct- and alternating-current generators, and for the machinery, flour mills, etc.

The principal feature in which their engine differs from those of other makers is a combined drain exhaust and relief valve, which allows of the exhaust to the atmosphere when starting up, or, if necessary, for any length of run. This valve embodies three valves in one casing and gear, and allows of the engine being started up without undue compression.

Before the engine is started, the hand-control lever is set to the "drain" position, when any condensed water is allowed to leave the cylinder. Immediately after starting, the hand lever is set to the "exhaust" position, and acts as an exhaust valve. As soon as the vacuum has reached, say, 20 in., the control lever is set to the "running" position, and acts as a relief valve.

These engines are manufactured in powers from 100 to 2,000 indicated horse-power, and are designed to give a satisfactory overload of 30 per cent.

The prominent features in all sizes are that the main bearings and cross head slides are water-jacketed, and forced lubrication is fitted throughout.

With regard to steam consumption, the makers claim that it is practically the same per brake horse-power from about half load up to 10 per cent. overload, and they recommend as good working conditions a steam pressure of 160 lb. per square inch, superheated to a total temperature of 600 degs. Fahr. Under these conditions, they state that, for engines up to 500 indicated horse-power, the steam consumption would be approximately 9.75 lb. per indicated horse-power hour, and in larger sizes it would be less.

Owing to its economy and reliability, this engine has a great future before it for driving electric generators up to, say, 1,500 kilowatts, and it is often advisable or more economical to put down a small power station at the source of demand than to obtain power from a central station, on account of transmission losses and cost of cabling.

Fig. 5 shows a part section of the cylinder of one of these engines. On the left the piston valve is shown in such a position that steam can enter the cylinder. On the right the liner is shown in position, and is in section, the piston valve spindle being broken off to show the arrangement of the steam ports.

An explanation of the reference letters on the figure is as follows: A, bonnets containing cam motion operating the piston valve; B, false cover to neatly finish off the joint here and to cover the bolt circle round the valve bonnet; C, planish steel lagging; D, polished ring to cover the joint in lagging (by removing this ring access is obtained to the nuts holding the cylinder head in place, and there is no need to remove the lagging if the head should have to be taken away); E, sectional view of piston valve liner in position; F, steam inlet port; G, steam port in the liner; H, entrance into the cylinder for lubricant on each side of the exhaust belt; J, liner for drain exhaust and relief valve; K, bonnet to contain gear for drain and relief valve; L, metallic packing; M, cylinder foot; N, cylinder false cover to cover non-conducting material and support lagging; O, clamps on lagging rings; P, piston in forward position.

A Cole-Marchent engine installed at a tin-plate works at South Wales develops 300 indicated horse-power when running at 150 revolutions per minute and using steam at a pressure of 150 lb. per square inch, superheated to a total temperature of 500 degs. Fahr. The cylinder is 23 in. in diameter by 24 in. stroke. Another very interesting installation is in work at a colliery in the North of England. The power developed is 550 indicated horse-power when running at 135 revolutions per minute and using steam at a pressure of 70 lb. per square inch, superheated 100 degs. Fahr; the drives are by means of ropes and belts.

At the far end of the engine house is an alternator driven by ropes direct from the flywheel; the two independent rope drives shown between the flywheel and dynamo are for driving ventilating fans in the mine; the extension of the crank shaft is coupled to gear which drives three air compressors by means of belting.

Results of Running Tests.

Messrs. Woolcombers Limited, of Bradford, give the following complete test of one of their uniflow engines. They state that they have now working three uniflow engines, two manufactured by Messrs. Sulzer Brothers, of Switzerland, and one by Messrs. Musgrave and Sons Limited, of Bolton.

Engine.—The engine is of the single-cylinder uniflow type, made by Messrs. Sulzer Brothers, Winterthur, Switzerland. It is rated at 600 indicated horse-power when working with a pressure of 140 lb. per square inch. The steam admission valves are of the equilibrium drop type, operated by means of rollers, cams, levers, and eccentrics from the side shaft, and governed by a shaft governor mounted on the latter, which allows for variable cut-offs from 0 to 25 per cent. There are no exhaust valves; circumferential slots in the cylinder body, which are uncovered and covered by the moving piston, provide large ports for the steam exhaust.

Method of Measuring Steam Consumption.—Steam was supplied during the test from one Lancashire boiler (Horsfield), 8½ ft. in diameter by 30 ft. long, fitted with a Boltons superheater in the downtake. The boiler had only been working about two months, and all rivets and joints were absolutely tight. The safety valve was set to blow off at a pressure of 140 lb. per square inch, and at no time during the trial did the pressure exceed 140 lb. per square inch. The water was weighed in a tank fitted on

an Avery weighbridge, which was calibrated before and after the test by dead weights. After weighing, the water was run into a second tank, from which it was pumped direct into the boiler by a special feed pump, which is used solely for testing purposes, all other connections to the boiler being blanked off and tested for leakage. The test was in every sense a commercial one; it included all radiation losses in the boiler and steam pipes, and gives the actual cost of running the engine.

PARTICULARS OF ENGINE.

Diameter of cylinder, in inches	29½
Diameter of piston rod, in inches	5½
Stroke of piston, in inches	31½
Volume swept through by piston, in cubic feet	12.45
Number of revolutions per minute	144
Piston speed, in feet per minute	760
Clearance volume (front), in cubic feet	0.298
Clearance volume (front), per cent.	2.4
Clearance volume (back), in cubic feet	0.2607
Clearance volume (back), per cent.	2.1

OBSERVATIONS AND RESULTS.

Duration of trial	1.35 p.m. to 4.50 p.m. = 3¼ hours
Atmospheric pressure	29.7 inches Hg.

STEAM.

Total water evaporated, in pounds	17,248
Water entering engine per hour, in pounds	5,307
Pressure by gauge at boiler, in pounds per sq. in.	140
Pressure by gauge at stop valve, in pounds per sq. in.	135
Pressure absolute, in pounds per sq. in.	149.7
Temperature of steam at engine side of stop valve, in degs. Fahr.	484.7
Temperature of saturated steam at steam pressure	358°
Superheat in steam	126.7

POWER.

Indicated horse-power in cylinder (front end)	228.5
Indicated horse-power in cylinder (back end)	263.1
Total indicated horse-power	491.6
Total revolutions by counter	27,431
Revolutions per minute	144.6
Piston speed, in feet per minute	760.2

CONDENSER.

Temperature of injection, in degs. Fahr.	89.8
Temperature of air pump discharge, in degs. Fahr.	106.8
Vacuum in condenser, in inches of Hg.	26.3
Temperature of steam in exhaust belt, in degs. Fahr.	143.2

HEAT ACCOUNT FROM 32° FAHR.

	B.t.u.	P.c.
Gross heat supply entering engine, per minute	112,072	100
Heat equivalent of indicated horse-power	20,850	18.6
Heat leaving engine in exhaust, balance of heat account, radiation, errors of observation, etc.	91,222	81.4
Totals	112,072	100.0

RESULTS (CALCULATED FROM HOT WELL TEMPERATURE).

Heat supplied per indicated horse-power per minute, in British thermal units	214
Thermal efficiency, per cent.	19.78
Heat theoretically required (Rankine cycle), in British thermal units	148.9

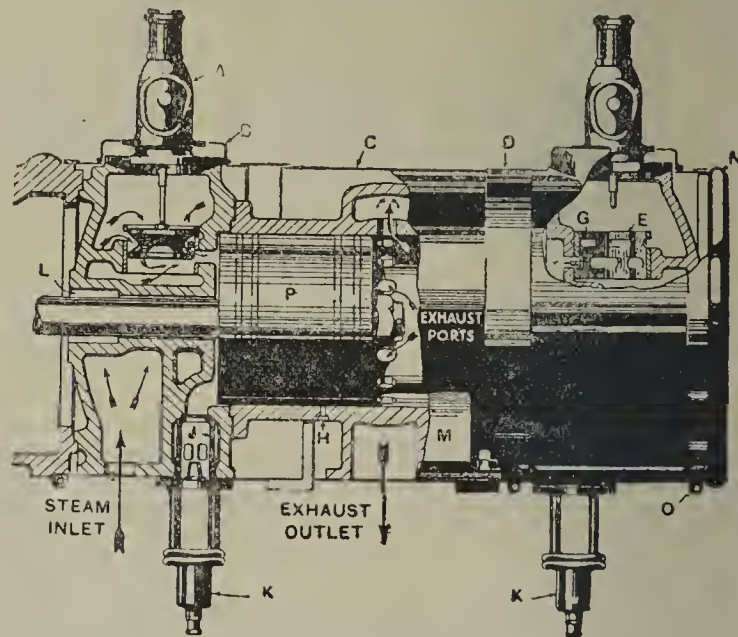


FIG. 5.—DIAGRAMMATIC SECTION OF CYLINDER OF COLE, MARCHENT & MORLEY ENGINE.

Efficiency of Rankine cycle between limits of 484.7 and 106.8 degs. Fahr., per cent.	28.5
Efficiency ratio	0.6942
Work actually obtained per pound of steam, in foot-pounds	183,530
Maximum work theoretically obtainable from 1 lb. of steam, in foot-pounds	264,400
Thermal efficiency of engine, per cent.	69.42
Pounds of steam per indicated horse-power per hour	10.79
Equivalent consumption of saturated steam per indicated horse-power per hour, in pounds	11.9

A uniflow engine, having a different type of valve gear, is manufactured by the Lilleshall Company Limited, of Oakengates, Salop. This company have now made two of these engines to the patents of Prof. Stumpf, and these are giving every satisfaction in working.

The inlet valves are placed at the side of the cylinder, thus making them very accessible; additional clearance valves are provided, which automatically increase the clearance spaces at each end of the cylinder in case the vacuum should be destroyed. These engines are built from 100 horse-power upwards.

With regard to Continental practice, Messrs. Sulzer Brothers have been makers of the uniflow engine for

many years. Their engines are of a high-class finish, and economical in working, many having been supplied to this country as well as to France, Russia, Germany, etc. They are built of the horizontal type only, the cylinder having no steam jacket, but the covers are heated by live steam before it enters the cylinder.

The steam inlet valves are of the double-beat type, located in the cylinder covers, and are claimed to remain absolutely tight at varying steam temperatures and pressures. The cut-off is regulated by a shaft governor, allowing of a speed variation of ± 5 per cent. whilst the engine is running. The flywheel is designed for use as a belt or rope pulley, and usually for a coefficient of fluctuation of about $\frac{1}{150}$.

The inlet valves are placed down as low as possible in the end covers, in order to reduce the clearance space. With regard to the question of the permanent running of non-condensing uniflow engines, Messrs. Sulzer Brothers state that the steam consumption, when using steam at a temperature of about 600 degs. Fahr., would be about 50 per cent. higher than when

REFRACTORY MAGNESIA.

By R. C. G. SROW.

The following data have been obtained from the author's own experiences in the calcining of magnesite and the electrical dead burning and shrinking of the magnesite so formed.

The magnesite which was used was from a deposit in Lower California, from which considerable quantities of magnesite had been mined and shipped in previous years.

The raw magnesite analysed:—Insoluble, 0.50 per cent.; Al_2O_3 and Fe_2O_3 , 0.90 per cent.; $CaCO_3$, traces; $MgCO_3$, 98.10 per cent. This was a massive magnesite, white in colour, and having a hard conchoidal fracture.

The raw calcining was carried on in a vertical kiln 30 in. inside diameter and 5 ft. deep. This was so arranged that a door on one quadrant near the bottom allowed the calcined material to be drawn out, and at 90 degs. with the draw hole was an opening 10 in. by 12 in. for a pressure air-oil burner. The burner was 15 in. from the bottom of the shaft. Lumps of

325; 76 hours, 3.70; 100 hours, 4.60; 125 hours, 5.50; 150 hours, 5.60; and 172 hours, 6.00 per cent.

The purpose of carrying on the work on magnesite and magnesia was to prepare a satisfactory dead burned and shrunk magnesia that would be suitable for lining the hearth and walls of an electric steel furnace.

The result desired was a monolithic lining, including side walls and hearth. In order to provide against any subsequent cracking or shrinkage it was considered essential to first take out all the shrink from the raw material, before setting in the furnace.

The first monolithic lining which was put in was partially a success, and partially a failure. The electrically-burned magnesia was ground to about 6 mesh and thoroughly mixed with 10 per cent. of powdered ferric oxide (80 mesh) and 5 per cent. of a basic steel furnace slag. This mixture, approximating 4,200 lb. in weight, was heated in 1,000 lb. batches, on a steel-plate frame, and well-boiled tar, to about 12 per cent., thoroughly mixed and heated with the basic materials. The mixture was rabbled well to ensure coating of the grains with the hot tar.

The hot mix was then rammed in the side walls of the furnace, and around a steel-plate form, for the crucible. The side walls were 10 in. thick at the bottom and 7 in. thick at the top and 42 in. high. Steel hand rammers were used, and only small layers put in at a time, but constantly, and rammed hard. When the lining was completed the inner steel form was removed, and the inner surface smoothed up. The hearth in the furnace was put in on the old bottom. The roof was then replaced.

Before firing, the material was given three hours to air-set, and then an oil burner was set in the tapping-spout opening. The charging doors were opened and the oil burner lighted. A very small smoky flame was used, and eventually, as the walls became heated, distillation of the tar in the binder took place. Eventually the volatile gases burned and the excess tar was burned out, leaving principally a carbon residue between the grains of the material. It was given about four hours for the "smoking" and burning of the tar to take place. Gradually the heat from the burner was increased, until in about eight hours the furnace was a bright yellow. The lining showed one small crack directly opposite the oil-burner flame, in a vertical position. The lining was extremely hard, and gave a metallic ring when hit with a steel bar.

At the end of eight hours on oil firing, the electrodes were put in and the arc formed. (The furnace was a one-ton Stassano, radiated arc.) The heating took place evenly and without any further cracking developing in the lining. The walls and hearth were a bright yellow, and cold scrap was charged for a wash heat. About 1,200 lb. was charged, and melting proceeded rapidly.

During melting, it was observed that directly over the electrode ports the magnesia mixture was falling down and accumulating on the electrodes. Eventually enough material fell on to the electrodes to cause a bridging across from one side of the port to the other, a distance of 5 in. This material was white hot. When the last of the 1,200-lb. charge was poured from the furnace, the furnace interior was a dazzling white. The lining was apparently in good shape so far as cracking or shrinking was concerned. But a considerable "sluffing-off" effect was noticed by an accumulation of material at the base of the walls, on the hearth. The lining was a dazzling white, and the arc was almost "out." The electrodes were brought nearer together, and a short arc could only be maintained. When the furnace-charging doors were opened large quantities of small floating particles of white substance floated through the air, coming from the furnace openings. These small particles in the air gradually spread out into feathery particles. This material was analysed and showed magnesia to be the main ingredient, with some silica.

The "sluffing-off" effect became so great, that the hearth was covered with the material of the lining, and the lining was now only about $4\frac{1}{2}$ in. thick on the walls above where the slag line would be. Considering the uncertainty of this lining, it was decided to repair the furnace with bricks and get back to producing steel castings, and not holding up business with experiments.

The experiment showed several things, which have since then been useful in putting in monolithic linings of magnesia for ferro alloy furnaces.

After cleaning out some of the highly heated material, it showed considerable ferrous oxide, and a honey-combed structure which resembled incipient fusion and decrease in volume. The mix was apparently too high in iron oxide. Hand ramming is difficult to give uniform density on so great a volume of material. Air rammers would be more desirable. The lining walls were too thick, not allowing the effect of the heat to penetrate rapidly enough to burn and frit the whole wall. The inner wall was burned hard, but halfway through the material had no bond, and was very destructible and friable, which was evidenced by the "sluffing" effect. Precautions are necessary to make hard and dense the material over openings, so this material doesn't sluff and fall down on the electrodes, short circuiting the current through the lining. Rapid heating after burning out the tar and rapid heating to a maximum temperature appeared essential; and other binders than tar should be tried.—*Met. Chem. Engineering.*

The executive committee of the Automobile Association, of Farnham House, Whitcomb-street, W.C. 2, has decided to offer a prize of £1,000 for the best invention which will enable coal gas to be used for propelling motor cars and motor-cycles. A sub-committee is preparing conditions, and is asking for suggestions.

Iron and Steel Combine.—Provisional arrangements reported to have been made for the combination and amalgamation of the following companies: Steel, Peckham; Tozer Limited, Phoenix Special Steel Works, Rotherham; Samuel Fox and Company Limited, Stockbridge, Sheffield; Frodingham Iron and Steel Company Limited, Scunthorpe, Lincolnshire; and Workington Iron and Steel Company Limited, West Cumberland. Under the scheme, it is proposed to form a new company and acquire the entire assets and undertakings of the several companies.

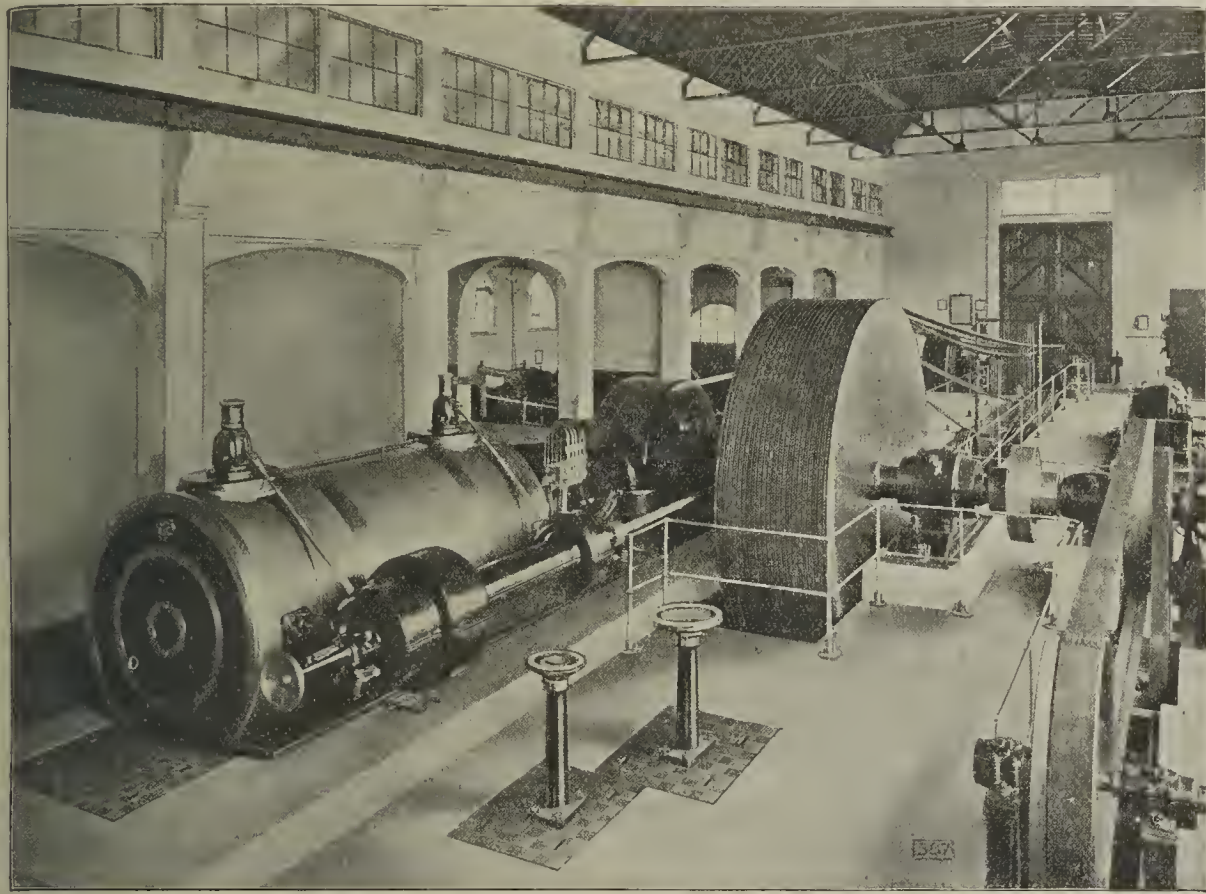


FIG. 6.—COLE, MARCHENT & MORLEY ENGINE AT A NORTH OF ENGLAND COLLIERY.

working condensing, and with saturated steam almost 100 per cent. more.

The maximum obtainable output (not permanent) of the engine when running under these conditions, with a cut-off of 20 per cent., corresponds approximately to the nominal output of the condensing engine (cut-off of about 10 to 11 per cent.), and therefore it is not advantageous to run uniflow engines non-condensing.

DEVELOPMENT OF THE FORTH VALLEY.

In his report relative to the better development of the Forth Valley, Mr. H. M. Cadell dwells at some length on the mineral developments. Dealing with the question of iron and steel, he states that "the native ironstone seams in Scotland of workable thickness are now largely exhausted, and foreign ore requires to be imported to keep the blastfurnaces going. The largest iron ore deposits in Europe are at Kirunavaara, in Lapland, and most of the output is shipped *via* Narvik, in Norway, to Emden, where it is sent by rail to the Ruhr. Now, the Firth of Forth is 100 miles nearer Narvik than Emden, and the ore could be brought to Carron, which is a far shorter distance than from Emden to the Ruhr. Special furnaces to deal with a large quantity might be constructed, and the basic process of iron and steel making introduced on a large scale. The Carron ironworks, being close to a large harbour and in a coal mining and good industrial centre, are admirably suited to be extended so as to make basic iron from the Lapland ores. With a large supply of steel locally made, and excellent sites for shipbuilding, large ships could be built in the vicinity.

"The most important Scottish coal field is now that of Fife, which extends along the north side of the Firth from the Forth Bridge to Kennetpans and Alloa. Thick seams of coal have lately been opened up, and are now being worked along the shore at Torry Bay, by the Fife Coal Company. Several important seams of coal at present not being worked crop out at Preston Island, in the centre of the bay and under the mud to the west of the island at Culross. If the whole bay were reclaimed by the means adopted on the south side, those seams could be safely worked. Coal is being worked under the sea at Bo'ness, and also under the foreshore, where it has been lately reclaimed so as to permit of the shallower seams being safely mined.

"To the west of Bo'ness a large seam of excellent fire-clay is known to occur in an easily-worked field well above sea level, and this has been opened up near the Avon for manufacture elsewhere. There is, however, great capability of enlarging the workings, and there are good sites for the construction of kilns and works for making bricks and other goods. Good limestone occurs close to the fireclay, which is the same seam as is profitably worked at Castlecary, and is in the geological series of the well-known Glenboig seam in Lanarkshire."

magnesite $1\frac{1}{2}$ in. to 3 in. were charged in such a way that the interstitial spaces between the lumps were not filled up, but allowed the gases to escape at the top of the kiln. The kiln was two-thirds filled, and firing started. As the top of this became hot, the kiln was slowly filled to its full holding capacity, the top always reaching a dull yellow heat before more magnesite was added. The kiln held about 1,200 lb. of raw rock. This was fired for 10 to 12 hours, when the whole mass was a bright yellow. The oil burner was shut off and this opening plugged tight. The top was covered and the kiln allowed to cool slowly overnight. The walls of the kiln were thin, to allow the mass to radiate its heat sufficiently fast to handle the material in the morning. The kiln content was drawn out on a flat sheet-steel plate and sampled. The analysis was:—Ignition loss, 2.20 per cent.; Fe_2O_3 and Al_2O_3 , 1.90; MgO , 94.70; CaO , 0.10; and insoluble, 0.85 per cent.—total, 99.75 per cent.

The magnesite lumps which occupied about three-fourths of the height of the kiln, were burned to buff-coloured clinkers, and showed no core in the 3 in. lumps, but fell apart easily with handling during the drawing and sampling. That portion which occupied the upper one-quarter of the kiln was not clinkered well, and was powdery and white. But owing to the subsequent treatment of this calcined material, it was immaterial, regarding this fine, soft material on top. The kiln was run on the described schedule until about 3,600 lb. of magnesia was obtained. This magnesia was crushed to about $\frac{1}{4}$ in. size, and some unavoidably went to powder, and the whole then was divided up in 600 lb. lots.

These batches were then charged—600 lb. at a time—into the crucible of a one-ton Stassano, three-phase, arc-radiated steel furnace. The material was levelled up, and a current of 600-800 amperes carried at 150 volts for 30 minutes. During this time the magnesia was turned and rabbled to give it exposure to the flaming arc. Directly under the arc some magnesia fused to a hard slab, about 8 in. to 10 in. in rough diameter and about 1 in. thick. This was broken up and added along with the balance of the calcined material. Before charging each batch the furnace crucible was brought up to a bright yellow, so that the furnace was hot when the material was charged into it.

The total amount of material charged in, weighed 3,600 lb., and the power consumption was 520 kw.-hours, metered on the secondary of the transformers. At 1 c. per kw.-hour the cost was 5.20 dols., or at a cost per 100 lb. of 14.4 c.

The sampling was made on the cold material and showed 0.7 per cent. loss on ignition by heating in an electric combustion tube furnace. The magnesia grains were hard and flinty, and scratched glass. They showed a specific gravity of 3.65.

A sample of $\frac{1}{4}$ in. lumps from this electrically-burned lot showed no change in weight in moist air for 10 days. Another sample, from the oil-fired kiln, previous to electrical burning, showed the following percentage increase in weight:—30 hours, 2.5 per cent.; 44 hours,

MINING INSTITUTE OF SCOTLAND.

General meeting of the Mining Institute of Scotland, held in the Royal Technical College, Glasgow, on Friday, December 8, Mr. D. M. Mowat, Coatbridge (president), occupying the chair.

The PRESIDENT made sympathetic reference to the death, on active service, of Lieut. A. R. Nimmo, a member of the institute.

Messrs. H. Johnstone, 28, Hamilton Park-terrace, Hillhead, Glasgow, and Mr. S. Chambers, colliery manager, Murdostoun Colliery, Cleland, were admitted to membership.

Intensive Mining in Thin Seams.

Discussion was resumed on Mr. GEORGE GIBB's paper on "A Fresh Aspect of Intensive Mining in Thin Seams." (*Colliery Guardian*, August 17, 1917, p. 304.)

Mr. R. W. DRON (Glasgow) wrote that there were not many coal fields in Scotland where similar large areas were to be found free from troubles, and with a moderate dip and rise. The advantage accruing from these favourable circumstances would have been neutralised in this case owing to the roof conditions had the ordinary longwall system been continued. A considerable part of the advantage gained by this system of working was due to the mother gates being at right angles to the gateways. The difference was a saving of 9 per cent. in the length of roadways. He (Mr. Dron) had been able to effect a similar economy in working a thin seam, with a good roof and a parting of about 12 in. in the centre of the seam, by driving the mother gates through the waste at right angles to the gate roads. The ripping from the mother gates was stowed in each gate road as it was cut off. When a new mother gate was required, work was commenced at three or four different points, so that the whole operation took only a very short time. Another advantage of Mr. Gibb's system was that the gate roads were always at right angles to the line of faces. Where the roof was suitable, it was always an economy to drive the gate roads in this way. Of course, the advantage could be obtained in the ordinary system of longwall working if the necessary care was taken in laying out the faces. If Mr. Gibb could reduce the ratio of roadways to repairers to a figure of relative cost per ton for a given standard of wage, it would bring out the saving more clearly. With the county wage at 7s. per day, would the saving be equal to 6d. per ton on the output? Under the conditions of roof pressure described in the paper, Mr. Gibb's system would give all the relative advantages stated, but under other conditions an attempt to maintain the great length of roadways would be disastrous.

Mr. ROBERT McLAREN (Airdrie) said he had watched the development of the system, and he believed in its ultimate success. Like all other new methods, the element of uncertainty entered, and unforeseen obstacles arose. Eventually, however, these were overcome, and the system was now a complete success. Perhaps the greatest advantage lay in the narrow openings in the first working driven to the boundaries. In ordinary longwall, the roof movement over the large waste area was a constant factor, and the roadways in this area were, as a rule, constantly under repair. In this new system the movement was confined to the narrow opening, and any threatened movement was held up by the solid pillars on each side of the opening. The system of retreating was not new, being already in operation in the thick seams worked stoop-and-room. The author had followed out a sound principle in working the seam outbye, and leaving waste and pressure behind him. Co-ordination and concentration were the main features in the method, and these always made for a reduced working cost. Like the author, he (Mr. McLaren) was of the opinion that there was no limit to the thickness of seam to which this system could be applied, but its full application would best be found in a large field. As far as Scotland was concerned, the thicker seams would be exhausted in the near future, and since only thin seams would be available, any method giving better and cheaper working was of the utmost importance.

Mr. J. B. THOMSON (Hamilton) said he thought it would enhance the value of the paper if Mr. Gibb would describe the sketches which accompanied it a little more fully. He would also like the author to say whether the working of one seam by this method had any effect on adjacent seams. For instance, in working Pyotshaw coal over an area from which the Main coal had been extracted, where the strata between the seams was about 20 ft., if the Main coal had been taken out by ordinary longwall, the working of that seam was comparatively simple. But if the Main coal had been cut into stoops 50 or 60 yds. square, with 10 or 12 ft. rooms, and the stoops extracted by longwall working, the Pyotshaw was very much disturbed, whilst if the stoops of the Main coal had been taken out by ordinary stooping, the Pyotshaw was usually as good as lost. He (Mr. Thomson) would like to know if the author had had any experience of semi-longwall and its effect on adjacent seams where these were thin. The author gave four reasons for the success of the system described over ordinary longwall, but he (Mr. Thomson) did not think the haulages would be any more complicated by ordinary longwall working than they were as shown by the paper. Again, he did not see that Mr. Gibb could claim simplified ventilation, because the length of roadways was materially increased from the same output. Then, for just the same output, there might be a large number of small sections of six places, instead of a long straight face, as in ordinary longwall. These all tended to increase the power required for ventilation. In his (the speaker's) experience, the longwall settled down gradually, so that the working of main roads could be done without disturbing the normal output; but in the case of the roof seemed to come down in places, so that long stretches might have to be abandoned at a moment's notice. He believed

that the roof would come down in a narrow working just as much as in ordinary longwall, provided the width would allow the strata to break to the surface, and he thought the apparent saving of 9 per cent. was due to the slope roads of ordinary longwall being closer together than the cross roads of the stoop-and-room, and the branch roads being brushed through on the slopes of the ordinary longwall, but not in the cross roads of the stoop-and-room working. He did not think this gave a fair comparison, because if the slope roads had to be so close together, it was just as necessary to have the cross roads as close. If the branch roads had to be brushed through on the slopes, it was equally necessary, if not more so, to brush the branch roads through on the cross roads. He himself had started a section of Humph coal on similar lines since he heard this paper read, but for a different reason than any given by the author. He believed that the enthusiasm and interest that Mr. Gibb had been able to create among his officials, coal producers, and others, was the chief reason why the method had been such a success; but there was no technical or scientific advantage inherent in the system itself. Finally, he would like to ask the author if he had considered the actuarial aspect of laying out a new colliery on this system.

Mr. SAM MAYOR (Glasgow) considered that the records shown by the curves on fig. 2 were so plain and so full of significance, that they compelled attention to the methods by which these striking results had been obtained. It was generally recognised that the future prosperity of this country depended upon increased productivity of the workers in every branch of industry. Where the cost of labour—as in coal mining—was a large proportion of the total cost of production, the efficient application of labour was of paramount importance. Assuming the provisions of suitable mechanical equipment, two principal factors were concerned in the increase of output: (1) Improved organisation and system in the application of labour, so as to avoid ill-directed effort and unnecessary delays; (2) inducement to the worker by attractive methods of payment and otherwise to exert his best efforts. The special value of Mr. Gibb's paper lay in its bearing upon the problem of improved organisation and system. The key-note of the system was the repetition of work and the standardisation of method and plant. The "administrative units" were of uniform plan; the wide headings and the pillars were of uniform quantity. These conditions were clearly favourable to the systematic conduct of operations at the coal face, to the training of the men in the routine duties, and to the definiteness of aim, which was a stimulus to effort. Each man by practice became expert in his allotted task, supervision was simplified, and punctuality and regularity were achieved. The delays in connection with tram traffic, so far as they were due to the necessity for road repairs, appeared to be practically eliminated by the system. Relief of the roadways from excessive pressure removed an element of uncertainty, and enabled regularity of traffic to be definitely controlled. In every considerable colliery there was ample scope for a new official—an underground traffic manager—to organise and maintain regularity of transport. The miner at a coal face, who, in answer to his question as to the number of trams he filled per day from the seam, replied, "It depends on the cleek," went to the root of the matter. The best of men were deteriorated by having periods of avoidable idleness forced upon them—idleness which restricted their earnings. A distinct feature of the system was that it lent itself to methodical application of mechanical aids—coal cutters, conveyors, and haulages.

Mr. JAMES HAMILTON (Glasgow) said he did not suppose that Mr. Gibb suggested this system was capable of universal application with advantage. It seemed to him that the question of roof was one of the most important elements in the subject. So far as standardisation was concerned, he did not think that ought to be applied unless under very exceptional circumstances. Mining was not an industry to which they could apply standardisation in the matter of working.

Mr. DAVID BEVERIDGE (Wemyss) said that, after all, cost was the great thing, and if Mr. Gibb could supply them with comparative details as to the cost of ordinary longwall, and what it represented now, it would enhance the value of the paper.

Mr. A. H. STEELE, H.M. inspector of mines, Glasgow, remarked that, generally speaking, the working of thin seams necessitated machine mining, and particularly in thin seams where they were driving the places narrow they must have machines. In the panels shown by the author, he had 12 or 13 places all going together. It would be informative, therefore, if Mr. Gibb would say how many machines he required for this one panel, and how he managed his cutting. One was inclined to think that the quantity of electric cables, joint boxes, and electrical apparatus generally lying on these roads, must be very much greater than in the case of ordinary longwall working.

Mr. WM. JARVIE (Bothwell) said it seemed to him that the success of the system stood or fell upon this point, whether a moderately strong or weak roof would stand the strain of those 50-yard places as well as under ordinary longwall working. He would like to know, for example, if Mr. Gibb took any special precautions in building his places—whether he took sufficient brushing to stow the roads solid through and through. Also if there was a strong post of rock above the seam. In the Hamilton district, one of the difficult roofs was in connection with the Humph coal, and they had heard from Mr. J. B. Thomson that he had started the system experimentally in the Humph coal. He (Mr. Jarvie) had been informed that the system had already been tried in the Hamilton district, and proved unsuccessful, in a section at a depth of 190 fathoms. The rate of travel which the author claimed for these narrow places, namely, 400 to 500 yds. per year, represented almost a fathom per working shift;

and it certainly seemed a very rapid rate. The reduction of the amount of rubbish sent to the surface to one-fifth of the total seemed a very strong factor in favour of the system, and, if that was the actual result obtained, he thought they would all be very anxious to try the system in seams with a weak roof.

Mr. JAMES NISBET (Coatbridge) said it would be interesting to know if Mr. Gibb would advocate the particular system of working described in all seams presently worked ordinary longwall, or did he mean to limit it to conditions similar to those in which he himself had adopted it. It would be helpful if they could have particulars of the depths of the seams worked, with details as to their nature and thickness, the inclination, and a section of the associated strata.

Mr. WM. ROSS (Glasgow), who had been associated with Mr. Gibb in this work, said that on one occasion they got as much as 78 ft. in one week. That occurred in three walls taking 150 ft. He had yet to see the seam presently being worked by ordinary longwall where he would be afraid to apply this system.

Mr. C. C. REID (Cowdenbeath) said he was in agreement with the author in practically everything he stated. If they were going to secure an increased production in the future, it must be along the lines of some such system as Mr. Gibb advocated. It seemed to him that their present methods of working were all wrong. He deprecated the present working plan of increasing the output as the circumstances warranted it, speeding up at times when they thought the conditions were favourable, and easing off at times when things were less favourable. Mr. Gibb's paper suggested, to his mind, a new method of mining. Under that scheme, they could even have their predetermined output in that part of the field in which they were particularly operating. Further, they could have all the given areas planned out in such a way that they could operate them to the best advantage. The other day he had been looking at one of his working plans, and he was struck by the fact that he was keeping up infinitely more main roads, air courses, etc., than should have been necessary if a small area had been worked at a time and developed for all it was worth. If they looked around the coal fields of Britain, they would discover that the output fluctuated from year to year, not so much because of the fact that the field itself fluctuated, but because the development scheme in the collieries had not been thought out, and worked to a carefully prepared and systematic plan. Managers in the future had to face the question of being able to interest the coal producers in their work. Until they had a definite plan to start off on, and a definite plan to follow right through, it seemed to him that the problem of mine management was in the melting pot.

Mr. WM. RIDDELL (Bothkennar) said that one of the features in this method of mining was the fact that the human element in the production of coal would be more and more eliminated. If mine managers and mechanical engineers could put their heads together and devise some such plan of mining as the author had described, it would be of far-reaching importance to the future of mining and to the nation in general. One of the principal factors in the whole situation was the question of capital, because every colliery manager could take up a new scheme where the initial capital outlay was likely to be heavy.

Mr. JAMES KIRKPATRICK (Bothwell) said that in trying this system himself, he had experienced some difficulty in regard to the ventilation at the face, necessitating, in fact, the introduction of auxiliary fans. He should like, therefore, to know if the author had also to use auxiliary fans for the purpose of keeping the air in order at the faces.

Contributions to the discussion were also made by Mr. SMELLIE (New Cumnock) and the PRESIDENT.

Mr. GEORGE GIBB said he preferred that his reply to the points raised in the discussion should be held over until the next meeting of the institute. It was possible at that meeting there would be additional criticism. Since he wrote the paper, a way had been opened out for even far greater possibilities, and he hoped to be in a position to deal with that and the other points at the next meeting.

Capital Charges and Current Expenses.

A short paper was read by the PRESIDENT on "Capital Charges Considered Along with Current Expenses." It was agreed that the council should arrange for the printing of the paper, with a view to it being discussed at the next meeting.

Iron and Steel Trades Advisory Committee.—The Ministry of Labour has appointed a Central Advisory Committee for the iron and steel and kindred trades (operatives), as follows:—Tin and Sheet Millmen's Association, Coun. Ivor H. Gwynne; Iron and Steel Trades Confederation, Mr. A. Pugh, Mr. J. Walker, Mr. W. T. Griffiths, Mr. T. Griffiths; Amalgamated Society of Steel and Iron Workers of Great Britain, Mr. Owen Coyle; National Federation of Blast Furnacemen, Coun. T. McKenna, Mr. H. Nixon, and Ald. P. Walls. The chairman is Mr. A. Pugh.

Hull Coal Trade in November.—In November, 207,906 tons of coal entered Hull from the collieries (191,404 tons by rail, and 16,502 tons by river). Compared with November last year, the figures show a decrease of 40,899 tons. The total entry this year, to November 30, was 2,640,000 tons, a decrease of 430,366 tons compared with the first 11 months of last year. The following are the collieries which sent to Hull last month more than 5,000 tons: Ackton Hall, 10,452 tons; Brodsworth, 6,582; Bentley, 6,390; Bullcroft, 9,543; Denaby and Cadeby Main, 22,655; Grimethorpe and Frickley, 7,033; Glass Houghton, 8,352; Hickleton, 6,304; Kiveton Park, 5,303; Low Laithe, 6,226; Manvers Main, 7,277; Maltby, 5,474; West Riding and Silkstone, 6,078 tons. The figures for coal exported, both foreign and coastwise, are not available.

BOILER MANAGEMENT WITH SUBSTITUTE LABOUR.

In his memorandum for the year 1916-17, Mr. C. E. STROMMEYER, chief engineer to the Manchester Steam Users' Association, deals with the problem of the scarcity of labour and its replacement by substitutes in the working of boilers. As a rule, boiler attendants of former days, if engaged from outside, had varied boiler experiences, or if advanced from the position of labourers, were selected on account of their reliable disposition, and received some training. It is a mistake to imagine that boiler attendants should think that they are competent to judge of the safety of boilers. Their first and foremost qualification should be reliability. In fact, the little knowledge which can be imparted to them may be, or, rather, often has been, a dangerous thing. A fireman who has been taught to believe that it is dangerous, especially to himself, to overload the safety valve, or to allow the water level to sink out of sight, is safer than a man who has heard that a boiler is worked at a factor of safety of 4 or 5, and overloads the safety valve, or who knows that the gauge glass bottom is 3 in. or 5 in. above the furnace crown, and, once too often, allows the water level to fall out of sight. Unfortunately, it is the reliable men who, if they have not had to enlist, have been attracted into lucrative berths, and the unreliable ones are both uneconomical and dangerous. In one case, such a man fired his boiler for several hours, although it contained no water.

There are, of course, many good men amongst the substitutes, and many willing men who wish to do their best. They show their willingness by working hard, but a busy stoker is rarely a good one. A stoker's limited duty is to shovel coal on the fire, watch the pressure gauge and water level, and manipulate the feed valve. A man who is new to his job is probably at first not impressed with the importance of these matters. Not until he discovers that the works actually engage an inspector to examine the inside of the boiler carefully, to adjust the safety and low water alarm valves, and to verify the pressure and water gauges, does he become impressed with the importance of these matters and of his own duties. At any rate, in the first few years of the war, when more and more substitutes were being engaged, small boiler accidents were very numerous, whereas now their number seems to be decreasing.

Another effect of having to employ substitutes in place of well-trying stokers is that the efficiency as well as the output of boilers is very frequently reduced. This is particularly annoying at the present time, when coal is both scarce and dear, and increasing demands are made on boilers. This is almost natural. Take the case of a boiler which used to be fired with good coal by an expert fireman. Possibly the duty of such a boiler might have been increased 10 per cent. without a reduction of efficiency. If, however, the demand for steam has increased 10 per cent., if the quality of the coal has been reduced, and if an inexperienced stoker has been engaged, the probability is that he will not be able to maintain steam, he will rake and slice his fires, and reduce the efficiency by perhaps 10 per cent., and the boiler, which is probably unable to increase its consumption by 20 per cent., wastes coal and reduces its steam production.

Managers as Teachers.

Masters or their managers might set aside a day or two to the study of the firing problem, and devote themselves to the teaching, or rather guiding, of the newly-appointed fireman. If, as may easily be the case, especially with the present high coal prices, such a procedure should result in a saving of a few hundred pounds on a battery of boilers, the time and trouble will have been well spent.

Seeing that the best teachers are said to be those who are learning while teaching, the owner or his manager who watches the stoking operation need not imagine that his is a case of the blind leading the blind. The leading principles are exceedingly simple, and are based on what is transparently obvious—that the maximum quantity of steam is produced from a ton of coal if the heat losses are reduced to a minimum.

One of the heaviest losses is that due to radiation, which is irreducible if the boiler is already well covered with non-conducting material, but the chief loss is the heat which is carried up the chimney by the waste gases. This loss can be varied within wide limits; it increases with bad stoking, and diminishes with good stoking. The hotter the gases which leave the boiler, and the greater their weight, the larger is the waste of heat. The temperature of these waste gases is not subjected to control, or only very slightly, it depends on the relative size of the heating surface to the rate of combustion, the waste gas temperature increasing with the duty. There is, therefore, only a single controllable factor, viz., the quantity of waste gases, and that is the reason why the principles of stoking are so very simple.

Loss Through Opening Fire Door.

For example, as a rule, boiler furnaces are fired about once every quarter of an hour, the firing operation taking about two minutes. During these two minutes practically no air passes through the grates of the two furnaces, because, as the one door is open, the chimney draught draws all the air it can draw through the open door. During these two minutes there is practically no combustion on either grate, and relatively little heat radiates from the one red hot bed of coal to the furnace plates, and the other one is black with coal. A distinct loss of heat is caused by the rush of cold air along the furnace and the flues, for it abstracts heat both from the boiler plates and from the brickwork, and arrives at the base of the chimney with nearly the same temperature as that of the average waste gases. This in itself is a serious matter, but it has to be remembered that as this air has not got to overcome any resistance, for it passes through an open door instead of through a thick bed

of fuel, it travels with a great velocity, and its weight will be from 50 to 100 times (say, 50 times) the weight of the coal which would have been burnt in the same time if the door had been shut. If the average air supply is 15 lb. per pound of fuel burnt, then for a combustion of 1 lb. per minute we have a total supply of 15 lb. \times 13 minutes = 195 lb. + say, 50 lb. \times 2 minutes = 100 lb., making a total of 295 lb. in 15 minutes, for the burning of 13 lb. of coal, or nearly 20 lb. of air, instead of the theoretically necessary 15 lb. Now, the minimum chimney loss with a waste gas temperature of 500 degs. Fahr. above that of the atmosphere is about 15 per cent. If the weight of waste gases be increased to 20 lb., the loss is 20 per cent., and if it be increased to 30 lb., an amount easily attained with bad stoking, this loss will be 30 per cent., instead of only 15 or 20 per cent.

But if a careless or inexperienced stoker be employed, he may keep the fire door open for perhaps four minutes instead of two, and if he cannot keep steam and opens the doors for another two minutes to rake the fires, he will easily exceed an air supply of 30 lb. per pound of fuel burnt. Roughly speaking, every two minutes of open doors means a loss of efficiency, which may reach 5 per cent., and the power of the boiler is reduced by about double the ratio of open to closed door time. Not only is there no steam production from two furnaces when one door is opened, but the cold air of one furnace actually abstracts heat. In the Navy this door-opening loss is materially reduced by arranging that the firing is to be done by two men, one right-handed and the other left-handed, and one of the chief reasons why mechanical stokers are economical is because with them the doors are never opened except for raking or similar purposes.

The man who may be watching the fireman will soon discover that the more quickly the firing is done, the more easily can steam be maintained, but only if the firing is properly done. Suppose that the coal is thrown on the grate anyhow, then, as there is less resistance to the passage of air at the thin parts than at the thick ones, the latter hardly burn away at all, while the former burn themselves first into pockets, and then into holes, and long before the next firing is done there will be a rush of cold air through these holes. This unfavourable condition has, of course, to be remedied by raking, but that operation introduces cold air, and results in a diminished steam production and a reduced efficiency.

It would, however, be wrong to forbid the raking of the fires or the opening of the doors. Some coals must be broken up, and some coals, because they produce smoke, must be supplied with air through the doors. This latter air supply has to be regulated by studying the smoke discharged from the chimney. If it is black or dark, then the air supply through the fire door is insufficient; if there is no smoke, then there is an excess of air either through the door, or through holes in the bed of fuel, or through the bed of fuel if this is too thin.

Thickness of Fire.

The question of thickness of fire is a somewhat complicated one. Let it be assumed that the fuel on the grate is very thin, then much air will pass through it. Of this air, only a small portion will come in contact with the coal, and will escape without causing combustion. The result will be a relatively large volume of waste gases, and the efficiency, the steam production, and the draught will be low. If the thickness of the coal were to be increased, this should result in perfect combustion and high duty, even though this thickening increases the resistance to the air and reduces its flow. Any additional thickening will still further reduce the air supply, but, as this reduction is associated with the evolution of combustible gases, the total quantity of coal consumed will be increased. But the gas which now escapes is partly combustible, and would carry away much potential heat. Here, however, perfect combustion can be effected over the bed of fuel by admitting air through the door and mingling it with the escaping gases.

Now, it is evident that immediately after firing, when the bed of fuel is thick, a comparatively large quantity of air should be admitted through the fire door, but gradually, as the bed of incandescent fuel on the grate is reduced, and as more and more air passes through it, the air supply through the door should be restricted. The ideal conditions would be to pile so much coal on the grate that at first there is what might be called perfectly incomplete combustion, and never to let the fires burn themselves so thin that excess air can pass through them. The study of this subject will take time, for which reason the man watching the stoking operation should decide to devote a day or two to it. He will find that, because of the steadily increasing bulk of clinker on the grate, the thickness of a fire at the end of the day is only apparent. The flow of air is then restricted by the clinker even more than by coal of the same thickness, and, therefore, as the fires get dirtier and dirtier, the production of combustible gases grows less, and the air admission above the bars has to be decreased. These changes can, of course, be balanced by altering the positions of the dampers, unless these are already full open because the boiler is overworked.

Seeing that both steam production and economy are affected by the thickness of fuel on the grate, an onlooker will be interested to study the extremes of thin and thick fires. Thin fires, as already mentioned, allow too much air to pass through the fuel without burning it. The heaviest steam production would take place when the maximum amount of air passes through the fuel and through the door, provided that it is completely used up. The best condition varies for different coals and for different conditions of the bed of fuel. Supposing that this best condition has been found with the fire door, say, half open. Then, if we thicken the bed of fuel, we reduce the flow of air through it, but we increase the relative amount of combustible gases, and the door can perhaps still be kept half open, the efficiency is likely to be the same as before, but as the amount of perfect combustion in the bed of fuel has

been reduced, the steam production will also have been reduced. If now we increase the thickness of the bed still further, both the perfect and the imperfect combustion in the fuel will be reduced, and the door will have to be partially closed, unless the space over the fuel has a smaller sectional area than the half-open door. In that case, of course, the door will have to be kept full open. Under these conditions, the power will have been reduced, but not the efficiency. If the thickness of the fire be still further increased, insufficient air will enter above the grate, and both the power and efficiency will be reduced.

The best conditions of working are evidently too vaguely defined to be determined by trial and error. A more rapid determination can be made by purposely working under extreme conditions of thin and of thick fires, and then adopting the mean condition as being probably the best.

Firing with Different Types of Coal.

As some of the above remarks apply only to smoke-producing coal, a few words on the firing of different qualities will be needed. Roughly speaking, our coals can be divided into caking and non-caking coals. The latter break up while burning, and, if disturbed by raking, they fall through the grates, and the result is much waste. Coal of this class should, therefore, be thrown evenly on the grate, and should not be disturbed. Considerable manual skill and a good eye are required to do this work properly, and inexperienced firemen will have to use the rake.

Caking coal, on the other hand, must be broken up after it has become heated and stuck together. Caking coal produces smoke, and that has to be avoided. The general practice with this coal is therefore to throw it on to the front end of the grate, nearly choking the fire door hole, which is kept open during the time that the mass of coal is warming up and producing smoke and combustible gases. Then this mass of coal is broken up with a rake, and shoved back, the fire door being entirely or partially closed some time after. Another method, called side firing, is equally effective in preventing smoke. The firing interval of, say, 15 minutes is divided into two short ones of about seven minutes, and during the one opening of the door the fuel is thrown only on the one side of the grate, and during the next on the other. The smoke which is produced on the newly-charged side is consumed as it passes to the other side. If this firing were done with the help of long troughs filled with coal, in the same way that horizontal gas retorts are charged, the periods during which the fire doors are open could be very much curtailed, and the efficiency of the furnaces improved.

In ordinary times it is, perhaps, not necessary for managers to trouble about steam production; if one fireman cannot maintain steam, or if he burns too much coal for the steam produced, he can easily be replaced. To-day, however, replacements are not easily effected, and the substitutes who have taken the place of reliable firemen have to be guided into methods of firing which will give the best results.

Cleaning Flues.

Bad results are, however, not always due to the fireman; in many cases the inspection and cleaning of flues is not properly carried out. The following recent case is an instructive one. In a certain factory, the power requirements had increased somewhat, and on account of bad coal and poor firemen the steam production sank lower and lower, and the coal consumption rose higher and higher. On the advice of an outsider, a sixth boiler was added to the fire overworked ones. Then the trouble grew worse; even more coal was burnt, and less steam was produced. On examining the various dimensions, it was found that the flue area was only suitable for three boilers, and, as alterations could easily be made, the building of a larger flue was advised. It was also discovered that there was a solid layer of flue dust, which must have been damp occasionally, of 2 ft. in thickness. The factory can now be worked with the greatest ease with five boilers, and the saving of coal is probably well over £1,000 per annum.

A source of recurring trouble is the disturbance of the brickwork of the flues and outer walls. That such should occur is but natural, for the difference in the length of a boiler when cold and when hot is about half an inch, and as it is a heavy weight, it is sure to pull the brickwork out. These expansions and contractions also affect the outer walls, which crack and admit air, and this unnecessary air wastes much heat, as explained above. As these cracks may occur the day after an inspection, and remain for a twelve-month, it is desirable to look for them, and have them plastered up. The searching along walls with lamp or candle flames is not an efficient method. A simpler plan is to have the boiler walls, especially the front and the blow-off pit, whitewashed as frequently as may be found necessary. If any cracks occur, the inrushing air, which in a stokehold is always laden with coal dust, will blacken the cracks, and these can then be plastered up and whitewashed.

Economisers.

Under present hard working conditions, many a manager's thoughts will have turned to mechanical helps, mechanical stokers for choice. They have been discussed recently, and it is, therefore, only necessary to say that if they can be obtained they would very likely prove of great temporary benefit, partly because of the bad coal, and partly because of the scarcity of skilled firemen. Another mechanical help is the economiser, but, like mechanical stokers, it is not applicable to all cases. It is, for instance, hopeless to obtain any advantage if the draught is sluggish and the boiler overworked, for the first effect of introducing an economiser is to reduce the draught, with it the coal consumption, and the net result of a 20 per cent. reduced coal consumption and a 10 per cent. increased efficiency would be a 10 per cent. reduction of steam production. Then, also, there is no advantage in adding an economiser to a boiler whose waste gas temperature is low, for then there will be very little heat available for warming the water in the economiser, and the saving is likely to be under 5 per

though an economiser added to an overworked man may effect a saving of, say, 15 per cent., less depreciation, and upkeep. As a rule, the expense, even including the power expended in the scrapers, is low, but in districts where the water is sedimentary the cost of removing the scale out of the pipes may more than balance the saving in fuel. The late Mr. Bryan, before he became chief of the Metropolitan Water Board, is reported to have said that in his East London district (where the water is chalky) the saving effected by economisers was just about balanced by their cost of maintenance. This remark probably applies as well to-day as 20 years ago, for although the price of coal has gone up, and fuel savings are more valuable than they used to be, labour is also dearer than it was.

MIDLAND INSTITUTE OF MINING, CIVIL AND MECHANICAL ENGINEERS.

A general meeting of the Midland Institute of Mining, Civil and Mechanical Engineers was held at the Applied Science Department of the University of Sheffield on December 6, Mr. W. D. LLOYD (president) in the chair.

The following new members were elected:—Members, Messrs. R. E. Westwood and A. Butler. Associate member, Mr. M. R. Swanson. Associates, Messrs. A. Ball, W. C. S. Crabtree, and J. Robinson.

University Education: Discussion.

Dr. W. RIPPER, C.H., D.Eng., D.Sc., M.Inst.C.E., Vice-Chancellor of the University of Sheffield, read a paper on "University Education in Relation to Mining Engineering," which was given in our issue of the 7th inst. (page 1093).

The PRESIDENT, in proposing a hearty vote of thanks to Dr. Ripper for his paper, said the question of education as a whole was exercising the minds of a great part of the community at the present time, and was also receiving the attention of that institute. At the previous meeting, at Doncaster, they discussed another part of the same subject, concerning more particularly the education of colliery managers and deputies. Dr. Ripper's paper also dealt with the education of colliery managers, but more, possibly, with the training of experts in various branches of engineering. How far these would be co-ordinated with the training of the higher colliery officials in the university course was a subject which he thought required careful consideration. Dr. Ripper made a great point of the fact that, before men could take advantage of the university training, they must have a good secondary education. The question was: how was that to be obtained? At their previous meeting they were discussing, from the purely mining point of view, how a man was to get his practical training at the same time as his secondary education. It seemed that the lines proposed in Mr. Fisher's Bill should get them over that difficulty—that everybody should have an opportunity of a secondary education, which would give scope for a larger number of men to continue their education and to take advantage of the university courses. Exactly how the training of the different grades of colliery officials could be provided for at the universities was one of the matters that seemed to him to require the most careful attention.

Mr. J. H. W. LAVERICK (Tinsley Park), in seconding, said the question that interested him about secondary education was whether the time was ripe to begin now, or whether they ought to wait till they had won the war. In the Sheffield works, there were lots of boys working overtime, and some of them had left school before the proper time in order to start their work. That might be an impediment in their case. On the other hand, in connection with collieries in the locality they had not that difficulty to deal with. Their boys, when on the day shift, ceased work at two o'clock, and had the rest of the day for their own pleasure, amusement, or study, as they thought fit. He knew that, even at the collieries nearest to Sheffield, the number who attended evening classes or the university was a very small percentage of the whole. Therefore, it seemed to him that, from the colliery point of view, the Education Bill should be pushed forward; and he quite agreed with the suggestion that the meeting should urge the matter forward from their own point of view, which was the only one they could speak about.

The resolution was carried.

Dr. RIPPER, in reply, said it was a great pleasure to him to have the opportunity of speaking to the members of the institute. In the future of our country every industry would be well advised to get into it the very best possible quality of boy at the start. They must not be content, in any of their industries, to play a second part. They must be determined that nothing should be wanting to secure for their industry the means and opportunity of attaining to the very best that could be attained. Our great shipbuilding industry had attained to its present magnificent standard of excellence because our Government, for more than 50 or 60 years, had taken the precaution of giving a sound training to the young boys who entered it, and selecting from those boys the more brilliant ones to proceed to a still higher training, until at last they had been competent to take the highest positions. The Government not only did that for their own internal purposes, in the dock yards, but from that training school of the Government boys proceeded to all the great shipbuilding works; and the result had been what we see to-day. Now, every industry which is in the front rank must do the same. It must not be content to take any sort of second-rate training, and must be particularly anxious to put them into places of responsibility. It was extremely important that they should be jealous for the type of boy that was to their industry; and why? Because we

must, from this time forward, recognise that we were part of an Empire, and that the far distant lands of that Empire called to the home country to send them men who were capable of developing their resources. What had been happening for years? The young trained German had been having a splendid education in his great mining schools, and the country, not having enough opportunities to offer to its students at home, had been sending them into British colonies and into the neutral countries all round the world, until more or less they had been seizing upon the very fundamental industries upon which our nation and Empire depended for their well-being. Now, that had got to cease; in fact, it had ceased; and we must have a determination in our minds to do our best to get into every industry the very best possible type of student, and, having got him, to do the very best we could to train him. It was a great thing to equip our coal mines with the very best possible machinery, but greater than the machinery equipment was the equipment of the *clientèle* of the working staff, the quality of that staff. He was quite sure that the members of the institute, whose presence indicated their interest in the well-being of their industry, and in the promotion of science as applied to it, would agree with him that nothing must be left undone to man the industry with the best possible type of student.

Prof. L. T. O'SHEA (Sheffield University) thought that, in calling attention to the largely-felt want of efficient facilities for secondary education, Dr. Ripper had emphasised one of the main points with regard to the education of students who entered not only the colliery industry, but others as well. It seemed to the speaker that this was at the root of their difficulties at the present moment, and it was most urgent that they should take steps to give facilities for secondary education to those who wished to profit by the higher education that they could get in the universities. It was one thing to talk about the ladder which passed from the primary school to the university, but it was another thing to get students into the university in such a state that they could profit by the education that was given them. Another thing that they were prone to leave out of consideration was the fact that those who possessed time and means to go to well-equipped secondary schools were able to enter into the higher education with an advantage which was not possessed by others less fortunate, who therefore did not get the same chance. The facilities which had been proposed in the new Education Bill were doubtless a step in the right direction, but he hoped that the proposal for compulsory attendance at evening continuation schools for part-time would be carried still further, and that means would be given for the more promising youths who wished to pass to the university to be able to attend for a longer time at secondary schools. Whatever type of education the secondary schools produced, he thought it should be arranged that those who wished to enter into industry should have a sound education in mathematics, physics, and chemistry, together with a proper education in English. With regard to mining education, he thought they should differentiate between the preparation for examinations and the training of men to take intelligent interest in the work which they were doing. At present, he thought, they were inclined to look at the question of passing for certificates of proficiency as the thing to be aimed at. He would prefer that they should look at it from the point of view of what was most desirable to enable the men to take an intelligent interest in the industry. The training of men to understand what they were doing, to think about what they were doing, and to try to improve the industry, was the sort of training they wanted; not to look simply to the passing of an examination with the object of becoming a colliery manager in the long run. There were various grades in the industry, and they had to differentiate between what was required for the education of those who were going to occupy the subordinate positions in the mine, those who were going to occupy the intermediate positions, and those who were going to achieve the distinction of mining engineer. Whatever plan of education was introduced for the mining industry, it should be such as to enable a man to pass through the various grades of education until he reached the highest, and there should be a suitable means of selecting the more able and capable students and seeing that they got the best of them rising to the highest ranks of the industry.

Mr. G. BLAKE WALKER (secretary) said that, with regard to the education of the future members of the profession, he would urge all those who had the charge of young men to do what they could to encourage them to come forward and take advantage of such educational facilities as were offered them at that university and in the mining schools in other parts of the district. The institute was considering the matter at the present time. They were very anxious that, from the bottom of the ladder to the top, they should have a better educated staff. Without that, they would certainly not succeed in pushing on the success of their enterprise. Some of those present had been to Germany and seen the splendidly-equipped mining school at Bochum, and they were hoping, as time went on, that something of the sort would be founded and carried on in Sheffield and in other centres of the mining industry. The Bochum Mining School was mainly intended for the training of under-officials in German mines, and he was quite sure that managers would not be able to accomplish much unless they were adequately supported by an intelligent body of under-officials. He appealed to all the members to give their support, and to encourage their owners to give financial support, to the provision of educational facilities for their young people. In these days of high wages, it was almost more difficult than ever before to get these young men to make the present sacrifice in order that they might have the future benefits. They saw that they could get large wages in the pits by commencing to work as soon as ever they could get rid of school. That was a thing which the members of the institute had to fight against. Wherever they saw promising

talent, they should keep their eyes on it, and endeavour to bring into the fold of education whatever ability there might be in the mines—and he believed there was really a good deal if they only looked for it. Their great difficulty at the present time was, not the provision of facilities, but the encouragement of willingness on the part of the young people to avail themselves of such facilities. If they had a great number of youths coming forward to say, "Educate us; help us on," he did not think that there would be any difficulty about meeting their desires. But, unfortunately, it was the other way, and they had to urge the youths on to make a present sacrifice in order that they might become thoroughly well qualified soldiers in the industrial army. It was just as important—more important, in a way—that they should have good soldiers in the industrial army than in the military army. He should like to see the spirit which animated our soldiers in the field pervading the industrial world, in order that they might have staffs, in every branch of industry, equal to that of any other country in the world.

Mr. C. C. ELLISON (New Monckton) said that with regard to the means which existed, or were likely to exist, for secondary education, anybody who was connected with a colliery situated within a tram journey of a town like Sheffield was placed in a very much better position than 90 per cent. of the people employed in the coal trade. From the actual practical point of view, supposing they were asked now, "How are we going to make a start to find the youths to take up the higher education after they have received their secondary education?"—assuming that they had received it—he thought there would be a very great difficulty in selecting a number of boys who would continue and turn out satisfactorily. Mr. Walker had touched upon a most important thing in his comparison of the industrial army and the military army. The soldiers had a goal to fight for, but the industrial fighters had a very miserable goal to struggle for; and until the officials at collieries were assured of a very much better remuneration for their years of training, he did not think there was sufficient encouragement for the young men to go and be trained. If the colliery companies were wise enough to put money aside, in proportion to their output, to train a number of youths, he was sure that that would pay them, and would also keep out the unnecessary interference of Government departments. If they could train their own men, on proper lines, and pay for it in that way, he believed they would get the necessary men. But they all knew what "handsome" salaries were even now being paid in some coal districts to the managers who were responsible for large outputs and very large numbers of men. He did not think that remark applied very much in that particular district, but it did apply, and had applied still more, till quite recent years, over the whole of the coal field. After they had selected their young men, and got them trained, they would probably find neighbouring collieries, which had been too idle to train men, taking away their officials. They must not be narrow-minded about that—he thought a man was a very poor man who stepped in the way of his young men getting on—but, at the same time, it seemed rather unfair that, when a firm had educated its young men, they should be taken away by a neighbouring colliery. He should like to see a scheme, brought about by a mining association, or by the various institutes, or by the coal owners' association, whereby everybody would undertake to train so many men, according to the output of their concerns. If that were done, a coal mining district would always have enough students to train. He did not know a more disheartening thing than for a lecturer to find the attendance at his class falling from perhaps 30 the first night to 20 the second, and so on, until it got down to three or four. If they had a large number of men in training, it would be worth while to have a place, and have good instruction for them. Take the industry which he thought was possibly the most important in connection with coal, or would be in a very short time—the chemical industry. He supposed they would not be very much older before they saw the coal become the by-product, while the by-product would be the horse, they might say; and it was essential that they should have in the management of the coke industry the best chemists that they could get. No doubt the chemical industry in connection with coal would be centralised and specialised to a very much greater extent than had ever been done in this country. He saw a very great difficulty in obtaining men for training unless they were practically kept, and given sufficient money to live upon, by the concerns which were training them. At present, the highest rate of wages which a boy could earn was a good deal more than most of the junior clerks had been receiving in nearly all commercial concerns.

Mr. W. H. CHAMBERS (Denaby Main) said they who were responsible for the management, conduct, safety, and efficiency of the mines had always been impressed with the necessity of getting the highest efficiency from the staff. The first thing was to induce men to qualify for the positions which they were called upon to occupy. He thoroughly agreed with Mr. Ellison that the positions should be sufficiently remunerative to make it worth men's while to qualify for them. They were all aware of the shortcomings, and the want of economy in the administration of mines, owing to the lack of sufficiently trained men to carry out the duties that devolved upon them. The question that was disturbing the minds of all of them was: How the education could be acquired, and how the selection of suitable men for those positions could be made? It was not possible to take all boys who might have shown themselves to be bright in their elementary schools, and assist them through the secondary school to the university. There would have to be proper selections made, and before they made a selection they would have to be assured that the young man to be selected was desirous of qualifying to attain the position that he sought. Now, was it worth while, under present conditions, for a lad, if he could obtain assistance, to

forgo his earning capacity and his leisure in order to go from elementary school to secondary school, and thence to the university, to pass an examination to become a deputy? That was not his ultimate object. If he took that course, he wanted to be something better than a deputy, and to get to the highest position that was attainable in the industry. Passing from the school to the university appeared to the speaker to take the youth up too many rungs of the ladder to start with. There were quite a number of deputies now who realised their want of education and information to discharge the duties that they had to perform, and who desired further education. At the colliery with which he was connected, there had recently been a conference of deputies and under-officials, at which this question was discussed. There seemed to be a general desire that facilities should be afforded to give them an opportunity of acquiring further knowledge, and that a local class should be available for this purpose. There was no doubt that some would want to get into a higher position, and they would be transferred from this class to the university for the completion of their education. But the great drawback of passing away from the school to the university was that when they had gone through that process of education, they would have to go back to the coal face to work as colliers for two years before they would be qualified to be examiners. Now, this was not necessary for an under-manager or a manager, and therefore what it amounted to was that a manager or an under-manager was not qualified to make an examination. When the Mines Bill was under consideration, the Home Office gave way to the representations of the miners that this was a necessary education before a man was qualified to be a deputy. To his mind, it was analogous to saying that a man could not be an organist unless he had blown the bellows for two years. He considered it stupid to say that a manager or an under-manager was not qualified to make an examination, as a deputy was, although his requirements were far superior, and he had the direction of those men. That was a very great drawback. He hoped it would be amended, and that, in the case of managers, a course of education and examinations would be substituted for the work at the coal face. The condition that, after a young fellow had gone through his course, he should have to go and work two years as a collier before he could be a deputy, was a very great deterrent to anybody. From what was said at the conference referred to, he was strongly of opinion that local classes should be established. He hoped that they would be under the control of the university, which was the best qualified body to select the most suitable instructors, and to establish and administer local classes which should be attended not only by prospective officials, but by present officials who were desirous of getting further education. The latter should be able to attend, not to be associated with the younger fellows who were more advanced in education than themselves, but in order to become better qualified to discharge their duties. This course would also cause the young men to emulate, and perhaps to surpass, them in the qualifications required for the efficient discharge of their duties. The more brilliant of those who attended the classes could pursue and extend their education by attending the university classes and qualifying themselves to occupy the highest positions at the collieries.

The PRESIDENT, referring more particularly to Mr. Chambers' remarks, said he thought that they had rather overlooked the excellent work that was being done by the county council evening classes in some parts of the district, and also by the technical schools. There was no doubt that, in both the mining and the engineering branches, a great deal of technical education was at the present time being obtained by the prospective officials of the collieries in some parts, and the question was how to make the best of that, and also how to carry the best of the students to the universities. At the same time, there was this great difficulty, that to get the full advantage of the university education, and to get the best brains of the industry for special work over and above the ordinary day-to-day supervision, it was essential that a man should have a good secondary education. Therefore, he thought that meeting would be well advised to adopt Dr. Ripper's suggestion and pass a resolution with the object of helping on the question of the Government measure for providing secondary education. He therefore moved:—

That the members of the Midland Institute of Mining, Civil and Mechanical Engineers, at a meeting held at Sheffield on December 6, 1917, do urge the Government to proceed forthwith with the Education Bill, for the purpose of providing our industries with better trained students to deal with the scientific problems urgently awaiting solution.

Mr. G. BLAKE WALKER seconded, and the resolution was carried.

Splitting of Coal Seams by Dirt Partings: Discussion.

Other papers on the agenda, open for discussion, were those "On the Splitting of Coal Seams by Dirt Partings—Part I.: Splits that Re-join," by Prof. KENDALL (*Colliery Guardian*, November 9, 1917, p. 883); and "Areas of Deposition of the Coal Fields of North-Western Europe," by Mr. G. BLAKE WALKER (*Colliery Guardian*, October 5, 1917, p. 639).

Prof. KENDALL, referring to his paper, said members of the institute might have felt some disappointment that it had not yet been published. The result of the discussion at the previous meeting had been to bring him a considerable amount of correspondence, adding or drawing his attention to new facts in regard to the phenomena in the same seam in areas that were previously unsuspected; and he had thought it necessary to withhold the paper from publication for a short time while he investigated those cases. The results so far had not in any way invalidated the general conclusions which he set forth in the paper.

There was no further discussion on either of the papers.

COAL-CUTTING MACHINERY IN 1916.

In Part II. of the General Report on Mines and Quarries in 1916, the Chief Inspector of Mines reports that there were 667 collieries where coal-cutting machines were at work as against 638 in the preceding year. The total number of machines employed was 3,459 (as against 3,089 in 1915), of which 1,590 were worked by electricity and 1,869 by compressed air; the total quantity of mineral obtained in 1916 by the aid of these machines was 26,805,398 tons—an increase of 2,295,274 tons compared with 1915. The Scotland Division (No. 1) and the York and North Midland Division (No. 3) take the lead as regards the number of machines employed, nearly 52 per cent. of the total number of machines in use being employed in these two divisions.

Table A shows the number of machines, and of collieries where used, motive power employed, and quantity of mineral obtained by their use in the various inspection divisions during the year 1916, and Table B the number of mechanical coal-cutters in use in the various inspection divisions during 1916.

TABLE A.

Division.	Number of collieries where machines are at work.	Number of machines.	Worked by		Mineral obtained.	Number of conveyors at coal face.
			Electricity.	Compressed air.		
					Tons.	
Scotland	232	987	841	146	9,764,280	102
Northern	82	671	139	532	3,778,653	70
York and North Midland	127	802	387	415	7,739,275	125
Lancashire, North Wales and Ireland	99	569	48	521	2,564,620	39
South Wales	60	136	51	85	650,260	137
Midland and Southern	67	294	124	170	2,308,310	18
Total in 1916	667	3,459	1,590	1,869	26,805,398	491
Total in 1915	638	3,089	1,449	1,640	24,510,124	424

TABLE B.

Kind of machine.	Number in use.						
	Scotland	Northern.	York and North Midland.	Lancashire, North Wales and Ireland.	South Wales.	Midland and Southern.	Total.
Driven by electricity							
Disc	564	44	166	11	1	32	818
Bar	248	24	84	21	27	23	427
Chain	23	67	132	16	23	67	328
Percussive	3	—	1	—	—	2	6
Rotary heading	3	4	4	—	—	—	11
Total	841	139	387	48	51	124	1,590
Driven by compressed air:—							
Disc	100	41	157	123	2	14	437
Bar	4	16	49	48	18	7	142
Chain	1	13	76	24	23	45	192
Percussive	41	457	129	326	37	99	1,089
Rotary heading	—	—	4	—	—	5	9
Total	146	532	415	521	85	170	1,869
Total in 1916	987	671	802	569	136	294	3,459
Total in 1915	908	605	753	447	139	237	3,089

The table below specifies the quantity of mineral cut by machinery in the various inspection divisions during the year 1916.

Division.	Statute tons cut by		Total cut by machnry.
	Electricity.	Compressed air.	
	Tons.	Tons.	Tons.
Scotland	8,613,316	1,150,964	9,764,280
Northern	1,309,003	2,469,650	3,778,653
York and North Midland	3,951,157	3,788,118	7,739,275
Lancashire, North Wales and Ireland	353,437	2,211,183	2,564,620
South Wales	236,744	363,516	600,260
Midland and Southern	1,408,946	899,364	2,308,310
Total in 1916	15,922,603	10,882,795	26,805,398
Total in 1915	14,378,272	10,131,852	24,510,124

EMPLOYMENT OF BOYS IN MINES.

Statistics in Part II. of the General Report on Mines and Quarries in 1916 show, as a general result, that the occupation of boys underground is slightly less dangerous than that of persons over 16; the average death rate for 10 years per 1,000 persons employed underground being 1.43 in the case of the lads under 16, and 1.50 in the case of persons above that age.

The following table indicates the death rates per 1,000 persons employed underground, under and above 16 years of age respectively, at all mines, for the years 1907-1916:—

Year.	Age.		Total.
	Under 16.	Above 16.	
1907	1.33	1.46	1.46
1908	1.52	1.46	1.47
1909	1.59	1.62	1.62
1910	1.77	1.63	1.62
1911	1.26	1.31	1.31
1912	1.09	1.28	1.27
1913	1.37	1.76	1.74
1914	1.34	1.18	1.19
1915	1.44	1.55	1.54
1916	1.54	1.46	1.47
Averages (10 yrs.)	1.43	1.50	1.50

Lighting arrangements in Budapest are seriously affected by the use of inferior Prussian coal, which choked the retorts in the gas works.

Vacancies for certifying surgeons under the Factory and Workshop Acts at Yarmouth (Isle of Wight), Killeshandra (Cavan), Wolsingham (Durham), and Kenilworth are announced.

INDUSTRIAL RECONSTRUCTION COUNCIL.

The first meeting of the Industrial Reconstruction Council was held on Tuesday, December 11, at the Holborn Restaurant. The chair was occupied by the PRESIDENT, Sir Wilfrid Stokes, K.B.E., and the draft constitution submitted by the Provisional Committee was approved and adopted. Among those present were:—Sir Herbert Bartlett, Bart., Mr. Ernest J. P. Benn, Mr. Walter Birch (Furniture Manufacturers' Association), Mr. Emil Davies, Dr. William Garnett, Mr. A. MacCallum Scott, M.P., Mr. Ben Tillett, M.P., and Miss Mona Wilson (Ministry of Reconstruction).

Mr. BEN TILLET, M.P., emphasised the need for a propagandist body which would help to remove the distrust of labour and the contempt of Capital. The need of the future was not only efficiency of Labour, but efficiency of capital. He was glad to associate himself with any movement which had for its object the education of all parties in the real position of industry.

Mr. ERNEST BENN, in presenting to the meeting the report of the Provisional Committee, laid stress on the

single purpose of the new Council. It was a propagandist body, and its battle-cry was "Self-Government for Industry." Mr. Benn gave a brief sketch of the present chaotic condition of industry. Much of the trouble had inevitably arisen from the state of war, but much also was the result of ever-increasing interference from a central bureaucratic Government. The only way by which this nation could work out her industrial salvation was to establish within each trade a self-governing body representative of all those engaged in that trade, charged with the duty of maintaining and developing it in the national interest. The membership of the Industrial Reconstruction Council was open to all sections of the community of whatever shade of opinion, the only qualification being a genuine desire to promote the doctrine of industrial self-government. The Council would start immediately upon a great campaign throughout the country and in every trade; on the one hand awakening public interest in the vital problems of industry, and on the other encouraging the representatives of the trades themselves to meet together to take concerted action for the full development of their industries.

Mr. EMIL DAVIES, speaking of the Whitley Report emphasised the fact that the Government had now for the first time distinctly laid it down that labour was no longer a chattel. This idea was fundamental. There was a great need for some body like the Industrial Reconstruction Council which would popularise the principles embodied in the report.

Miss MONA WILSON, as a member of the Whitley Committee, strongly supported the establishment of the Council as a propagandist body. It was extremely important that Capital and Labour should understand what a very wide field was open to the Whitley Councils if set up in all industries, and how necessary they were as representative bodies with whom the Government could negotiate in all matters affecting labour, commerce and industry.

Partnerships Dissolved.—The *London Gazette* announces dissolution of the partnership of J. Amatt and T. A. Dolan, trading as the Witton Engineering Company, 27, Newtown-row, Birmingham; and of F. Bailey and J. Knight, trading as Bailey and Knight, engineers and millwrights, D. Lanes.

United States Steel Industry Mobilised.—Mr. William H. Clegg, chairman of the War Industries Board, announced, at a two hours' conference with Messrs. Gary, Schwab, and other leading men in the steel industry, that the United States Government was assured that all the steel works necessary would be forthwith engaged turning out munitions for victory. The labour situation, he said, was "in good shape."

North of England Institute of Mining and Mechanical Engineers.

PRESIDENT (Mr. John Simpson) occupied the chair at a largely attended meeting of members of the North of England Institute of Mining and Mechanical Engineers, held on Saturday, December 8, in the Lecture Theatre of the Wood Memorial Hall, Westgate-road, Newcastle-on-Tyne.

The council reported that it had been decided to invest £500 in the 5 Per Cent. National War Bonds, payable on October 1, 1927. No applications for the Daglish Travelling Fellowship had been received.

New Members.

The following candidates for membership, etc., were admitted into the institute:—

Members.—Messrs. R. J. Browne, mining engineer, Gosforth, Newcastle; G. Hindson, colliery under-manager, Framwellgate Colliery, Durham; S. J. Sawyer, mining engineer, West Maitland, New South Wales, Australia; J. A. Turnbull, mechanical and civil engineer, Parkside, Hawick; and C. O. Wraith, mining engineer, Moor House, Spennymoor.

Associates.—Messrs. J. H. Spence, coal miner, Hetton-le-Hole, co. Durham; and R. H. Wood, assistant surveyor, Shildon, co. Durham.

Students.—Messrs. R. S. Paxton, mining student, Hill Crest, Windlestone, Ferry Hill; A. T. Smith, mining student, Dundas House, Bishop Auckland; and H. L. Wilson, mining student, Cradock Villas, Bishop Auckland.

Subscribers.—Messrs. Robey and Company Limited, Globe Works, Lincoln.

Intensive Mining in Thin Seams.

Mr. GEORGE GIBB'S paper on "A Fresh Aspect of Intensive Mining in Thin Seams" (*Colliery Guardian*, August 17, 1917, p. 304) was discussed.

Mr. SIMON TATE (Trindon Grange) stated that Mr. Gibb had ascribed to the longwall method a number of mining troubles and difficulties which were also common to other methods of coal working. With regard to the "irritation of labour," he (Mr. Tate) had always found that meagre wages were a more potent element of dissatisfaction and unrest than any particular method of work. Easy work and high wages tended to calm unruly spirits, and longwall work stood out pre-eminently as the ideal method of accomplishing that, reducing the most laborious part of a coal hewer's or coal getter's labour by taking the full benefit of the weight of the superincumbent strata, and thereby utilising natural forces rather than the muscular effort of the collier. Although honest labour, however hard it might be, was not derogatory, yet to see an intelligent human being day after day and week after week flogging away at the hard unyielding coal face of a bord or wall, such as existed in some of the thin, hard coal seams, emboldened one to hope that the time was rapidly approaching when, either by the use of longwall or by machinery, the hewing of hard coal by manual labour would be reduced to a minimum. With regard to interruptions to normal and steady working alienating the sympathies of labour, the speaker knew of nothing peculiar to longwall working that merited this condemnation; rather the contrary. With respect to the statement that the larger areas which must be developed in dealing with thin coal at considerable depth were so extensive as almost to preclude from the horizon the possible economic application of longwall in its entirety on the outward journey, the speaker interpreted that to mean that, in order to obtain a large output in deep pits, the longwall face would be so extensive that it would preclude the application of that method of working. In the speaker's opinion, however, the longwall system lent itself to yielding the maximum output in the shortest possible time from any given area of coal mines, as a much larger number of coal getters could be applied on a longwall face than by any other system. That the need for efficient transport was increased because of larger areas and outputs was well known to the merest tyro in mining, for, with a greater output required, the outlets, the haulages, the mechanical power, and all the necessary plant must be in adequate proportion; but the adoption of all these aids to output were not the prerogatives of "intensive mining." Mr. Gibb had claimed that the inherent defects in longwall prevented the fullest advantage being taken of the electrical and mechanical facilities now available for transport work, etc. Surely that assertion was incorrect, because longwall working fulfilled one of the first requisites of a successful application of mechanical haulage. It focussed a larger number of colliers' output to central collecting points than could be arranged for by any other system. For example, in South Yorkshire longwalls, the output of five or six men was probably all coming to one gateway (in cases where conveyors were used, as many as 12 coal getters were often filling coals into one gateway); and, if one considered the tonnage delivered from a single district of one of these pits, one could see how much more simply and effectively mechanical haulage could be utilised in these circumstances than in a pit where a larger percentage of coal was won from comparatively narrow working places driven into the solid for future gate roads, as suggested by Mr. Gibb. The author claimed that, in the scheme detailed by him, the aim was to retain the advantages of relieved pressure, but the speaker had always understood that the pressure, having once been exerted upon coal and afterwards reduced, caused the coal to become "winded," and resulted in its being much harder to work. The statement that exploring headings were carried ahead 400 to 500 yds. per seam, showed that Mr. Gibb was not in favour of the longwall method, but rather of the "winded" seam. In a longwall pit proper it was not a question of precautionary measures against known or suspected old workings or faults, but of keeping with safety and the Mines Act were driven. In order to maintain continuity of output, all that was required was as soon as the requisite output had been

obtained, was to cease working as much of the coal near to the shaft as was necessary for the future equalisation of output and cost of working. As to subsidence, Mr. Gibb claimed 20 to 25 per cent. less subsidence by his method of working. How could that claim be substantiated if the coal seam were completely and thoroughly worked out? The overlying strata must ultimately fall or sink to fill up the space of the extracted coal. The speaker was afraid, therefore, that the lessened subsidence was due to the whole of the coal not being as cleanly extracted as would be the case in longwall working. He thought it probable that, in longwall workings, a larger immediate subsidence of the surface occurred than with pillar working, but the ultimate amount of subsidence must be the same in both cases, provided that the coal was cleanly worked out. He noticed that Mr. Gibb did not claim great originality for the scheme. He himself had seen it in operation more than 40 years ago at the Elemore Colliery, in which case the pillars were formed by bords and walls driven by coal hewers, and the pillars worked off from the coal gate roads, the face being undercut by coal-cutting machines called the "Iron Man." The system was abandoned because of the cost of forming the pillars and the difficulty of working the last portion of the pillars, when, as the face of work came near to the cross headings (headways), the roof stone broke up, causing great trouble and expense in maintaining the working, and often resulting in considerable loss of coal. The introduction of the compressed air percussive heading machines had revolutionised the driving of narrow whole-mine work, especially where the coal seam was of a hard nature and difficult to win. These machines were invaluable in all such cases, and, with their aid, bord-and-pillar working more nearly attained the advantage of longwall working. In many cases where the coal was hard to work in the whole mine it had been found very advantageous to win out the coal pillars by using the heading machines, and afterwards to work off the pillars by manual labour. There was, however, a well-known exception to even longwall working in the mining of the thin coking seams of the West of Durham, where the coal was comparatively tender and easy to work, and the size of the produce was immaterial. It was there found to be much more economical to work these seams either by bord-and-pillar or by single or double stall; but, for working thin, hard seams, longwall was the system that would generally yield the most satisfactory results.

Mr. T. Y. GREENER remarked that he thought Mr. Gibb's object was to bring before them the advantages of a modified system of longwall when applied to the working of thin seams. Mr. Gibb did not state exactly how thick the seams were, or their depth, but the speaker gathered from the paper that they were about 200 fathoms deep. By "intensive mining," he supposed that Mr. Gibb meant that it was a system by which he concentrated as many men as possible in a given area for the purpose of obtaining the largest possible output from that area—an object that would commend itself to every member of that meeting. As Mr. Tate remarked, the system was by no means new. In Yorkshire, a good many years ago, the system of bank working was very much the system that was shown on the plan accompanying Mr. Gibb's paper, but was abandoned because longwall was found much more advantageous, producing a larger quantity of round coal, and getting rid of serious outbursts of gas. His own experience in the West of Durham had convinced him that it was cheaper to work the thin seams in that area by the modified system of longwall, because one could do with a less amount of shift work than where there was a long, straight face. (He was not expressing any opinion as to seams 200 fathoms in depth, and perhaps 2 ft. in thickness—and he should think that, unless they were very exceptional seams, there were not many that were being worked at that depth.) The subsidence, although ultimately, no doubt, taking place, as with longwall, did not follow so quickly. There was not the same difficulty in maintaining the gateways and the face. He had tried both systems, and ultimately came to the conclusion that the modified system was cheaper; but it had no other advantage that he could see. Of course, where mechanical coal conveying systems were introduced, these systems were more applicable to a modified system of longwall than to a long straight face. If it were possible by the panel system of working to reduce the pressure, the coal conveyor necessarily worked cheaper and more easily than it did in a longwall system, in which there was great pressure. That paper was particularly interesting to the northern district and to the county of Durham, because they were working a larger number of thin coal seams—2 ft. 6 in. and under in thickness—than perhaps in any other part of the country. The coal was generally used for coking coal and unscreened gas coal, and the size was not important. On the whole, whilst there was a great deal in the paper with which he was not in agreement, he was certainly in agreement with Mr. Gibb that, under certain conditions, a modified system of longwall was more suitable for working thin seams than the ordinary longwall methods.

Mr. MARK FORD (Washington) observed that the methods of mining coal in different districts might be due to the size of the coal required by the market, the quality, hardness, or peculiar formation of the coal, the depth, the strength of the roof or floor, and the flexibility of the strata intervening between the seam and the surface; so that the discussion of such a paper was attended with a host of difficulties due to the lack of local knowledge. In his work on coal mining, Mr. G. Kerr, who dealt largely with Scottish practice, stated, with reference to longwall working, that "the length of wall depends on the thickness of the seam and the amount of material at disposal for 'packs.' For a seam 4 ft. thick, and with a good roof, 12 to 15 yds. is quite long enough; for a 3½ ft. seam, 15 to

20 yds. is sufficient; and for seams 1½ to 2 ft. thick, the walls may be 20 to 25 yds. in length." Now, in the local coal fields, and in most other coal fields, the reverse was the case—the thinner the seam the shorter the face between the gate roads. It would have been better if Mr. Gibb had given the sizes of his faces, pillars, and width of gateways. It was the practice at many places in that coal field to drive a winning place or places 9 to 12 ft. wide, and to protect them by leaving 40 to 100 yds. of coal before opening out longwall. That enabled the mechanical haulage to be kept well up to the face, and was often a useful method, especially when going to the dip. In place of that, Mr. Gibb adopted what he called semi-longwall, wherein the subsidence was 25 per cent., as compared with 80 per cent. under ordinary longwall. What width of coal he extracted was not stated. Much would depend on the hardness of the coal and on roof and floor conditions, as to the behaviour of the roadways. If there were a soft coal and shale roof, it was possible that the subsidence would be as great, and the necessary repairs as much, as in longwall proper. With a width of 40 yds., a hard coal, and a sandstone roof, there might be little settlement and a difficulty in getting the air very far from the shaft, as there would be insufficient pressure to make the packs airtight. In many cases, the roof would be broken by the side of the semi-longwall roads making the new roads dangerous and costly to turn away. In other cases, the coal would be "winded" and hard to get when being opened out. Interruptions to normal and steady working were not the experience in that coal field where longwall was practised. As a rule, there was less irritation from the labour point of view when working longwall than in other methods. It might be that, by his method, Mr. Gibb had overcome difficulties peculiar to his own district, and on that he was to be congratulated. The mining of thin seams was a vital problem with many engineers to-day, and such discussions were very useful. The labour problem was full of difficulties. Secretaries of trades unions might shut their eyes to the results of the Minimum Wage Act, but mining engineers had to recognise them, and act accordingly. A pick sharpener recently said he could generally tell who were the "minimum men," as their picks so rarely came to bank. Hard coal would not be hewn by hand, and recourse must be had to mechanical cutters, or advantage taken of the weight of the strata. If anyone plotted the increase of coal getting by machinery in this country in the past 12 years, he would be surprised at the slow growth in comparison with the increase in the total output. The figures for coal cutters for 1916 showed a considerable increase, however. By more scientific records of the rate of travel of the face, the number of the temporary and permanent supports, the direction of the face, the tools used by the miner, better results might be obtained by hand labour in the future. Recently, it was found at a colliery where a good number of men were "on the minimum," there were 980 picks sharpened for 1,074 hewers' shifts. It was also found that the weight and pattern of pick used was irrespective of the thickness or hardness of the coal. The picks varied from 1½ to 2½ lb., the average being 2 lb. Engineers and workmen had both carried, from thick seams, their methods, machinery, tools, and prejudices into thin seams, and free discussion and interchange of experiences would, in time, tend to relieve the present irksome nature of mining in thin seams.

Mr. C. C. LEACH (Seghill) said that the best way of allaying labour unrest was to see that the men were making fairly good wages, and that unduly irksome work was done away with. He was quite sure that longwall and all its relations had done away with very much hard work, which the present-day young men had never had, and never would have, to do.

Mr. ROBERT PEEL (Durham) wrote that there would seem to be special reasons in Mr. Gibb's case for the method recommended, and that the conditions of working must have been exceptionally bad, due to a difficult roof and soft thill. It might be assumed that the seam as worked on the ordinary longwall method was unprofitable, and that the combination of stoop-and-room with a modified longwall had been adopted as an alternative. It was quite an ordinary resource to change from one method of working, which might be giving bad results, to another, in the hope that less difficulties might be encountered, and the seams prove more remunerative.

Mr. J. R. R. WILSON, H.M. inspector of mines for the Northern District, suggested that an opportunity for further discussion of the paper should be given at the next meeting; and the discussion was adjourned accordingly.

The Flow of Water in Siphons.

The discussion on Mr. MARK HALLIDAY'S paper on "The Flow of Water in Siphons" (*Colliery Guardian*, October 19, 1917, p. 749) was continued by

Mr. WM. WATTS (Wilmslow), who wrote remarking that the mathematical calculations were interesting and instructive, but too abstruse to be understood by the majority of users of them. In the flow of water under atmospheric pressure only, the fewer the changes made in the delivery the more likely was the discharge to be regular. Change of direction in the descending part of the siphon was to be avoided as much as possible to ensure uniform and steady flow, and, in his opinion, fig. 1 ensured more even flow than fig. 2. Too many changes of direction, therefore, should be avoided, and the diameter of the pipe fixed to control carefully the delivery required. Any change of direction in the flow of water in a pipe checked the velocity, which must be felt in a siphon influenced only in its delivery by atmospheric pressure. If the supply of water at the inlet were constant, the flow would be unceasing, and, in that respect, fig. 1 was the simplest form to introduce. If the descending part of the siphon was not fully charged, air was likely to get in and cause air-lock at the crest, and occasionally stop the siphon. To avoid that, the outlet end should be permanently submerged, or the diameter slightly

reduced, to ensure the full bore being maintained. To ensure steady work being done by a siphon, it was necessary to see that it was adjusted to deliver the water provided for it at the inlet under the steady pressure of the atmosphere only.

Prof. ALEX. H. JAMESON (King's College, London) wrote that "the loss at entry to the pipe" amounted to half the velocity head for the usual parallel mouth flush with the side of the reservoir, while, with a pipe projecting into the reservoir, it was equal to the velocity head. Only with a proper bell-mouthed entry would it be practically negligible as only amounting to $0.05 \frac{v^2}{2g}$. It should certainly be taken into account if

the velocity head $\frac{v^2}{2g}$ were worth mentioning. It would, in any case, make the equations but little more complicated. In drawing the absolute pressure line hydraulic gradient on fig. 1, the absolute pressure head just inside the mouth of the pipe was height of water barometer (34 ft.) - $\frac{v^2}{2g}$ - less of head at entry, as it

was less than that just outside the mouth by the kinetic energy and loss of head at entry. According to the author, that pressure head just inside the pipe ($= \frac{\pi}{62.4}$) was 34 ft., or the height of the water barometer.

At the outlet, the absolute pressure line would be above the water level by a height equal to that of the water barometer, as the velocity head was wholly lost in eddies unless the pipe widened out very gradually, in which case some of it might be restored. He did not understand the author's statement that "the valve must be regulated until $(v_3 \times \text{area at C}) = (v_2 + \text{area at B})$." If the only effect of partly closing a valve was that the water passed through it at a higher speed (inversely as the area), the discharge would be unaffected. Actually, the loss of head caused by the sudden contraction and consequent re-expansion at the valve gave a sudden drop in the pressure line; the effect was to lessen the slope of the hydraulic gradient and so to reduce the flow, while the consequent raising of the absolute pressure line behind the valve increased the absolute pressure at the summit of the siphon with beneficial results, if it would otherwise be too low. The absolute pressure at the summit of the siphon could not in practice be zero, as air escaped from the water when the pressure was very low—probably it would never be allowed to fall below 6 to 9 ft. of water. Some air-discharging device was essential at the summit of the siphon to allow occasional discharge of the air which collected at all summits on a pipe line. Even on an ordinary inverted siphon, air-release valves (automatic) had to be placed at all summits and at intervals on slight gradients and at the top of steep slopes; otherwise the air would accumulate and reduce the flow. It was advisable not to cut things too fine, i.e., not to let the absolute pressure line in a true siphon or the pressure line in an inverted siphon approach too near the top of the pipe, as one could not be sure that the resistance of the pipe was quite uniform. One part of the pipe might encrust more than another, in which case that part of the pipe would require a steeper hydraulic gradient to produce a flow which required a less gradient on another part less encrusted. Consequently, one must not assume that the hydraulic gradient would be absolutely a straight line from end to end of a uniform pipe. He emphasised the advisability of drawing the hydraulic gradient or absolute pressure line on a vertical section of the siphon (to an exaggerated vertical scale), as in all cases of complicated flow in pipes. If the pipe line were at all steep, the base of that section must be extended to equal the inclined length of the pipe. If a height PA were set off above water level at A in fig. 1, equal to the barometric height, less the velocity head, less the loss of head at entry, and a height BQ were set off above point B equal to the minimum allowable absolute pressure head at the summit of the siphon (say, 6 to 9 ft., as above), then the maximum flow of water possible was that produced by the hydraulic grade PQ, viz., $\frac{h}{l} = \frac{4fv_2}{2gd}$. If now a height CR were set off

above the water level at the outlet of the pipe, equal to the height of the water barometer, 34 ft., then all depended on the position of point R with respect to the line PQ produced. If R lay above PQ produced, the hydraulic gradient would be the straight line PR, which had a less slope than the maximum slope PQ. If R lay upon PQ produced, the flow would be a maximum, and the hydraulic gradient PQR would just pass a sufficient distance above the summit B for the siphon to work. If R lay below PQ produced, the hydraulic gradient in the falling leg of the siphon would have to be a line RS parallel to PQ, and meeting the falling leg in some point S, the siphon running only part full from B to S. That would allow an empty space in which air would soon collect and stop the siphon working. In such a case, the only thing to do was to close the valve at the outlet C until the absolute pressure head behind it was raised so that R was forced back on the line PQ produced. The nearer B was to A, the better the hydraulic gradient fell from A to C. That steepened the maximum allowable gradient, and increased the maximum flow. He suggested that a valve at N, in place of the air inlet, would be at least as useful in a compound siphon, as it would enable the hydraulic gradient on the true siphon part to be regulated as described above.

The Uniflow Engine.

Mr. G. G. T. POOLE contributed a paper on "Notes on the Uniflow Steam Engine." (See page 1127.)

Mr. G. BLAKE WALKER (Tankersley) wrote that the drop valve, as fitted to Messrs. Robey's engine, had the advantage that it was easy to keep steamtight, but, as the author mentioned, these valves were restrained from closing sharply so as to prevent hammering on the seats. It would be interesting to compare diagrams from engines fitted (1) with the Robey

valve, and (2) with the Cole Marchent drop piston valve, and to observe the difference as to sharpness of cut-off. The latter valve had the disadvantage that it was difficult to keep steamtight, especially when working with a short stroke. Probably a combination of the two valves might be tried as an experiment. Generally, with the conditions obtaining at collieries, where a quantity of large steam plant was already at work, better results could be obtained from a mixed-pressure steam turbine than with the uniflow steam engine, because although the steam consumption of the former was higher, it operated for a portion of its time entirely on a waste product—exhaust steam. The mixed-pressure turbine was, admittedly, not as efficient on the heat balance, but it was a machine perfectly adapted to the conditions at collieries. Mr. Poole mentioned valves of the double-beat type, especially made to keep tight at all temperatures, but he might say something further on that point; it sounded problematical. There appeared to be a passage, in fig. 2, between the exhaust belt and a chamber round the inlet valve spindle. Was that part of the balancing arrangement for the valve, or a by-pass for leakage? The indicator diagram showed that the reversal of the stresses in the reciprocating parts was gradual, a point of great importance which conducted to a quiet-running machine, even when considerable play was allowed in the bearings. If, however, they compared the uniflow engine with gas engines suitable for collieries where coke oven gas was available, the latter were naturally more efficient, as well as economical. It was possible with gas engines to get one b.h.p. hour from 10,000 British thermal units, whereas Mr. Poole claimed for the uniflow engine an efficiency of 18.6 per cent., and that did not take into account the boiler losses which were probably 25 per cent., bringing the efficiency down to 13.9 per cent., or 18,310 British thermal units per indicated horse-power. That 13.9 per cent. must be further discounted by the mechanical efficiency of the engine and the loss due to driving such auxiliaries as feed pumps, condensers, etc., before it was in line with the gas engine as to the net output.

Mr. MARK HALLIDAY (Durham) stated that the Cole, Marchent and Morley uniflow engine installed at Messrs. Bell Brothers' Tursdale Colliery was, he believed, the only uniflow engine in use for colliery work in Durham. Up to 1915, the whole of the steam at Tursdale Colliery was raised by waste heat from beehive coke oven, but the power plant had been reconstructed, and the new engines included a winder, a main-and-tail hauling engine, and a uniflow engine, a Corliss valve main-and-tail hauling engine, installed a few years previously, being retained. A battery of four second-hand Lancashire boilers, each at a working pressure of 80 lb. per square inch, was installed, and suitably arranged for hand firing. Superheaters, economisers, and a central barometric jet condensing plant were added later. With the exception of the winder, the new engines were not ready when hand firing commenced, but that circumstance gave them an opportunity for an economic comparison between the older and the modern power plant. At that time, the fuel consumption was 1,300 tons of best coal per month, and, with that, it was difficult to maintain steam. Two boilers on the old coke ovens had to be fixed, in addition to the four already referred to. By degrees, the new plant was put into commission, and, as a result, there was a steady decrease of fuel consumption until the uniflow engine and all its auxiliaries were in satisfactory working order, whereupon it came down with a leap. The uniflow engine was arranged in a central position near the boilers to drive two ventilating fans, an air compressor, air extracting and circulating pumps for the condensing plant, and the alternator which generated electrical energy for the main underground pumps, the screens, saw-mill, shops, and other auxiliary machinery. It was almost entirely due to that engine and to the arrangement of drives that marked economy had been effected. In September last, when everything was in order, the fuel consumption dropped suddenly down to 450 tons of coke ballast, and they now used steadily about 400 to 500 tons of inferior fuel per month, varying in quan-

month. It was astounding what condensation took place in long pipe lines. The above figures were, in his point of view of fuel economies for powers below 1,000 horse-power. Further, it should be noted that that was a low-pressure engine, lower than that recommended by Mr. Poole. That feature enabled it to work in conjunction with an old boiler plant in cases where a capital expenditure on new boilers could not be justified. There was every indication of the engine being reliable. For several months after starting up at Tursdale, they encountered difficulties which were now almost entirely eliminated. They got no steam from their coke ovens now. From the coke ballast they found, by means of a Lea recorder, that the evaporation varied from 4 to 5 lb. of water per pound of fuel. Asked by Mr. LEACH what the saving in fuel would have been had the use of coal firing been continued, Mr. Halliday said he thought it probable that, if they had used best coals, the consumption would have been about 60 tons per week, i.e., 240 to 300 tons of coal per month. They had four boilers, but could drive quite readily by three.

Mr. JOHN MORISON said Mr. Halliday's remarks led him to suppose that they had cut out a large number of auxiliary engines of inferior quality, extravagant engines, and had cut out long leads of steam pipe. The economy due to the particular type of engine might be something, but it was merely a fraction of the total economy obtained.

Mr. GREENER said he was astonished to hear from Mr. Halliday that he could get from 4 to 5 lb. of steam from 1 lb. of coke ballast. It was quite contrary to his own experience in the matter. It was perfectly obvious that the quantity of steam required at that colliery was very small, because even 1,300 tons of best coal per month, with even a heat value of 8 or 9 lb., represented a very small quantity of steam.

Replying to Mr. TATE, Mr. HALLIDAY stated that the engine at Bowburn, where there was a similar system of working, was not a uniflow but a compound engine. The results were not as good. In his opinion, the difference was largely due to the type of engine. The flywheel weighed 25 tons, and there were rope drives from it to the alternator, etc.

Mr. TATE expressed the hope that Mr. Halliday would give them a sketch of the method of applying that system at the two collieries mentioned. He knew that the system had been a great success at the Bowburn Colliery. He was quite sure that the results at both places had been good.

The PRESIDENT hoped that Mr. Halliday would give them the details of the old plant also.

In response to further queries, Mr. HALLIDAY stated that they had no electrically-driven hauling engines as yet, although they were extending, and expected to have some electrically-driven haulages in the near future. The present steam consumption, he agreed with Prof. Henry Louis, was one-sixth of what it used to be.

The discussion was adjourned.

The Late Mr. J. H. Merivale.

A "Memoir of John Herman Merivale," by Miss JUDITH MERIVALE, assisted by Prof. G. A. L. LEBOUR and Mr. CHAS. HERMAN MERIVALE, was read by Mr. CORDNER.

Moving a vote of thanks to Miss Merivale, the PRESIDENT said he was sure they would all endorse every word she had said in favour of their late esteemed colleague and honorary secretary, for he was a most genial man and a very true friend.

Mr. LEACH, seconding, extolled Mr. Merivale's qualities, and said there was not a kinder-hearted man in the Northumberland coal field.

The vote was agreed to and the meeting ended.

SAFETY LAMPS IN MINES.

Part II. of the General Report on Mines and Quarries in 1916 contains the following particulars regarding the number of safety lamps in use in the various inspection divisions:—

Division.	Total number in use.	Flame safety lamps.								Electric safety lamps.							
		Method of locking.				Method of lighting.		Kind of illuminant.				Total number in use.	Method of locking.				
		Lead rivet.	Magnetic.	Screw.	Other.	By electricity.	Otherwise.	Colza or colza and petroleum.	Petroleum.	Volatile spirit.	Other illuminant.		Lead rivet.	Magnetic.	Screw.	Other.	
Scotland	28,682	12,577	15,496	43	566	19,942	8,740	5,208	5,052	14,740	3,482	5,610	424	5,172	6	38	
Northern	101,172	34,931	61,309	1,895	34	68,821	32,351	71,875	11,470	5,067	12,760	8,542	2,764	5,765	—	13	
York & N. Midland	172,590	94,676	77,048	849	17	102,560	70,030	76,195	18,468	43,550	34,437	50,192	5,623	50,483	3	83	
Lancashire, North	101,842	83,657	18,178	3	4	41,585	60,257	55,903	9,272	23,822	12,845	4,515	1,601	2,898	16	—	
Wales, and Ireland	132,630	55,148	72,945	367	4,170	95,124	37,506	114,441	3,968	5,597	8,024	49,969	1,499	48,463	—	7	
South Wales	73,905	41,588	30,769	1,375	173	58,703	15,202	29,435	6,282	28,859	9,329	1,986	972	925	32	57	
Midland & Southern																	
Total in 1916	610,821	322,580	278,745	4,532	4,964	386,735	224,686	353,057	54,452	121,635	81,677	126,784	12,883	113,646	57	198	
Total in 1915	601,088	318,862	261,280	13,272	7,074	349,873	251,215	358,446	61,151	112,419	69,072	95,167	11,482	83,485	25	175	

tity according to its calorific value. Not a single ton of coal had been burnt for four months. Thus, they now generated by 5,400 tons of coke ballast per annum the same power for which two years ago the consumption rate was 15,600 tons of best coal per annum. There was also a consequent saving of labour which was considerable. Whilst a good deal of that saving was due to the uniflow engine, that was not sufficient to account for it all. It was, as Mr. Poole had stated, its adaptability as a main engine to drive several machines, in addition to its low steam consumption over a large range of loads, that made it specially suitable for colliery work. For instance, at Tursdale, the uniflow engine was running before the motors for the auxiliary machinery at the surface were ready, and, although these represented only about 100 horse-power, the old steam engines and long pipe lines which they were to replace, accounted for 400 tons of ballast per month, the consumption then being 850 tons per

The number of the various types of flame safety lamps in use is as follows:—Davy, 505; Clanny, 82,898; Mueseler, 77,601; Marsaut, 439,313; Wolf, 10,425; and Hepplewhite Gray, 79.

Use of Inland Waterways.—The County Purposes Committee, reporting to the Common Council, London, approved of the invitation of the Canal Control Committee to the traders of the country to make the fullest use of the inland waterways for the conveyance of goods which can be conveyed by water. Holding that it would be a great advantage to the trading community, if the waterways were unified and improved, the Committee suggests the construction of a central authority, with Parliamentary powers, to take over and develop the waterways. Further, the Committee recommends that the Government be urged to give effect to the recommendations of the Royal Commission appointed in 1906.

CONTENTS.

ARTICLES:—	PAGE
Statistics of Coal Production	1137
Statistics and Designs Bill	1137
Notes on the Uniflow Steam Engine	1127
Development of the Forth Valley	1129
Refractory Magnesia	1129
Boiler Management with Substitute Labour	1131
Coal Cutting Machinery in 1916	1133
Employment of Boys in Mines	1133
Industrial Reconstruction Council	1133
Safety Lamps in Mines	1135
South Wales Mining Timber Trade	1141
Mining Research in Canada	1142
Home-Grown Timber	1142
Labour and Wages	1146
The Freight Market	1146
Open Contracts	1146
Publications Received	1148
Obituary	1148
Abstracts of Patent Specifications Recently Accepted	1148
New Patents Connected with the Coal and Iron Trades	1150
Catalogues and Price Lists Received	1150
Government Publications	1150
LETTERS TO THE EDITORS:—	
Wages and Prices in Anthracite Collieries	1141
The Iron Ores of Lorraine	1141
REPORTS OF MEETINGS:—	
Mining Institute of Scotland	1130
Midland Institute of Mining, Civil and Mechanical Engineers	1132
North of England Institute of Mining and Mechanical Engineers	1134
THE COAL AND IRON TRADES	1138-1141
The By-Products Trade	1141
The London Coal Trade	1141
The Tin-plate Trade	1141
LAW INTELLIGENCE	1141
PARLIAMENTARY INTELLIGENCE	1142
CURRENT SCIENCE AND TECHNOLOGY	1143
NOTES FROM THE COAL FIELDS	1143
COAL, IRON AND ENGINEERING COMPANIES	1148
MISCELLANEA:—	
Iron and Steel Combine	1129
Iron and Steel Trades Advisory Committee—Hull	
Coal Trade in November	1130
Partnerships Dissolved—United States Steel	
Industry Mobilised	1133
Use of Inland Waterways	1135
Requisitions for Coal—Berlin's Coal Shortage—Colliery Explosion	1141
Scheme to Develop British Export Trade	1142
Coal in Corea	1144
Labour Representation—Navy Oil	1146
Institution of Petroleum Technologists—The Concrete Institute—Leeds University and the Gas Industry	1150

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The Colliery Guardian

AND

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Joint Editors—

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LONDON, FRIDAY, DECEMBER 14, 1917.

The London market has been better supplied lately, but the demand is still strong. The larger houses and both railway and gas companies have a fair amount on hand. Slacks are improving.

Foreign enquiries in Northumberland and Durham have become very scarce, and the collieries rely on official requirements and inland deliveries to keep business going. Producers of second class and inferior sorts fare the worst. Prices are simply

nominal. Both Lancashire and Yorkshire present stereotyped features, marked chiefly by the usual rationing which gives priority to Government purposes. Pressure in the house coal trade is maintained in Leeds and Barnsley, and small fuel for electricity works is in demand. South Yorkshire hards are 30s. Hull or Immingham for Allied ports and 35s. neutral destinations. Gas coal is scarce. The Cardiff market is unsatisfactory owing to the deficiency of ships and empty wagons. Supplies are plentiful, especially smalls, and the latter has been extensively banked. The market in Scotland remains very depressed.

Prompt supplies of anthracite are plentiful in Swansea, and machine-made sorts have a rather easier tendency. Rubbly culm and duff are not going well. Patent fuel supplies are large.

As tonnage is almost unobtainable, freights remain firm. Tyne to London is quoted 21s. and Tyne to Barcelona has been fixed at 300s. The Humber-London rate is 20s. to 21s. South Wales appears to be suffering most from the scarcity of tonnage.

The Coal Controller has telegraphed to all secretaries of coal owners' associations as well as district miners' agents assenting to the customary holidays being taken at Christmas and New Year. Such days will be recognised holidays within the meaning of the war-wage circulars.

The pooling scheme relating to coal exports to Italy will come into operation on January 1.

In the House of Commons, on Monday, the Coal Mines Agreement (Confirmation) Bill was read a third time.

A meeting of the Coke Oven Managers' Association (Midland section) will be held to-morrow (Saturday), commencing at 3.30 p.m., in the Grand Hotel, Sheffield. Mr. G. A. Hebden (Parkgate) will read a paper on "Ammonia and its Compounds."

At a meeting of the Institution of Mining and Metallurgy, in Burlington House, Piccadilly, London, on December 26 (commencing at 5.30 p.m.), a paper on "A Neglected Chemical Reaction and an Available Source of Potash," by Mr. E. A. Ashcroft, and another on "Syphoning Gravel," by Mr. J. J. Garrard, will be submitted for discussion.

Economics of Coal Production.

THE Society of Chemical Industry had under consideration at their London meeting this week an important paper by Prof. HENRY LOUIS upon "The Economics of Coal Production." The title is a wide one—too wide, in fact, to cover adequately in a single paper; and Prof. Louis wisely confined himself to the consideration of a single aspect of the subject—viz., the cost of production and its dependent factor, the price which the consumer has to pay for it.

Before enlarging upon this topic, we must confess to being at some disadvantage, owing to the meagre character of the abstract which we have been permitted to publish. The complete paper will, of course, be accessible in the official publication of the society, but we submit that a fuller summary would not have detracted from the value of the *Transactions*, which probably few of our readers have an opportunity of reading, and would have greatly widened the appreciation which will undoubtedly be felt of this departure from custom in bringing before industrial chemists a matter of purely economic importance. Yet it cannot be said that technical chemists are not vitally interested in the problem of the cost of coal. The position which coal has assumed in the national economy leaves no industry unconcerned, and least of all the chemical industries, with their wide ramifications and growing importance in all the arts of peace and war.

Prof. LOUIS dwelt at some length upon the different items which go to make up the cost of coal. These he summarised under the following heads: The value of coal in the seam; wages; materials; administration; profit of the colliery owner; and distribution to the consumer. He considered these various matters in the light of the possibilities which still remain of reducing the cost. With regard to the first, the value of coal in the seam, we imagine that the author includes under his heading the cost of getting it out of the seam; for obviously coal in the seam has no value in the strict sense. It is, in fact, this fallacy which has been responsible for so much misconception respecting the conservation of coal, which some economists carry to such an extent as to

imply that by mining coal the nation is living on its capital. Without any pretence to being adepts in practical economics, we submit that coal *in situ* is not capital, and is only convertible into capital after work has been expended upon it in bringing it to the surface of the earth and converting it into a marketable commodity. Even if we accept the proposition that coal has a value in the seam, this value can scarcely be placed higher than the amount of royalty that it would command, which would reduce all coals to the same value of about 6d. per ton. We know, however, that all coal seams have by no means the same value, even when they are of the same quality, because the cost of extraction varies between such wide limits; and this cost must necessarily go on increasing in proportion as the workable seams get deeper. Even if all the other items enumerated above remained fixed, the cost of coal must necessarily show a progressive upward tendency. The only way to check this natural rise in the cost of mining is to improve our methods of mining by an increased use of machinery, and by raising the efficiency of the miner, so that the time rate of production may keep pace with the increasing difficulty of mining.

Wages, as the author stated, form the largest item in the cost of getting coal, and there is little prospect of any reduction being possible in the near future so far as the daily earnings of the miner are concerned. But this factor can be controlled by increasing the output per man. This does not necessarily imply the redoubled blow about which there was so much controversy at the time of the discussion on the eight-hour day. The output of marketable coal is not entirely a question of the gross tonnage mined. A great deal depends also upon the quality of the coal produced, the proportion of large and small, and the removal of dross. Dr. C. H. CARPENTER pointed out that one of the striking results of the shortage of labour in the pits at the present time was that, although the cost of coal has risen enormously, its quality has depreciated to a serious extent. The reason for this falling off in quality he attributes largely to inadequate work at the picking belts; but probably other factors are involved, for there may be a marked difference in the proportion of dirt sent up from different pits, and even from the various working places of the same pit. The miners are, perhaps, not wholly to blame for this, except where their short-sighted views impose difficulties upon the management with regard to the introduction of improved methods of working. It is of the highest importance that men should abandon their attitude of suspicion towards any innovation which is designed to increase the owner's profit, and that they should learn to realise that their wages are necessarily bound up in the general prosperity of the pit. Mr. NORMAN SWINDEN stated that in America it had been found possible by improved systems of scientific management to increase largely both the output and the wages earned, so that even where wages had been doubled the cost had been reduced one-third. That, however, is not any proof that such marvellous results would be possible in this country, where the conditions are so different from those prevailing in America. But it undoubtedly is an argument worthy of serious consideration, for he would be a bold man who maintained that British mining methods have yet reached their limit of economical working. There are, doubtless, still many possible economies both in working and administration, but the British mine manager may be excused if he hesitates to introduce innovations which may engender friction amongst the men on the one hand or incur the criticism of Government inspectors on the other. The position of the colliery manager to-day is one of great delicacy and difficulty, and between State regulation and trade union prejudice he has by no means an easy task.

The remaining items considered by Prof. LOUIS, although presenting aspects of interest, seem to be of less importance from the coal mining point of view. Cost of materials, colliery profits and even the cost of distribution have a smaller influence upon the cost of coal to the consumer than the matters considered above. Prof. LOUIS suggests that the most likely methods of keeping down the cost will be found in the federation of individual collieries into large units, the revival of inland navigation, the elimination of waste, and the better utilisation of small coal. In this connection, Prof. J. S. BRAME, called attention to the possible economy that could

be effected by the reduction of the coal used in the collieries themselves, which he computed to represent about 7 per cent. of the output, or about 20 millions per annum. This amount might possibly be reduced by combination into groups of pits operated by electric power generated from low-grade coal. Amongst other points of view presented in the discussion of this paper, some were sufficiently obvious and have already become somewhat hackneyed; some were fantastic, others were somewhat mixed up with economic fallacies; while a few, plausible enough in the abstract, present too many practical difficulties for serious consideration.

Patents and Designs Bill.

THE Bill introduced in the House of Commons by Sir ALBERT STANLEY, President of the Board of Trade, is intended to remedy certain imperfections in the Patents and Designs Act of 1907. Before entering into its provisions, however, it will be convenient to call attention to the weaknesses disclosed by ten years' working of the existing Act. We may, in the first place, premise that the main purpose of our patent laws is not only to promote the commercial development of inventions by giving the inventor a monopoly for a term of years, but also to ensure the publication of such a full account of all inventions, that when the monopoly period expires anyone may be in a position to make of them what use he pleases. The Garton memorandum finds that the existing Act does not adequately fulfil these fundamental requirements. It is, it states, becoming increasingly common for patents to be obtained for the sole purpose of preventing development in the interests of an existing process. Moreover, it is complained that the fees require revision, being too high for the protection of minor inventions, and beyond the means of relatively poor men. It is claimed to be economically unsound to consider patent fees merely as a source of revenue, and also that it would be to the national advantage to devise some means whereby patentees of small means might obtain assistance in the commercial development of their inventions.

The Dominions Royal Commission recently considered the matter from another standpoint—viz., the diversity of present practice as regards the protection of imported inventions. Thus, in the United Kingdom, anyone who imports an invention from abroad, provided that it is not in use in the United Kingdom, may obtain a patent; but, at the same time, the inventor is allowed priority over other applicants for one year from the date of his foreign patent, if the country in which his patent was obtained belongs to the International Convention for the Protection of Industrial Property. Australia and New Zealand refuse protection to imported inventions. There is also a divergence in existing practice in the Dominions with regard to opposition to the grant of patents, as well as to the life of a patent, which is 18 years in Canada, as compared with 14 years in the United Kingdom and the other Dominions; while the provisions for renewals differ largely. The conditions for the revocation of patents for non-working are equally diverse. Witnesses in the United Kingdom, giving evidence before the Dominions Commission, also complained strongly of the heavy cost of full protection, which, in 1912, was stated to be £289 for the United Kingdom and all the Dominions; but this amount has since been reduced to £166 by recent legislation in the Union of South Africa.

In short, there is so much divergence in the existing patent laws that the Commission considers immediate uniformity to be unattainable on account of the number of legislative authorities amongst whom agreement would have to be secured. But on many points uniformity is not only possible but eminently desirable. We merely call attention to these matters for the purpose of showing that the ideal of complete uniformity throughout the Empire is not practicable. This is evident if we consider only the question of renewal fees, which are rightly heavier in the United Kingdom, with its large market of 45 millions of people, as compared with the smaller population in the Dominions. In any case, it appears to be the business of the Dominions, with their variations of legal requirements, to come into line with the mother country so far as it is possible to do so, and for this purpose it is all the more desirable that our own patent law should be as perfect a model as can be devised.

ALBERT STANLEY'S Bill does not seek to cover ground as is indicated above. It does not question of fees, and is confined almost entirely to securing adequate working in the United Kingdom on a commercial scale. There were various loopholes in the Act of 1907, which rendered almost nugatory the revocation of patents for non-working. The present Bill provides that the monopoly rights under a patent shall be deemed to be abused if, after the expiration of four years, the patented invention is not being worked within the United Kingdom on a commercial scale, and no satisfactory reason can be given for such non-working; if the working of the invention on a commercial scale is being prevented or hindered by the importation from abroad of the patented article by the patentee; if the demand for the article is not being met to an adequate extent and on reasonable terms; if, by reason of the refusal of the patentee to grant licences upon reasonable terms, the trade or industry of the United Kingdom or the establishment of any new trade or industry is prejudiced, and it is in the public interest that a licence or licences should be granted; and if any trade or industry is unfairly prejudiced by the conditions attached by the patentee to the purchase, hire, or use of the patented article, or to the using or working of the patented process.

For the purpose of determining whether there has been any abuse of the monopoly rights, it is to be taken that patents for new inventions are granted not only to encourage invention, but also to secure that new inventions shall if possible be worked on a commercial scale in the United Kingdom without undue delay. Power is given to the Comptroller, in case of default, to issue a licence to petitioners to work a patent, to preclude the patentee from himself working or using the invention, and to secure to the patentee a maximum royalty compatible with the licensee working the invention on a commercial scale and at a reasonable profit. In granting licences of right the Comptroller is to endeavour to secure to the patentee the maximum advantage consistent with the invention being worked by the licensee at a reasonable profit, and endeavour to secure the widest possible use of the invention consistent with the patentee deriving a reasonable advantage from his patent rights.

How far this Bill will remedy the defects of the existing Act will probably be more apparent when its clauses are discussed in Parliament. So far as can be judged it is aimed not so much at simplifying procedure within the Empire as at the removal of anomalies with regard to foreign inventions.

THE IRISH COAL TRADE.

THURSDAY, DECEMBER 13.

Dublin.

Cold weather stimulates business, and the past week has been a busy one in the coal trade, the shortage of tonnage still making it extremely difficult to procure adequate supplies. Freights have advanced from 11s. to 16s., and this week the merchants' prices for coal are 1s. 6d. per ton higher all round. Current quotations for household coals are as follow:—Best Orrell, 50s. per ton; best Arley, 49s.; best Wigan, 48s.; Pemberton Wigan, 46s.; best Whitehaven, 48s.; best kitchen coal, 47s., all less 1s. per ton discount for cash; coke, 46s. 6d. per ton delivered. Prices of Irish coals from the Wolfhill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton, all f.o.r. Athy, the nearest railway connection with the mines. At the Castlecomer Collieries, co. Kilkenny, best large coal is 28s. 4d. per ton at the pithead. Slacks are considerably below the normal, and during the past week the total quantity of coal discharged upon the quays from English, Scotch and Welsh ports was only 12,995 tons. At the last weekly meeting of the council of the Dublin Industrial Development Association the views of an expert interested in Irish coal were put before the council. It was stated that in normal times the rates of carriage are considerably higher from Irish mines to Dublin than rail and sea freights from British mines. The heavy Irish freight rates would require to be altered in favour of the native product to enable Irish coal to compete with the imported commodity.

Belfast.

Demand for all qualities continues to be good, and there is, so far, no further advance in prices at this port. The number of steamers at the wharves is very small, owing to navigation difficulties, and a large number of orders on hand are getting into arrears as a result of existing conditions. Current quotations for household coals are as follow:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Approximate prices of Scotch steam coal are 31s. 6d. per ton for the inferior sorts, the better qualities being as high as 37s. 6d. per ton. Gas coke is about from 42s. 6d. per ton. Foundry coke from 63s. 6d. to 68s. 6d. per ton. From 18 to December 1, the total number of ships entering the harbour was 103.

A colliery recruiting court on Thursday afternoon, when, among other things, pages, clerks, chemists' assistants, and printers who entered the collieries after the war began.

THE COAL AND IRON TRADES.

THURSDAY, DECEMBER 13.

Scotland.—Western District.

COAL.

No change is reported in the general position of the Scotch coal trade. A little more business has been done on home account in view of the fact that public works are now taking in their largest supplies for the year. In the west of Scotland there is a tendency towards improvement, owing to increasing local demands. The export side of the account is still affected by the shortage of tonnage. Shipments for the week amounted to 93,878 tons, compared with 72,229 in the preceding week and 118,376 tons in the same week last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	20/-25/
Ell	26/6-28/	26/6-28/	22/-24/
Splint.....	28/-30/	28/-30/	25/-30/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

All-round activity still characterises the Scotch iron trade. All departments are as busy as possible, but still higher outputs could be obtained if the supplies of raw materials were in greater volume. In the pig iron trade everything is subservient to the demand for hematite, the production of which is claiming every available furnace. Ordinary qualities, therefore, become more and more difficult to procure, especially No. 1 iron. Shipments are few and far between, and almost entirely for the Allies. No alteration has yet been made in home prices, and while export values have assumed very high proportions quotations are of little account, as makers have very little to offer for ordinary shipment. Monkland and Carnbroe, f.a.s. at Glasgow, Nos. 1, 140s., Nos. 3, 135s.; Govan, No. 1, 135s., No. 3, 130s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 150s., Nos. 3, 145s.; Glengarnock, at Ardrossan, No. 1, 140s., No. 3, 135s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 145s., Nos. 3, 135s.; Shotts and Carron, at Leith, Nos. 1, 150s., Nos. 3, 145s. per ton. In the malleable iron trade Government orders also take premier place. Works are fully engaged, but many would be glad to be in a position to accept ordinary business at the prices presently obtainable. The quotation for crown quality iron bars is round about £16 per ton, but a much higher figure can be secured for guaranteed deliveries. The outputs of black sheets and of galvanised material are wholly monopolised by war requirements. Makers of light castings have good orders on hand, and engineering works have also a large number of orders booked, including a fair amount of outside business.

Scotland.—Eastern District.

COAL.

In the Lothians land sales are comparatively good, but the lack of regular business for export continues, owing to the scarcity of boats. Shipments amounted to 17,566 tons, against 17,591 in the preceding week and 16,766 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	25/
Secondary qualities.....	25/6	25/6	23/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

Fifehire collieries have reaped some benefit of late from fair shipments of navigations and first-class steams. Other sorts are still difficult to dispose of. Clearances amounted to 28,046 tons, against 34,223 in the preceding week and 52,949 in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	30/-35/
Unscreened do.....	24/-25/	24/-25/	28/-30/
First-class steam coal.....	28/	28/	28/-30/
Third-class do.	24/	24/	22/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The prices quoted are for shipments to France and Italy. For other orders an additional 2s. 6d. per ton must be added.

The aggregate shipments from Scottish ports during the past week amounted to 139,490 tons, compared with 124,083 in the preceding week and 188,091 tons in the corresponding week last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

The position of the prompt coal market was bad enough last week, but this week, if anything, it is worse. Until a day or two ago, best steam coal collieries were, by reason of official requisitioning, kept fairly well employed, although most other pits in Northumberland and Durham were suffering from lack of transport facilities and were experiencing an uncomfortably large amount of idle time. At the time of writing, even the best steam coal collieries have, in some instances, had to join the unemployed, and there is no prospect at the moment of any very early improvement in the tonnage position, so that irregularity of work is quite "on the cards" for the rest of the present year. Export business, excepting, of course, of an official nature for our Allies or selves, is almost at a standstill. Fortunately, the inland consumption of such brands of fuel as gas coals, household, smithies, coking coals and coke continues good and sufficient—in fact, pretty well to absorb the output of the four latter classes enumerated. Special smithies for export still retain their recent quotation of

33s. 6d. per ton. The bunker market is inanimate, excepting for special Durhams, which continue to be quoted at from 30s. to 32s. 6d. There is no forward business of any importance to report.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/
Do. Tynes (Bowers, &c.) ...	29/6-32/	29/6-32/	28/6-30/
Secondary, Blyths	25/6-28/	25/6-28/	24/-26/6
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	24/-26/
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	18/-19/
Do. Tynes.....	18/6-21/	18/6-21/	17/-17/6
Do. specials.....	20/6-23/	20/6-23/	20/-21/
Other sorts:—			
Smithies.....	25/-33/6	25/-33/6	20/
Best gas coals (New Pelton or Holmside) ...	25/-27/6	25/-27/6	24/-26/
Secondary gas coals (Pelaw Main or similar) ...	23/6-26/	23/6-26/	18/-20/
Special gas coals	26/6-29/	26/6-29/	27/6
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	17/-19/
Do. do.			
Northumbrians	26/6-27/6	26/6-27/6	18/-20/
Coking coals	24/-27/6	24/-27/6	18/-20/
Do. smalls	24/-27/6	24/-27/6	17/-18/
House coals	28/6-32/	28/6-32/	27/6-30/6
Coke, foundry	42/6-45/	42/6-45/	40/-45/
Do. blast-furnace	42/6-45/	42/6-45/	36/-38/
Do. gas	35/-37/6	35/-37/6	33/-35/

Sunderland.

COAL.

The position generally shows no change. The arrival of tonnage continues inadequate to the requirements of the collieries, which are only working indifferently. Steam coals are moving off fairly well, but not briskly on requisition account. In the home trade there is a strong demand for special qualities and manufacturing fuels, and also gas coals, smithies, and washed smalls and nuts. Bunker coals do not show any improvement and remain a slow dragging business. Steam smalls still accumulate, demand unimproved. Values generally are unchanged. Coke is fully steady, gashouse make being in good request and firm.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	27/6
Secondary do.	25/-27/6	25/-27/6	19/
House coals:—			
Best house coals	32/6	32/6	28/
Ordinary do.	30/6	30/6	24/6
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	28/6
South Hetton do.	31/-32/6	31/-32/6	27/6
Lambton unscreened	26/6	26/6	17/
South Hetton do.	26/6	26/6	17/
Do. treble nuts	22/6	22/6	20/
Coking coals unscreened	27/6	27/6	16/6
Do. smalls	27/6	27/6	16/3
Smithies.....	27/6	27/6	17/6
Peas and nuts	27/-28/6	27/-28/6	18/6
Best bunkers.....	27/6	27/6	18/6
Ordinary bunkers.....	26/6	26/6	16/
Coke:—			
Foundry coke	42/6-45/	42/6-45/	41/
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke.....	35/-37/6	35/-37/6	32/6

Middlesbrough-on-Tees.

COAL.

Some improvement has occurred, but there is still much room for improvement. Some of the pits are doing very well, but that is not the general experience. Home demand for gas coals, coking kinds, and special manufacturing sorts continues heavy, and a fair amount of business in these descriptions is passing, but steam smalls are much too plentiful, and are slow of sale; whilst bunkers continue to drag and sales are confined mainly to superior qualities. Values keep at the schedule minimum figures. Best gas coals are 27s. 6d., seconds 26s., and Wear specials 29s. Coking coal 27s. 6d., small steams 21s. to 23s., and unscreened bunkers 26s. 6d. to 27s. 6d. There is no alteration in the coke market. Continued heavy local demand is met by more than ample supply, and the result is a rather extensive business. Average blastfurnace kinds are 33s. at the ovens, and qualities low in phosphorus 35s. 6d. at the ovens; whilst foundry sorts are 38s. For shipment to the Allies, beehive and patent oven both stand at 42s. 6d.; and for export to neutrals these descriptions are 45s. Gas-house product keeps in strong request, and readily realises 37s. 6d.

IRON.

The advances in pig iron prices have been officially confirmed. Provision that the higher rates be retrospective is causing little trouble as regards home sales. For some time past contracts have contained a necessary protective clause providing for advances in prices, and many sales have already been put in order. So far as foreign transactions are concerned difficulties arise, but matters promise to be fairly well adjusted. Home business in Cleveland pig is quiet, sales under the very liberal December allocations having been practically all made, and as supply of trucks is better and improving, deliveries over the last month of the year are likely to be heavy. Demand on foreign account is large, and though many makers are not at all keen to commit themselves extensively, several substantial sales have been made for shipment abroad over the first three months of next year. For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 95s., and No. 1 is 99s.; and for shipment to France and to Italy No. 3 116s. 6d., No. 4 foundry 115s. 6d., No. 4 forge 114s. 6d., and No. 1 121s. 6d. The east coast hematite department presents no new feature of importance. The situation is still stringent, but relief is gradually being felt by enlargement of output of basic iron. Deliveries to home customers are maintained on an adequate scale, and hope is expressed that shipments will be heavier in the not distant future. Nos. 1, 2 and 3 are 122s. 6d. for home use, and 147s. 6d. for export to France and to Italy. As regards manufactured iron and steel, pressure of delivery of war material and shipyard necessities is unabated. At the time of writing, quotations have not been altered, but readjustment of prices is anticipated.

Cumberland.

Prices at pit (except where otherwise stated).

Prices at pit.

Maryport.

COAL.

There has been a welcome change for the better in the condition of the coal industry in West Cumberland. The sharp frost has given a stimulus to the house coal trade both in the local and export markets, and another gratifying feature is that the weather has been more favourable for shipping. Practically all the coal that has recently been held up on the dock sidings has been shipped during the last few days. The home market is firmer; the demand for all varieties of fuel is going stronger and the collieries are now unable to cope with all the business that is being offered. The house coal trade is in a remarkable state of activity. All the pits are working full time and there are fewer complaints of absenteeism. Locomotive fuels for the local railways are very steady, and gas coal is very firm, but only business on contract is being dealt with. There is an abnormal demand for both manufacturing and house coal for Ireland. During the week 17 vessels have sailed, all with coals for Irish ports, and the shipments have amounted to 5,690 tons, compared with 4,130 tons at the corresponding period of last year, or an increase of 4,485 tons compared with the previous week. Over 2,000 tons have been shipped to Belfast, and some good cargoes have been consigned to Bangor, Coleraine, Carrickfergus, Dublin and Portaferry. The imports this week have included two good cargoes of pit timber. The coke industry is well employed. Current quotations are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls ..	19/2	19/2	16/8
Do. peas ..	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	25/
Best works fuel	31/	31/	30/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	22/6	22/6	20/
	21/6	21/6	19/

IRON.

Activity continues in all departments of the hematite pig iron trade in Cumberland and North Lancashire. All the industries on the west coast are fully employed, and some of the plants are busier than they have been for years. The market is in a very firm condition. Although production is steadily rising, makers are still unable to fulfil all requirements. All the iron ore mines are working full time, and with the introduction of more outside labour, production is gradually increasing. All grades of local ore are in keen request.

South-West Lancashire.

COAL.

After a short period of something like a lull in the pressure of the inland household trade, the activity is coming on again, orders being placed upon the merchant's book far quicker than the receipts by him can cope with; otherwise there is nothing to comment upon. With regard to shipping there is not much change to report, though the demand for steam coal for general bunkering and export is, if anything, rather better than it was a week ago, and wagons are being cleared more quickly. Business, however, is quiet. At the same time there is not much spare coal about. Prices of Lancashire steam coals are according to official schedule. In household coals for the coastwise and cross-channel trade, difficulties multiply, the exigencies of the present situation necessitating the closing of the ports from time to time, and consequently the coasting trade vessels are not getting through the tonnage which is expected of them in normal times. The result is that wagons at the ports are not working so well, and the merchants across the water are always anxious buyers. In slacks there is a considerable amount of pressure all round, and particularly for the better grades. Enquiries for nuts of good quality and small size are numerous, and the demand for this small graded fuel is far more than can be met. Gas Companies betray anxiety in their repeated calls upon the coal producer for increased supplies.

Prices at pit (except where otherwise stated).

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	23/6-24/6	23/6-24/6	21/
Do. (f.o.b. Garston, net)	21/6-22/6	26/-	25/6
Medium	20/6	21/6-22/6	19/-20/
Do. (f.o.b. Garston, net)	26/	25/	24/6
Kitchen	25/	20/6	18/
Com. (f.o.b. Garston, net)	24/	24/	24/ upwds
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	22/6-23/
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

There was a good attendance on the Manchester Coal Exchange on Tuesday. The demand for all descriptions of coal is in excess of the quantities offered. Whatever easement there is, is in common slacks. The gas managers are pressing for full deliveries, and it is with difficulty that the collieries are able to maintain full tonnages. Prices generally are as follow.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington)	—*	—*	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

IRON.

There was a good attendance on 'Change in Manchester on Tuesday, but no information is yet to hand whereby one can definitely foresee the advances which are likely to take place in pig iron. All works are fully occupied on war material, and there is no new feature to report in the state of affairs in this district.

Yorkshire and Derbyshire.

Leeds.

COAL.

A good attendance on the market on Tuesday included traders from London, Hull and other distant markets, as well as local merchants endeavouring to secure supplies. The market was brisk, and a fair amount of business was done, mainly for forward delivery. Very little was offering on prompt parcels, but a fair number of contracts for house coal and other qualities which expire at the end of the year were renewed. The demand continues strong for house coal for the London district. Reports from the depots indicate that north of the river fair-sized stocks have been accumulated, and the demand at the depots is well within the capacity of merchants to deal with it, but there are complaints of shortage south of the Thames. Special attention is being given to the orders of the Controller for supplies of coal for local control committees in the south, to be used as reserves in case of transit breakdown during the winter, and considerable supplies are being sent by the collieries for this purpose. An improvement in the position in Area 13 seems to be indicated. The coastwise trade is featureless. Nearly every cargo shipped is contract coal, the bulk of the business being done at Goole. Freights are still in the neighbourhood of 20s. Locally the house coal trade is busy in view of the approaching holidays, and merchants in many cases are short of supplies. Occasional purchases of gas coal are being made to supplement contract deliveries, and special efforts, more or less satisfactory in the result, are being made to cope with the needs of gasworks. Pressure is being brought to bear on the collieries from official quarters with this object, and the anxiety of gas engineers is to this extent being relieved. Manufacturing fuel, especially nuts, is in strong request. Nuts are exceedingly difficult to procure on the open market. Reports from the industrial area, including Bradford, the heavy woollen district, the Spen and Colne valleys, Leeds and Huddersfield show that supplies of manufacturing sorts are fairly satisfactory, considering the conditions. There is a marked scarcity of best quality rough slacks, and practically no stocks of anything at any of the pits. Washed furnace coke is unchanged, except that attempts are made to get extra supplies in preparation for the Christmas stoppage, the demand being particularly keen from the Midlands and Frodingham. The supply of coking smalls continues to be the chief difficulty of coke makers.

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallsend & London best	21/-21/6	21/-21/6	19/-20/
Silkestone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkestone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/6	20/6-22/6	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal	18/-18/6	18/-18/6	16/-17/
Gas nuts	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/-18/
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens			
Furnace coke	32/	32/	25/8

Barnsley.

COAL.

Business has shown no material alteration during the week, the pressure for supplies continuing to be very strong, and there is little fuel available after contract supplies have been met. Owing to various causes, export continues on quiet lines. The continued activity to obtain surplus lots is no more successful than hitherto. The tonnage needed for Admiralty supplies is of a very extensive character so far as the local collieries are concerned, and difficulty still exists in procuring a sufficient supply of steam nuts, owing to the heavy consumption by concerns engaged in the production of war needs. All kinds of small fuel are in exceptionally heavy request, especially grades which are required for electricity works. The position in regard to gas coal has undergone no material change, and stocks continue to arouse much anxiety, but the position appears to be unalterable. Quite a vigorous request still comes to hand for larger supplies of slacks required for coke making; but the production does not permit of heavier deliveries, whilst there is no diminution in the demand for furnace coke. House coal supplies are hardly so favourable as a week ago, but on the whole the collieries are doing fairly well in meeting the needs of the nearer districts. Values more than ever remain nominal.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkestone	22/6-24/6	22/6-24/6	20/-22/
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/
Secondary do.	18/-18/6	18/-18/6	15/6-16/
Steam coals:—			
Best hard coals	20/-21/	20/-21/	17/6-18/6
Secondary do.	19/-20/	19/-20/	16/6-17/6
Best washed nuts	18/9-19/	18/9-19/	16/3-16/6
Secondary do.	18/-18/9	18/-18/9	15/9-16/3
Best slack	15/-15/6	15/-15/6	12/6-13/
Secondary do.	13/-13/6	13/-13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/
Gas nuts	18/9	18/9	16/
Furnace coke	32/	32/	25/8

Hull.

COAL.

Business has been on somewhat quieter lines for some little time. Not quite so much is going to France, and practically none to Italy. One or two cargoes have been sent to Sweden, but generally speaking neutral business is very restricted. The home demand on supplies is extremely heavy, and after Admiralty and official requirements have been met there is not much left over. Large steams are firmly held for 35s. for best South Yorkshire hards, and West Yorkshire Hartleys for 30s. for neutral shipment. All industrial fuels are fully absorbed. The official return of arrivals of coal at Hull from the collieries during November is the least satisfactory since April, the total of 207,906 tons being 40,000 behind same month last year, and comparing with 260,358 tons in October. The smaller figure is no doubt contributed to by the diversion of coal to London by rail from Yorkshire.

Chesterfield.

COAL.

Coal of every class continues in great demand. The cold weather is bringing in increasing numbers of orders for house coal, but delay in their execution is inevitable. As no stocks are held at the collieries, customers are entirely dependent upon the daily output of the pits for a partial satisfaction of their requirements of coal. Manufacturing concerns are pressing for supplies of fuel for industrial purposes. The large steel establishments of Sheffield are calling urgently for supplies, and cobbles and nuts are particularly wanted for gas producers. Slack for boiler firing is more readily obtained just now. Fair quantities are going forward to the Lancashire cotton mills. Gas coal is in active demand, and railway companies are pressing for increased deliveries of locomotive coal in view of the approaching suspension of work at the collieries for the Christmas holidays. The condition of the coke market is unchanged. The demand for every quality is active. The export trade shows no sign of improvement, and licences are unobtainable. The shipment of Derbyshire coal is now totally prohibited.

IRON.

An active condition of things prevails all round, the works of the district being busily employed in every department.

Nottingham.

COAL.

The position of affairs in this county has improved this week in consequence of the resumption of work at the Sutton Colliery after a five weeks strike. Fortunately, the pressure in the domestic fuel section has eased. At the same time, merchants are taking whatever supplies they can obtain from the collieries in order to increase their stocks, which had been almost depleted by the heavy early autumn purchasing by the public. Good consignments are being sent to London and the southern counties, and the supplies locally are rather better than a few weeks ago. The tone in the steam coal branch continues remarkably active. A heavy demand prevails for home consumption on account of war work. The tonnage available for manufacturing purposes is on a limited scale. Cobbles are less difficult to secure, but the shortage of steam nuts continues. Many contracts are in arrears, and very few odd lots are to be met with in the open market. A good trade is being done in better class and ordinary slacks.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/	21/-22/	18/6-20/
Good house coals	20/-21/	20/-21/	18/-18/6
Secondary do.	18/6-19/6	18/6-19/6	17/-18/
Best hard coals	18/3-19/	18/3-19/	17/-18/
Secondary do.	17/-18/	17/-18/	16/-17/
Slacks (best hards)	14/6-15/	14/6-15/	12/-13/
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/	13/	11/

Leicestershire.

COAL.

Although the system of day-to-day working is still in operation, it is hoped that normal conditions will soon be restored. The difficulties attending administration and the sub-division of supplies, so as to ensure regular deliveries to domestic consumers in great centres of population, have never been so great. The output is well maintained all round, but it is very much less than it would be under normal conditions. The demands for munition works and for factories under Government control still show a tendency to increase, and the deliveries to London and district are maintained at the maximum. All classes of household are in very keen demand, and both main and deep cobbles and nuts are cleared off day. There are also heavy deliveries of bakers' nuts and nuts for mechanical stokers. Country coal merchants are struggling against very adverse conditions, which include a great shortage of labour and very irregular deliveries with no stocks in reserve. Under these circumstances a slight increase in the maximum charges has been sanctioned in order to ease the position. Coal yards at country stations have been quite denuded of supplies. There are no stocks of any kind in reserve at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best coal	20/-21/6	20/-21/6	17/-19/-
Hand-picked	19/-20/-	19/-20/-	15/6-17/-
Small cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/-
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/-
Small nuts	17/-18/-	17/-18/-	14/6-15/6
Deep breeze	15/3-16/-	15/3-16/-	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/-
Main nuts for London			
kitcheners	16/-17/6	16/-17/6	14/-15/-
Steam, best hand-picked	16/6-17/6	16/6-17/6	14/6-15/6
Steam, seconds	15/6-17/-	15/6-17/-	13/6-15/-
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/-
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

Output at the pits is well maintained, and just before Christmas may be said to reach high-water mark. After supplies for essential war needs are met, there is not a big surplus. The greatest scarcity is for nuts and good class slacks. There is also a certain amount of delay in transit, brought about by the frosty mornings. Merchants have still a good deal of leeway to make up in household deliveries, but they are finding the regulation forbidding deliveries to customers who have more than a month's stock in hand of very great assistance, and the demand is nothing like so acute as it was. As a matter of fact, there has been so far no hardship on anybody.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep	24/6	24/6	22/-
Do. seconds deep	22/6	22/6	20/-
Do. best shallow	21/6	21/6	19/-
Do. seconds do.	20/6	20/6	18/-
Best hard	21/-	21/-	18/6
Forge coal	18/6	18/6	16/-
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/-
Do. hand-picked			
cobs	20/6	20/6	18/-
Best hard spires	22/6	22/6	20/-
Forge (steam)	18/6	18/6	16/-
D.S. nuts (steam)	17/-	17/-	14/6
Small (do.)	17/-	17/-	14/6

IRON.

The pig iron advances seem to be coming by instalments. Lincolnshire and Cleveland makes have risen, but no mention has so far been made of Derbyshire, Staffordshire, or Northamptonshire brands. Whether the readjustment, which it is felt is inevitable, will be reflected in the market price or not, it will probably be made retrospective, and the prospect of collecting back money on contracts, many of them completed, is not anticipated with any degree of pleasure. Houses which were selling fairly freely a fortnight ago are again holding their hands, and are not taking on new customers. They are irritated at the delay in coming to a decision, and in view of the modest nature of the advances conceded in other districts, are preparing themselves against disappointment by expecting little. For finished iron and steel the market is restricted outside Government needs, which, however, are very formidable and absorb nearly the whole of the output. A fair amount of material continues to be released for agricultural implements and tools. Marked bars are retained at £15 10s., less 2½ per cent., and merchant bars at £13 15s., the average for bar iron generally, under the latest Wages Board return, being £14 19s. 6d. Hoops, strip, and miscellaneous, which come next to bars in point of quantity turned out, averaged £16 4s. 4d., angles and tees £15 5s. 1d., and plates and sheets £17 16s. 6d. In all these branches there is a sustained pressure for deliveries. Plate shearings have now been brought under the control system, and the price fixed at £10 7s. 6d. on trucks, at plate makers' works, compared with the previous quotation of £11 10s. This brings the cuttings into proper relationship with the sheet bars, which they are used to supplement, and with the finished sheets, which were recently limited to £17 for lots of 2 tons and upwards. The distribution of discard steel is also being regulated so as to safeguard essential needs. A quickened demand has followed the fixing of a maximum price for shearings, and the plate mills are finding themselves with the offer of more orders than they can reasonably fulfil.

Forest of Dean.

Lydney.

COAL.

The colder weather has created a heavier demand for household coals, but unfortunately collieries are not able to send increased supplies, as a large portion of the output is already allocated. Stems are still unduly long in the shipping branch of the trade, and vessels are kept waiting for their cargoes up to a fortnight in some cases. Slacks and all steam qualities are in good request, and the works of the district are kept well supplied. There are no stocks to be noticed.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best	26/6	26/6	24/-
Second	25/6	25/6	23/-
Third	25/9	25/9	23/3
Fourth	24/-	24/-	21/6
Fifth	15/6	15/6	13/-
Sixth	22/6-23/6	22/6-23/6	20/-
Seventh	18/-19/-	18/-19/-	16/-17/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

THE WELSH COAL AND IRON TRADES.

THURSDAY, DECEMBER 13.

Monmouthshire, South Wales, &c.

Newport.

COAL.

Though some improvement in the arrival of tonnage is evident, there has been no very appreciable change in the coal market of this district during the past week. Very large stocks were still reported to be on hand, especially of small coal, which appeared to have been made in great quantities. The holding up of a great many wagons caused considerable dislocation in the working of the pits. There appeared to be some prospect of improvement in the immediate future, but how far this will be realised time will show. Coke has been very scarce, and as there has been barely enough for local requirements it has been decided that no coke should be exported from South Wales to France, and the committee charged with the duty of controlling the supply of fuel to France has been advised to draw supplies from the north of England. House coal has been in strong request, and gas coals have been scarcely sufficient to supply the demand.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	32/6	26/-27/-
Western-valleys, ordin'y	31/6	31/6	25/-26/-
Best Eastern-valleys ...	31/6	31/6	24/-25/-
Secondary do.	30/6	30/6	23/-24/-
Best small coals	23/6	23/6	17/-18/-
Secondary do.	22/6	22/6	12/-16/-
Inferior do.	20/6	20/6	10/-12/-
Screenings	25/6	25/6	17/-18/-
Through coals	29/6	29/6	—
Best washed nuts	32/6	32/6	—
Other sorts:—			
Best house coal, at pit...	35/6	35/6	24/6-26/6
Secondary do. do.	33/3	33/3	22/-24/-
Patent fuel	32/6	32/6	35/-37/-
Furnace coke	47/6	47/6	47/6-52/6
Foundry coke	47/6	47/6	62/6-65/-

IRON.

The iron and steel works of the district are fully employed, and are maintaining an excellent output, chiefly on Government account. There is very little change in the tin-plate trade, which is now under complete control. Pitwood arrivals have only been moderate, and the market has been kept up to 75s. ex-ship for best French fir, though the Controller of Mines is expected shortly to issue an Order that purchasers should not pay more than 65s. ex-ship.

Cardiff.

COAL.

A slight improvement is shown in the tonnage position this week, but the quantity available is not nearly sufficient for the requirements of the trade, and is practically all absorbed in the carrying out of Admiralty orders and contract commitments. More activity prevails in loading operations, and it was expected in many cases that collieries would be able to work throughout the week. New business is at a standstill, and no change in existing conditions is anticipated until a larger number of vessels are available for general shipments. Admiralty collieries are favourably situated, but there is a difficulty in dealing with the increasing stocks at pits producing inferior grades. Banking is resorted to in numerous instances, but experience during the last few days has shown that it is a hazardous proceeding, dangerous in many cases and likely to entail considerable loss. Where small coal has been banked, in several districts spontaneous combustion has been responsible for the outbreak of fires in the accumulation heaps. Fortunately, these have been promptly dealt with, and no serious damage has occurred, but loss is being incurred in other ways. Exposed to all kinds of atmospheric conditions, there is a considerable amount of deterioration, and after protracted dumping, small coal particularly, loses a great proportion of its value. Such

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam	33/-	33/-	—
Superior seconds	31/6	31/6	—
Seconds	30/9	30/9	26/-28/-
Ordinary	30/-	30/-	24/-25/-
Steam smalls No. 1	21/6	21/6	17/-19/-
Do.	21/-	21/-	—
Do.	20/6	20/6	15/-17/-
Do.	20/-	20/-	—
Do.	19/6	19/6	14/-15/-
Do.	19/-	19/-	—
Do.	18/6	18/6	12/-14/-
Do.	18/-	18/-	—
Best dry coals	30/-	30/-	25/-26/-
Ordinary dries	28/6	28/6	23/-24/-
Best washed nut	30/-	30/-	25/-26/-
Seconds	28/6	28/6	24/-25/-
Best washed peas	27/6	27/6	23/6-24/6
Seconds	26/6	26/6	22/6-23/6
Monmouthshire:—			
Black Veins	30/-	30/-	26/-27/-
Western-valleys	29/-	29/-	25/-26/-
Eastern-valleys	29/-	29/-	23/-25/-
Inferior do.	28/-	28/-	23/-24/-
Bituminous coals:—			
Best house coals (at pit)	33/-	33/-	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large	30/9	30/9	26/-27/-
Small	26/-	26/-	18/-20/-
No. 2 Rhondda—			
Large	27/-	27/-	24/-25/-
Through-and-through	22/-23/6	22/-23/6	18/-20/-
Small	17/-19/-	17/-19/-	17/-19/-
Best patent fuel	30/-	30/-	35/-37/6
Seconds	30/-	30/-	34/-35/-
Special foundry coke	47/6	47/6	62/6-67/6
Ordinary do.	47/6	47/6	57/6-60/-
Furnace coke	47/6	47/6	47/6-52/6
Pitwood (ex-ship)	75/-	70/-	75/-49/-50/-

Nominal.

factors lend importance to the discussion now going on as to whether it would not be better to close down some of the less essential collieries. The new pooling scheme with regard to Italian shipments has been finally arranged, and will come into operation on January 1. In the first instance the business will be entrusted to six firms who were the largest exporters of coal before the war, and the firms doing the actual business will be allowed a fittage charge of 1½d per ton. The management committee consists of six members, two of whom retire by rotation every three months, and their places will be taken by two others representing the next largest exporting firms. The distribution of the moneys pooled will take place quarterly, according to the percentage of the business done. An effort is also to be made to secure exporters' commission and brokerage for the pool on all business done with Italy in excess of the arranged Government orders between October 31, 1916, and December 31, 1917. All transactions continue to be on the basis of the Controller's schedule, exclusive of the 2s. 6d. for increased wages. Patent fuel is in ample supply with little demand. Coke is scarce, and the French Committee have been requested to obtain their supplies from the Durham district in consequence of the inland demand for South Wales coke for manufacturing purposes. In the meantime licences for shipment to France and French colonies are being suspended. The supply of pitwood is again meagre, and quotations range up to 75s. per ton for best French fir.

IRON.

There are no fresh developments in connection with the tinplate trade, and outputs are being satisfactorily maintained. Supplies of bars are more regular, and the mills are accordingly working better time. Receipts from works last week amounted to 25,963 boxes, but there was a considerable increase in the shipments, which totalled 30,581 boxes, leaving 94,386 boxes in stock, compared with 99,004 boxes the previous week, and 156,353 boxes a year ago. Although permits are being more freely granted for the utilisation of washers, complaints are still made that stocks of oil sizes are excessive, and that they might readily be disposed of for home consumption, and thus afford considerable relief to manufacturers. The basis prices for standard sizes remain 30s. per box, but as the quotation for block tin now exceeds £298 per ton, makers are now obtaining 31s. 6d. per box for 14 x 20 x 112 sheets net free on rail at works. At the iron and steel works there is no falling off in the demands, and both the blastfurnaces and the mills are working at top pressure. There is a brisk enquiry for rails of light calibre for Government purposes, and ordinary commercial business is neglected. In the galvanised sheet trade there is no alteration, and works are chiefly engaged on black plates, for which there is a steady demand. All prices are nominal. Spelter is £54 per ton. Supplies of iron ore continue satisfactory, and outputs of pig iron are steadily increasing as extensions are being completed. Scrap metals are firm, and maximum rates are being readily obtained for the small quantities available.

Llanelli.

COAL.

The tonnage question is still affecting the position of the local market and idle days are prevalent at the collieries owing to a shortage of empties. Large anthracite qualities are a little easier, owing to tonnage working late, and it is therefore possible to secure supplies for prompt business. Cobbles are also not quite so firm, but the position of nuts and beans is unchanged, and adequate supplies are still difficult to secure. Peas are not in strong demand, and supplies are offering freely. There is no improvement in the demand for culm and duff, and as stocks are very heavy, sellers have no difficulty in executing promptly any orders which may offer. Steam coals are not an improved market, and with practically all qualities offering freely buyers have no difficulty in covering their requirements. Large of the better grades are fairly steady, but throughs and smalls are inactive, with stocks of the lower grade of smalls very heavy. Manufacturing coals are well supported, local works taking the bulk of the outputs. House coals are very firm, and all suitable supplies are well booked up.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/-	30/-	29/6-32/-
Seconds	29/-	29/-	27/6-30/-
Thirds	27/6	27/6	—
Red Vein large	25/6	25/6	24/-25/-
Machine-made cobbles	42/6	42/6	37/6-40/-
Seconds	41/-	41/-	—
Thirds	39/-	39/-	—
Red Vein cobbles	36/-	36/-	—
Machine-made nuts	42/6	42/6	—
Seconds	41/-	41/-	—
Thirds	39/-	39/-	—
Red Vein nuts	36/-	36/-	—
Machine - broken beans (best)	35/-	35/-	28/6-29/6
Seconds	34/-	34/-	—
Thirds	33/-	33/-	—
Red Vein beans	31/-	31/-	—
Peas (all qualities)	20/-	20/-	20/-22/-
Rubby culm	13/-	13/-	10/6-11/6
Red Vein culm	11/-	11/-	—
Breakers duff	8/-	8/-	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/-	30/-	27/-28/6
Seconds	27/-	27/-	—
Cargo through	23/6	23/6	19/6-22/6
Seconds	22/-	22/-	—
Bunkers through	23/6	23/6	—
Smalls	19/-	19/-	13/6-17/-
Second smalls	17/-	17/-	—
Bituminous:—			
Bituminous through	27/-	27/-	—
Smalls	24/-	24/-	17/-19/6
Gas through	23/6	23/6	—
Gas smalls	21/-	21/-	—

Swansea.

COAL.

Business proceeds slowly at present. Steam coals, especially smalls, are exceedingly quiet, with the result that collieries are working on reduced outputs or short time. Bituminous and gas coals have a good market. Anthracite is decidedly easier to obtain, and the cheaper grades in particular appear to be plentiful. Machine-made sorts are also offered. This position of affairs is due to the tonnage difficulty, and it is doubtful whether any improve-

ment in that respect will occur in the near future. Prices are all as per schedule under the Coal Control, except for neutrals, and owing to difficulty in obtaining licences and tonnage for neutrals practically all present business is being transacted on account of France and Italy.

SOUTH WALES MINING TIMBER TRADE.

It is announced that supplies of home-grown and imported mining timber for South Wales will be allocated through a committee in order to equally distribute the available supplies of timber in accordance with the requirements of collieries. Under the present system, the tendency is for some collieries to secure large stocks, whilst others are short. The Allocation Committee will be representative. The composition of the Allocation Committee is as follows:—District Pitwood Committee: Mr. J. Dyer Lewis and Mr. H. A. A. Phillips; Monmouthshire and South Wales Coal Owners' Pitwood Association Limited: Mr. Finlay A. Gibson; Timber Supply Department: Prof. H. A. Pritchard; Admiralty representative: Mr. W. St. D. Jenkins; Monmouthshire and South Wales Pitwood Importers' Association: Mr. W. Harry; Admiralty Pitwood Committee: Mr. Thos. Evans. South Wales coal exports are dealt with through an Allocation Committee, which sits daily, and it is intended that the machinery of the Pitwood Allocation Committee will run on much similar lines. Merchants foresee difficulty, inasmuch as supplies are in small lots and arrive at irregular periods. The Allocation Committee will be compelled to sit frequently, otherwise stocks will be held up, and the question of who will have to pay demurrage will arise. Then there is the question of empty trucks, and the marshalling and forwarding of supplies at the instance of the committee. This cannot be done with clockwork regularity in normal times, and transport difficulties are likely to be considerably accentuated. It is anticipated that the Allocation Committee will commence operations from January 1 onwards, and simultaneously maximum prices will be enforced.

Imports Very Poor.

The imports of foreign mining timber during the week ended December 7 have been very poor, and will probably continue so until merchants succeed in arranging their supplies on the basis of the maximum prices, which it is stated will be fixed at 65s. ex ship. As merchants have been buying at 70s. to 72s. per ton, and growers and agents abroad are holding out for high prices in view of the fact that 75s. per ton is being demanded for wood on the Cardiff Exchange, there is a difficulty in purchasing supplies to leave a profit if the wood has to be sold at 65s. Dealers state that it is useless to fix maximum prices at which the wood is to be sold to collieries unless representations are made through the French Government for the f.o.b. prices of French timber to be fixed. Consequently at the present time very few contracts are being arranged. The imports of foreign mining timber for the week ending December 7 amounted to but 3,600 loads, of which 2,604 loads were for the Admiralty Committee and the remainder for Messrs. Morgan and Cadogan, viz.:—

Cardiff (Barry and Penarth):—		
Date.	Consignee.	Loads.
Dec. 4	Lysberg Limited	1,680
" 4	Lysberg Limited	840
" 4	Morgan and Cadogan	300
" 7	Lysberg Limited	84
" 7	Morgan and Cadogan	96
Total		3,000

Newport:—

Dec. 7	Morgan and Cadogan	600
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Home-grown timber was in exceptional demand, and high prices were realised for good sorts. Some of the wood delivered to collieries is very large in girth, and in a few places saw mills have been installed to split the timber into suitable sizes.

THE BY-PRODUCTS TRADE.

Tar Products.—The demand in London and the provinces for tar remains quiet, but quotations are steady, at about 24s. to 25s. north, and 25s. to 30s. London, at works. Pitch is firm in London, although the position for holders is not an easy one. They are expectant of an advance in demand and price, but accumulations are occurring, and the disquieting outlook concerning railway facilities and manpower (leaving out of account the tonnage problem) must be taken into account. Nevertheless, pitch is not a nervous commodity at any time, and many holders believe that the advantage is on their side at present rates. The scheme of mixing pitch with fuel oil, in accordance with the official schedule, is more easily operated in print than in business, and until arrangements are on a more tangible basis than the present, it is needless to trouble about them in a trade report. The Midlands and the North—influenced no doubt by the prospect of heavy accretions during the winter—seem disposed to a fairly low level of quotations for suitable business, and 20s. is regarded as a fair average in the Manchester district, as compared with 21s. to 23s. east coast, and 22s. to 24s. west coast. Solvent naphtha is rather unsteady, probably on account of the question of an official schedule of prices. The possibility in that direction is mentioned, but nothing definite has been disclosed. Provincial quotations show a tendency to decline after the recent brisk demand, and supplies at 4s. are obtainable. Heavy naphtha ranges from 2s. 9d. to 3s. 3d. Naphthalene quotations are maintained, the crude being in strong demand, and refined having also a good sale. Creosote presents only nominal features, owing to regulations, and the authorities require so much benzol and carbolic that the market for these commodities scarcely calls for notice just now. Cresylic acid inclines to advance from 2s. 9d. The other by-products are practically unchanged.

Sulphate of Ammonia.—Sulphate is in good request, at the fixed price for the home trade. Nitrate of soda is firm. Offers are scarce, and consequently trade is limited. Liverpool sellers quote £27 for ordinary and £27 10s. for refined per ton in singles net ex store.

Requisitions for Coal.—The Controller of Coal Mines desires to point out that a recent notice in the Press requiring coal consumers to send in their requisitions before December 31 next, only related to the Metropolitan Police Area and certain adjoining districts which are subject to the Household Coal Distribution Order, 1917. The notice does not in any way affect consumers in other districts. For the present, requisitions under the above Order are not required outside the districts mentioned.

THE LONDON COAL TRADE.

THURSDAY, DECEMBER 13.

The demand for house coal on the London market continues strong, but the pressure for supplies in the principal residential quarters has fallen off considerably, owing doubtless to the fact that the larger houses have been fairly supplied. All the depots in the East End and in the neighbourhoods where the trolley men are accustomed to go are still very keen to secure their regular weekly or monthly supply. The depots are busy with dealers. The attendance on the market has fallen off considerably, and the bulk of the demand seems to rest with the outlying depots, some of which are still very short of supplies. The special urgency of the Coal Controller for coal within the Metropolitan area has been somewhat relaxed, and the country stations are enabled to get a better proportion of the output. Colliery representatives still report an undue number of orders on hand, and there does not seem any prospect of overtaking the mass of orders on the books. Very few of the colliery representatives are prepared to book any orders except for contract coals. The stocks on the ground have improved lately, and merchants are now facing the prospect of colder weather with a degree of equanimity. Hard steam coals are very scarce, and the urgent requirements for the large factories and munition centres show no sign of abatement. Railway companies have in one way and another secured a fairly good supply, and the principal gas works also have good stocks by them. So far the seaborne market has kept up wonderfully well: 24 contract cargoes arrived in the River Thames for Monday's market, and six for Wednesday. Small nuts for electric stations are in good demand, and the supply is exceedingly limited. Slacks are moving freely, and with the necessary curtailment of this kind of fuel for the colliery's own use during the approaching holiday season, the demand is likely to increase. For the best South Yorkshire hard steam coal 35s. per ton f.o.b. is asked, and 30s. for the cheaper qualities. Whilst these prices are obtainable in the shipping market, with the high freights now quoted, there is very little hope of much of this kind of coal coming into the London area, where the Limitation Act for prices is in force. Apparently every colliery is working at full pressure, unless it is those who are dependent entirely upon the shipping trade, and the boats are not obtainable.

From Messrs. Dinham, Fawcus and Company's Report.

FRIDAY, DECEMBER 7.—Seaborne house coal was again in good demand, but no available or spare cargoes were on offer. Cargoes, 10.

MONDAY, DECEMBER 10.—The colder and damp weather caused a good demand for seaborne house coal, but no fresh sales were reported, the supplies being very limited. Cargoes, 24.

WEDNESDAY, DECEMBER 12.—There was a scarcity of supply of seaborne house coal in the market, which ruled firm. No sales reported. Arrivals, 6.

LAW INTELLIGENCE.

JUDICIAL COMMITTEE OF THE PRIVY COUNCIL. December 10.

Before Lord PARKER, Lord SUMNER, Lord PARMOOR, Lord WRENBURY, and Sir ARTHUR CHANNELL.

Coal in Captured Vessel.

Procurator-General and the steamship "Alwina."—His Majesty's Procurator-General appeared in regard to the seizure at Falmouth, in January 1915, of the Dutch steamship "Alwina." The vessel left Newport, South Wales, in October 1914, laden with 1,606 tons of coal. It was alleged by the Crown that the papers of the "Alwina" were false, and that, instead of the coal having a legitimate neutral destination, it was intended for the German Fleet, then operating in the South Atlantic. Owing to the destruction of this fleet off the Falkland Islands, however, the "Alwina" was unable to carry out the alleged intentions of her owners. The coal was sold, and the vessel returned to England. The President of the Prize Court (Sir Samuel Evans) held that the vessel was immune from capture on the return journey by reason of the fact that she did not actually deliver her cargo to the enemy, and he directed restitution of the ship.

The Attorney-General, in supporting the appeal, argued that vessels employed in an enterprise of this kind lost their neutral character, and became, in fact, auxiliary vessels of the enemy fleet. The vessel's papers stated that she carried no passengers, but she had on board a German, who was a passenger, but falsely represented to be steward.

The cross-appeal by the owners was against the President's order as to costs. They submitted that no matter what the first venture was, it had come to an end, and the second venture, during which she was captured, had nothing to do with it.

Judgment was reserved.

THE TIN-PLATE TRADE.

Liverpool.

So far as the merchants here are concerned, very little in tin-plates can be reported. The Government is steadily buying for war requirements for ourselves and Allies, but all this trade is booked direct with the makers. Prices are, on the whole, well maintained at the official maximum, most works having as much on the books as they care about, but where specifications are wanted it is possible to buy at a shade under this. Wasters are not going out at all well this last week or so, permits for their release coming along very slowly, and stocks are in consequence again becoming heavy.

The Charlaw and Sacriston Coal Company Limited has sent on a donation of £50 towards the funds of the Durham Aged Mine Workers' Homes, in response to the appeal made to them.

Mr. Robert W. Lumsden, who died on Monday at Low Fell, at the age of 82 years, was for about 50 years in the employ of Messrs. John Bowes and Partners, during much of which time he was engineer at the Springwell and Wardley Collieries, from which position he retired about 13 years ago.

An interim report of the Coal Conservation Sub-Committee of the Ministry of Reconstruction, deals with the extent to which coal conservation would affect power production and create new industries. The Committee recommends the appointment of a Board of Electricity Commissioners, with power to deal with electricity supply.

LETTERS TO THE EDITORS.

The Editors are not responsible either for the statements made, or the opinions expressed by correspondents.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

As replies to questions are only given by way of published answers to correspondents, and not by letter, stamped addressed envelopes are not required to be sent.

WAGES AND PRICES IN ANTHRACITE COLLIERIES.

SIRS.—As a shareholder in an anthracite colliery in South Wales, I should like to point out that, while the recent advance granted to the men and boys in their wages carries with it a corresponding licence to coal owners to increase their prices by 2s. 6d. per ton, there is an exception made, as regards increase of price, in the case of those collieries who are supplying our Allies with coal, and consequently many collieries, who hitherto have been making a small profit, are now sustaining a heavy loss.

South Wales, especially the anthracite district, supplies France and Italy to the extent of 75 per cent. of their average output, and while still having to pay the additional amount in wages, are debarred, roughly, from participating in three-quarters of the 2s. 6d. per ton increased price, and must consequently be faced with the necessity of closing down, thereby curtailing the much-needed supplies to our Allies. Surely this state of things calls for some more favourable consideration from the State.

A. D. M.
December 8, 1917.

THE IRON ORES OF LORRAINE.

SIRS.—In your note* upon the lecture I delivered before the Sheffield Society of Engineers and Metallurgists on the 1st inst., you make me responsible for the following erroneous statement:—"A good deal more than half of our imports of iron ore came from Lorraine." What I did say was that "a good deal more than a half of the tonnage of smelted metal imported into Britain in the pre-war year could be traced back to an origin in the ore fields of Lorraine," and I further stated that the total weight of mineral raised (the term "mineral" including both the iron ore of Lorraine and also the coal mined in Westphalia and other of the coal fields of the Rhineland and Belgium for the purpose of providing coke to smelt the ore), in order to produce the semi-manufactured metal sold from Germany and Belgium into Britain in 1913, was considerably greater than the total quantity of Spanish hematite (4,525,843 tons) imported into this country in the same year.

You also quote me as having said that "the output of iron ore from Lorraine—that is, the German output—had risen from practically zero in 1870, to 20 million tons at the outbreak of war." Except that in 1913, instead of 20 million tons, the actual production of iron ore from German Lorraine was 21.1 million tons, this statement *per se* is not inaccurate; but, as quoted, it makes no mention of the circumstances that in the same year the production of ore from French Lorraine was 19.9 million tons (of which the Briey plateau was responsible for 15.1 million tons), while the production from the Grand Duchy of Luxembourg was 6.5 million tons, making for the whole Lorraine iron field a total output of over 47.5 million tons.

Further, I am reported to have said that "Sheffield, as the home of high-class steel, did not like basic phosphoric ores." May I explain that the quantity of raw ore which Sheffield consumes in steel furnaces is not great, and that only ore of the very purest quality can be used for the conversion of pig iron into steel in the Siemens furnace. The basic material of which I spoke as the staple raw material used in the making of steel in Germany and Belgium was basic pig iron obtained by the smelting of Lorraine phosphoric ores, and the basic material which I was advocating as a possible substitute for the hematite-grade pig irons so much in demand in Sheffield, and of which there is a very present national shortage, was such basic pig iron as can be, and is now being, made from home ores mined in the neighbouring county of Lincoln, in Northamptonshire, and in the Cleveland district of North Yorkshire, and for the production of which the home reserves of ore are abundant and can readily be made available.

Since, in reading the abstract of my lecture as printed, some of your readers may be misled by the statements mentioned, and since I regard the matter as one of fundamental importance to the future development of the country's iron and steel industries, I shall be grateful if you will grant me the necessary space to add these amplifications and corrections.

Sheffield, WILLIAM G. FEARNSIDES.
December 8, 1917.

* See *Colliery Guardian*, December 7, 1917, p. 1091.

Berlin's Coal Shortage.—In its issue of December 11, *Forwards* states that the coal business in Berlin is simply chaos, and the resultant misery in the poorer quarters is beyond words. Berlin municipal enterprises are almost in an equally bad position. Berlin gas and electricity works, the city overhead and underground railways, are so scantily furnished with coal that they "live from hand to mouth." The slightest interference with the present slender supplies, "such as any frosty day may bring, must compel a partial, if not total, stoppage." The authorities are said to be letting matters drift.

Colliery Explosion.—A serious explosion occurred at the Crouton Colliery, belonging to the Hulton Colliery Company, at Halshead Park, near St. Helens, on 1st inst. Eight men, badly injured, were brought to the surface, and subsequently others were found. There were 160 men at work in the mine at the time. Following the firing of a shot, there was an accumulation of gas. A flame enveloped the men, and a heavy fall of roof resulted. When they were rescued, it was found that the clothing of the men had been burned away. Five or six deaths have resulted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.—December 13.

Coal Mines Control.

LORD CHANCELLOR moved the second reading of the Coal Mines Control Agreement (Confirmation) Bill, which had come up from the Commons. Its object was to give effect to the agreement come to between the Board of Trade and the coal owners relating to the compensation to be paid in respect of the control of coal mines by the State.

LORD STRACHIE, in moving that the Bill be read a second time that day three months, denied that it had the general approval of the House of Commons, and said that it was only welcomed by the Labour Party as introducing the thin end of the wedge for the nationalisation of mines. There was, in fact, a very strong feeling among coal owners throughout the country against the Bill in many respects. There was to be no charge on the National Exchequer, but the coal owner was to pay an additional 15 per cent. excess profits duty. That meant that the men who were energetic and prosperous were only to be allowed to retain 5 per cent. of excess profit. Increased production would not accrue as the result of the Bill if the Government removed all incentive to its achievement. What was the position under the Bill of the royalty owner, who would certainly suffer owing to the mining of less coal? And, when a pit was closed by the Controller, what would be the position of the coal owner? Would he still have to pay wages, royalty, and other charges? He hoped that the House would protect the miners by introducing some provision for compensation in the event of loss of employment.

The Marquess of CREWE thought it was impossible fairly to regard the coal industry as one and to treat all coal owners on the same lines. There was no reason why prosperous coal owners should provide a fund for the compensation of coal owners who failed, any more than successful butchers or bakers should provide a fund for the compensation of their unsuccessful competitors. In some cases, this system of compensation must operate directly to the discouragement of increased output, and particularly to the application of improved methods of production.

EARL RUSSELL said the Government had missed a favourable opportunity for taking over coal mines permanently, and working them in the interest of the community. But as that would be a large and dramatic experiment in State Socialism, it failed, no doubt, to commend itself to the Government.

The amendment was by leave withdrawn, and the Bill was read a second time. It was agreed that the Committee stage should be taken on Thursday next.

HOUSE OF COMMONS.—December 6.

Coal Supply (Ireland).

MR. BYRNE asked what steps were being taken to supply coal to poor people in Ireland, and whether the Chief Secretary was aware that people in Dublin experienced difficulty in obtaining supplies even at 3s. 2d. per bag.

MR. WARDLE said he was not aware of any difficulty regarding the supply of coal to Ireland, but he would be glad to forward any complaints to the Coal Controller, who was about to address a communication to local authorities in Ireland with regard to the limitation of retail coal prices.

December 10.

Coal Mines Control Agreement (Confirmation) Bill.

The Bill to confirm and give effect to the agreement relating to the compensation to be paid in respect of the control of coal mines by the Government was considered as amended in Committee.

SIR C. CORY moved an amendment limiting the application of the measure to owners who were parties to the agreement. He urged that it would be a great hardship to inflict the whole of the terms of this agreement upon parties who had resisted them, and make it apply to undertakings which might be very much larger than the coal mines.

SIR J. WALTON, in supporting the amendment, questioned whether there was a precedent for a Government Bill imposing an agreement upon people hostile to it, and, at the same time, the power being withheld from Parliament to examine each clause, and amend where necessary.

The SOLICITOR-GENERAL said he could not accept such an amendment, as it would apply only to the possession of the mine by the Board of Trade in cases where the owners were not parties to the agreement.

MR. PRINGLE said he thought the Solicitor-General misunderstood the amendment. It was unfair that those who objected to the agreement should not only have their coal mines affected by the Bill, but also their subsidiary businesses.

MR. ROCH observed that unless the Bill were amended, those merchants who were not coal owners would compete with the latter at an advantage regarding the 15 per cent.

Brig.-Gen. HICKMAN agreed with the Solicitor-General that the amendment would nullify the operation of the Bill, but he urged that the Solicitor-General should insert some wording to cover the point.

The SOLICITOR-GENERAL replied that the amendment and subsequent amendment would render the scheme of compensation ineffective.

Amendment negatived.

MR. PRINGLE moved to add to the end of subsection 1 the words "Provided that this Act shall not deprive any persons who are not parties to the agreement of any rights to compensation which they may have at common law or otherwise."

The SOLICITOR-GENERAL declined to accept it.

SIR C. CORY remarked that the Solicitor-General, instead of speaking of compensation, should call it confiscation.

SIR J. WALTON maintained that those who were not parties to the agreement should have their full rights and privileges under the law of the land.

Amendment negatived.

Col. SIR JOHN NORTON-GRIFFITHS moved to exclude coke ovens and by-product plants from the operation of the Bill. He said that such exclusion would affect another industry, and that the production of basic iron.

The SOLICITOR-GENERAL expressed a readiness to fall in with the suggestion.

Brig.-Gen. HICKMAN moved to add to the motion the words "and like works not directly concerned with the production of coal."

The SOLICITOR-GENERAL undertook to embody this in his Bill.

The Report stage was concluded.

MR. PRINGLE, on the motion for the third reading, asked what were the intentions of the Government in respect of any miners who might be thrown out of employment owing to the closing of mines under the Act. He demanded that the Government should compensate such men.

SIR A. STANLEY said the question of unemployment was a matter quite separate and distinct from the Bill. It had been receiving the sympathetic attention of the Board of Trade for a considerable time. The Coal Controller was in communication with the mine owners and the Miners' Federation on the subject.

The Bill was read a third time.

December 11.

Railway Facilities for Miners.

MR. BECK (Parliamentary Secretary of the Ministry of National Service), replying to a question, said he could not ascertain that any men other than those enrolled as War Work or National Service Volunteers had been moved to work in collieries away from their homes, in response to an appeal by the Government. For enrolled Volunteers arrangements made by the Government entitled such men to free railway passes to their homes at recognised holiday periods.

Non-Ferrous Metal Industry Bill.

The Non-Ferrous Metal Industry Bill was further discussed on second reading, an amendment having been moved for the rejection of the measure.

MR. BONAR LAW said that they could not have independence at home unless they got rid of German control. That was the object of the Bill.

The motion for rejection was defeated by 182 votes to 79, and the Bill was read a second time.

December 13.

Lost Coal Cargoes.

SIR L. CHIOZZA MONEY, replying to Mr. G. LAMBERT, said that of the British tonnage actually sunk in September and October, about one-eighth only consisted of ships carrying food, over one-third of ships carrying coal, and the remainder of ships carrying miscellaneous commodities or ships sailing outwards in ballast.

Coal Field Development.

MR. BONAR LAW, replying to Capt. WRIGHT, said that the present policy was to postpone the normal development as far as existing conditions made such a course necessary. It was not anticipated that there would be any shortage of face room at the pits upon demobilisation.

MINING RESEARCH IN CANADA.

The following Associate Committee on Mining and Metallurgy of the Honorary Advisory Council for Scientific and Industrial Research has been appointed, under the chairmanship of Dr. F. D. Adams, and vice-chairmanship of Prof. S. F. Kirkpatrick, both of whom are members of the Research Council:—

Maj. C. L. Cantley, B.Sc., acting works manager, Nova Scotia Steel and Coal Company, New Glasgow; Mr. A. A. Cole, B.Sc., M.A., mining engineer, T. and N. O. Railway Commission, Cobalt; Mr. C. V. Corless, M.Sc., general manager, Mond Nickel Company, Coniston; Mr. Th. Denis, B.Sc., Superintendent of Mines for the Province of Quebec, Quebec; Mr. C. Fergie, president, Inter-Colonial Coal and Coke Company, 413, Dominion Express Building, Montreal; Mr. A. R. Globe, assistant general manager, Hollinger Gold Mines Limited, Timmins; Prof. G. E. Guess, M.A., Professor of Metallurgy, University of Toronto, Toronto; Prof. J. C. Gwillim, B.Sc., Professor of Mining Engineering, Queen's University, Kingston; Mr. E. H. Hamilton, B.Sc., consulting metallurgist to the Consolidated Mining and Smelting Company, Trail; Prof. H. E. T. Haultain, C.E., Professor of Mining Engineering, University of Toronto, Toronto; Prof. A. Mailhot, B.Ap.Sc., Professor of Geology, L'Ecole Polytechnique, 228, St. Denis-street, Montreal; Mr. E. P. Mathewson, B.Sc., general manager, British-American Nickel Corporation, 9, King-street East, Toronto; Lieut.-Col. D. H. McDougall, LL.D., general manager, Dominion Steel Corporation, Sydney; Mr. J. G. Morrow, inspecting engineer, Steel Company of Canada, Hamilton; Prof. J. B. Porter, Ph.D., D.Sc., Professor of Mining Engineering, McGill University, Montreal; Mr. F. D. Reid, B.Sc., manager, Coniagas Mines Limited, Cobalt; Mr. W. F. Robertson, B.Sc., Provincial Mineralogist, Victoria; Prof. F. H. Sexton, S.B., president, Nova Scotia Technical College, Halifax; Prof. A. Stansfield, D.Sc., Professor of Metallurgy, McGill University, Montreal; Mr. J. T. Stirling, Chief Inspector of Mines for Alberta, Edmonton; Mr. R. H. Stewart, B.Sc., consulting mining engineer, 736, Granville-street, Vancouver; Mr. J. B. Tyrrell, B.Sc., M.A., consulting mining engineer and geologist, 534, Confederation Life Building, Toronto; and Mr. O. E. S. White-side, M.Sc., general manager, Inter-Colonial Coal and Coke Company, Coleman.

A letter addressed by the chairman of the Committee to the respective members states that the Council has now been in existence somewhat less than one year, but considerable progress has already been made along several lines of work. Thus, the survey of the natural resources of the Dominion, which was inaugurated by the Arthur D. Little Company, has been taken over by the Council, and is now being developed on a somewhat different line, and extended over a much wider field than was originally planned by the company in question. The object of this survey will be to correlate and make more readily available to the public the immense body of information with reference to the natural resources of the Dominion which has been accumulated by the various agencies, including the Government departments, which deal more especially with the natural resources of Canada. For the purpose of encouraging and developing research in Canadian universities, the Government, on the recommendation of the Advisory Council, have established 20 studentships and five fellowships, to be awarded to graduates and others who have completed their preliminary scientific education, and have shown special ability in the way of scientific or industrial research. The various agencies in Canada now carrying on scien-

tific and industrial research have been tabulated, with a view to bringing them into more intimate relation with one another, and, if possible, making their work more productive.

Special attention has been devoted to a number of problems connected with the further development of Canada's natural resources, among which may be mentioned the production of a high-grade fuel for the eastern plains from the inferior lignites of Saskatchewan. This will indicate in a general way some of the lines along which the Council has been at work. The fields of mining and metallurgy in Canada are so extensive and susceptible of such wide and manifold development, while they are at the same time of such importance in connection with the future growth of the Dominion, that the Council immediately upon its appointment decided that work in this direction could successfully be carried on only by securing the close co-operation of the leading men of these industries in the Dominion. Questions which come before the Council in connection with mining and metallurgy, and requiring special technical advice for their solution, will be submitted to members of the Associate Committee.

HOME-GROWN TIMBER.

A meeting called by the Royal English Arboricultural Society and the English Forestry Association, to consider the question of native timber supplies for the war, was held on Monday at the Surveyors' Institution, Westminster. The chair was taken by Maj. COURTHOPE, M.P. (president of the English Forestry Association), and the Controller of Timber Supplies (Mr. J. B. Ball) attended to explain the Government requirements and the official Orders issued by his department. Among those present were the Duke of Somerset, Lord Plymouth, Lord Strachie, Lord Harlech, Lord Somerleyton, Lord Cross, Lord Erskine, Lord Dynevor, Lord Barrymore, Lord Glenconner, Lord Dunraven, Sir Mark Collet, Lieut.-Col. Weigall, Mr. G. Holford, Mr. F. S. W. Cornwallis, and other land owners, and many estate agents and representatives of the timber trade.

MR. J. B. BALL expressed satisfaction at the readiness with which land owners had placed at the disposal of his department various woods in this country. At the outbreak of war enormous demands were made on imported timber supplies for Army requirements, and in 1915, owing to the submarine warfare, it was decided that steps should be taken to utilise home-grown timber. At the end of May the present Timber Control was instituted, and it had purchased something like 75,000,000 cu. ft. of timber of all kinds, some of which had been handed over to colliery associations in order to enable them to carry on their work in the mines. Up to the end of October, the average price paid was just over 9½d. per cu. ft. In consequence of the demand, and the restriction of imports, it was decided to scrutinise the purchase of standing timber over £300 in value, and an Order was issued to that effect. Such purchasers had to apply for permits, and 960 of these had been issued, and 100 were now under consideration. The quantity dealt with in these permits represented a total of 27,000,000 cu. ft., of which 20,000,000 cu. ft. were used for coal mining purposes, the remainder being sawn timber and a percentage of ash and oak. The requirements of the coal industry were enormous. For the production of 250,000,000 tons of coal per annum, it was estimated that 3,500,000 tons of pit props and pitwood were required. In regard to the output of sawn timber, he hoped that during next year they would be able to produce 300,000 standards. The present production was roughly about 1,000 standards per day; and they were endeavouring to double this output. That timber must be found very largely in this country. As regards imports, the department had been able to carry on with 25 per cent. less than the amount which was brought into the country before the war. The demands for imported timber had brought about keen competition, which had resulted in big prices being asked for standing timber; and in order to prevent inflation, the department had recently fixed the maximum prices. It had also issued an Order in regard to Ireland, the object of which was to control the export to Great Britain of native-grown Irish timber, and to prevent the exploiting by Englishmen of woods at the expense of the Irish home demand. The Coal Controller was naturally interested in the price he had to pay for pitwood, and he was about to issue to the collieries a schedule which fixed the price they would have to pay. As to afforestation, his department had no direct mandate to deal with it; but it seemed to him that there ought not to be any very serious difficulty in developing home-grown timber. It might be necessary to control further the user of home-grown timber in the same way that the Department had controlled the user of imported wood. He would be very loth to do it.

Scheme to Develop British Export Trade.—Mr. G. C. Mandleberg, chairman and a managing director of Messrs. J. Mandleberg and Company Limited, Pendleto, Manchester, has placed before British manufacturers and producers the outline of a scheme on national lines for the direct encouragement and development of the British export trade. The main proposal is to organise British manufacturers and producers into a body for the specific purpose of securing more orders from overseas. Mr. Mandleberg suggests the formation of a corporation to develop trade in old, and more especially in new, markets, for the mutual benefit of members. The method proposed is to make available for all firms in the new British Manufacturers' Corporation, which is the title suggested, the means which business experience shows to be the most effective in developing foreign trade. This is the employment of representatives abroad, men of first-class ability, and possessing thorough knowledge of the business conditions in the different foreign countries to which they will be appointed, and where they shall be resident. They will be known, it is suggested, as agents-in-charge. They will find and appoint the right men as local selling agents for individual firms, gets first news of fresh trade openings, and report on the standing of possible customers.

CURRENT SCIENCE AND TECHNOLOGY.

Tar from Vertical Retorts.

Mr. J. West (*Gas World*) states that the amount of benzol, toluol and paraffin contained in tar made from vertical retorts varies according to the temperature employed and the class of material carbonised; similar variances are noted with regard to horizontal retort practice. Taking a number of tests which have been made on vertical retort tar, it is found that the average of these results shows that the tar contains 0.7 per cent. of benzene, 0.3 per cent. of toluene and 0.3 per cent. of paraffin. In tar made from the carbonisation of coal in horizontal retorts an average result is approximately 1.4 per cent. benzene, 0.5 per cent. toluene and a slight trace of paraffin. The approximate amount of toluol and benzol per 12,000 cu. ft. of gas in vertical retorts as well as horizontal retorts is:—

Vertical retorts.		Horizontal retorts.	
Per 12,000 cu. ft. of gas.		Per 12,000 cu. ft. of gas.	
Toluol.	Benzol.	Toluol.	Benzol.
lb.	lb.	lb.	lb.
1.6	4.5	4.0	9.0

Although vertical retorts give less hydrocarbons of the benzene series and more paraffins than the horizontals, it must not be forgotten that a larger quantity of burning oil can be procured by the verticals than by the horizontals, which figure was given by Dr. Colman in the ratio of $7\frac{3}{4}$ gals. to 3 gals.

Simple Pipe Flow Formulæ.

The *Gas Journal* summarises the work done by Mr. J. M. Spitzglass, in the laboratories of the People's Gas Light and Coke Company of Chicago, which shows that the loss by friction depends not only on the physical character of the interior surface of the pipe, but also varies as the diameter. The experimental coefficient F is found in terms of the diameter D to be

$$F = 0.00285 \left(1 + \frac{3.6}{D} + 0.03 D \right),$$

which gives a minimum value when D is about 11 in.

On this basis, the following data have been calculated:—

$$\begin{aligned} \text{For high-pressure gas } Q &= 66.5 K \sqrt{\frac{PA}{SL}} \\ \text{,, low-pressure ,, } Q &= 3550.0 K \sqrt{\frac{h}{SL}} \\ \text{,, water } Q &= 53.4 K \sqrt{\frac{H}{L}} \\ \text{,, steam } W &= 85.2 K \sqrt{\frac{Pw}{L}} \end{aligned}$$

Q = cubic feet of gas, or gallons of water, per minute.
 P = friction drop on pressure, in pounds per square inch.

A = absolute mean pressure on line (gauge + 14.7), in pounds.

S = specific gravity of gas. (Air = 1.)

h = friction drop in pressure, in inches of water.

L = length of pipe in feet.

H = friction drop of hydraulic head in feet.

W = pounds of steam flowing per minute.

w = density of steam at mean pressure, pounds per cubic foot.

K = coefficient as per the following table.

VALUES OF "K" FOR VARIOUS DIAMETERS OF PIPE.

Nominal. In.	Actual diameter.	K =
$\frac{1}{8}$	0.622	0.117
$\frac{1}{4}$	0.824	0.265
$\frac{3}{8}$	1.049	0.532
$\frac{1}{2}$	1.380	1.171
$\frac{5}{8}$	1.610	1.816
1	2.067	3.675
1.25	2.469	6.015
1.5	3.068	10.940
1.75	3.548	16.23
2	4.026	22.95
2.25	5.047	41.75
2.5	6.065	68.00
2.75	7.981	138.5
3	10.020	246.8
3.25	—	387.5
3.5	—	567.0
3.75	—	785.0
4	—	1,340.0
4.25	—	2,065.0
4.5	—	3,470.0
4.75	—	5,265.0

Recovering Benzol from Gas.

M. Leonce Fabre, of the Marseilles Gas Works, writing in the *Revue Générale Chimie* (abstracted in *Chemical Trade Journal*), describes the Greling, Gasser and Feld processes for the removal of benzol from gas. In the Greling process the gas is first cooled; and the benzol is then absorbed, extracted, washed and rectified. Absorption is effected by means of four columns provided by the necessary pumps, tanks and pulverisers. The saturated oil is conveyed to the steam-heated stills, having passed through a reheater which utilises the heat of the vaporised benzol. The benzol vapours pass through a dephlegmator into the cooler and are condensed. The benzol-free oil, after distillation, is cooled down to 20 degs. Cent., and is again used in the columns. The continuous washing process is as follows:—The benzol from the tanks enters the first feeding vat, passes over a layer of acid and into the second vat, and thence into an empty vat, where it is left to stand so that any acid may separate out. The benzol then passes into the soda tank, and finally into the water tanks. No stirring is required; and consequently there is no loss of benzol by evaporation, both the space and labour being saved. In small plants the rectifier consists of a still with a coil inside; a dephlegmator, with steam heating in the lower part; and two condensers in the upper part. Valves are provided for removing the various distillation products at the different levels. The 90 per cent. benzol, 50 per cent. benzol, and naphtha are obtained by three different dephlegmators.

In the Gasser process the saturated oil first enters into a tubular heat exchanger, and is heated by the benzol vapours and steam coming from the stills; then into a second heater, which acts at the same time as a

hydraulic seal for the still, and in which heat exchange is effected by the hot benzol-free oil coming from the stills. The oil then passes into a third reheater, of cylindrical (steam-heated) elements, and thence into the distilling apparatus. This consists of a number of cylinders with steam coils and jets, the coils maintaining the necessary temperature, and the jets removing the benzol. After leaving the stills, the oil passes through the reheater, and after cooling it is conveyed to the column. The mixture of steam and about 50 per cent. of the benzol are conveyed from the still into a dephlegmator, the surface of which consists of cylindrical cells; and thence into a second dephlegmator consisting of three tubes filled with coke to absorb the last traces of oil. The mixture next goes into the oil reheater, and finally into a cooler, where it is cooled down to 20 to 25 degs. The water and benzol are then separated in the usual way. Small space and easy accessibility of the plant are features of this method.

In the Feld process the chief feature is the use of 11 washers. The process, according to the author, appears to be of doubtful utility. The absorption of the benzol by the washing oils is not always satisfactory; and the cooling of the benzol-free oil is not always sufficient before using in the washers. Moreover, the quantity of oil in the washer is such that its temperature tends to equal that of the gas, even if this latter has a temperature above 15 degs.—giving rise to conditions unfavourable to maximum absorption.

The best results are apparently only obtained by the modern method of atomising or spraying the washing-oil. This method, carried out by means of the "Excelsior" washers, permits the vaporised oil in the form of mist to be intimately mixed with the gas current; and since the washing oil is gradually removed from the gas mixture, it is easy to cool it by placing the suction and pressure pipes from the pumps in a cooling tank containing cold water, or by means of brine.

Zirconia and Zirconia Apparatus.

According to E. Podszus, zirconia for refractories should first be melted and ground to an exceedingly fine powder (*Zeitschrift für Angewandte Chemie*, abstracted in *Engineering*). A paste is then made of the zirconia with water and some organic binding agent; when compression can be applied, no binding agent is needed. The moulded articles are fired at 2,300 degs. Cent. or higher temperature; if the temperature cannot well be raised above 2,100 degs. Cent., some phosphoric acid or boric acid may be added to the paste; these additions would be expelled again at 2,100 degs. Cent. The great difficulty is to melt the zirconia, and for this purpose he embeds the carbons of a vertical arc in the zirconia. A little zirconia turns into carbide, which covers the lower electrode: this carbide conducts the current, and a small cavity is formed round the electrodes. The carbons may then be pulled further apart; the arc burns quietly, and the zirconia melts on the walls of the cavity. With an arc of 50 ampères to 100 ampères at 220 volts, finally 30 cm. in length, he claims to fuse several kilogrammes of zirconia in half an hour. The arc really burns first between the upper carbon and the liquid zirconia, although the latter is practically an insulator. Thoria is melted in a similar way. With the aid of a Lummer-Kulbaum pyrometer the melting-point of zirconia was found, in three determinations, to be 2,950 degs., 2,950 degs. and 3,000 degs. Cent. The oxide was not reduced by hydrogen at 2,200 degs. Cent., and rods of zirconia wound with tungsten wire and heated to the highest temperature in a high vacuum did not show any loss by volatilisation. The pure zirconia is almost white, though generally yellowish with traces of iron, and also discoloured by long heating; it is almost as hard as corundum, and difficult to disintegrate; when hard steel balls are used in mills, some iron is taken up, which can be extracted again by hydrochloric acid, however. Moulded zirconia articles should be fired at 2,300 degs. or 2,400 degs. Cent., as mentioned. The firing is effected in a furnace provided with zirconia walls and a rotating flame fed with a blast of air or oxygen. Coal gas and oxygen easily give 2,400 degs. and 2,500 degs. Cent. in this furnace; with the aid of petroleum and oxygen temperatures of 3,000 degs. Cent. might be attained. Such a furnace can be used for 200 hours without essential repairs. Crucibles of pure zirconia will resist even fusing caustic alkalis for some time; but the shrinkage of the articles may amount to 20 per cent.

Spark Lengths in Gases and Vapours.

Mr. R. Wright (*Transactions of the Chemical Society*, 1917, p. 643), in comparing the lengths of discharges through gases, kept the spark gaps under test at the same temperature so as to have the same number of molecules per unit volume. The spark-length depends on the number of molecules in the gap and heating a gas has no effect provided the number of molecules per cubic centimetre be kept constant. It was found in the experiments that a gap of 20 mm. at 100 degs. Cent. corresponded with a gap 15 mm. at 18 degs., and a gap of 20 mm. at 183 degs. with one of 5 mm. at 18 degs. The electrodes used for standard air gap were brass spheres, 5 mm. in diameter, fixed on 3 mm. rods, and adjustably mounted, in a vertical glass tube, 15 mm. internal diameter, surrounded by a vapour jacket. The tube containing the gas or vapour under test was similarly arranged and the two tubes were electrically in parallel with an induction coil so as to have three spark gaps in parallel, the third gap serving for variation of the potential. At the beginning of an experiment the third gap was almost closed, the electrodes being then moved apart until a spark crossed one of the other gaps. The spark-lengths obtained were not very concordant, differences of 10 per cent. and more being frequent, and the spark-length corresponding to a 20-mm. air gap was not two-thirds of the 30-mm. air gap, as it should have been, if the potential and spark-length curves were parallel. Carbon dioxide, *e.g.*, proved a better insulator than air at low potentials, but a better conductor at high potentials. Generally

speaking, however, an increase of molecular length gave an increase in insulating power (decreased conductivity). Thus methane CH_4 , methyl chloride CH_3Cl , methylene chloride CH_2Cl_2 , chloroform CHCl_3 , carbon tetrachloride CCl_4 , gave, at 100 degs. Cent., with an air gap of 30 mm., sparks of 29 mm., 24 mm., 9 mm., 5 mm., 1.5 mm. respectively, and with an air gap of 20 mm., sparks of 20 mm., 16 mm., 6 mm., 3.5 mm., 1 mm. Similar figures were found for the halogen derivatives of ethane, (ethyl chloride, bromide, iodide), homologous alcohols, and substances like carbon dioxide, carbon disulphide, sulphur dioxide, and sulphuretted hydrogen.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Proposal for Heavy Increase of Port Charges—The "Pooling" of Italian Business—Miners and Income Tax—Parliamentary Seats to be Contested.

The Swansea Harbour Trustees have decided to approach the authorities at the other ports of the Bristol Channel with the object of securing power from the Board of Trade to increase rates of shipping and goods by no less than 50 per cent. It will be remembered that the financial position of the Trustees, owing to the war, is not at all satisfactory, and that the Corporation has had to be called upon to contribute from the rates in order to meet unavoidable expenditure. The Order which the Trustees seek would be made under the Defence of the Realm Act, and it would be additional to 50 per cent. increase which already had been made. The reason for the application is that increase of wages, with other costs, as well as circumstances already indicated, leave the Trustees in such a position that the present rates do not meet the unavoidable expenditure; and there is reason to believe that some similar application will be made in respect of other ports. The application from Swansea will be the first from any port on the South Wales coast.

The Newport Harbour Trustees discussed on Wednesday the suggestion that the port charges should be increased, and they decided not to agree with it.

The coal exporters to Italy have elected as a committee of management under the pooling scheme Messrs. Percy Miles, T. J. Callaghan, H. J. Hill, J. A. Jones, Percy Phillips, and E. P. Barnett. A meeting was held in Cardiff Exchange on Friday of last week, when draft rules were finally fixed, so that the pooling scheme shall operate as from January 1. Two members of the committee will vacate office every three months, their places to be filled by representatives of two other firms, choice being made in the order of the largest percentage of trade. A fittage of 1½d. a ton will be allowed for the firms who carry out the shipments. Representations are to be made to the Board of Trade with regard to the period between October 30, 1916, and December 31, 1917, it being desired that the Italian Commission should be communicated with so that exporters' commission and brokerage on all shipments exceeding 225,000 tons per month to Italy should be paid into the pool, except the South Wales proportion agreed with the Board of Trade to be shipped to the Italian Commission. At the meeting in Cardiff there were representatives present from Swansea, so that the arrangements of the Swansea committee could be co-ordinated with those of Cardiff.

The executive council of the South Wales Federation on Friday of last week dealt with the refusal of some miners to pay income tax, their refusal being based upon a resolution alleged to have been passed at the recent conference. The executive has decided that all members should understand that no such resolution was passed, and they advise all workmen to meet their obligations in this matter. A committee was appointed to deal with what is described as a "plan of campaign," concerning both the taxation of wages and the supply of food, with the regulation of prices, and these matters will come before a conference that is to be summoned at an early date.

Certificates have been distributed to the students in the Ammanford Colliery ambulance class, they having the remarkable record of securing 100 per cent. passes. In their name, Mr. E. Hewlett, of Wernolien, made a presentation to the lecturer (Dr. Dunbar) of a silver flower stand, with a framed photograph of the students. This class has been very successful in ambulance competitions during the year, and, in Dr. Dunbar's opinion, they will make a really first-class brigade. A presentation was also made to the secretary (Mr. Peter Cooke).

As showing the activity of the miners concerning Parliamentary representation, it is to be noted that Mr. Arthur Henderson, M.P. (secretary of the Labour Party), met the executive council of the South Wales Federation on Friday of last week in Cardiff, and discussed with them the question as to what candidates should run at the next general election. At least 11 seats will be contested in that district by the Federation.

The Trustees of Swansea Harbour have appointed Mr. Phillips general manager, the salary to be £800 a year. Mr. Phillips has been acting in this capacity since the retirement of Mr. Law.

Mr. V. Hartshorn will be a member of the new committee dealing with the re-employment of colliers after the war.

A circular of considerable importance has been issued by the Rhymney Iron Company, and, although under ordinary circumstances it might pass without notice, its general application at the present time is of special interest. The board of directors announce that they will not pay the usual interim dividend, although the company has made profits in the first six months of its current financial year sufficient to warrant payment. Their reasons are that, since the end of July, owing to the lack of shipping, the collieries have worked irregularly, with the result that working costs have been increased, and the profit per ton has been reduced upon the diminished output. In addition, the Controller has authorised payment of the war wage of 1s. 6d. per day, whether the pits work or not; and although 2s. 6d. per ton has been authorised as an increase in coal prices, except on exports to France and Italy, the company does not profit, because a large portion of its output goes to those countries. The net result is that the price is far from adequate to meet the cost of the war. It is because of this reduction in earnings, and of the uncertainty as to the future, that the directors have reached the conclusion that it would not be prudent to do more than pay the present time than pay the dividend on the preference shares. This condition of things operates adversely to other undertakings, though the Rhymney directors are the first to make such an explicit statement.

The trade of Swansea showed a gratifying increase last

no less than 41,000 tons higher than in the year 1916, and this, of course, made its effect felt in the shipments of coal and patent fuel. The total coal shipped exceeded 55,000 tons, whilst patent fuel shipped only 20,000 tons.

Of much importance came before the Aberdare County Court on Monday, an ostler in the employ of the Cwmaman Company claiming balance of wages alleged to be due, and his case being taken as a test one which would govern 11 others. He sought to recover payment of 4s. per week for 48 weeks, alleged to be due in respect of an extra turn paid to the ostlers under a custom arrangement. It was argued that when the award of Judge O'Connor affecting the payment of a bonus turn of 5s. to ostlers was given, the employers merged the 4s. extra turn payment in the bonus turn, adding 1s. to make up the 5s.; and the plaintiff now claimed that he was entitled to the 4s., in addition to the 5s. The defence of the company was that the bonus turn had been duly paid; and after hearing argument his Honour reserved judgment.

It has been noted with much satisfaction that in the debate on the Control Agreement Bill on Monday evening, an amendment was accepted by the Government which provided that the agreement shall not extend to coke ovens or by-product plant. In view of the wide extension of by-product manufacture in this district, the concession is of considerable value.

Dowlais miners have decided to approve of proposals for subscribing 3s. per man per annum towards a fund for establishing a workmen's hospital; and they thus bring themselves into line with the Merthyr men in this matter.

Further prosecutions against the agent and manager of the Main Colliery Company were heard at Neath on Friday of last week, these completing the 71 summonses which have been issued, but of which only 61 came on for hearing. The cases dealt with on this occasion had relation to charges for not providing manholes in proper places in the workings; and the defence was that the failure was due to shortage of labour. There were also summonses for not providing a clear space of 2 ft. between the tubs and sidings on the roads; but this charge was dismissed. Other cases had relation to overhanging timbers on the haulage roads; and the evidence was that the attention of the examiners had been called to the matter, and that promises had been made that it should be attended to, but that nothing was done until the inspector of mines had visited the colliery. The agent and manager were fined £10 on each of two summonses, and advocate's fee was allowed. The temporary manager was ordered only to pay costs.

At the Mountain Ash County Court on Tuesday, an employee of Nixon's Colliery Company sued for compensation, he having been injured through the snapping of an iron bar. Notice of the injury be sent by a helper to the fireman; but respondents denied that any such notice had been received. It was further stated that verbal notice of the accident had been given. The judge non-suited applicant, stating that the notice must be in writing. It was quite worthless unless in writing. The statutory notice was to prevent fraud and perjury.

The coal exporters met at Cardiff Exchange on Wednesday, and discussed the situation in relation to arrears upon coal contracts, Mr. T. E. Watson (president of the Chamber of Commerce) being in the chair. Mr. F. Saunders, of Swansea, had been suggested by the Coal Controller to act as arbitrator upon matters at issue; but the meeting decided not to agree with the suggestion, their preference being for their own suggestion, previously made, of a local committee. This committee, consisting of three representatives of colliery proprietors and three of the exporters, was formed a few weeks ago, but disagreement arose as to chairmanship, with the result that the exporters resigned, and the work of dealing with the contracts question had been in abeyance. At this meeting on Wednesday, it was felt that no chairman was needed. However, if one were required, it was agreed that Sir T. J. Hughes, chief of the Welsh Insurance Commissioners, who at one time practised as a solicitor in the coal field, should be called in to act; and on this understanding being reached, the exporters' representatives were willing to withdraw their resignations, and it is expected, therefore, that the committee will be re-constituted with Messrs. E. R. Moxey, H. J. Hill, and P. Miles.

Northumberland and Durham.

Mr. C. Fenwick's Career—Lord Joicey and Government Departments—Daglish Fellowship—A Lost Lamp.

From trapper boy to Privy Councillor was—so Mr. John Cairns reminded those present at the luncheon to which the leaders of the Northumberland Miners' Association entertained Mr. Chas. Fenwick, M.P., on Saturday last—the evolution of their guest. The occasion of the gathering was the celebration of Mr. Fenwick's completion of 32 years' representation of Wansbeck Division of Northumberland in Parliament.

Lord Joicey, the magnitude of whose colliery interests and operations in other industrial directions entitle him to much commercial respect, made a vigorous attack upon Government methods in matters of business at Wednesday's meeting of the Newcastle Chamber of Commerce. He pointed out that the business men of the country had spared no effort to assist the Government in the prosecution of the war, and had remained quiet under many irksome restrictions. The *Board of Trade Journal* gave a list of 180 committees that had been set up to control the industries of the nation. These committees, in his opinion, were simply bonnets for the Government. They were merely advisory, and had no real powers, everything having to be submitted to Government departments in London, often represented by clerks or men who had been promoted from being clerks, who knew nothing of business. The business men in that locality could get nothing done without submission to London, with the result that sometimes their business was hung up for weeks. If the Government desired to promote business, it should appoint representatives for each locality to deal with all matters save those in which some vital principle was involved. Matters which had been settled in two minutes when dealt with by the industry concerned now took two or three weeks. The powers given to the Government should lapse, with the Defence of the Realm Act, six months after the finish of the war. He felt quite sure that there would be a very great effort to retain these powers, but the committee must make up its mind that it would not survive after the war of these powers. If such attempt were made, the whole of the coal and industrial classes, both employers and employees, would give the Government clearly to understand that they would have industrial freedom. Success in the future would depend on judgment, quick decision, and ability to take advantage of opportunities. These were all negative to present control. We should not be able to

cope with foreign competition after the war unless we had our freedom.

The fact that this year there have been no applications for the Daglish Travelling Fellowship is illustrative of the "upset" which our social system has suffered as a result of the war, most of those who would, in normal times, have been candidates for such a fellowship being very much "otherwise engaged" at present. Candidates for the Fellowship must be nominated by the North of England Institute of Mining and Mechanical Engineers, must not be less than 20 years of age, and must be either members or associates of the institute. Applications must be sent in by December 1.

Bishop Auckland magistrates fined John Mais 10s. for having failed to report the loss of his lamp, which had fallen from the cage into the sump at Leasingthorne Colliery. It was stated that the colliery owners did not wish to press the case unduly, but had brought it as a warning. Defendant explained that he was waiting for the lamp to be recovered before reporting having lost it.

Addressing the shareholders in the firm of Bell Brothers Limited, at the adjourned annual meeting held last Tuesday, Sir Hugh Bell referred to the purchase by the company of the Hutton Henry Colliery, and said they might be interested to know that it was more than 20 years since the directors very carefully considered the question of acquiring that colliery, at which time, however, they decided to have nothing to do with it. More recently, the information which Mr. Dorman and he obtained, through being members of the board of the Horden Collieries Limited, resulted in the re-consideration of their former decision, and, as the Horden Company was anxious to part with a portion of the property, the directors of Bell Brothers decided to purchase. He had every reason to believe that the purchase would prove very satisfactory to them. After alluding to the amount of work involved in preparing Government returns, Sir Hugh remarked that Government control of industry was not so simple as it might seem. What was going to happen if the wishes of certain persons who made their views known in the newspapers were acceded to, and the whole of the industry were nationalised, the imagination failed to grasp. How it would be possible to carry on any industry in the circumstances, he was at a loss to understand.

In committing for trial at the Assizes William Burns (42), treasurer of the Ouston E. lodge of the Durham Miners' Association, on a charge of having converted to his own use the sum of £119 from the medical charity fund of the lodge, Mr. Philip Kirkup, chairman of the Chester-le-Street magistrates, remarked that it appeared to him that the system had something to do with placing accused in that position. There had been great carelessness. Evidence had been given to the effect that Burns had received nearly £6 per fortnight in respect to the fund. No books were kept in regard to the fund. It was expected that the money would be paid into the bank immediately it was received. When the quarterly audit took place this year, the pass-book was never produced, the defendant stating it was at the bank. In spite of this, the auditors reported that the accounts were in a satisfactory condition. Mr. Heath, who prosecuted on behalf of the association, said the total defalcations amounted to almost £390.

A charge against Messrs. John Scott and Sons of having sold coal to the authorities at the Gosforth War Hospital without it having been weighed was dismissed by the Northumberland County magistrates at Newcastle on Wednesday, the defendants stating that an official at the hospital said he would accept the colliery weighing of the coal, and the defence being that the coal was weighed at the colliery by agreement, and delivered to the hospital.

At the same court, Geo. Atkinson, Jas. Wm. Borthwick, and Thos. Leech, youths, were each fined £1 for having stolen five tons of coal, valued at £5, the property of Messrs. Scott, and destined for the Gosforth Hospital. They had delivered the coal to private householders, who had paid them from 8s. to 12s. 6d. per load for it. John R. Carter and Jas. N. Stewart, similarly charged in respect of three tons, valued at £3, were similarly fined; as was also John R. Watson, who was charged with having aided and abetted the two latter. Charges of having received the coal well knowing it to have been stolen were made against eight householders, but were dismissed, the Bench accepting the submission that none of them knew the coal had been stolen. It was stated that Messrs. Scott had recovered most of the coal.

Cleveland.

During last month, 23,638 tons of pig iron were shipped from Middlesbrough, as compared with 29,412 tons in October, and 45,384 tons in September. The manufactured iron and steel shipments amounted to 16,308 tons in November, as against 31,365 tons in October, and 6,985 tons in September.

Yorkshire.

At a meeting of the Coal Merchants' section of the Bradford Chamber of Trade on December 6, Mr. Ben Galloway and Mr. H. Triffitt reported on a recent conference of Yorkshire coal merchants at Leeds, at which a Yorkshire Federation of Coal Merchants' Associations had been formed. It was resolved that the Coal Merchants' section of the Bradford Chamber should become affiliated with the new body, and Messrs. B. Galloway, H. Triffitt, and H. Mosley were appointed delegates.

At the annual meeting of the Sheffield and district branch of the Coal Trade Benevolent Association on Friday of last week, the hon. secretary (Mr. Sidney Smith) stated the total receipts of the branch for the year were £352. A total of £308 had been paid out in relief to applicants. Mr. Longbotham was re-elected president for the fourth year in succession. All the other officers were re-elected.

Notts and Derbyshire.

At a meeting of the council of the Derbyshire Miners' Association at Chesterfield on Saturday, it was decided to take a ballot of all the members on the question of contesting in the Labour interest two Derbyshire divisions at the next General Election. It has already been decided to contest Clay Cross Division. Messrs. H. Hicken (Williamthorpe lodge), William Sewell (Holbrook), Samuel Murfin (Brittan), and Enoch Overton (Bolsover) were nominated for the position of president in succession to Mr. James Martin, who is retiring. A resolution was passed repudiating the programme and policy of the British Workers' League, and the association's delegates to the next meeting of the Miners' Federation were instructed to vote against the attitude of the league.

At Chesterfield County Court on Friday of last week, Judge A. Macpherson was occupied a considerable time regarding the final disposition of £283 realised from an auction sale of the effects of the Mickley Colliery, near

Dronfield. It was stated the total amount of money lost in this colliery undertaking by the old company was between £15,000 and £20,000. The judge reserved his decision.

The Midlands.

The annual meeting of the South Staffordshire and East Worcestershire Colliery Under-Managers' Association was held at the Technical Schools, Dudley, on Saturday. There was a good attendance. The retiring president (Mr. T. Tranter) said the annual report showed that the membership was growing, and that the finances were sound. They were determined to continue their negotiations with the Coal Controller for a recognition of their services. They were expected by the Government to carry out the law, and by the colliery owners to get the best out of the mines, and they were therefore entitled to greater consideration than had been recently shown them. Although their applications had met with rebuffs locally, they were continuing to press the Coal Controller, who had granted fair and just concessions to members connected with the Scottish branch of the National Association, and who was considering similar applications to theirs from other parts of the country. This course, it was considered, ought not to have been necessary during such a period of difficulty, especially as under-managers were the officials who had had to contend with so many periods of agitation and unpleasantness from various classes of employees. Some of their members had advocated the advisability of again obtaining a workman's position, considering that they would be better off as regarded bours, responsibility and, in many cases, wages. The following officers were elected:—President, Mr. B. Haynes; vice-president, Mr. J. Shaw; treasurer, Mr. A. Cartwright; and secretaries, Messrs. A. G. Fellows and W. Garratt.

The Birmingham Municipal Coal Supplies Committee have resolved on a scheme for distributing the additional supply of coal provided by the Coal Controller to meet the requirements of inhabitants during the winter. In order to facilitate the method of distribution, the committee decided to allot this special supply between two co-operative societies and six firms of factors, distributed as equally as possible over the poorer portions of the city, and these several holders will be responsible for placing the supply direct in the hands of small coalyards and bag-wagon retailers. The price will be in conformity with the official regulations already decided on. Each merchant will set aside out of his allotment a reserve stock on a 25 per cent. basis during such period as the Lord Mayor may direct, such coal to be released or sold only with the written consent of the Lord Mayor. In the case of merchants who may be unable to deal with the whole of their allotment permission is given to transfer at cost price part of their allotment, but in not less quantities than truck loads, to other accredited merchants. Normal supplies of domestic coal at date from the Warwickshire collieries are by no means large.

Kent.

Last week the output at the Tilmanstone Colliery was 2,800 tons, and the Snowdown Colliery output also approached 3,000 tons.

The extensive alterations in the articles of association of the Wingham and Stour Valley Collieries Limited, which were before a recent meeting of the company and were approved, are to be brought before an extraordinary general meeting of the company for confirmation on December 17.

Scotland.

New Workings Arranged—Censorship of Leaflets—Burntisland Shipments.

At the annual meeting of the contributors to the Mauricewood Pit Disaster Relief Fund, it was reported that the number of beneficiaries was now down to 21. The investments, which stood in the books at £8,740, had been written down to the market value of £7,072.

Subject to making a satisfactory arrangement with the proprietors of Lilliehill Brickworks, Dunfermline Town Council granted permission to the Townhill Colliery Limited to work the Swallowdrum seam of coal in an area of 6 acres and the Upper Bright; Lower Bright Cairncubie and Ell coals in an area of 4½ acres, from which it is estimated that a quantity of about 84,000 tons will be got.

The Scottish Miners' executive committee agreed to forward a resolution to the Miners' Federation of Great Britain asking for assistance in trying to have withdrawn regulations curtailing the right to issue pamphlets unless they are permitted by the Censor.

Last week at Burntisland, the shipment of coal was 7,420 tons. The exports for the month aggregated 48,199 tons as against 78,005 tons in November 1916. Only 10,147 tons of this quantity was consigned coastwise. At Methil, the shipment for last week was 19,883 tons against 23,598 tons in the previous week.

Coal in Corea.—The Acting British Vice-Consul at Seoul (Mr. P. D. Butler), writing in reference to the resources of Corea, states that the coal so far discovered is mainly anthracite, deposits of which of varying size have been found in a large number of places scattered over a wide area. The most important anthracite deposits occur in the Raido and Koto districts, where seams have been traced for over 50 miles. The Government-General reserves to itself the right to work coal mines in these districts, and for a number of years the Heijo Mining Station has been established for this purpose. It is stated by the authorities that the reserves of anthracite coal in the neighbourhood approximate to 200 million tons, but it apparently remains to be proved that this coal is entirely suitable for the use of works and factories. The coal is very dusty, and, if not mixed with a large proportion of lump coal, has to be used in the form of briquettes. Doubts have been expressed in several well-informed quarters as to its commercial utility. Supplies of bituminous coal also exist in several places, the most important being at Shin-an-shu; but the quality of the coal is generally inferior. A factor which should not be lost sight of is that most of the coal deposits occur in close juxtaposition to deposits of iron ore. The anthracite coal mines belonging to the Government-General are situated at Jido, about seven miles by branch line from Heijo railway station. The mines were originally worked jointly by the Corean Government and a French firm at Seoul, but some 10 years ago the concession was taken over by the Government-General. The machinery now in use at these mines is somewhat primitive. The motive power is electricity, but is at present only of 530 horse-power. This is now to be increased to 3,000 horse-power. The Corean demand for briquettes is supplied by a small briquette-making plant.—*Board of Trade Journal.*

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
AND
INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

BRITISH MANUFACTURE THROUGHOUT.

SIMON-CARVES L^{TD} 20, MOUNT ST., **MANCHESTER**

LABOUR AND WAGES.

South Wales and Monmouthshire.

The executive committee of the South Wales and Steel Workers' Association met in Cardiff on Saturday with the question of stop-work hours on Saturday, a subject which has been under discussion for some time past. The Ministry of Munitions have been approached upon the matter and they were not unwilling provided the employers agreed; and also that certain modifications should be made in the suggested arrangements. Negotiations to that end not having been successful, the men's executive met on Saturday and decided that work should cease at 1 o'clock on Saturday, commencing at once. The chief undertakings concerned in this are Messrs. Guest, Keen and Company's works at Cardiff and Dowlais, the Ebbw Vale, etc.

The Blaenavon workmen held a mass meeting on Sunday and considered a reply from the Ministry of Munitions as to a dispute at the works which had been referred, and as to which evidence was taken on November 26, by a court of enquiry. A resolution was submitted that the men should continue working until the enquiry was complete, and this resolution was carried, a deputation being appointed to deal with the matter further.

The local organisation of enginemen, stokers and craftsmen has been in consultation with the president of the National Federation of Enginemen, etc., so that joint action may be taken in protection of their separate interests in view of the pressure exercised to bring all colliery employees within the Miners' Federation.

The Enginemen and Stokers' Association meeting in Cardiff discussed a report of their deputation, who had had an interview in London with Sir George Askwith. The subject of the interview was the action of the Miners' Federation in endeavouring to compel enginemen, stokers and craftsmen to join the Federation. It was also reported that co-operative action is being taken with members of the South Wales Winding Enginemen's Union, who also endeavour to preserve their independent position. The meeting dealt with certain points concerning administration of the war wage.

The Federation executive has had before it the difficulty which has arisen at Rhymney Collieries concerning the payment of war bonus to night workmen, and the secretary (Mr. T. Richards, M.P.) was instructed to see the general manager of the Rhymney Company (Mr. Rutherford) and try to effect a settlement.

Llanerch, Blaenyskerch and Tirpentwys collieries, near Pontypool, were idle on various days over the week-end owing to lack of clearances.

North of England.

During November, 41 Northumberland steam coal pits worked an average of 4.81 days per week and 21 household coal pits an average of 4.89 days per week, or a total average of 4.83 days per week, as compared with 5.02 days per week in October.

The dispute at Newbiggin Colliery over the dismissal of a workman for having taken coal has been settled, the man, who was alleged to have been victimised, having obtained work elsewhere.

The voting of the lodges of the Northumberland Miners' Association for the appointment of four representatives to attend the annual conference of the Labour Party in January has resulted as follows:—Elected: W. Straker, secretary, 254 votes; E. Edwards, Ashington, 142; W. Weir, president, 128; and G. H. Warne, Woodhorn, 128. The next highest were: John Cairns, financial secretary, 102; G. E. Middleton, Mickley, 77; and W. Hogg, treasurer, 63. The result is interesting as showing the strength of the peace party in the county, all the elected being of strongly pacifist sympathies, while the runners-up are all "fight to a finish" advocates.

Federated Area.

The long standing grievance of the fork and shovel at Brodsworth Colliery, which has led to no end of trouble in the past, has at length been settled. The miners have agreed to the usual deduction being made for dirt, and have undertaken to keep the coal as clean as they possibly can.

Scotland.

Arising out of a recent dispute as to payment of the war wage at Kennel Collieries certain claims were submitted, for payment of war wage, on behalf of workmen and females who lost work in consequence of the dispute but were not in any way responsible for the idle time. The Coal Controller has decided that the war wage is not payable in respect of any time lost, directly or indirectly, on account of a strike. He has also decided that where men or drawers stop work voluntarily before the completion of their shift they forfeit the war wage for that shift. Further, he has decided that if the leaving of their work by one body of men, which is not in the nature of a strike, prevents another body of men from working, the second body of men are entitled to the war wage.

At a conference of Midlothian and Haddingtonshire miners' delegates at Dalkeith, reports showed that the coal trade was continuing active, fully 8 per cent. of the workmen obtaining 10 to 11 days employment per fortnight.

Returns are being requested in Lanarkshire with a view to ascertaining whether labour is steady at the various collieries throughout the country, as resolutions have been carried at some of the branches suggesting that the men, because of the unsteady employment, should revert to the five days per week working policy.

An agitation has sprung up among the underground workmen throughout Scotland for the purpose of having the eight hours working day applied to themselves. The Mines (Eight Hours) Act provides for this class of men, if necessary, working 9½ hours per day, and at some collieries the employers have insisted on this number of hours being worked. It is understood that in some cases the employers have given extra payment for the extra one and a-half hours.

The strike at Bedlay Colliery, Lanarkshire, still continues. It has been agreed that Messrs. Adam Nimmo for the owners and John Robertson for the men, should put the case for either side in writing, and have the whole subject afterwards discussed by the Disputes Committee for the county.

At Bedlay Colliery, Lanarkshire, is continuing at work, a coming from other mines belonging to the same company.

Udston Colliery, Hamilton, have been considered by the colliery, who, while declining to accept the workmen's inspectors, have agreed to the Kilpatrick, Larkhall, as arbiter.

It is reported that the Lanarkshire colliery owners have already all their arrangements made for cutting of wood for the mines, and there is not much likelihood of men being taken from the Lanarkshire pits for this purpose. This is evidently not known to the miners in the county, as many enquiries are being made at the union headquarters by miners who are anxious to undertake this class of work.

The arbiter in the tonnage rates dispute at No. 17 Pit, in the Cadder district of Maryhill has now given his award. He has decided that an advance of 1s. 3d. per ton has to be paid on ironstone. The men claimed an advance of rates if it was to be reckoned on the coal they produced of 1s. 1d. per ton, if on the ironstone 1s. 3d. per ton, and the arbiter has taken the latter view. A new point has been raised at these collieries in connection with the claim for an advance of wages by the surface workers. A deputation put the claim before the general manager, who, before giving a decision, is going to ask the Coal Controller if colliery owners are entitled to advance wages without the latter's consent.

In Fifeshire several cases of shortage of wages are engaging the attention of the union officials. The points at issue are not serious, and it is not expected idle time will follow.

The drawing conditions at Ellismuir Colliery, Baillieston, have been the cause of trouble. The men have decided to give the manager's suggested policy a fair trial.

The dispute at Nackerty Colliery, Uddingston, has now been settled.

At most of the collieries in West Lothian from nine to 11 days work is being obtained.

The dispute at Kepplehill Colliery, Lanarkshire, still remains unsettled. Mr. J. Sullivan is meantime dealing with the matter, and it is expected that he will be able to bring about a satisfactory termination of negotiations without the necessity of resorting to a strike.

Work in the Kilsyth district of Stirlingshire is very steady, and the amount of absenteeism is very small. Satisfactory arrangements have been made between the representatives of the masters and the men in regard to the payment of war-wage.

At the Easter Jaw Colliery, Stirlingshire, trouble was threatened because a few workers were not members of the union. Those outside the organisation have now received notice that unless they enrol as members of the union they cannot work in the colliery.

There was likelihood of trouble at the South Craigend Colliery, Stirlingshire, over three of the firemen who refused to become members of the miners' organisation. The workers were given permission to ballot as to whether they should strike, but it is now understood that the firemen have agreed to become members, and this will prevent any further friction at the colliery.

A joint meeting of the Scottish Mine Managers' Association and the Colliery Under-Managers' Association was held on Saturday, in Glasgow, to discuss the question of a working policy between the two organisations. A resolution was adopted expressing the view that the status and economic conditions of mine officials is inferior to their duties and responsibilities, and a danger to the proper discipline of the mines and to the efficiency of mining operations. It was therefore decided that the two associations should assist each other in every way towards the securing of improvements calculated to remove the disabilities under which their members labour.

Addressing a district meeting of Bellshill miners on Sunday, Mr. David Gilmour, general secretary of the Lanarkshire Miners' Union, said that his appointment to the Labour Advisory Committee, under the National Service scheme, had been challenged by a section of the miners in the county—men identified with the Independent Labour movement. They had falsely asserted that he was a Government official, and that he could not serve both Labour and the Government. In a word, they wished him to withdraw his services from the Government. It had now been decided that a ballot of the members of the union be taken to determine the issue. If a majority decided that he must withdraw from national service, the only course left for him was to resign the office of general secretary. He appealed for the loyal support of the miners.

THE FREIGHT MARKET.

Business in the outward freight market this week has been done on similarly attenuated lines to those reported last week, the tonnage supplies showing no improvement. On the north-east coast, transactions in the open market have numbered three, up to the time of writing—one for Gothenburg at 190 kr., one for Stockholm at 200 kr., and one for the carriage of coke to Dieppe at 72s. 3d. The Swedish rates are the same as prevailed a week ago. Orders in all other directions with which we nowadays do business are very numerous, and, in some instances, higher figures are offered; whilst for others figures are well maintained. Thus, London is steady, at 21s., for Tyne loading. For Bilbao or Santander discharge, 180s. is now on offer, as against 160s. earlier. Portuguese ports have advanced in quotation by 5s., Lisbon being now listed at 100s., and Oporto at 110s. Gibraltar is steady, at 100s., and Port Said at 200s. The Spanish Mediterranean is firm, at 300s. quoted for Barcelona. At South Wales, the amount of business done has been very limited, and, excepting for a fixture for Gibraltar at 100s., only French Atlantic destinations have been entertained. Enquiries for tonnage for neutral directions, especially for Spain, are very numerous, and fully late figures are on offer. It will be noted that a 2,000-ton steamer has been fixed for Clyde loading to Barcelona at the record rate of 365s.

Homewards, the River Plate is steady, with a fair enquiry for steam and sail vessels at Government rates. Up-river ports to the United Kingdom are quoted at 145s., and down-river at 140s. To the States from the Plate, the rate is 20 dols. on net form. At the United States, the coal freight from Virginia to the Plate is steady, at 125s. Tonnage on net form basis is steady, at 260s. from the Northern Range to French Atlantic, with 360s. for West Italian discharge. On Committee account, heavy grain cargoes from the Northern Range to the United Kingdom are quoted at 40s., with 45s. for France, and 70s. for West Italy. At the Far East, Madras Coast to Marseilles with kernels is firm at 550s. Saigon-Haiphong to French Atlantic with rice is steady, at 500s. Kurrachee to the United Kingdom, on scale basis, is unaltered, at 250s. Bombay to the Mediterranean on d.w. is mentioned at 400s., whilst 275s. would be paid for United Kingdom discharge. Mediterranean and Bay port rates for the carriage of ore are very firm.

Tyne to Dieppe, 500, 72s. 3d., coke, neutral; Gothenburg, 2,000, 190 kr.; and Stockholm, 2,900, 200 kr.

Cardiff to Caen, 500, 48s., neutral; Dakar, 1,000, 85s., Dublin, 300, 21s.; Gibraltar, 4,000, 100s.; Havre, 1,350, 22s. 6d.; Rouen, 2,000 and 1,400, 48s. 9d., neutral; and St. Malo, 1,700, 21s.

Swansea to Rouen, 1,500 and 1,570, 48s. 9d., neutral; Havre, 1,300, 45s. 9d., neutral; and Caen, 600, 48s., neutral.

Cardiff, Penarth, or Barry to Rouen, 1,400 and 2,000, 48s. 9d., neutral.

Port Talbot to Rochefort, 1,500, 61s. 6d., neutral.

Burypport to Guernsey, 350, 42s.

Forth to Gothenburg, 2,100, 195 kr.

Hull to Gothenburg, 1,600, 190 kr.

Newport to Nantes, 1,100, 61s. 6d., neutral.

Glasgow to Gibraltar, 105s.; and Barcelona, 2,000, 365s.

LATER.—Since the above was written, the following additional fixtures have been announced:—

Glasgow to Barcelona, 2,400, 365s.

Swansea to Caen, 1,300, 1,350, 1,450, and 1,500, 46s. 6d., neutral.

Newport to Buenos Ayres, 2,500, 80s., sail, special terms.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

BIRKENHEAD, DECEMBER 18.—Coal for the Guardians. Forms from the clerk, Union Offices, Conway-street.

BLETCHINGLEY, DECEMBER 18.—Coal and coke for Godstone Guardians. Forms from the master, Institution, Bletchingley.

BURTON-ON-TRENT, DECEMBER 20.—Coal for the Guardians. Forms from the clerk, Union Offices, Burton-on-Trent.

BURY (LANCASHIRE), DECEMBER 19.—Coal and coke for the Guardians. Forms from the Union Offices, Bury.

CHELTENHAM, DECEMBER 20.—Coal for the Guardians. Forms from the Workhouse.

CHORLEY, DECEMBER 18.—Coal (6 or 12 months) for Chorley Joint Hospital Board. Forms from R. E. Stanton, clerk, Chorley.

CLAYTON (YORKS), DECEMBER 20.—Coal for North Bierley Guardians. Forms from the clerk, 4, Town Hall-street, Bradford.

CLEOBURY MORTIMER (SALOP), DECEMBER 18.—Coal and coke for the Guardians. Forms from W. Roberts, relieving officer, Cleobury Mortimer.

CROYDON, DECEMBER 31.—Coke for the Guardians. Forms from the clerk, Union Offices, Thornton Heath.

HENLEY-ON-THAMES, DECEMBER 18.—50 tons hard locomotive coal for Guardians. Forms from the clerk, 12, Hart-street, Henley-on-Thames.

LISBURN (IRELAND), DECEMBER 18.—200 tons of Wrexham Main, Orrell William Pill, or St. Helens coal for the guardians. Tenders to the presiding chairman, Workhouse, Lisburn.

NEWTOWN (MON.), DECEMBER 18.—Steam coal for Newtown Guardians. Particulars from the clerk.

SEVENOAKS, DECEMBER 19.—Coal and coke for North Isolation Hospital. Forms from F. H. Vibert, clerk, Sevenoaks.

SHEERNESS, DECEMBER 24.—1,000 tons good Yorkshire or Langwith nutty slack, to pass through a 1½ in. mesh, for the Urban District Council. Forms from the clerk, Council Offices, Trinity-road.

SOUTHAM, DECEMBER 18.—Cobbles and coke for the Guardians. Forms from the clerk, Market-hill, Southam.

STAINES, DECEMBER 17.—Coal and coke for the Staines Guardians. Forms from F. Hutchinson, clerk, Ashford.

WELLINGBOROUGH, DECEMBER 18.—Coal and coke for the Guardians. Forms from the master, Workhouse.

WIGAN, DECEMBER 18.—Coal for various institutions. Forms from the Poor Law Institution, Frog-lane, Wigan.

WOLVERHAMPTON, DECEMBER 18.—Coal, slack, and coke for the Guardians. Forms from the clerk, Union Offices.

WOTTON AND BARNWOOD (GLOS.), DECEMBER 21.—House coal for Asylums. Forms from the steward, Wotton Asylum.

The date given is the latest upon which tenders can be received.

Labour Representation.—The executive of the Miners' Federation of Great Britain, acting with the Labour Party under the scheme of Parliamentary representation, propose that the miners shall nominate 43 Parliamentary candidates for mining constituencies at the next General Election. In addition, there are six mining constituencies represented in the House of Commons by miners' representatives who are not members of the Labour Party, and are likely to be again candidates, which will raise the number of miners' candidates to 49 at the General Election. The executive proposal is that the candidates shall be allocated to districts as follow:—Yorkshire, 6 candidates; Lancashire and Cheshire, 5; Scotland, 5; South Wales, 8; Nottinghamshire, 2; Derbyshire, 2; Northumberland, 3; Durham, 6; Midland Federation, 3; small districts, group 1, North Wales, Cleveland and Cumberland, 2; group 2, Leicestershire, South Derbyshire, Bristol, Somerset, Forest of Dean, and Kent, 1.

Navy Oil.—In a letter to *The Times*, Mr. W. Joynton Hicks, M.P., states that almost every area in the United Kingdom has been thoroughly investigated and tested for oil; that the experimental plant at Chiswick has now for some months been working night and day, including Sundays, and that as the result of a vast number of tests of one or two tons of each kind of refuse, it is found that an average of 35 gals. of crude oil can be obtained per ton. He adds that it is already demonstrably possible to erect 60 or 70 batteries of retorts each able to produce 3,500 gals. per day, and then quotes the following instance: A colliery in the Midlands is throwing 200 tons of cannel on the dump every day. It is a colliery of considerable area, with a seam of 4 ft. of cannel, approximating upwards of two million tons. Without much difficulty it could produce seven or eight hundred tons per day, and yet this pit is closing down as the house coal is practically finished, and the necessary retorts, which were recommended months ago, have not yet been begun. If it is once shut down, the pit will become water-logged and ruined, and production of oil could not be effective for another six months: whereas, if the matter were taken in hand, this pit alone could produce 30,000 gals. per day. He concludes by asking whether there has been a lack of official co-ordination, as not a ton of oil has been commercially produced yet.

*Our Manufactures
include :*

Cables for Lighting, Power,
Telegraphy and Telephony.

H.C. Copper Wires & Strands.

Aluminium Wires & Sheets.

Phosphor Bronze Wires.

Enamelled and Cotton
Covered Wires.

Brass Rod.

Joint Boxes and Pillars.

Jointing Compounds.

Primary Batteries.

Exploders.

Shot Firing Cables.

Window Lead.

Cable Racks.

Static Condensers.

Pole Line Steel Work.

Paper Pinions.

Fuses and Fuse Wire.

Electric Welders.

Brass Forgings.

Telephone Cords.

Annealing Furnaces.

Tramway Insulation.

Overhead Equipment.

Electricity Meters.

Knife Switches.

TO COLLIERY ENGINEERS

And all whom it may concern.

Helsby Static Condensers

(Patents Nos. 22139/05 and 14817/14).



A serious problem confronts the users of alternating current for power purposes in the loss of plant efficiency due to the low power factor consequent on the amount of inductive machinery in circuit, which inevitably causes heavy losses in the system, poor regulation, and undue limitation of the output of generators.

The above illustration shows a 1,200 microfarad condenser designed to improve the power factor of a 90 kw. load from 0.5 to 0.9 on a 550 volt 50-period 3-phase circuit.

The dimensions of the condenser are 6 ft. 6 in. long by 4 ft. 10 in. high by 2 ft. in depth.

If, as is pretty certain, you are working at a low power factor, you can, by the use of this device, OBTAIN A MUCH LARGER OUTPUT FROM YOUR PRESENT GENERATORS.

We are not offering you perpetual motion or a panacea for all the ills that human flesh is heir to, but a sound engineering device based on well known electric principles.

SEE PAMPHLET H 75.

BRITISH INSULATED & HELSBY CABLES LTD.,

Cable Makers and Engineers,

HELSBY, Nr. WARRINGTON.

Coal, Iron, Land and Colonisation Company
The directors announce a bonus distribution of
one share, tax free.

Anglo-French (Transvaal) Navigation Coal Estates Limited.—The directors announce that an interim dividend of 4·6 per cent. (No. 14) has been declared on the 7 per cent. cumulative preference shares. The distribution refers to the balance of interest due on the preference shares to 31st inst.

Cargo Fleet Iron Company Limited.—The directors announce that in view of circumstances arising out of the Finance and Munitions Acts, the accounts for the year ended September 30 have not been settled, and that the balance-sheet will not be ready for presentation at the annual meeting, which it is suggested should be adjourned to a later date, when the report will be submitted. In the meantime, the directors are satisfied that the profits allow of a dividend of 5 per cent., less tax, payable 31st inst. to shareholders registered on 15th inst.

Chinese Engineering and Mining Company Limited.—Owing to the non-receipt from China of the final accounts for the year ended on June 30 last, it will be necessary to adjourn the forthcoming meeting to a date to be fixed hereafter, when the directors' report and accounts will be submitted. The directors are satisfied from the information in their possession that the profits will permit of a total dividend of 12½ per cent. for the year, and they will recommend the declaration of a final dividend of 7½ per cent., free of tax.

Fassifern Coal Company Limited.—The report for the year ended June 30 states that, after charging expenses, depreciation, etc., and placing £2,500 to reserve, the profit, subject to excess profits duty, if any, amounts to £4,560, to which has been added £4,664 brought forward. The directors recommend a dividend of $7\frac{1}{2}$ per cent., free of income tax, which will require £4,382, leaving to carry forward £4,842. No advance has been taken from the Bank of New South Wales for the purpose of building wagons, a large coal hopper, and cottages at the mine—the position being the same as at the date of the last report. Since June 30, there have been serious labour troubles in Australia, which have affected operations. All collieries were placed under Government control. The strikes are now over.

Middleburg Steam Coal and Coke Company Limited.—The report for the year ended June 30 last states the output of coal aggregated 309,555 tons, being an increase of 12,331 tons on the output for the previous year. The quality of the company's production has maintained its high standard in every respect, and has given every satisfaction to the customers. The appropriation account for the 12 months under review may be summarised as follows : By balance brought from previous year, £6,248; less balance dividend on ordinary shares, £3,745; leaving £2,502. Profit from colliery, etc., for year to June 30 last (less depreciation), £22,306; total, £24,808. A dividend at the rate of 5 per cent. on account of the profits of the year has already been distributed. The directors have placed a further £5,000 to the investment reserve fund, which brings that fund up to £17,500. This leaves a balance of £6,424 to be dealt with, and it is proposed to distribute a final dividend of 5 per cent., less tax at the rate of 3s. 6d. in the £, making a dividend of 10 per cent. for the year.

Milcom and Askam Hæmatite Iron Company Limited.—The directors announce that as the liabilities for special taxation have not yet been ascertained, they have been unable to complete the accounts. They are satisfied that the profits for the year ended September 30 last will admit of the payment of a final dividend of 9 per cent., free of income tax, making 15 per cent. for the year, payable January 1 next to holders registered 18th inst.

North Lonsdale Iron and Steel Company Limited.—After writing off £8,000 for depreciation, the accounts for the year ended October 31 show a net profit, including £15,258 brought forward, of £46,633. It is proposed to place £4,000 to reserve, making it £50,000; and the directors recommend a further dividend of 9 per cent., making 15 per cent. for the year, as compared with 14 per cent. for the previous year, carrying forward £17,133.

Nova Scotia Steel and Coal Company Limited.—The directors have declared a dividend of 20 per cent. on the ordinary capital, payable in ordinary shares.

Power-Gas Corporation Limited.—The report for the year ended September 30 states that the accounts show a profit of £21,915, which added to £11,120 brought forward makes £33,035. The directors have appropriated to reserve fund £4,380, and recommend a dividend of 6 per cent. per annum on the ordinary shares, less income tax, leaving £13,673 to be carried forward, out of which excess profits duty, if any, will be met.

Redpath, Brown and Company Limited.—The company's liability in respect of Munitions Exchequer payments has not yet been fixed by the Ministry, and the accounts and balance-sheets for 1916 and 1917 will not be ready for presentation at the meeting on December 20. The directors are satisfied, after considering all the circumstances, that the position of the company justifies a dividend at the rate of 6 per cent. per annum, less income tax, to the preference shareholders (already paid); and a dividend at the rate of 8 per cent. per annum, with a bonus of 7 per cent., free of income tax, to the ordinary shareholders. An interim dividend of 5 per cent. on the ordinary shares was paid on June 19, 1917.

Rhymney Iron Company Limited. — The directors announce an interim dividend on the preference capital at the rate of 6 per cent. per annum, less tax, but intimate that no interim dividend will be paid on the ordinary capital at the present time, in view of events in the coal trade during the last three months. A circular announces the appointment of Mr. Evan Williams, formerly chairman of the South Wales and Monmouthshire Coal Owners' Association, as a director of the company.

Steel Company of Canada Limited.—Regular dividend of $1\frac{3}{4}$ per cent. on preference and $1\frac{1}{2}$ per cent. on ordinary shares for quarter ending 31st inst.

P. & C. L. L. Company Limited.—The directors have recommended a dividend of £47,804. A final dividend of 7½ per cent. ended, together with allocations of £1,000,000. Fifteen new coke ovens have been ordered. The company has a year to complete the battery of 100 and by-product plant.

Company Limited.—The accounts for the year ended June 30 show a profit of £1,709, reducing the balance brought forward to £15,256.

NEW COMPANIES.

E. B. T. Syndicate Limited.—Private company. Registered office, 5, Thavies Inn, E.C. Registered December 4. To carry on the business of engineers and manufacturers of machinery, etc. Nominal capital, £20,000 in £1 shares. Directors to be appointed by the subscribers. Subscribers (one share), A. E. Ellen and W. Wood.

Siddons (H. C.) and Company Limited.—Private company. Registered office, Exchange Buildings, Birmingham. Registered December 5. To acquire the business of iron and steel merchants, etc. Nominal capital, £25,000 in 24,700 £1 preference shares and 300 £1 ordinary shares. Directors : S. Wilkinson, E. Newery, and S. Goode.

Waes Silica Land Company Limited.—Private company. Registered office, Mold, Flint. Registered December 4. To get and prepare for market ore, metal, and other mineral substances, etc. Nominal capital, £5,000 in £1 ordinary shares. Directors : L. W. Carder, H. J. Dixon, and L. Shaffer. Qualification, £10.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

PUBLICATIONS RECEIVED.

"Cassier's Engineering Monthly" (Vol. 52, No. 6), December 1917, price 1s.; "The Journal of State Medicine" (Vol. 25, No. 12), December 1917, price 2s. net; "Journal of the Western Society of Engineers" (Vol. 22, No. 4), April 1917, 50c. a single number; the Nantyglo and Blaithwaite Iron Works Company Limited—"Directors' Report and Balance-Sheet for the year ending Sept. 30, 1917"; "Let Nothing be Wasted, Produce Everything We Can in the United Kingdom and Our Grand Empire, and Increase British Trade," written by A. Sydenham, Birmingham (printed by Watson and Ball Limited, Birmingham); "The Journal of the Chemical, Metallurgical and Mining Society of South Africa" (Vol. 18, No. 3), September 1917, single copies 3s.; "Transactions of the Mining Institute of Scotland—General Meeting at Edinburgh, October 6, 1917" (Vol. 40, Part 2); "Industrial Management" (Vol. 54, No. 2), November 1917 (edited by John R. Dunlap), price 25c.; "Bulletin et Comptes Rendus Mensuels de la Société de l'Industrie Minière, 2^e livraison de 1917"; Use of Inland Waterways—"Report, County Purposes Committee" (presented November 29, 1917).

United States of America—Department of Commerce:
(Technologic Papers of the Bureau of Standards, No. 78),
“Properties of the Calcium Silicates and Calcium Aluminate
Occurring in Normal Portland Cement,” by P. H.
Bates, chemist, and A. A. Klein, assistant physicist.

University of Illinois Agricultural Experiment Station :
(Circular No. 187), "A Serious Disease of Cultivated
Perennials Caused by *Sclerotium Rolfsii*," by George L.
Peltier; (Bulletin No. 188), "Methods of Fertilising
Sweet Potatoes," by C. E. Durst; (Bulletin 189), "Para-
sitic Rhizoctonias in America," by George L. Peltier;
(Bulletin No. 190), "Soil Bacteria and Phosphates," by
Cyril S. Hopkins and A. L. Whiting; (Bulletin 191),
"Yields of Different Varieties of Corn in Illinois," by
W. L. Burlison and O. M. Allyn; (Bulletin No. 192),
"Feeding Pure-Bred Draught Fillies," by J. L.
Edmonds; (Bulletin No. 193), "Summary of Illinois Soil
Investigations," by C. S. Hopkins, J. S. Mosier, and
F. C. Bauer; (Bulletin No. 194), "A New Limestone
Tester," by C. S. Hopkins; (Bulletin No. 195), "Yields
of Spring Grains in Illinois," by W. L. Burlison and
O. M. Allyn; (Bulletin No. 196), "The Use of Commer-
cial Fertilisers in Growing Roses," by T. W. Mencie;
(Bulletin No. 197), "A Study of the Rate and Economy
of Gains of Fattening Steers, with Special Reference to
the Influence of the Amount and the Character of Feed
Consumed," by H. W. Mumford and others; (Bulletin
No. 198), "Soybeans and Cowpeas in Illinois," by W. L.
Burlison and O. M. Allyn.

United States Bureau of Mines—Department of the Interior : (Bulletin 142), "The Mining Industry in the Territory of Alaska During the Calendar Year 1915," by Sumner S. Smith, United States Inspector for Alaska; (Technical Paper 103), "Organising and Conducting Safety Work in Mines," by Herbert M. Wilson and James R. Fleming; (Technical Paper 149), "Answers to Questions on the Flotation of Ores," by O. C. Ralston; (Technical Paper 156), "Carbon Monoxide Poisoning in the Steel Industry," by J. A. Watkins; (Technical Paper 160), "The Determination of Nitrogen in Substances Used in Explosives," by W. C. Cope and Guy B. Taylor; (Technical Paper 169), "Permissible Explosives Tested Prior to January 1, 1917," by Spencer P. Howell; (Technical Paper 177), "Preparation of Ferro-Uranium," by H. W. Gillett and E. L. Mack.

OBITUARY.

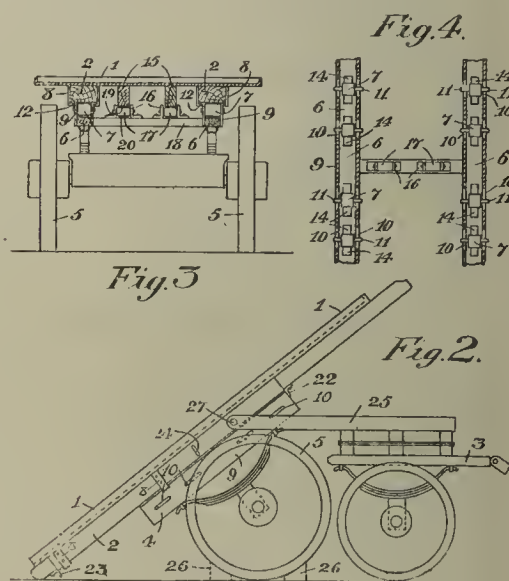
The death is announced of Mr. Jas. Dryburgh, Kirkland Hill, Wemyss. Mr. Dryburgh was closely associated with the rise and development of the coal industry in Wemyss. He was for over 30 years connected with the management of the late firm of Bowman and Company, coal masters, Buckhaven.

Mr. Ewing Matheson, who died recently at Dartmouth, in his 78th year, attained an important position among engineers. The works carried out under his direction include St. Pancras Station, London, St. Enoch's Station, Glasgow, and the Central Station, Manchester. In 1887 he became managing director of the Farnley Iron Company. His publications include "Works in Iron" (1873), "Aid Book to Engineering Enterprise" (third edition, 1898), and "The Depreciation of Factories."

Lieut.-Col. Denniss, whose death is announced this week, was, until a few months ago, the general manager of the Bute Docks and Railway at Cardiff; and his term of office was notable for the endeavour he made to expedite coal shipments. He held a very strong opinion that by more effective utilisation of the dock facilities, the speed of loading vessels could be materially enhanced, and he endeavoured to put this into practice, at one time suggesting that instead of the present system of railway companies working round the docks, the whole of the locomotive service within the Dock Company's area should be carried out by their own engines—a reform which was not carried through, partly owing to the fact that the Taff Vale Railway, under an old agreement, deals with a large proportion of the coal wagons that come on to the dock side. Col. Denniss was formerly connected with the North-Eastern Railway.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

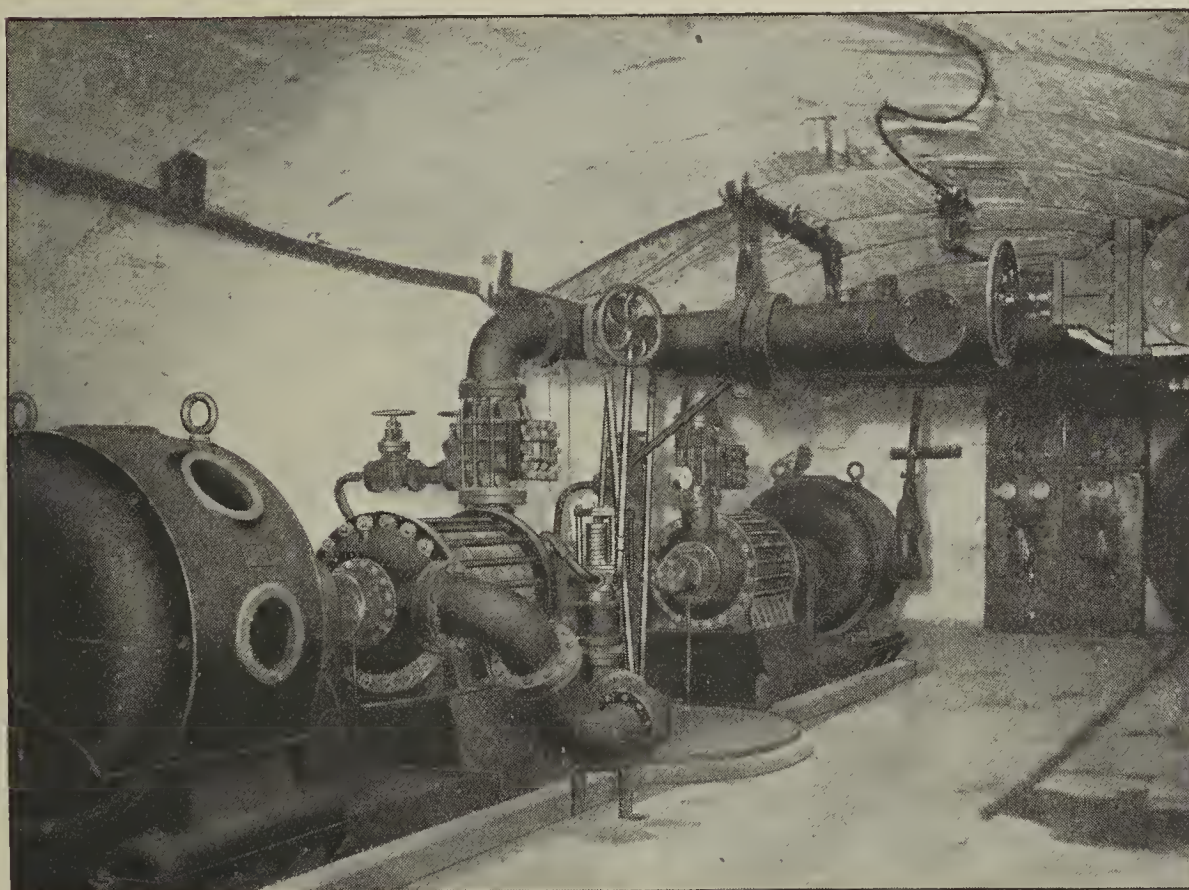
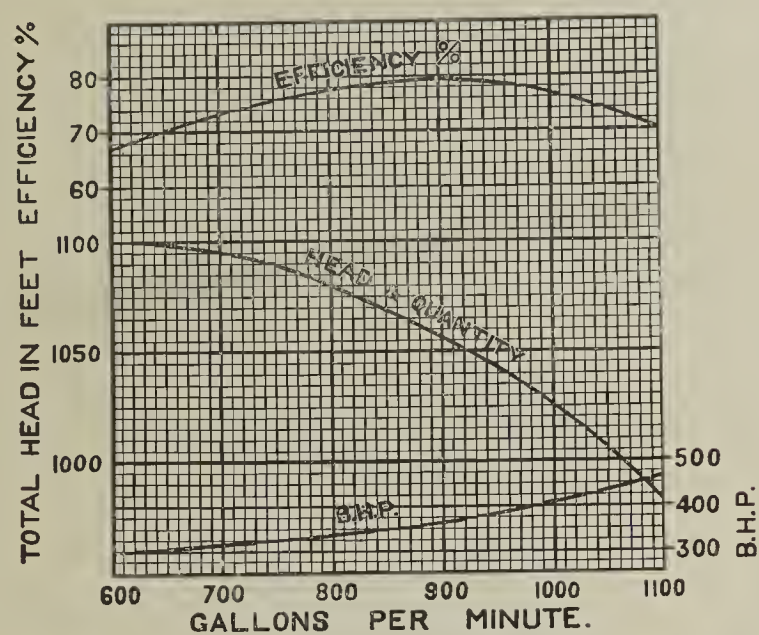
109536. *Improvements in Tip Wagons.* E. Spencer. 1895. Cald-y-road, Aintree, near Liverpool. — This invention relates to tip wagons of the type wherein the body is so mounted with reference to the rear truck or carriage as to provide a sliding connection which will permit the body to be moved longitudinally with reference to the said rear carriage a sufficient distance to allow the load to be dumped when the centre of gravity has been shifted to a given point relative to the rear axle. Fig. 2 shows the parts in position when dumping the load; fig. 3 is a cross section through the rear part of the wagon; fig. 4 is a plan view of the rear truck. Referring to the construction in detail, the body is indicated by 1, and the longitudinal bars constituting the principal portion of the main frame of the body by 2. These bars 2 extend lengthwise of the body near the sides thereof, and are supported toward the front by the forward carriage or truck indicated by 3 and at the rear by the truck 4. The rear carriage or truck 4 is mounted on wheels 5, and is formed with parallel wood bars 6 mounted below, and spaced away from the bars 2 of the body, and slidable with reference thereto by means of rollers 7. 8 are metal stirrups bolted at intervals to the longitudinal bars 2. The parallel bars 6 are faced on both sides with longitudinal plates 9. These plates 9 are wider than the bars 6, so as to extend upwards beyond the bars 6, and are provided with slotted apertures 10 for the accommodation of the pins 11 of the rollers 7. The lower edge of the stirrups 8, and the upper edge of the longitudinal plates 9 are bent over at right angles in opposite directions in such manner as to overlap or engage one another at 12, thus retaining the bars 6 of the truck and the longitudinal bars 2 of the main frame at all times in the same position vertically and laterally with reference to each other. The rollers 7 are designed to support the weight of the body with reference to the rear truck, and are mounted in such manner that any excessive strain to which the body must be subjected will not cause binding between the rollers and the bars 2 of the body portion and the bars 6 of the rear truck. To prevent friction, the said bars 2 and 6 are properly separated, and a metallic plate or truck 13 is mounted on the underside of the bars 2, and a plurality of plates 14 (or a single plate) are secured to the



upper side of the bars 6, so that a channel-like structure is produced, in which the rollers 7 are located. The plates 13 bear upon the rollers, and the rollers 7 bear upon the plates 14, so that no undue weight is borne by the pins 11, while the slots 10 allow for longitudinal play between the bars, and at the same time the plates and rollers will properly support the body under heavy loads and unusual strains. The parallel bars 6, with their plates 9, are firmly connected and spaced from each other by one or more strut members 18. This member 18 carries by means of the brackets 16 the rollers 17, on which rest two supplemental bars 15 of the main frame of the body. A metallic plate 19 is mounted on the underside of each of these supplemental bars 15, and a plate 20 is mounted on the upper side of the strut member 18, so that the rollers located between bear against the two plates 19 and 20, and no undue weight is borne by the axial pins 21 of the rollers 17, which are freely journaled in holes in brackets 16. Stops 22 and 23 are provided for limiting the movement of the body 2 with reference to the rear carriage, and catches 24 secure the body and prevent the movement thereof with reference to the rear carriage until it is desired to effect the dumping operation. Dumping is effected by having scotches or chocks 26 placed against the hind wheels. The catches 24 are released, and the horse or locomotive backed. This through the connecting bars 25 slides back the bars 2, the bars moving easily over the rollers 7 and 17 until the centre of gravity of the wagon over-balances it, and when the forward angle stops 22 come against the truck 4, the body and the truck 4 tip on the pivots 27, the pivoted bars 25 continuing horizontal, while the longitudinal bars 2 are tilted clear of the forward carriage. The hind wheels now have the chocks or scotches placed in front, and the horse or locomotive goes forward, thus drawing forward the forward truck, and bringing the body and the rear truck into the horizontal position, with the bars 2 resting on the forward carriage. The bars 2 continue to ride along the rollers until the rear angle stops 23 come in contact with the bars 6, when the scotches or blocks are removed, and the catch 24 falls into position for locking the wheels at their maximum distance apart. (Three claims.)

109559. *Liquid Level Indicators*. D. E. Bruce, Dublin, County of Coahoma, State of Mississippi, U.S.A. — This invention relates to liquid level indicators of the kind adapted to audibly indicate when a predetermined low point of the liquid level is reached, and the said invention has for its object to provide an improved indicator for gasoline to be used in connection with motor vehicles of all kinds. Fig. 1 is a side elevation partly in section of the improved indicator, showing the relation thereof to the dash of a vehicle also shown in section; fig. 2 is a top view of the same drawn to an enlarged scale; fig. 3 is a horizontal cross section drawn to an enlarged scale on the line 3—3 of fig. 1. The stand pipe 1 is preferably in the form of a glass tube, in order that the level of the gasoline or other liquid therein may be readily observed at a glance. The upper end of said tube or stand pipe 1 is fixedly held and supported by a top bracket 2, while the lower end of said stand pipe is supported by a bottom bracket 3, the brackets 2 and 3 being fixedly secured by means 4 to the

It speaks for itself.



Pumping Plant in a Colliery Pumphouse 1,050 feet below surface.
 Three units each delivering 50,000 gallons per hour to the surface.
 Efficiency of Pumps, 79 per cent. Speed, 1,485 revs. per minute.
 Motors work at 5,500 volts.

Write for List No. 736.

Pulsometer Engineering Co., Ltd.

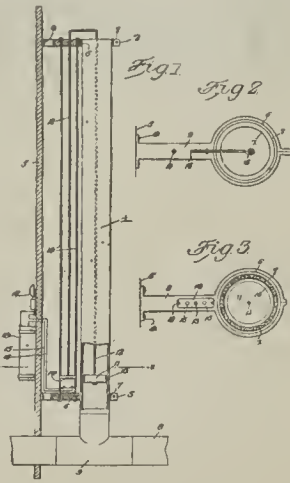
OFFICES :

11, Tothill Street,
 LONDON, S.W. 1.

WORKS :

Nine Elms Iron Works,
 READING.

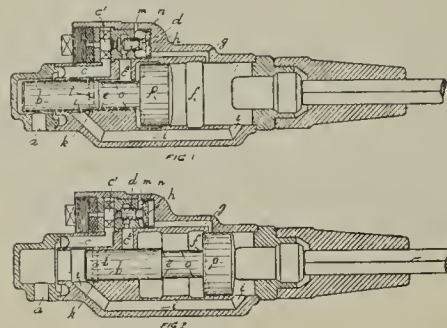
Fig. 5. Each of the brackets 2 and 3 is formed with a circular opening 6 to receive the tube or stand pipe 7 of rubber or other material may be placed within the brackets 2 and 3, for the purpose of absorbing vibration and preventing the fracture of the glass, of which the stand pipe 1 is formed. The lower end of the pipe 1 is in direct communication with the fuel feed pipe 8 leading from the tank to the carburettor by means of a T-fitting 9, which is incorporated in the feed pipe 8, and which receives the lower extremity of the tube 1. Therefore the gasoline or other liquid stands at the same level in the tube 1 as it does in the storage tank. Mounted to move upwardly and downwardly within the pipe 1 is a float comprising an outer metallic shell 10 and a body 11 of cork, which practically fills the metal casing 10. Connected to the float formed by the casing 10 and the cork 11 is a stem 12, which extends centrally and longitudinally of the tube 1 through the top bracket 6, where it is re-curved or bent to extend downwardly the return portion 13 of stem having fastened at the lower extremity thereof a circuit closer 14, which in moving downwardly is adapted to bridge and electrically connect the terminals 15 and 16 of an electric circuit, in which is included a bell or audible signal 17 and a source of electrical energy 18, said bell and source of electrical energy being located in any part of the vehicle. Guides 19, shown in the form of light rods or wires extending in parallel relation to each other are connected at their top and bottom extremities to the top and bottom brackets 2 and 3 respectively, and the circuit closing member 14 is notched or otherwise formed at diametrical opposite points to engage the guides 19, thus ensuring accurate rectilinear movement of circuit closer 14, and preventing the same from striking or beaving against the stand pipe 1, also ensuring the proper contact between the circuit closing member and the terminals of the signal circuit. The gasoline or other liquid stands at the same level in the pipe or tube 1 as it does in the storage tank. As the level falls, the float in the tube 1 descends, and simultaneously the circuit closer 14 moves downwardly. The float in the pipe or tube 1 is always visible, so that the operator may instantly ascertain the quantity of fuel in the tank, and when a predetermined low point is reached the audible signal or bell 17 is sounded by the closing of the circuit by the circuit closing member 14. It is preferred to arrange the parts in such manner that the bell will be sounded while there is still a considerable quantity of fuel in the tank, in order that the operator may reach the point where the supply may be replenished. (Three claims.)



109572. *A Method of Converting Highly Viscous Mineral Oils, etc.* I. Rosenberg, 35, Unter den Linden, Berlin, W.8, Germany.—The object of the present invention is the conversion of highly viscous petroleum or other mineral oil, or of the residues from the distillation of petroleum or other mineral oil, which, in consequence of their viscosity, are by no means suitable for use as liquid fuel, into hydrocarbons of less viscosity which will serve excellently as fuel, and can also be treated for the preparation of lubricating oils. The method is as follows:—The highly viscous product to be dealt with is heated to a temperature of about 400 degs. Cent. under a pressure of about 4 to 6 atmospheres, but for such a short time that, as far as possible, any decomposition or splitting up of the oils is avoided. The requisite conditions are best attained by using closed vessels which will allow of relief by discharge of all excess pressure in case the pressure should exceed the limits already stated. The time during which the product must be heated to the specified temperature and under the specified pressure is very short—only half an hour to two hours—this being determined by a preliminary trial in most cases according to the nature of the material used and the result aimed at. If the conditions above enumerated are fulfilled, the highly viscous material, or residue, will be converted into a much thinner material, from which it will be possible to distil out the lighter hydrocarbons, present in small quantity, to such an extent that the flash point will be raised to the height desired and requisite for the further use to which the material is to be put in any given case. The present invention is based essentially on the observation that decomposition of hydrocarbons, by heat, is really preceded by an intermolecular re-arrangement of the material. The method claimed therefore aims only at producing that molecular re-arrangement, while, at the same time, any considerable decomposition of the material treated is prevented as far as possible. As a general rule, the object of this method will be attained by continuing the heating for only a short time and at a low pressure. The particular conditions in each case can best be determined by preliminary trial. To take an example:—Californian crude oil, with a viscosity of 116 at 20 degs. and 12 at 50 degs., as shown by Engler's viscosimeter, is heated to a temperature of 400 to 415 degs. Cent. in a closed retort provided with a relief valve, and under a pressure of $4\frac{1}{2}$ to $5\frac{1}{2}$ atmospheres. The heat and pressure are maintained for half an hour, the relief valve on the cover of the retort being opened sufficiently to prevent the pressure exceeding the limit above specified. After cooling, the product shows a viscosity of 22 at 20 degs. and of 4 at 50 degs., with a flash point of 115 degs. A current of steam is then led through the oil (which is simultaneously heated to 150 degs. Cent.) and allowed to pass until a test specimen shows a flash point of 160 degs. The product thus obtained represents an excellently serviceable fuel oil. (One claim.)

109777. *Improvements in Percussive Rock Drills, etc.* G. H. T. Rayner, Grange Farm House, Carter Knowle-road, Abbeydale; and P. Rayner, 19, Falmouth-road, Sheffield. The object of this invention is to provide a rock drilling machine capable of striking a very large number of blows per minute, and simple in construction, and which will not deteriorate beyond that of a hammer drill, and which will be simple in construction and easy to operate. The invention will be described with reference to the accompanying drawings. Fig. 1 is a longitudinal sectional elevation of a rock drill according to this invention, showing the commencement of its forward stroke; Fig. 2 is a longitudinal sectional elevation of the same drill, showing the piston at the commencement of its backward stroke. In the arrangement shown in Fig. 1, air is admitted at port *a*, and acts continuously on the small piston *b*; it also passes by ports *c* and *c*¹

to the small end of valve *d*, which is thereby forced to the right as shown. The air likewise passes by port *c*² and annular recess *o*, formed in the piston *b* to the rear end of the large piston *p*. It will be seen that pistons *b* and *p* are in one piece, and constitute the striking piston or hammer. The whole left hand surface of the striking piston is thus under pressure, and is forced to the right. As soon as the shoulder *e* on the piston *b* has passed the port *c*² on the forward stroke, the admission of air to the left hand surface of piston *p* is cut off, and that which had previously been admitted acts expansively for the remainder of the stroke until the main exhaust recess *f* is uncovered by the large piston *p*, when the pressure falls to that of the atmosphere. The recess *f* is constantly and freely in communication with the atmosphere by a suitable passage or passages, not shown on the drawing. During the travel of the piston to the right, port *g* is shut off from communication with the main cylinder, and the compressed air from the supply port *a*, passing through the small port *h* in the valve *d* accumulates, and reacts on the larger right hand area of the valve *d*, forcing same to left, and closing the communication between parts *c*¹ and *c*². The several moving parts are then in the position shown in fig. 2. During the passage of the striking piston to the right, the port *i* is uncovered by the piston *b*, whereby the right hand end face of the piston *p* is put under pressure, and is forced powerfully back to the left. In so doing the port *i* is again closed, and the trapped air acts expansively until the passage of the piston *p* places the exhaust recess *f* in communication with the cylinder. The pressure then falls rapidly in the cylinder, and also in the port *g*, and likewise on the right hand surface of the valve *d* until the pressure thereon is less than that on the small left hand end of the valve *d*, when the valve is forced to the right, and air from the inlet *a* is again admitted to the port *c*², the various parts being then in the position shown



in fig. 1, ready for the commencement of another stroke. In the cylinder wall surrounding piston *b* is formed a recess *k*, which by means of port *l* is in direct communication with the atmosphere, whereby an outlet is provided for any leakage of live air along the piston *b*. In connection with the valve *d*, a port *n* is provided, leading directly to the atmosphere, with a view to preventing an accumulation of leakage air in the recess *n*, which might tend to irregular working of the valve. (Seven claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Akt.-Ges. Brown, Boveri, et Cie. Preventing pulsation in centrifugal compressors. (17949)
 Allen, R. W. High-speed centrifugal fans. (18041)
 Anderson, J., and Ellison, G. Controllers for electric motors. (18032)
 Baker, W. E. Clinometer. (17936)
 Bates, E. J. (Bates, W. H.) Grinding mills for reduction of shales, clays, ores, etc. (17914)
 Brown, G. Pumping machines. (18220)
 Carey, R. F. Pump, motor, etc. (18233)
 Chitty, H. Dynamo electric machines. (18046, 18048)
 Chitty, H. Motors of the double rotation type. (18047)
 Cortese, E. Furnaces for roasting ores, etc. (17892)
 Cross, R. B., and Moffat, T. G. Retorts for distillation. (18158)
 Cumberland, E. Internal combustion engines, and fuel therefor. (17946)
 Fletcher, Russell and Company, Singleton, J. H., and Young, C. Rotary engines, pumps, blowers, exhausters, etc. (17837)
 Foster, L. L. Air compressor. (17988)
 Foster, W. J. Superheated air blast for furnaces. (17829, 17830)
 Godfrey, C. D. Manufacture of tin-plate. (18053)
 Gregory, A. W. Process for recovery of tin from tinned metals. (18223)
 Hammonds, E. Colliery, etc., haulage gear. (17934)
 Hayes, W. H. Internal combustion engines. (18031)
 Howden and Company, J., and Hume, J. H. Draught installations for boilers. (18159)
 Marsh, G. Manufacture of refractory substances, artificial slate, etc. (17893)
 Nelson, L. Gas producers. (18249)
 Peebles and Company, B. Dynamo electric machines. (17849)
 Penhale, J. Motor fuel. (17858)
 Pilkington, J. Devices for lighting miners' safety lamps. (18012)
 Poole, W. J. Hot air engines. (18000)
 Richards, E. J. W. Gas and air reversing valves for steel melting, etc., furnaces. (17843)
 Ruehmeling, J. H. Air compressor. (17988)
 Smith, D. J. Combined gas cooler and filter. (17882)
 Smithey, W. D. Means for generating and storing power. (17989)
 Soc. Anon. delle Miniere di Mercurio del Monte Amiata. Device for safety closing of pit mouths. (18021)
 Way, A. J. Manufacture of tin-plate. (18053)
 Webb, H. E. Dynamo electric machines. (17849)
 Westinghouse Brake Company. Drive chains. (18190)
 Williams, M. Continuous conveyor over swampy, etc., ground by means of wire rope. (18087)
 Wood, W. R. Water tube boilers. (17878)

Complete Specifications Accepted.

(To be published on December 27.)

1915.

7875. Bade. Cradles or stages for use in the sinking or construction of shafts.

10207. Pinet and Debout. Process for the distillation of coal for the manufacture of gas, and apparatus therefor.

1916.

[NOTE.—The number following the application is that which the specification will finally bear.]

12011. Helps, G. Manufacture, utilisation, and combustion of fuel. (111495)
 12305. Wang, K. T. Apparatus for converting or transforming electric currents. (111497)
 15241. Hanley, A. Appliance used for gripping and releasing ropes used in winding, hauling, guiding and like purposes. (111502)
 15522. Baumann, K. Steam turbines. (111503)
 15523. Baumann, K. Steam turbines. (111504)
 17121. Boye, F. L. Internal combustion engines. (111520)
 17169. Adams, C. H. Pumping apparatus. (111529)
 17216. Purchas, A. W. Eduction pipe for air-lift pumps. (111532)
 17454. Gill, H. A. (U.S. Light and Heat Corporation). Dynamo electric machines. (111544)
 17681. British Thomson-Houston Company (General Electric Company). Dynamo electric machines. (111551)

1917.

108. Watson, E. A. Steam superheaters for locomotive type boilers. (111576)
 2273. Wrightson, T. G., Ringquist, J. M., and Head, Wrightson and Company. Hoists for charging blast furnaces and the like. (111592)
 2274. Wrightson, T. G., Ringquist, J. M., and Head, Wrightson and Company. Blast furnaces and the like. (111593)
 3449. Simpson, D., and Simpson, A. Treatment of bituminous shales and the like for the obtaining of oil therefrom, and apparatus to be used therein. (111605)
 3521. Davey and Company, and Brown, F. C. Contrivance for securing a plurality of rope terminals to a main rope or other suspender. (111606)
 5916. Sterling Telephone and Electric Company, Bell, F. G., and Davey, W. C. Electric bells. (111622)
 5284. Proctor Limited, J., and Holden, A. Mechanical stokers. (111622)
 5301. British Westinghouse Electric and Manufacturing Company (Westinghouse Electric and Manufacturing Company). Control of dynamo electric generators. (111623)
 5697. Ravenna, G. Reversible steam turbines. (105919)
 6346. Price, J. B., and Elbow Vale Steel, Iron and Coal Company. Double-acting internal combustion engine. (111632)
 7198. O'Connor, T. Rotary pumps. (111635)
 10162. Milligan, J. Mine signalling apparatus. (111642)
 11048. New Jersey Zinc Company. Gas filtering apparatus. (110907)
 14369. Tanner, H. L. Electric motors. (110359)

Complete Specifications Open to Public Inspection Before Acceptance.

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1917.

16481. Irminger, R. Internal combustion engines. (111663)
 17299. Soc. J. Munier et Cie. Elevators for blast furnaces, kilns, etc. (111673)
 17370. Soc. J. Munier et Cie. Blast furnace skips. (111674)

CATALOGUES AND PRICE LISTS RECEIVED.

Boving and Company Limited.—The newly-issued catalogue of the Boving turbo pumps (so long known as "Victoria" pumps) necessarily summarises the information regarding various types, but complete lists will be sent to any enquirer. It is an elementary fact that the efficiency as well as the life of a turbo pump depends on the correctness with which the waterways are designed, not only in the impellers, but also in the entrance guide wheels, the diffuser, and the casing, but the correct application of that principle involves a great deal more than elementary skill. The makers of the Boving pumps claim to obtain exceptional results with productions which are mechanically right, and which work safely and efficiently, with the minimum of attention. One of the most interesting illustrations is that of the pump which has been running underground for over six years at the Lambton Collieries. No reduction of efficiency can be traced. A feature of the high-pressure pumps is the balancing device that serves its purpose permanently. Another improvement is the absence of that common source of trouble, the pressure stuffing box. Some of the pumps illustrated in the catalogue include those used in the pits of the Lothian Company, the Bengal Coal Company, Cannop Coal Company, and other mining and engineering undertakings. The London offices of Messrs. Boving and Company Limited are at Imperial Buildings, 56, Kingsway, W.C. 2.

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained on application at this office at the price named **post free**.

Colonial Reports (Annual): (No. 941), Cyprus. Price 3d. (No. 942), Grenada. Price 1½d. (London: Published by H.M. Stationery Office).

Institution of Petroleum Technologists.—A paper on "The Prospective Oil Fields of Barbados," by Mr. E. H. Cunningham Craig, will be read at a meeting of the institution in John-street, Adelphi, on December 18, commencing at 8 p.m.

The Concrete Institute.—A meeting of the Concrete Institute will be held at Denison House, 296, Vauxhall Bridge-road, Westminster, on December 20, at 5.30 p.m. Papers will be read by Mr. Ellis Marsland and Mr. H. Kempton Dyson on "The Effects of Fire on Reinforced Concrete Buildings, as Demonstrated by Some Recent Examples." A discussion will follow.

Leeds University and the Gas Industry.—Mr. Henry Woodall, junr., has promised a valuable donation of carbonising, washing, and purifying plant for the use of the department of coal gas and fuel industries of the Leeds University. Mr. Woodall expressed himself in a letter as happy to provide and erect the plant "free of cost to the university in memory of my late father and partner, whose interest in the university was very deep and sincere." The council accepted the offer.

THE COLLIERY GUARDIAN

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No. 2973.

Lighting Safety Lamps by Electrical Ignition.

By L. FOKES.

The method of lighting safety lamps by means of sparking coils is an old one, and although many attempts have been made to introduce new methods, only one of them (ignition by magneto generator) has survived, and is likely to become a serious rival to the old method in the near future.

The magneto generator will not displace the sparking coil by reason of any better lighting qualities, the magneto being inferior in that respect, but because of its adaptability to portable lighting sets for use underground. At the present time, both systems are largely used, the magnetos for underground use and accumulators and coils for lighting in the lamp room.

Accumulators and Sparking Coil Method.

This system was adopted when the idea of lighting lamps electrically was first introduced, and for speed in lighting it cannot be beaten. It consists essentially of

ing current is on, and then, in reality, the cells do not supply any of the current, coils being operated on the drop in volts (due to the charging current) across the cells, so that, immediately the current is interrupted by some cause outside the lamp room, all the lighters are disabled.

What is even worse than this is that full lighting voltage is on the lighting dishes. Assuming an earth to occur outside on the lighting mains, it is possible that the lighting dishes may have a potential to earth equal to the full lighting supply voltage; and considering that the majority of lamp room benches are of metal, and probably earthed, there is a grave danger of short circuit to the bench, with the possibility of fire, through the ignition of oily waste or other material, such as the insulation of the wires to the lamp dishes, besides the probability of a man receiving a severe, if not dangerous, shock or burn. Fig. 3

accumulators are used in series, the spark of the coils is very fierce, and contains sufficient energy to enable safety lamps to be lighted when the lighting pins are in such bad condition as to prevent re-lighting being effected underground by a magneto. It is obviously unwise, therefore, to use a system of lamp lighting at the lamp room which will allow defective lighting pins to pass, such as prevents their being re-lighted should they become extinguished.

The system of lighting safety lamps should be uniform throughout a particular colliery, so that a lamp which is passed from the lamp room can be re-lighted underground without difficulty, as other-

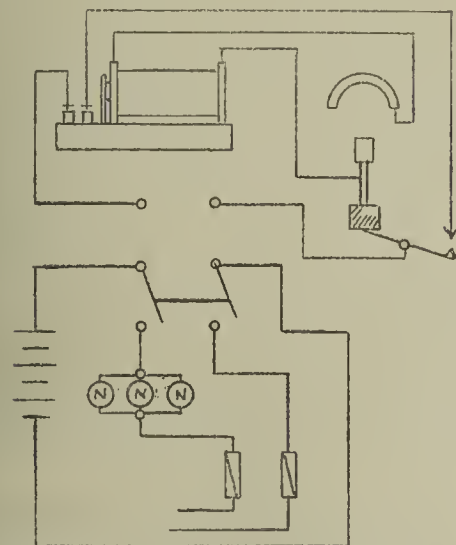


FIG. 1.

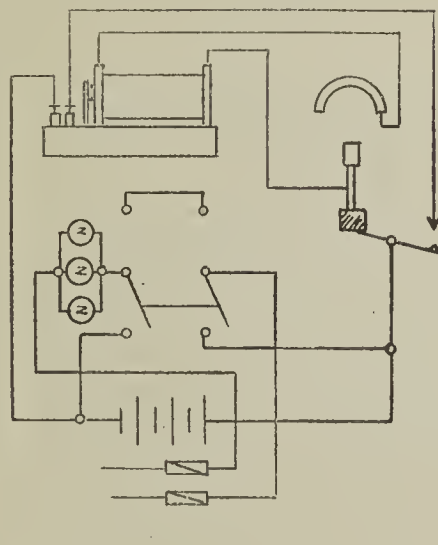


FIG. 2.

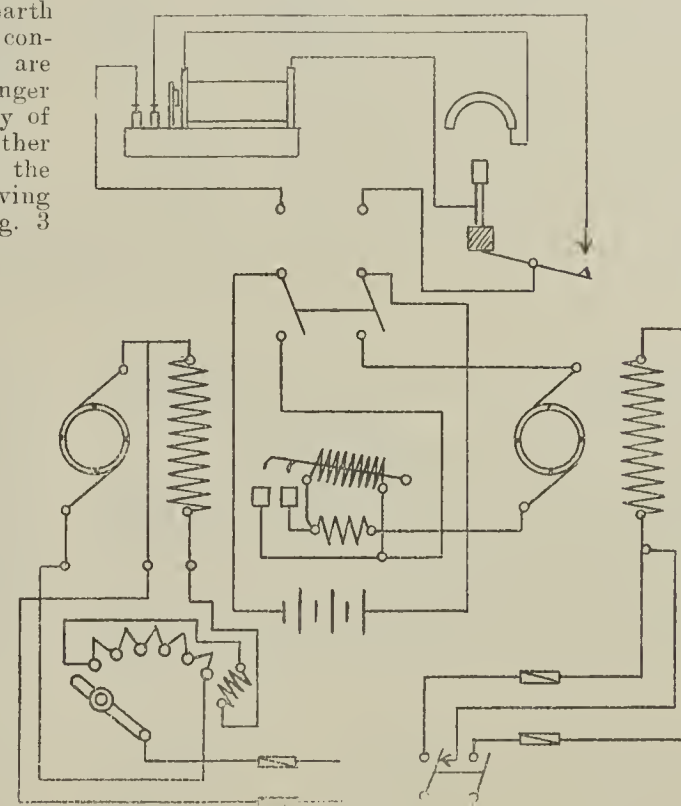


FIG. 3.

a sparking coil operated by one, two, or perhaps three accumulators. The difficulty of making an efficient and safe re-lighter for underground use has caused the method to be discarded for that purpose, but it is retained in the majority of cases for lighting lamps in the lamp room, as already mentioned.

The accumulators are usually charged from the colliery electric lighting supply, in series with a resistance, which may be the lamps for giving light in the lamp room, or separate lamps may be used for charging, although this is not as economical. However, neither method of charging is satisfactory, and where accumulators and coils are retained for lamp lighting purposes, it is far more economical and efficient to employ a small motor generator charging set for charging the accumulators.

There are objections to charging accumulators from the lighting mains, as usually the current available is not sufficient to supply the full charging current to the cells, and consequently it has to be kept on for a large number of hours, and often during the day time, in order to keep the cells charged. In these circumstances, even when the charging is carried out in series with the lamp room lighting, the process is wasteful, the method being really economical only if the charging can be done at night, when the lamp room lighting is required. Again, this method is open to abuse and subject to cause fire under certain circumstances.

Figs. 1 and 2 show two different methods of connecting the circuits. The semi-circular contact indicates the ring on the lamp dish, whilst the plunger is shown beneath, to which is attached an insulating block (shown hatched). The other items are obvious. Fig. 1 (which is the correct method) shows a double-pole change-over switch, the accumulators being connected to the two centre terminals, on which the knives of the switch are pivoted. The upper position is for discharging when the lighters are working, whilst the lower position places the cells on charge in series with the lamp resistance across the lighting mains.

Fig. 2, however, is entirely wrong, though unfortunately largely used; and it is this method which is so much open to abuse.

It will be noticed from the diagram that, instead of the cells being connected across the centre terminals of the change-over switch, they are connected to the bottom, whilst the lighting circuit is brought to the centre terminals. The upper position simply lights the charging lamps, whilst the lower position places the cells in series with them for charging.

It will be obvious, from the connections, that both charging and lighting the safety lamps can be carried out at the same time; and this is the great objection. Cells may be neglected until they are in such a bad state as to be only able to light lamps while the charg-

shows the diagram of connections for a motor generator set driven off the colliery lighting supply. This system has the advantage over the previous one, that only sufficient energy is used to enable the cells to be charged, and to overcome the losses in the charging set; and although the saving may not appear to be much, yet in cases where energy is bought from a power company, and the losses continue over a large number of years, this item is worth consideration.

It will be readily understood that, where the usual voltage of 220 volts is in use, a waste of energy takes place, when charging cells, out of all proportion to that actually used in charging. For instance, assuming that a battery of three cells are employed for supplying lighting coils in a lamp room, and that the charging current required is 10 amperes, the total energy being used when charging will be $\frac{10 \times 220}{1,000} = 2.2$ kw., or 2,200 watts. The energy required to do the actual charging will be equal to the voltage across the cells multiplied by the charging current.

Assuming the voltage to be 9 volts, which is more than required, we have $\frac{9 \times 10}{1,000} = 0.09$ kw., or 90 watts. Therefore, in order to obtain 90 watts for charging, an additional $2,200 - 90 = 2,110$ watts are spent in resistance. This method, then, can hardly be called economical.

If we assume that a small generator is installed, capable of giving approximately the required voltage by field regulation, and that it is direct-coupled to a suitable motor; then, if 90 watts are generated and the over-all efficiency is taken as 70 per cent., the total energy used would be $\frac{90}{0.7} = 128$ watts, and after

making allowance for separate excitation of the generator field from a 220-volt lighting circuit, the figure would be approximately 150 watts, which would depend upon the resistance of the field winding. The saving in energy would be considerable, i.e., $2,200 - 150 = 2,050$ watts, or 2.05 British thermals units per hour. Instead of the cells being continually charging, and yet never thoroughly charged, they would be charged perhaps twice per week for, say, eight to 10 hours. The cells would last longer, and any neglect would immediately make itself known by the failure of the accumulators to work the lighters.

Magneto-Generator Lighters.

Although accumulators and coils do their work admirably, yet with the introduction of magneto lighters underground, the necessity for a similar means of lighting at the lamp room arises at once.

The output of a magneto-generator is more restricted than that of accumulator sets, and where perhaps three

wise much time may be wasted through men having to send up the pit to obtain lamps, through being unable to re-light those given them from the lamp room.

Although the type of re-lighter fitted with a handle for driving the magneto is suitable for underground use, owing to the relatively small number of lamps to be dealt with, it would be unsuitable in a lamp room, and motor-driven magnetos should be used, the motors taking current from the lighting supply. The motor should be of about one-tenth horse-power, and should give from 1,200 to 1,500 revolutions per minute, being

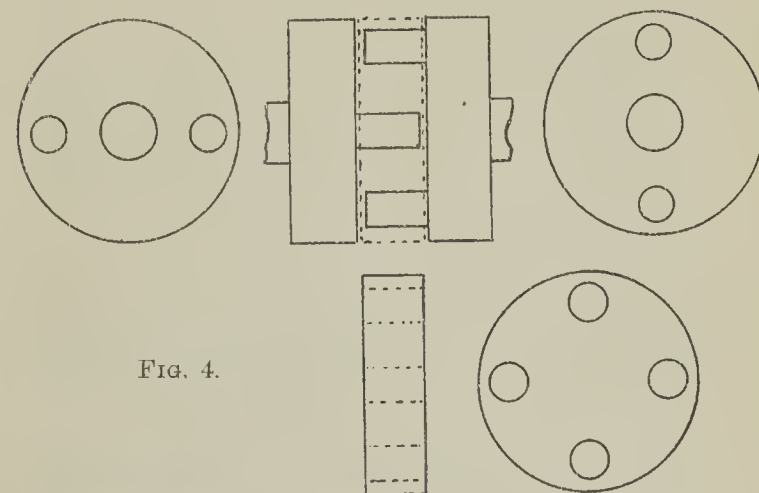


FIG. 4.

separately excited from the lighting circuit in series with a 16 candle-power lamp (assuming the supply is 220 volts).

This method of excitation is far more reliable than connecting the field straight across the supply, as with so small a motor, the field winding is of very fine wire indeed, and requires very careful handling. By exciting through a lamp, the voltage across the field winding is reduced, whilst a larger and more substantial wire may be used in its construction. The motor should be direct-coupled to the magneto by means of a coupling similar to fig. 4, consisting of a rubber block, into which are inserted four pins, i.e., two from each half coupling. This allows the ready removal of either the motor or magnet without disturbing the other. The two machines should be fastened to a small hardwood block, which can readily be withdrawn from a portable set or from any other protecting cover, so that examinations or repairs may be carried out; this is shown in fig. 5. The wiring should be so arranged that sufficient length is allowed

for the set to be withdrawn clear of its working position without disconnecting.

When the lamp dish is closed, it is necessary to connect the terminal of the magneto to earth, and this should be connected to the ring of the lamp dish, so that the contact placed upon the dish should make contact with the ring first, and break contact with it last. In this way lamps may be lighted without any shock whatever being produced. When lighting rapidly, however, one is apt to break this rule, but a small piece of waste held in the hand on the top of the lamp plate is being lighted will prevent any shock.

A magneto lighter may be conveniently made up as a portable set, in which case it may be housed as indicated in fig. 5, where a box is shown with a lamp dish fitted into the top, whilst the lighting set is situated inside the box, a door being provided for the withdrawal or inspection of the apparatus. When installed

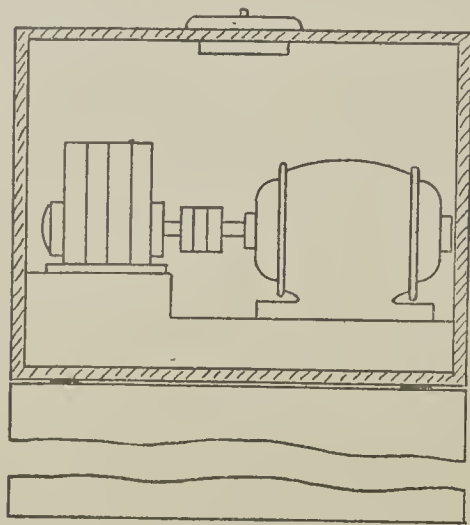


FIG. 5.

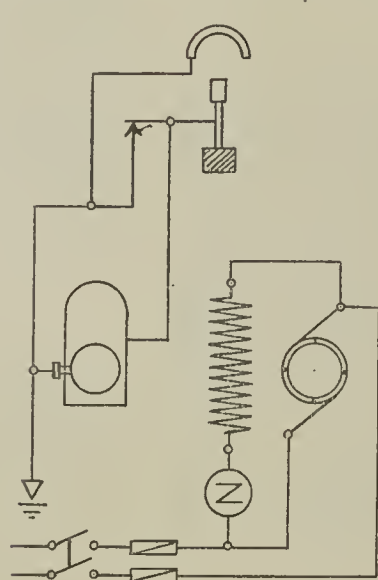


FIG. 6.

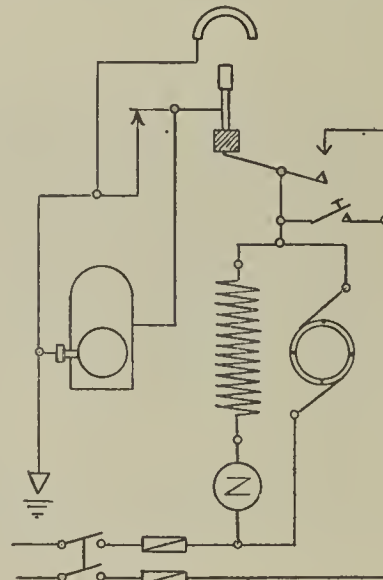


FIG. 7.

permanently it is better to place the motor generator above the benches, in a suitable recess, where they can be easily got at.

Magneto Lighter Connections.

Referring to figs. 6 and 7, the details will be readily recognised. Fig. 6 represents the connections of a lighter for continuous running when a large number of lamps require to be lighted.

It will be noticed that the motor is switched on, and continues to run, with the magneto short-circuited by the lamp dish. On depressing the plunger with a

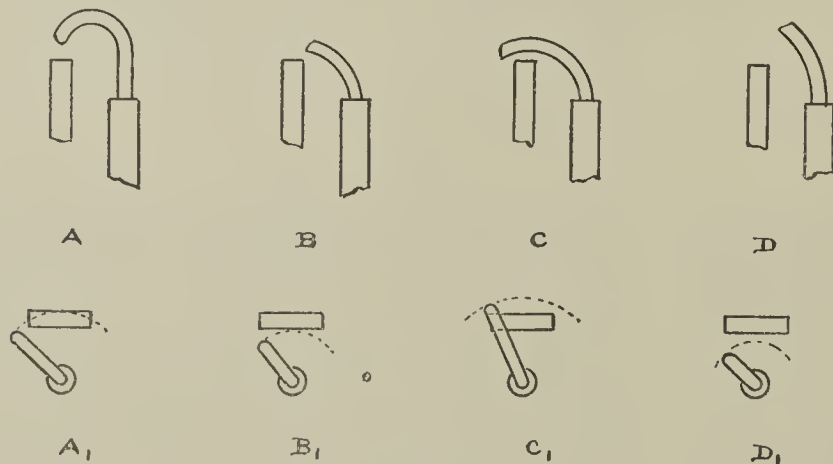


FIG. 8.

lamp, the short-circuiting contact is opened, and the lamp is lighted. The contact again closes immediately the lamp is removed.

It may be mentioned that no damage will be caused to the magneto by short-circuiting it while running; in fact it is unwise to run a magneto properly open-circuited, as the difference of potential is very high when no spark gap is in circuit, and flashing may take place in the machine.

Fig. 7 represents the connections for a continuous or intermittent lighter as desired.

During the lighting of a lamp, the descent of the plunger closes the motor circuit, and opens the magneto circuit, both switches returning to their original position as soon as the lamp is removed. This is useful between shifts, when an occasional lamp requires to be lighted, whereas should a number of lamps require lighting, the small switch indicated below the motor switch may be closed, thus causing the set to run continuously.

Insulation and Position of Lighting Pins.

So much depends upon these two items that a few remarks are necessary in this connection.

Insulation.—This is one of the most difficult problems connected with the lighting of safety lamps by electrical means.

A number of insulations have been tried, but all have defects which are difficult to surmount. At the present time, fibre is largely used for insulating the lighting pins, but its absorbent nature prevents it from being an ideal insulator. However, apart from its poor insulating qualities, its toughness and durability, together with the ease with which it can be worked, make it an ideal material for the work, and even its absorbent qualities may be prevented from showing provided proper care is taken of the

Fig. 8, it will be evident that the insulation on pin D is bound to be subjected to a great deal of wear, and consequently a lighting pin which is to be at a distance from the wick tube, is

sure to give trouble. The smaller the gap, the less potential will be required to bridge it, and therefore pins should always be close up to the wick tube, roughly one-eighth or three-sixteenths of an inch being the maximum when lighting.

Position of Lighting Pin.—This plays an important part in lamp lighting, and more especially in the speed with which the operation can be performed. Experience shows that a pin bent as at A, in fig. 8, is the best; and the lighting position is indicated at A₁. It will be noticed that, as the pin is a little above the tube, and the lighting position is just clear to one side, the spark from the point of the pin will strike the corner of the wick, and not the tube. This is as it should be.

Again, it should be noticed that, even with a pin bent as at A, it will take much longer to ignite a lamp wick if the pin is placed over the centre of the wick,

than it will if placed in the position indicated in A₁. This is due to the comparatively large amount of heat carried away by the body of the wick, as compared with the corner, which readily ignites.

Referring to B, fig. 8, this pin is quite wrong, as it sparks to the tube, whereas it should spark on the corner of the wick. This pin cannot light on the corner, as its radius of sweep is not sufficient. Again, at C is shown another kind of pin, one that comes across. Now, it is well known that the intensity of an electrical charge is always greatest at a point, and therefore it must always be made a rule to set the lighting pins so that the discharge comes right from the point of the pin. The pin at C has three parallel paths open for the spark, i.e., one on each wall of the tube and one on the wick, and consequently the spark is unstable, wobbling from one side to the other, and not raising any particular part to ignition point.

The pin at D has already been referred to as being too far away, which not only puts a severe strain on the insulation of the lighting pin, but also on the magneto and lighting dish fittings. This type should be avoided.

In conclusion, it may be added that a great deal of time will be saved, besides wear and tear, if proper attention is paid to lighting pins, as improper position and bad insulation prevent the efficient working of any means of lighting. As the capacity of magnetos is limited, every effort must be made to concentrate the available energy at the point of ignition, and not allow a large percentage to be lost through lack of sufficient attention to the condition of the lighting pins and their insulation.

Shortage of Coal in Bohemia.—The electrical works at Kolin, Bohemia, have been closed down through lack of coal, with disastrous results to the whole of the surrounding country. Fourteen towns and 35 village communities are without light. Eight sugar refineries, 11 large mills, 15 engineering works, the railway works, and numerous other industrial establishments are all obliged to stop work. A telegram states that in consequence of the shortage of coal, all industrial establishments in Hungary will close down from December 22 to January 3, while the Budapest tramways, for the same reason, will cease running for three weeks.

Coal Trade Fund for Huts.—Mr. Herbert Brown, of the British Farmers' Red Cross Fund, on Monday addressed the members of the London Coal Exchange in support of the coal trade effort to raise £200,000 for the national Y.M.C.A. Christmas appeal. Mr. Brown spoke of the value of the huts, and expressed the belief that had there been 1,000 such huts on the Russian front there would have been a very different tale to tell. The hut account was at present very much overdrawn. Nearly all the trades had made a start in the task now being undertaken, and it was hoped to raise throughout the whole country about £1,000,000. He was confident that the effort of the coal trade would have the backing of the miners. Other speakers were Mr. Warren (chairman of the Coal Exchange) and Mr. W. Volder (managing director of Messrs. Cory and Company), representing Sir Arthur Cory Wright, who was absent owing to illness. Mr. Volder intimated that appeals were being made at Hull, Cardiff, Birmingham, Leeds, Newcastle, and Glasgow. About £3,000 had already been received from members of the London Coal Exchange, where it was hoped to raise £10,000.

COKE OVEN MANAGERS' ASSOCIATION: MIDLAND SECTION.

THE MANUFACTURE OF AMMONIA.

The Midland section of the Coke Oven Managers' Association met on Saturday at Sheffield, under the chairmanship of Mr. J. W. LEE (Grassmoor), branch president, to hear a paper by Mr. G. A. HEDDEN (Parkgate) on "The Manufacture of Concentrated and Pure Liquor Ammonia."

After defining concentrated ammonia and pure liquid ammonia, and mentioning the various impurities that have to be eliminated from crude ammoniacal liquor, the author went on to describe the plant and method of working.

The first step in the process is the removal of the carbon dioxide and sulphuretted hydrogen from the crude liquor, and the method employed is based on the fact that when crude gas liquor is heated to about 95 to 100 degs. Cent., the CO₂ and H₂S split off from the NH₃ and escape, while the NH₃ remains behind in the liquor, and can be driven out later on by raising the temperature.

The necessary plant for the distillation of ammoniacal liquors and the manufacture of concentrated and pure liquor ammonia consists of: Liquor storage and settling tanks; decomposer or decarbonater; lime mixer and agitators; free and fixed ammonia still, or finishing still; necessary condensers, absorbers, and storage; tanks for products; purifying plant; pumps, etc.

Process of Distillation.

Removal of Sulphuretted Hydrogen and Carbon Dioxide.—This is usually effected in a decomposer or decarbonater, of which there are various types practically all working on the principle of the continuous ammonia still, the heating of the still being by direct steam fitted into the bottom chamber or tray (though in some cases indirect steam is fitted into the other trays).

The ammoniacal liquor distilled usually contained 1.60 per cent. free NH₃, 0.45 per cent. fixed NH₃, 1.7 per cent. CO₂, and 0.24 per cent. H₂S. The liquor, after being freed from tarry matter (the settling of the liquor free from tar is most important, to prevent naphthalene troubles in the gas and neutralisation of the action of the caustic lime) is pumped into the decomposer, one-half of the cold liquor passed through the tubes of Nos. 1 and 2 ammonia condensers (which act as heat interchangers between the hot ammonia gases and the cold liquor), entering the decomposer about half-way, and the other half of the cold liquor entering on the top tray.

Thus the cold liquor has a cooling effect on the gases about to leave the decomposer, and the other liquor entering the still hot reduces the amount of direct steam to be used on the bottom tray for decomposing, incidentally reducing also the amount of water vapour entering the still as direct steam.

Working Conditions of the Decomposer.

The temperature of the liquor in the bottom tray is kept about 100 degs. Cent., the pressure 10 to 12 lb. per square inch, pressure of steam on mains 50 lb. per square inch; under these conditions the percentage of CO₂ does not exceed 0.10 per cent., and the H₂S 0.03 per cent.

The temperature of the gas from the top of decomposer is kept at about 45 degs. Cent., and always contains a small amount of free ammonia. These gases are then passed through water catches, which absorb any ammonia, and, of course, a certain amount of CO₂ and H₂S. The liquor from these catches is worked up into crude ammonia, or run back into the gas liquor storage, and worked back again through the still. A certain amount of liquor is taken from the catches each day, and replaced by water. The foul gases from the catches free from ammonia are then passed through beds of oxide of iron, which absorbs the H₂S.

The decomposed liquor is then pumped into the free ammonia portion of the finishing still, which it enters at the top tray (larger than the other trays), the lime liquor being pumped into the still on the third tray, which tray is also larger than the others.

The method adopted by the author for lime mixing is as follows: The amount of lime required being calculated from the analysis of the gas liquor, a weighed charge of lime (sufficient to last three hours) is put into a lime mixer, consisting of an open pan fitted with perforated plates about 9 in. from the bottom, and a centre shaft driving propellers underneath the plates. Sufficient hot spent liquor from the bottom of ammonia still is used to slake the lime and give a mixture that can be pumped. This mixture is run from the bottom of the pan (the propeller agitating it all the time) over a grid into a rectangular box, at the same time as the lime liquor is run into a box, and was pumped into the agitators.

These agitators (three in number) are vertical cylindrical vessels, fitted with a centre shaft operating propellers driven from the same shaft at the lime mixer. They are also fitted with pressure gauge, liquor inlet and outlet liquor gauge, steam coil for heating up after being shut down, and a gas vent.

After the lime liquor has been charged into the agitator, condensings from the various condensers are run in and mixed thoroughly with the lime, the whole being kept agitated by the slowly revolving propellers.

During the filling of the agitator, the vent is opened to relieve the pressure (usually due to ammonia vapour, which is conducted into the ammonia still).

The principle of this method of lime mixing is to use the minimum amount of water, thereby getting a greater still efficiency, and also the better control of the amount of lime used per ton of liquor. The amount of liquor is regulated on the decomposer by the speed of the feed pump, and the amount of lime liquor in the same manner. Both these pumps are fitted with tachometers.

By mixing the condensed liquor (which consists mostly of free ammonia) with the lime, the free

ammonia is rapidly given off in the hot still, leaving the lime to mix with the decomposed liquor, which is free from a great portion of the water used in the usual method of working.

Working Conditions of Free and Fixed Still.

The top tray of the still is worked under a pressure of 6 lb. per square inch. The bottom tray is heated with direct steam, the pressure on this tray being 8 lb. per square inch. The spent liquor runs away through a seal, into brick settling tanks placed above ground, so that the lime after settling can be loaded up and carted away more easily. Test of the waste liquor leaving still average about 0.005 per cent. NH_3 .

The ammonia vapours pass away from the top of the still, first into a small trap to catch any liquor coming over with the gas, and return it to the still. The vapours then pass through three condensers in which the gases are cooled, and the cold gas liquor is pre-heated in cast iron tubes before passing on to the decomposer. As the condensed liquor is made in the Nos. 1 and 2 condensers it is used up in the agitators. The liquor from condenser No. 1 contains 2.5 per cent. NH_3 ; and that from No. 2, 7.4 per cent. NH_3 .

If concentrated liquor is to be made, the condensings and gases from No. 3 condenser are passed into absorbers made of cast iron, arranged to be worked in series. To ensure complete condensation of ammonia, these absorbers are fitted with coils for the cooling water, which is then run into the boiler feed tank.

The inert gases from the absorbers pass through coke towers fitted with water sprays, the ammonia water from these running into a common sump, into which also run any drainings from leaking pump glands, liquor gauges, etc. The concentrated liquor made contains 25 per cent. NH_3 and 0.15 to 0.25 per cent. H_2S .

Purification of the Ammonia Vapours for the Making of Pure Liquor Ammonia.—When pure ammonia is required, the gases have to be purified. For this purpose, the gases leaving the last condenser are passed through three more air-cooled condensers (it being essential that the ammonia gases should be as dry as possible, and not above 15 degs. Cent.), then through caustic soda washes which absorb any traces of carbonate, and then through slaked lime purifiers which extract the final traces of sulphuretted hydrogen. The gases still contain small amounts of phenols, pyridine, etc., which are extracted by passing the gas through oil washers, the oil being changed at regular intervals.

The gases after leaving the oil scrubber are passed through coke towers, to trap any oil which may be in suspension, and then on to the ammonia absorption tanks.

The absorption of ammonia by water produces a considerable amount of heat, and necessitates the cooling of the absorption vessels, which are usually ordinary closed iron tanks provided with an inside coil of pipes for cooling.

The tanks are used in turn, that which contains the strongest liquor receiving the fresh ammonia gas as it comes from the purifiers, whilst the last tank, charged with fresh water, receives the stream of gas as the last of the set. Any inert gases pass to the coke tower, as previously described.

In the author's plant, boiler tanks with the tubes left in are used, the cooling water being passed through the tubes, overflowing into the boiler feed tank; and the water used for absorbing is put into the boiler itself.

The ammonia liquor is blown up to the desired strength ready for sale, 880 SG and 920 SG being most in demand.

Mr. HEBDEN added a detailed description of the method of control, with an elaborate system of analysis and testing adopted. Upon this, he said, depended much of the failure or success of a plant. On the one described, the liquor worked per day averaged 400 tons. Pure ammonia should be made at by-product works even more economically, and it was certainly more profitable than producing crude ammonia.

DISCUSSION.

Mr. B. W. HAIGH (Barnsley Main), in opening the discussion, asked if Mr. Hebden would state what percentage of loss he experienced in the working of the plant he had described.

Mr. HEBDEN: Never above 5 per cent.

Mr. J. T. PRICE (Manvers Main) asked why the temperature of the gas from the top of decomposer was kept at about 45 degs. Cent.

Mr. HEBDEN explained that the plant was making crude ammonia as well, and the efficient working of the still at that temperature assisted in this. From the gases, ammonium carbonate was also made, and for that purpose a certain amount of ammonia was allowed to go through with the gases. Replying to a further question, Mr. Hebden said that three men were required to work the plant, with a chemist in charge, besides two men at the boilers. That was for 400 tons per day. A man and a boy were constantly going round day and night doing nothing else but taking temperatures and pressures. At one time a lot more men were employed, but with the control system he advocated being adopted they were able to reduce the number. In smaller plants it would only be necessary to have one still-man, and in some cases one man might do the whole job apart from boiler firing and the chemist in charge. It would not be necessary to have the chemist always on the spot. Samples taken during the night were locked up. Of course, to obtain the efficient working he described, it presumed that everything was kept at the highest pitch; the stills were cleaned out every three months, whether they appeared to need it or not.

Mr. THORPE (Barugh) said his experience was that it did not pay to get the percentage of sulphur in the spent oxide mentioned by Mr. Hebden (50 to 55 per cent.). It was, of course, quite easy at gas works, but with the stronger gas the action was very much more

vigorous, and it formed a coating of sulphur which was not very easily broken up, and his experience was that from 40 to 45 per cent. was the best limit.

Mr. HEBDEN said that they found at one time they used to get a fair amount of heating up, especially when the sulphur content in the oxide was getting a large percentage, but there was no difficulty in getting it up to 50 per cent., although, of course, the last 10 per cent. took more getting than all the rest. They used to revivify—take the oxide out, expose it to the air, put it back, and collect in that way. They had no special means different from ordinary gas works practice. They worked on one bed one shift, and another the next, using three, backwards and forwards. You would not, of course, keep to one bed till you got out 50 per cent.

Mr. THORPE said, in his experience, there was difficulty in revivifying the oxide; but Mr. HEBDEN added that he had not experienced any such difficulty.

Mr. RILEY (Tinsley Park) asked what method of treating the effluent was followed; but Mr. HEBDEN said this was a subject big enough for a separate paper. In reply to Mr. PRICE, he said he considered lime washing the vapours to be more efficient than washing the liquors.

Mr. J. TAYLOR (Silverwood) asked, with regard to the sulphide and carbonate content of the original liquor, if any difference in temperature was found necessary in washing these out in the crude liquor.

Mr. HEBDEN explained that the rise in temperature had to be the same, but the stills had to be worked more slowly, and that was regulated from the feed pumps. They did not meter except by strokes of the pump. He agreed that the pumps would occasionally vary, but the working was shown by analysis and other things, and if anything was wrong they went to the root of the trouble by decarbonating.

Mr. TAYLOR asked, assuming that a certain liquor of volatile ammonia contained 20 per cent. of caustic ammonia, 60 per cent. of carbonate, and 20 per cent. sulphide of ammonia, and, on the other hand, another liquor contained, say, 20 per cent. of carbonate and 60 per cent. sulphide, what difference should be made in the temperature of the decomposer gases.

Mr. HEBDEN said if one wanted more temperature, it was necessary to increase the pressure on the still, but all plants were built on an average strength of liquor.

Mr. HAIGH said the plant Mr. Hebden had been describing was one in which the liquor was brought to it; but, in his own case, he was mostly concerned with the necessity for continuous working. Did Mr. Hebden advocate the same system of working, whether with storage or a continuous process?

Mr. HEBDEN said he advocated enough storage for a two days' supply, and had been accustomed to store from 1,000 to 2,000 gals. of liquor; it was quite cold. One should have sufficient coolers in order to get a better control; otherwise in using warm liquor passing through condensers it would not be possible to get condensation to the same degree as passing cold liquor through.

Mr. J. A. WILSON (Staveley) pointed out that Mr. Hebden was saved a certain amount of trouble by the fact that he wanted a certain amount of ammonia to escape from his decomposer.

Mr. HEBDEN agreed that this was so, and added that there was a good sale for crude ammonia at the present time.

In reply to Mr. HAIGH, who asked what was the difference in value between pure and crude ammonia, Mr. HEBDEN said the circumstances were altogether different now, but he used to sell 880 ammonia at £20 per ton, while sulphate of ammonia fetched £10 to £12. In fact, he gave up making sulphate altogether. He believed it was quoted at above £20 now.

Mr. W. GREEN (Manvers Main) asked what percentage of pyridine and phenols were usually carried in the liquor, and also if Mr. Hebden experienced any difficulty in the removal of oil, carried forward mechanically in the gases, after passing through the washers.

Mr. HEBDEN said he had no difficulty in washing the pyridine out in oil, anthracene oil being found the most satisfactory for this purpose. He had not had time to get out the percentage of pyridine before entering the oil scrubber, and did not remember finding any in it afterwards. He had never experienced trouble with the mechanical carrying forward of oil. In reply to Mr. WILSON, he added that he had had experience with mineral oils, and found them fairly effective, but anthracene was the best. He had heard of oleic acid being used, but only in text-books.

Mr. GREEN asked if they had any trouble with oil coming down in the decomposer at all. Of course, the liquor should be perfectly free from tar, but he thought it was a fact that naphthalene was to some extent soluble in ammonia liquor, and would come down under the influence of heat.

Mr. HEBDEN replied that most of the oil used to go forward with the gases from the decomposer into the crude ammonia. Most of the oils were volatile. Their liquor always settled for 24 hours, and passed through three more tanks. The settling of the liquor overcame a lot of the difficulty.

In reply to Mr. J. MORRIS (Rotherham Main), who asked what was the difference in the percentage of H_2S broken up by the decomposer when pumped under pressure and spray and the ordinary type of decomposer with trays, Mr. HEBDEN said the mechanical decomposer with the spray was an absolute failure, and there were also mechanical difficulties with the pump. Doubtless improvements had since been effected, and he knew there were two on the market.

Mr. WILSON, in proposing a vote of thanks to Mr. Hebden, said that, personally, he merely made the sulphate, but had met with a good many of the problems to which Mr. Hebden had referred. At one

time he had trouble with the slaking of the lime. He had also found it better not to use spent liquor, the initial temperature of spent liquor producing too coarse a grain in the slaked lime.

The BRANCH PRESIDENT heartily associated himself with the expression of thanks, and hoped that other members would record their day-by-day experiences, not only for their own benefit, but for that of other members, to be given in papers during next session—their syllabus for the present one being already full.

The vote of thanks was warmly accorded, and briefly acknowledged.

The BRANCH PRESIDENT then announced the following arrangements for the remainder of the present session:—January 26 (Sheffield), joint paper by Messrs. B. W. Haigh and H. Lamb, on "Some Notes of the Comparative Values of Coke Over Crude Benzol"; February 23 (Leeds), Mr. W. Greaves, F.I.C., "Notes on the Manufacture of Concentrated Liquor and Benzol"; March 23 (Sheffield), Prof. W. G. Fearnside, "The Texture of Coke Oven Bricks"; April 27 (Leeds), Mr. J. D. Hamer, "Notes on Benzol Rectification"; May 25, visit to Martin's Fireclay and Brick Works, Halifax; June 29, Parkgate By-product and Coking Plant; July 27, Yorkshire Coking and Chemical Works, Glass Houghton; August 31, Silverwood Colliery plant; September 28, Houghton Main; October, annual general meeting.

NOVO SUZHDENSK COAL DEPOSITS, WESTERN SIBERIA.

A geological investigation has been made of the Fedoroff and Andreievsky sections of the Novo Suzhdensk mines by Prof. M. Ussoff, to ascertain their prospective value. The deposit was formerly worked in the neighbouring Anzher and Suzhdensk mines, at which latter there were no outcrops to guide enquirers.

The Fedoroff area borders on the Tomsk Railway. It is immediately south of the Anzher mines, occupying about 4 square versts, including part of the watershed between the rivers Anzher and Great Chalam and the basin of the upper reaches of these rivers.

Sixty-six boreholes were put down over an area of about 8,000 square sazhen, mostly on a broken east-west line, traversing the supposed direction of the coal deposits, about 125 sazhen long, and also along three short lines extending lengthwise. The holes in the chief line were sunk to a depth of 29 sazhen. The records of the works at the mines are defective: even the nature of the strata pierced had not been registered, and the only information obtainable from workers at the mines was to the effect that the shaft cut two beds of coal having a slight dip, one at the 13th sazhen, about 0.75 sazhen thick, and the other at the bottom of the shaft, about 1.75 sazhen thick.

The geological indications point to the possible reserves of coal being very important. Thus, taking only the beds of the Anzher mines of a general thickness of 3.5 sazhen and extending in a horizontal direction over the whole area of the concession there would be a total coal reserve of $1,000,000 + 3.5 + 700 = 2,450$ millions of poods. This reserve should be still further increased by other seams which doubtless exist there, and have been partly worked on the Novo Suzhdensk and Anzher mines. Finally, there is no reason to doubt that this series of coal seams continues in the southern concession belonging to the mines. If such be the case the total reserve of workable coal in the Novo Suzhdensk mines will enable mining to be carried on for many decades on a large scale.

A second concession where work is being done by the Novo Suzhdensk mines lies three versts north-east of the Fedorovsk concession; the coal seams disclosed by the workings are not uniform in quality. Seam No. 2 is the best and largest, and is indeed the only one that seems promising in the Andreef concession, the approximate reserves of coal being estimated at 160 million poods. There is reason, however, to believe that a more extensive investigation would disclose a fair number of workable seams of coal, and that both the Fedoroff concessions lying to the south of the Anzher mines are the direct extension of all the seams in the Anzher and Suzhdensk deposits, whilst at least two of these seams have been found at a certain distance.

Thus the concessions of the Novo Suzhdensk mines contain coal deposits sufficiently important for the development of a large industry. The work should be begun methodically and put on a broad basis. Prospecting is required, not only for the final estimation of the value of the deposits, but also in order to choose the position of the main shaft.

Imports of Pit Props.—In November, 73,864 loads of pit props were imported into the United Kingdom, the value being £405,080. The imports in November last year were 120,257 loads, valued at £432,820, and in November of the preceding year 184,609 loads, valued at £606,556. The total imports in the 11 months were 941,590 loads, valued at £3,967,984, compared with 1,919,358 loads, valued at £6,540,884, in the corresponding period last year.

Exports and Imports of Mining Machinery.—The value of imports and exports of mining machinery during November are given below:—

	Nov.		Jan.-Nov.	
	1916.	1917.	1916.	1917.
Imports	19,797	23,344	140,189	169,161
Exports	111,421	30,804	697,080	613,427

These figures are not inclusive of prime movers or electrical machinery. The following shows the value of exports of prime movers other than electrical:—

	Nov.		Jan.-Nov.	
	1916.	1917.	1916.	1917.
All prime movers (except electrical) ...	401,923	374,078	3,940,481	3,612,855
Rail locomotives	191,256	133,866	1,215,121	1,540,025
Pumping	41,048	31,518	476,284	362,876
Winding	1,175	509	14,809	14,783

MAXIMUM PRICES FOR FRENCH COALS.

The Ministry of Munitions has issued the supplementary list of maximum prices for coals:—

HAUTE SAONE.—Mixed washed, 20 fr. *Carcelle collieries*:—Lignite, and through-and-through, 23 fr.

SAONE-ET-LOIRE.—*Blanzy collieries*:—“Gaill-tins” (50-90 mm.), 43 fr.; screened flaming coal (over 55 mm.), 25 fr.; “châtillins” (10-55 mm.), 25 fr.; anthracite, 25½ fr.; mixed small (0-55 mm.), 20 fr.; washery sludge, 18½ fr. *Epinac collieries*:—House coal: Through-and-through (over 25 mm.), 28 fr. Industrial coals: “Menu barré,” 20 fr. *La Chapelle-sous-Dun collieries*:—Unwashed “gaillettes” (15-50 mm.), 29 fr. *Le Creusot collieries*:—“Grelats” (over 60 mm.), 34 fr.; “châtillins” (15-25 mm.), 35 fr.; smithy specials, 33 fr.; small washed (0-10 mm.), 27½ fr. *St. Leger and St. Bérain sur-Dheune mines*:—Screened “gaillettes” (over 20 mm.), 44 fr.; through-and-through, with 25 per cent. large, 34 fr.

SAVOY AND UPPER SAVOY.—*Voglans mines*:—Screened small lignite, 25 fr.; small lignite, 15 fr.

ISERE.—*Mure and Grésivaudan collieries*:—“Grésil” anthracite, No. 2, 32 fr.; “grésil,” No. 3, 21 fr.; “grésil,” No. 4, 24 fr.

UPPER LOIRE (LANGEOAC).—*Marsanges mines*:—Washery sludge, 15 fr. *Lubière mines*:—Screened (over 30 mm.), 40 fr.; unscreened small (0-30 mm.), 34 fr. *Mégécoste mines*:—Through-and-through, 33 fr. *Aubépin mines*:—Through-and-through lignite, 26 fr.

PUY-DE-DOME AND CANTAL.—*Armois mines*:—Through-and-through, 30 fr.

MESSEIX.—*Messeix mines*:—Anthracite washery sludge, 15 fr. *Singles mines*:—Through-and-through, 34 fr. *Burande mines*:—Through-and-through, 34 fr. *Vendée mines*:—Screened (over 30 mm.), 36 fr.; screened (20-30 mm.), 36 fr.; unscreened small (under 20 mm.), 27 fr. *St. Etienne mines*:—Washery sludge, 15 fr.

CREUSE.—*Bosmoreau mines*:—Special through-and-through, 40 fr.; industrial through-and-through, 35 fr.; small, 30 fr.

ALLIER.—*Ferrières mines*:—Large screened (over 60 mm.), 44 fr.; screened “gaillettes” (30-60 mm.), 42 fr.; screened “gaillétins” (18-30 mm.), 35 fr.; through-and-through, screened and re-classified, 32 fr.; unscreened small (0-18 mm.), 29 fr. *Commentry, Bezenet, Montvicq and Doyet mines*:—Large screened coal (over 55 mm.), 40 fr.; washed “gaillettes” (20-25 mm.), 31 fr.; washed small, 31 fr.; washery sludge, 15 fr. *Colombier mines*:—Through-and-through, 30 fr.

QUEUNE.—*Noyant mines*:—Washery sludge, 15 fr.

MAYENNE AND SARTHE (MAINE BASIN).—*Montigné, le Genest, la Bazouge, and Sablé mines*:—Screened anthracite, 45 fr.

DORDOGNE, LANDES AND HAUTES-PYRENEES.—*South-west lignite mines*:—Large and screened lignite, 25 fr.; through-and-through, 21 fr.; small, 15 fr.

VOSGES.—*St. Menge mines*:—Through-and-through, 40 fr.

Briquettes.

The maximum sale prices for briquettes have been modified as follows:—

Pas-de-Calais.—Ovoids, 45 fr. *Saône-et-Loire.*—Coal briquettes and anthracite ovoids, 52 fr. *Epinac.*—Industrial briquettes, 54 fr. *Savoie.*—Anthracite briquettes, 50 fr. *Isère.*—Anthracite ovoids, 47 fr. *Oisans.*—Anthracite ovoids, 60 fr. *Hautes-Alpes (Briançonnais basin).*—Anthracite briquettes, 60 fr. *Bouches-du-Rhône and Var.*—Lignite briquettes, 47 fr.; and ovoids, 41 fr. *Hérault (Graissessac district).*—Anthracite ovoids, 55 fr.; coal briquettes, 58 fr.; and ovoids, 55 fr. *Garl and Ardèche (Alais and Niègles-Prades district).*—Coal briquettes, 58 fr.; and ovoids, 55 fr. *Loire (St. Etienne).*—Briquettes, 53 fr.; ovoids, 50 fr. *Rive-de-Gier.*—Coal (anthracite) ovoids, 51 fr. *Brassac (Tape and Grosmeil mines).*—Briquettes, 54 fr. *Puy-de-Dôme and Cantal (Brassac).*—Anthracite ovoids, 55 fr.; anthracite ovoids, 55 fr. *Messeix.*—Anthracite ovoids, 55 fr. *Champagne.*—Coal briquettes, 54-55 fr. *Tarn and Aveyron (Aubin, Carmaux and Albi districts).*—Briquettes, 55 fr. *Creuse (Auhun mines).*—Briquettes, 56 fr.; ovoids, 54 fr.; (Bosmoreau mines): ovoids, 56 fr. *Allier (Bert and Montcombroux mines).*—Ovoids, 50 fr. *Mayenne and Sarthe (Montigné mines).*—Anthracite ovoids, 65 fr. *Vendée (Faymoreau mines).*—Coal briquettes, 58 fr.

Revised Prices.

The following increases have been authorised on existing Article 3:—

For all Pas-de-Calais mines but the Grenay concession, per ton, 1 fr.; Société Anonyme des Houillères de Saint-Etienne, per ton, 2 fr. 50 c.; Société Anonyme des Houillères de Montrambert and de la Béauidière, 2 fr.; Société Anonyme des Mines de la Loire, 1 fr.; Compagnie des Mines de Villebonf, 6 fr.; Société Anonyme des Mines de Houille de Janon-Terrenoire, 4 fr.; Société Anonyme des Mines de la Haute-Cappe, 2 fr.; Société Anonyme des Mines de Bourbon-Saint-Hilaire, 50 c.; Duchet de la Tourfondue et Cie., Buxières-les-Mines (Allier), 50 c.; Houillères de Doyet et de la Souche, 2 fr. 50 c.; Société Civile des Houillères de Montvicq, 1 fr. (which raises the sale price to 39 fr. on rail Commentry); Société Civile des Mines de Bezenet, 2 fr. (raises sale price to 37 fr. the ton free on rail); Société des Mines de la Boule, 50 c.; Compagnie des Forges de Châtillon, Commentry, Neuves-Maisons; Ferrières mines, 1 fr.; Noyant mines, 2 fr.; Société Anonyme de Commentry-Fourchambault-Decazeville, 1 fr. 50 c.; Campagnac, 3 fr.; Brassac, 3 fr.; Société des Houillères de la Haute-Loire, 4 fr.; Compagnie des Quatre Mines Réunies de Graissessac, 50 c.; Société des Houillères du Nord (Allier), 50 c.; anthracite, 5 fr.; coal and small anthracite, 5 fr.; Société Française d'Exploitations Anthracite de l'Ouest de Graissessac, 5 fr.; coal and small anthracite, 1 fr.; Albi, 1 fr.; Charbonnages du Centre (Allier), 4 fr.; Houillères de Mégécoste, 50 c.; Acieres de France, Mines d'Aubin, Produits Chimiques d'Alais et de Manosque et de Lincel mines, 8 fr.; Société

Anonyme des Houillères et du Chemin de Fer d'Epinac, 2 fr. 50 c.; Société Anonyme des Mines de Houille de la Chapelle-sous-Dun et des Moquets, 4 fr.; Société des Mines de Montigné, 5 fr.

For mines not included in this list, and of which the average monthly production for the first half-year of 1917 has been only 1,000 tons or under, the increase will be fixed by the chief engineer of the district in which the mine is situated.

All the foregoing prices and increases are applicable to deliveries made since October 1, 1917.

ASSOCIATION OF STUDENTS OF THE SOUTH WALES INSTITUTE OF ENGINEERS.

Principal KNOX of the South Wales and Monmouthshire School of Mines, delivered a presidential address to the East Glamorgan District Association of Students of the South Wales Institute of Engineers, on Saturday, December 8, taking as his subject “Possible Future Developments in the South Wales Coal Field.”

Dealing with mining in the past, he said it would be well to remember that we owed an immense debt of gratitude to the pioneers of science and industry who had made it possible for us to think of progress in much wider terms than was ever possible to them. This was particularly true of the mining industry, especially when we considered the few opportunities for technical training then in existence, and the excellent work carried out by the early pioneers.

If we were to make a comparison between the best equipped South Wales collieries of 25 years ago with those of to-day we could appreciate the great progress made during that period; but instead of assuming that it was now possible to “leave well enough alone,” this progressive development ought to prove the necessity of preparing for still greater developments during the next 25 years. It had been said that each generation had to overcome the mental inertia of its predecessor before any progress could be accomplished. This might account to some extent for the conservatism of the mining industry, but there were other causes which had operated in the same direction, chief of them being the jealous guarding, by individual colliery companies, of what was considered to be essentially secret information, a policy which had prevented anything in the nature of organised progress being accomplished. Fortunately this attitude of mind was rapidly dying out, otherwise such an association as theirs would only be of very limited service to its members and to the industry generally.

One need only cite a few examples, such as the erection of the Barry docks and railway, the Treforest power station and the establishment of the School of Mines, to show what could be done by an organised industry when their interests were in common. What had already been done in transit, power production and education could be materially increased and profitably extended to other branches of mining work in the future.

It was unnecessary to detail the progressive stages in the development of the South Wales coal field. In the early stages the outputs were small; coal was regarded as a finished product, and the engineering difficulties were comparatively simple. Within recent years, as the sinkings became deeper, involving new problems in mine working, engineering construction had become an important branch of a colliery equipment, to which had been added the more elaborate preparation of coal for the market, the manufacture of coke and the extraction of some of the by-products. This development was fully illustrated by the publication of the latest employment returns, which showed that Glamorgan collieries gave employment to 118,154 underground workers and 49,408 surface workers, whilst Monmouthshire gave employment to 23,156 underground and 8,514 surface workers—making a total of 199,232 for these two counties alone.

Mining in the Present.

We were still, however, in spite of all this progress, too much inclined to regard coal in the nature of a finished product, and not as a raw material forming the basis of other innumerable industries. Having had a plentiful supply of all classes of coal, at our disposal, we had been more or less unconcerned about its economical uses. These conditions had led to great waste of raw material in the mining of coal, and to a still greater waste in its application to industrial purposes.

Mining in the Future.

The speaker proceeded to deal with a few of the probable future developments in mining for the next 15 or 20 years, which would appear to be more immediate in their application. The first and most important of these was the conservation of our coal supplies by reducing waste in coal getting, and by the conversion of raw coal into various forms of fuel in preference to using it in its natural state.

Waste in Working.—His own estimate (five years ago) of the average loss of coal out of the 26,470 millions of tons then considered as available in the South Wales coal field, was no less than 7,941 millions (or 30 per cent.). While 7 per cent. of this loss was said to be due to barriers and pillars of support left underground, a much greater loss was due to layers of coal left unworked in thick seams and small coal thrown into the gob.

Although some improvement had been effected in this respect, much still remained to be done before the enormous wastage could be stopped. Coal seams in the South Wales coal field were more subject to excessive roof pressure than is the case in other coal fields, probably owing to the weight of an enormous unbridged mass of hard Pennants overlying the lower coal measures on either side of the valleys, which necessitated more complete packing if excessive squeeze was to be avoided.

Now there is only one method of complete packing known which could effect a roof support of anything up to 90 per cent. of the total support afforded by the original coal seam, viz., hydraulic stowing, which had

not yet been tried in South Wales. Mines packed in this manner and with ferro-concrete lined roadways would be rendered comparatively safe so far as huge dust explosions are concerned. The number of accidents from falls of roof and sides would also be considerably reduced, better ventilation provided and cheaper haulage effected. The cost of packing would be greater, but the saving effected in timber and surface damages more than compensated for the extra outlay, not to speak of the saving of large quantities of mineral wealth for the nation. We still lagged behind America (United States) in the application of machinery to underground mining purposes, particularly in regard to the cutting, filling and transportation of coal.

After having reduced the waste in production and the cost of transit, the next saving might be effected by more careful preparation of the coal for the market. One remarkable improvement had recently been introduced at Glamorgan Collieries by Mr. J. M. Draper, Bridgend, by means of which the finest duff could now be washed sufficiently free from dirt to enable this class of the coal to be used for coking or briquette making. The very fine-t varieties of steam coal duff, which a short time ago was of very small marketable value, could now be compressed by the Sutcliffe process into fuel briquettes without the use of any binding medium, and in this form was equal to the best quality of large steam coal as a steam raising fuel and more suitable for transport or storage.

Perhaps the widest scope for development in the utilisation of coal would result from the many efforts now being made to devise a satisfactory process of low-temperature carbonisation, whereby many of the essential by-products might be extracted from the raw coal before it was completely destroyed as a fuel when burned in boilers, furnaces, domestic fires, &c.

Some 35,000,000-40,000,000 tons of coal were used every year in this country for domestic purposes alone, and wasted large quantities of ammonia, fuel, oil and waste gas (capable of producing enormous power), which were ejected into the atmosphere. A large quantity of the coal used for industrial purposes could be saved if household coal was treated in this manner and replaced by a smokeless fuel. The Navy could use all the available oil fuel produced, and supplies of town gas could be obtained more economically than at present. The drier small coal could be gasified and mixed with the gas from low-temperature carbonisation plants, and used for power production in large central installations, from which it could be distributed throughout the coal field. Our wasteful consumption of raw coal in domestic fires and boilers, etc., was such that, if converted into smokeless fuel, it would produce “waste gas” of sufficient power to work electrically the whole of the railways in South Wales.

Having established a number of low-temperature carbonisation installations throughout the coal field, central depots could then be arranged for the treatment of heavy oils and tars, which would, in turn, form the basis of many new chemical industries for the production of the essential chemicals for pharmacy, photography, dentistry, the manufacture of explosives, dyes, etc., for which we had too long been dependent upon Germany.

What was wanted was a definite scheme of research to be undertaken in South Wales on South Wales coals to meet South Wales requirements. A National Research Board had been dealing with this subject for some time past, but there was too much work to be done, and the conditions prevailing in South Wales were so different to those of any other coal field that a special board was essential for this coal field if any immediate progress was to be made.

Need for Technical Education.

One of the chief reasons for our backwardness in industrial research work as compared with America or Germany had been the lack of technical education in this country, but here again there was a splendid opportunity for South Wales to give a further lead to the Empire, as it had already in the matter of mining technology. The Fisher Education Bill, if passed into law, would mark a decided improvement in providing youths with a better opportunity of acquiring at least an elementary knowledge of the technique of their industrial occupation. If properly graded and assisted by scholarships, the new system would enable many youths who, after having acquired a taste for technical education in their earlier courses, would continue their training in the higher branches of technology.

Many large technical schools with well-equipped laboratories would be required for this purpose throughout the coal fields; leading up to central colleges, to which the ablest boys would eventually gravitate, along with boys from secondary schools who had specialised on the science side. With the system of apprenticeship already established in South Wales for students at this stage, the combination of practical and technical training thus provided should be capable of turning out a supply of efficiently trained men to carry on the development already forecasted.

Some co-ordinated system embracing the educational institutions, providing the training and the industry for which the students were being trained, was also required; and, here again, it would seem that South Wales was going to give a lead to the Empire, a committee of the business men of South Wales and Monmouthshire having been formed which, in conjunction with the authorities responsible for university and technological education, had drawn up a scheme for the formation of a Faculty of Technology and a Board of Technology, which scheme, if accepted, would provide educational facilities unequalled in any part of the Empire.

Organisation.

Of late years the responsibilities of the colliery manager had been greatly enlarged, and it had now become necessary to consider whether future developments would not be expedited if some subdivision of those responsibilities could be effected. It was not possible for a colliery manager to be an expert in mechanical, electrical and chemical engineering as well as in mining, surveying and geology. At any rate, it

would not leave him much spare time to study economics, psychology and legislation affecting the management of mines.

There was a great deal to be said in favour of some system of training which would enable officials, whether colliery managers, engineers or chemists, to have an opportunity of keeping in touch with the latest developments in their respective branches by attending special courses of instruction at suitable educational centres.

The most capable colliery managers would ultimately become the mining engineers, agents or directors, and would then have control of all the departments involved at the colliery, assisted by specialists in the various departments, who would be responsible for the efficient management of and suggested improvements in their respective departments. It would then be possible to have efficient schemes of works organisation developed on the lines adopted in the largest modern engineering works, which would ultimately lead to more up-to-date mechanical processes being substituted for the more antiquated costly system now too frequently in use.

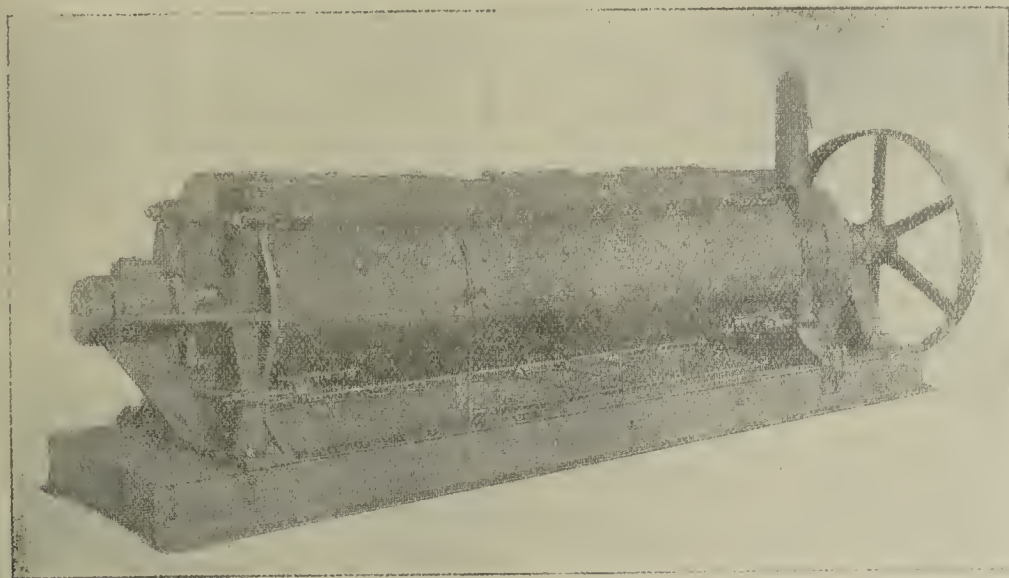


FIG. 1.—MIXER FOR COAL AND BINDER.

Another type of official whose services in the coal field would greatly assist in the development of our natural resources, but for whom no method of training had yet been devised, was the mining geologist, since there were many scientific and economic problems awaiting solution which he alone was likely to solve. The microscopical investigation of coal in itself offered a wide field for research, and might be of considerable help in assisting the chemist to determine the best varieties of coal and most suitable conditions under which low temperature carbonisation can be established. Then there was the question of our clay, silica and dolomite deposits, some of which would prove worthy of investigation, with a view to the establishment of works for the production of highly refractory bricks, which up till now had been largely imported. Many other geological problems, some of them purely scientific, such as the "formation of coal seams," but many of them essentially practical—as for an example, "subsidence," "index sections," could be successfully investigated if specially trained men were available who could give their whole time to the work.

Perhaps the mining industry, when properly organised, would do more to re-establish our industrial supremacy than anything else that could be imagined in the process of reconstruction, and the speaker believed we could hopefully look forward to the future scientific development of the mining industry, when the valleys of South Wales would be teeming with industrial life without the present day accompanying evils of smoke and dust and ugly rubbish heaps: when the hill sides would again be clothed with new forests, and the electric railways competing with a fast aerial service; when the fuel for industrial purposes would be conveyed to the seaports in pipes, and the power for local needs be transmitted and distributed by cable: when it would be safe to build garden cities over underground workings, and when coal would be used as the basis of innumerable other engineering and chemical industries, instead of being wastefully discharged into the atmosphere.

Supplies of Coke.—The Board of Trade has issued the following announcement: There are at the present time ample supplies of coke at gas works in the Metropolitan coal area. Consumers are therefore requested to take advantage of the position to complete their stocks of coke under their requisitions by placing immediate orders for their requirements. Mild weather also offers facilities for carting, which in any case is likely to be restricted in the near future. On both these grounds consumers should take the present exceptional opportunity to lay in coke supplies.

Wages, Profits, and Prices.—The Select Committee of the House of Commons on National Expenditure has presented its second report, which deals with the questions of Parliamentary Estimates during the war, the control by the Treasury over the expenditure of the departments, and the effect on national expenditure of the increase of prices and the causes of that increase. In one passage of the report the Committee observes: "Fresh cycles of wage advances succeed one another. Each one results in further increases of prices or in preventing a reduction of prices."

"The producers are raising prices against themselves as consumers. Meantime the cost of the war is vastly increased. We are deeply impressed by the seriousness of the position in this respect, and are convinced that, if the process continues, the result can hardly fail to be disastrous to all classes of the nation." It is recommended that the strongest case should be required to be established before any advance of wages is conceded on any ground other than the rise in the cost of living.

ANTHRACITE CULM BRIQUETTING PLANT.*

By G. J. MASHEK.

Until quite recently, the very large quantities of culm produced in the Pennsylvania anthracite region have been thrown on the dump, owing to the comparative cheapness of the better grades of coal. Many attempts have been made to utilise this culm by briquetting, and quite a number of plant equipments have been imported, on which considerable capital has been expended; but all turned out to be financial failures, and are not now in operation. The result has been that new processes, machinery, binders, and methods for briquetting American coals have had to be gradually invented, developed, and perfected, so as to produce at comparatively low cost a product that could compete with high-grade natural coal.

Of considerable delay to the development of fuel briquetting in the United States, especially of anthra-

cite, has been the question of the binder to hold the product together in the briquetted form. In Europe, practically all the factories are using coal tar pitch as a binder. The briquetting of fuels in the United States started with this same material, but serious objections were raised to it by the consumers, so that as long as this material appeared to be the only available binder little progress was made. In recent years, however, a great improvement has been made in the quality of the coal tar pitch, so that now this material can be obtained containing as low as 5 per cent. of free carbon and only a small creosote content. There are locations some distance from the better mines where, with a coal tar pitch binder, the briquetting of the local inferior coals might be made successful. The product would fill all requirements; in fact, it would be better fuel than the coal from which it was made, and, owing to the high price of high-grade natural coal, it would meet a ready market.

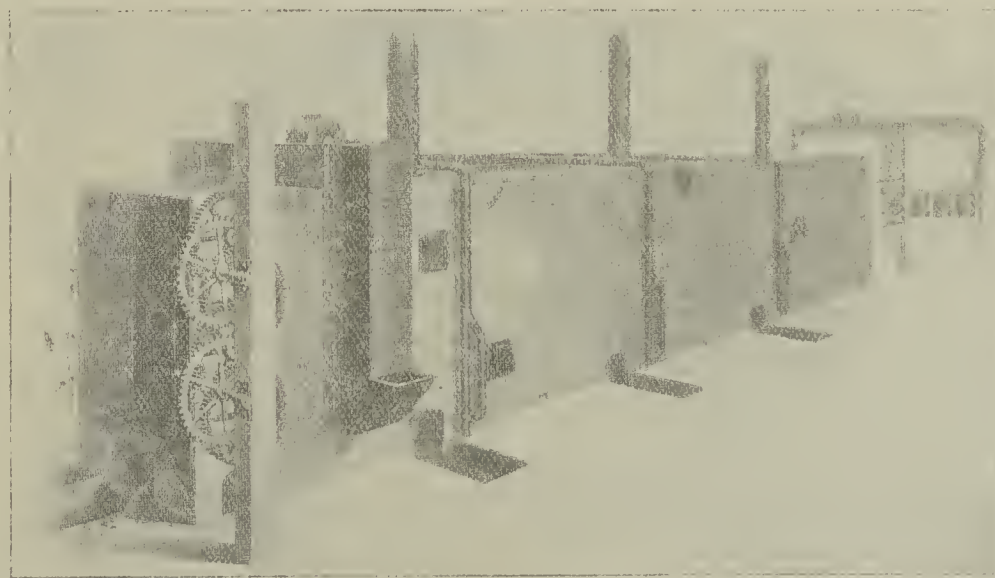


FIG. 2.—OVEN FOR BAKING BRIQUETTES.

To-day there are few plants using coal tar pitch as a binder, and those that do make use of this material are all located in sections of the country where smokeless or high-grade fuels are practically unobtainable. Most of the other plants are now employing a special grade of oil residuum asphaltum specially made for this purpose. This is all carbon, and makes a first-class binder for briquettes. The binder produces little smoke in burning, and no appreciable odour, but is still objectionable in the exclusively anthracite burning sections of the country, however, on account of the oily vapours it gives off for a few minutes after ignition. This condition is well known to practically all the coal operators who produce a smokeless natural product.

During the last 20 years many patents have been issued covering binders especially suitable for anthracite dust and coke breeze. These, it is claimed, produce a smokeless briquette. In addition to the patented formulae, there are a number of secret binders, several of which have been tried quite extensively, and some of which produce a very satisfactory product; but no progress of any consequence was made in the use of any of these binders until 1916, when the

Gamble Fuel Briquette Company, of Pennsylvania, erected a plant for testing on a commercial scale, the feasibility of a binder developed by Dr. B. E. Gamble, the principal ingredient of which is sulphite pitch. This pitch is obtained as a by-product in the preparation of wood pulp for paper making, and according to the reports of the United States Geological Survey, upwards of 1,500,000 tons of this material goes to waste every year. This material can be recovered readily, and under the names of "glutrin" and "binderine," is being used extensively as a core binder in steel and iron foundries in preference to flour, molasses and the other materials used heretofore.

The sulphite pitch is all carbon, makes an excellent binder, does not soften on ignition or from heat (which is an important consideration), is easily distributed through the coal dust, and is in itself an ideal binder in every respect, except that in its natural state the material is not waterproof. For this latter reason it was hitherto considered useless for briquetting fuels.

The Gamble process of waterproofing sulphite pitch binder briquettes makes use of an oil base waterproofing compound, a low melting point asphalt obtained from the distillation of an asphalt base oil. The particular substance used is what is known as hydrolene, which has a melting point of from 110 to 150 degs. Fahr. (cube water test). Whilst neither the sulphite pitch nor the low melting point flux or asphalt is new, the method of putting the two together and using only a small percentage of the waterproofing to make a waterproof briquette has taken considerable time to develop.

The sulphite liquor, as obtained from the pulp mills, usually contains from 2 to 7½ per cent. of cellulosic and resinous material dissolved from the wood by sulphurous acid. In concentrating this liquor, it is necessary first to neutralise this acid, and then evaporate it in quadruple-effect stills until the liquid contains from 50 to 52 per cent. of solids, is of about 22 Bé. gravity, and weighs approximately 10½ lb. to the gallon. The remaining portion of this sulphite pitch is water.

The method of introducing and using these materials is first to coat all the particles of coal dust with the sulphite pitch during the first stage of the mixing operation, diluting it with water if necessary so as to cover every particle of coal. The mixture is then heated and partly dried in the mixers (fig. 1), after which is introduced from 1 to 1½ per cent. of either the low melting point asphalt, water-gas tar, or other material of an oily nature that acts as a waterproofing medium, in order to put a coating on the outside of the sulphite pitch covering each particle of coal; this is followed by further mixing, with increasing heat. In order to make a hard product, it is necessary to carry out this mixing thoroughly before the material is delivered to the press, as stated above, the briquettes being formed under a pressure of about 3,000 lb. per square inch.

The briquettes coming from the press will stand a drop of 10 to 12 ft. without breaking. They are delivered by a belt conveyor to a special continuous moving type of drying oven (fig. 2), where the remainder of the moisture in the sulphite pitch is first evaporated slowly. This causes the binder to harden, and set as hard as the coal.

The briquettes, without being disturbed on the

carriers, then pass to another portion of the oven, where the temperature is considerably higher. Here partial distillation of the oil takes place, so that the oil vapour penetrates to all parts of the briquette, practically converting the sulphite pitch back into its original resinous state. It is then entirely waterproof, without possessing the disadvantage of softening under heat or while undergoing combustion. According to the nature of the waterproofing compound, the final temperature to which the briquettes are subjected sometimes runs as high as 600 degs. Fahr. They are then cooled before being deposited in the briquette bin ready for delivery.

The final product is harder, will stand more handling, and produce less breakage than the hardest prepared size of anthracite; and hardness is practically the same, regardless of hardness of the coal dust from which the briquettes are made. They are of uniform size, are easily ignited, and will hold fire in the anthracite. They are of the over-stuffed type, and weigh about 2 oz. each. The question of the suitable shape or the size of the briquette is an important, and depends on the purpose for which it is intended to be used.

The arrangement of the machinery is such that material travels logically from stage to stage during

* Coal Age.

Prof. BOYD DAWKINS, in seconding the resolution, said that many years ago he tried to get the Geological Survey to use the materials which were being accumulated in the district in order to bring the map up to date, but he was informed they had no men to spare to undertake the work. Then he offered to give the whole of the materials he possessed into their hands if they would correlate them in the Geological Survey office. To that also they returned a negative reply, and it was a great pleasure to him now to see that the material accumulated during all these years by himself and by many others who had got much more than he had, was being so very well used by Dr. Hickling in illustrating the geology of Manchester. He thought the hint Dr. Hickling had given them, that they should defer the discussion until they had the paper in print, might meet the situation. He felt that in seconding

Two members of the committee shall vacate office every three months, and their places shall be filled by the representatives of two other firms next on the exporters' list, as doing the largest percentage of the trade. In the case of those who shall first retire shall be those whose subsequent retirements shall be those of the chairman and vice-chairman shall be those who always eligible for re-election. Those retired into the pool shall be divided into two groups, A and B, and their shares of the pool shipped named in the list obtained from the committee in proportion to their percentage quantity in each group, and distributed according to their correct returns. The division shall be made quarterly.

the resolution with great pleasure, he was expressing the sentiments of the meeting.

The resolution was carried.

Dr. HICKLING, in responding, referred to the work that had been done by others, mentioning Mr. Percival and Miss March, as having been of great assistance to him in his investigations.

Mr. ATHERTON said the Openshaw section which Dr. Hickling had referred to was largely settled by Prof. Hull at the time it was put down, and certainly for the last 30 years they had followed the lines Dr. Hickling had so ably put before them. He did not think it was the end by a long way. There was one question he would like to ask Dr. Hickling which had not been emphasised enough. Apart from the faults, the question of the thickening and the thinning of the sandstone and the marls—were those definite magnetic directions? His own experience had been that from the size of the faults they could not judge where the thickening or thinning took place, but the direction, as they saw it followed in the mines, largely left them to form an idea as regarded the direction of the thinning. He preferred to take it as thinness, because as miners they wanted to find the thinnest spot, especially when they came to deal, as he expected they would, with the Radcliffe fields. It was a most interesting point, because by careful working they could take one level line through which would show in the different mines a practically level line, and the angles and directions in those levels led to the conclusion that a practical working might take place, whether it was a question of water supply or of mining, because personally he thought the two were synonymous.

Mr. PATON asked whether it were possible that the variation of record in the boreholes was in any way due to an erosive effect. He had had to consider a field in which 200 were entered and supposed to be different, and he found out the actual effect had been one of water erosion. It seemed to him there had been at some period an action from the north-east down through and into the Mersey basis, and as they came nearer to that the accentuation of the washout effect was much more common. In following that out, he thought that if he could follow it to a prior formation, and get some structure which gave evidence of the past transfer of material, he might get some information which would enable him to co-ordinate it. In one region he found a washout somewhere about 100 yds. There had been at one time, at the mouth of the Cheshire plain, a transference and an erosive effect. He had wondered whether that erosive effect had taken place through that basis, and that the variation in the borehole results might not be due to boreholes plunging into a very much washed out area. He took a glacial bed, and co-ordinated that with the strata.

Dr. HICKLING, in replying, said the two questions were much on the same lines, he thought. The concern in both cases was with the thickening and thinning of the beds, and he would like to clear the matter by saying that, so far as he had been dealing with that question, the thickening and the thinning was almost entirely confined to one band of rock, the so-called permian marls, and in that case he thought there was no doubt whatever that the actual facts were just as he had described them, namely, that the variation in thickness was due to the marked unconformity between the sandstones and the overlying marls, resulting in the fact that large portions of the sandstones were worn away. In some areas the whole was worn away before the marls were deposited. As regarded Manchester, they might describe the matter in this way: that if the sandstones had been formed, and before the marls were laid over the top, the main portion of the great faulting was accomplished, the result was that large masses of the permian sandstones lay in deep faulted troughs; then by denudation the upstanding portions of the sandstones were all swept away. The only portion of the sandstones left were those which were protected by lying in those deep troughs; consequently when the marls came to be laid down on the new surface where the marls were above the faulted troughs, they were separated from the ordinary coal measures by the great thickness of the sandstones; but in those regions which had been faulted up, the sandstones had been completely worn away, and in those regions, therefore, the marls rested directly on the ordinary coal measures without the intervention of any sandstones at all. That was a highly important fact, and he thought the explanation which had been given was undoubtedly the correct one.

Mr. ATHERTON said his experience was that the general line of fault always thinned to the north. It was not a question of following the line of the fault—the fault was the thickest point, and the outcrop was the thinnest. It always thinned towards the north; the thickest had been to the south.

Dr. HICKLING said with that he agreed; as far as the sandstone was concerned, it thickened to the south. But again the question of the fault came in.

Mr. PATON said the line he had in his mind ran parallel with the line of the bores mainly, and it was a matter of actual denudation; on one side they had the coal, and on the next side they missed the coal. They got a large trough formation faulted in by some other matter, and in trying to find out the extent to which the denudation passed he went back to the ice floor, and took some materials from it.

Dr. HICKLING, referring to a specimen handed to him by Mr. Paton, said he should not like to take it as a thing to correlate from. It was an ironstone nodule; no doubt Mr. Paton did match quite correctly, but he thought he might match the specimen at almost any horizon in the coal measures.

Partnership Dissolved.—The *London Gazette* announces dissolution of the partnership of S. H. Smith (who continues the business) and F. H. Rigby, trading as Smith and Rigby, metal merchants, Bishop-street, Birmingham.

MINING EMPLOYMENT STATISTICS.

In the returns relating to the industrial position during November the Board of Trade *Labour Gazette* states that employment in coal mining continued good except in a few districts where difficulties of transport were still reported. Compared with October there was an increase of 2,171 (or 0.4 per cent.) in the number of workpeople employed at collieries making returns, and an increase of 14,961 (or 2.7 per cent.) on a year ago. Of the 563,747 workpeople included in the returns for November, 259,240 (or 46 per cent.) were employed at pits working 12 days during the fortnight to which the returns relate, while a further 151,250 (or 26.8 per cent.) were employed at pits working 11, but less than 12 days.

Districts.	Work-people employed in Nov. 1917.*	Average No. of days worked per week by the collieries in fortnight ended				Inc. (+) or dec. (−) in Oct. 1917, on a	
		Nov. 1917.	Oct. 1917.	Nov. 1916.	Month ago.	Year ago.	
		24, 1917.	27, 1917.	25, 1916.	Days.	Days.	
<i>England & Wales.</i>							
Northumberland ...	38,574	4.96	5.24	5.01	−0.28	−0.05	
Durham	89,945	4.81	4.93	5.35	−0.12	−0.54	
Cumberland	6,310	5.62	5.42	5.68	+0.20	−0.06	
South Yorkshire ...	65,158	5.83	5.91	5.84	−0.08	−0.01	
West Yorkshire	25,611	5.82	5.83	5.78	−0.01	+0.04	
Lancs. & Cheshire	53,564	5.86	5.92	5.78	−0.06	+0.08	
Derbyshire	37,285	5.82	5.69	5.77	+0.13	+0.05	
Notts and Leicester	31,298	5.67	5.68	5.66	−0.01	+0.01	
Staffordshire	29,069	5.93	5.63	5.84	+0.30	+0.09	
Warwick, Worcester and Salop	8,230	5.82	5.81	5.86	+0.01	−0.04	
Glo'ster & Somerset	4,287	5.96	5.96	5.89	—	+0.07	
North Wales	6,730	5.97	6.00	6.00	−0.03	−0.03	
South Wales & Mon.	118,747	5.43	5.28	5.55	+0.15	−0.12	
Total	514,808	5.49	5.49	5.56	—	−0.07	
<i>Scotland.</i>							
West Scotland	21,832	5.22	5.36	5.35	−0.14	−0.13	
The Lothians	2,357	5.53	5.46	5.45	+0.07	+0.08	
Fife	24,287	4.96	4.91	5.25	+0.05	−0.29	
Total	48,476	5.11	5.13	5.30	−0.02	−0.19	
<i>Ireland.</i>							
Total	463	5.48	5.63	5.71	−0.15	−0.23	
Total, U.K.	563,747	5.46	5.46	5.58	—	−0.12	

* At the collieries included in the table.

The following table shows the numbers employed and the average number of days worked, distributed according to the principal kind of coal raised at pits at which the workpeople were engaged.

Description of coal.	Work- people em- ployed in Nov. 1917.*	Average No. of days worked per week by the pits in fortnight ended			Inc. (+) or dec. (−) in Oct. 1917 on a	
		Nov.	Oct.	Nov.	Month ago.	Year ago.
		24,	27,	25,		
		1917.	1917.	1917.	1916.	
		Days.	Days.	Days.	Days.	Days.
Anthracite	5,865	5.61	5.39	4.62	+0.22	+0.99
Coking	26,152	5.57	5.55	5.75	+0.02	−0.18
Gas	33,708	4.49	4.37	5.28	+0.12	−0.79
House	51,445	5.57	5.64	5.61	−0.07	−0.04
Steam	205,607	5.46	5.47	5.55	−0.01	−0.09
Mixed	240,970	5.55	5.55	5.64	—	−0.09

* At the collieries included in the table.

Iron, Shale and other Mining.—Employment continued very good at iron and shale mines. Returns received for each of the three periods named below, relating to the same mines, works and open works in each case, show that 19,164 workpeople were employed at mines included in these returns in November 1917, an increase of 364 (or 1.9 per cent.) compared with October, and of 2,118 (or 12.4 per cent.) on a year ago.

Districts.	Work-people employed in Nov. 1917.*	Average No. of days worked per week by mines in fortnight ended			Inc. (+) or dec. (−) in Nov. 1917 on a	
		Nov.	Oct.	Nov.	Month ago.	Year ago.
		24,	27,	25,		
		1917.*	1917.	1917.	1916.	
		Days.	Days.	Days.	Days.	Days.
Cleveland	7,626	5.99	5.79	5.66	+ 0.20	+ 0.33
Cumberland and Lancashire	6,554	5.93	6.00	5.93	− 0.07	—
Scotland	705	6.00	5.75	5.37	+ 0.25	+ 0.63
Other districts	4,279	5.94	5.86	5.88	+ 0.08	+ 0.06
Total	19,164	5.96	5.87	5.79	+ 0.09	+ 0.17

* At mines included in the returns.

Shale.—The returns show that 5,098 workpeople were employed in the fortnight ended October 24, 1917, at mines which worked on the average six days per week, compared with 4,846 workpeople in October at mines which worked six days, and with 4,746 workpeople in November 1916, at mines which worked 6.04 days per week.

Pig Iron Industry.—Employment continued good, and showed an improvement compared with both a month ago and a year ago. Shortages of materials and of labour were reported from most districts. The number of furnaces in blast (England, Scotland and Wales) totalled 299, an increase of 10 on a year ago.

Iron and Steel Works.—Employment at iron and steel works continued good, and was better than a year ago. The number of shifts worked by 111,627 workpeople showed an increase of 2,960 (or 0.4 per cent.) on a month ago. The shipbuilding, engineering and metal trades were working at high pressure, with much overtime. Engineering trade unions, with 308,851 members (mostly in skilled occupations) reported 0.1 per cent. unemployed at the end of November, exactly the same as a month ago and a year ago.

Tin-plate.—Dealing with the places covered by the returns, 73 tin-plate works and 250 tin-plate mills were in operation. These mills showed an increase of three on a month ago, and a decrease of 38 compared with November 1916. The sheet steel works numbered 84, and sheet steel mills 55.

Tubes.—Employment was good at Birmingham, and good at Wednesbury and in South Wales and Monmouthshire.

Prices and Wages.

The results of the ascertaining of the selling price of coal and iron in various districts are given in the table below:—

Product and district.	Period covered by last audit.	Prices according to last audit.		Inc. (+) or dec. (−) of last audit on	
		Average selling price per ton.	Previous audit.	A year ago.	
COAL.*	1917.	s. d.	s. d.	s. d.	
Durham	July-Sept.	16 0 ¹ / ₄ ...	+ 0 4 ³ / ₄ ...	+ 0 1 ¹ / ₂ ...	
MANUFACTURED IRON.					
North of England †	Sept.-Oct.	275 4 ¹ / ₂ ...	+ 1 11 ³ / ₄ ...	+ 18 2 ¹ / ₂ ...	
Midlands ‡	Sept.-Oct.	307 2 ¹ / ₂ ...	+ 1 4 ¹ / ₂ ...	+ 18 7 ¹ / ₂ ...	
West of Scotland §	Sept.-Oct.	290 8 ¹ / ₂ ...	+ 1 3 ¹ / ₄ ...	+ 20 11 ¹ / ₂ ...	
* Average of all classes of coal at pit's mouth.					
† Rails, plates, bars and angles.					
‡ Bars, angles, tees, plates, sheets, hoops, strips, &c.					
§ Rounds, squares, flats, tees, angles, &c.					

* Average of all classes of coal at pit's mouth.

† Rails, plates, bars and angles.

‡ Bars, angles, tees, plates, sheets, hoops, strips, &c.

§ Rounds, squares, flats, tees, angles, &c.

In connection with the ascertaining of the average selling price of Durham coal, wages remained unaltered at 107 $\frac{1}{2}$ per cent. above standard, plus the war wage of 1s. 6d. per day to men 16 years of age and over, and 9d. per day to boys under 16 years of age. In all three districts the wages of puddlers and millmen remain unchanged during December 1917 and January 1918 as a result of the ascertaining of the specified classes of manufactured iron.

In coal mining generally the net increase of wages amounted to £473,100, and it affected 1,008,000 workpeople; in iron mining the net advance of £14,400 affected 28,000 workpeople; in pig iron manufacture £6,500, affecting 26,000 workpeople; in iron and steel manufacture £21,500, affecting 92,500 workpeople; and in engineering and shipbuilding £435,700, affecting 1,023,000 workpeople.

In South Derbyshire and Leicestershire, commencing November 19, the basis rate was increased from 47s. 3d. per week for deputies, and from 7s. 1 $\frac{1}{2}$ d. per day for other workpeople to 8s. 4d. per day for those of five years' standing and over, and 7s. 6d. per day for those of less than five years' standing. The basis rate for shot firers was increased by 4d. per day at the same time.

In ironstone mining and quarrying in North Lincolnshire, commencing November 4, an increase was granted under sliding scale, of $\frac{1}{4}$ per cent. (making wages 59 per cent. above the standard of 1909, plus a war bonus of 1s. 1d. per shift).

Nottingham carters received an increase of 6s. a week (38s. to 44s.), and Leicester carters 7s. per week, making the weekly wage 41s. for carters and 40s. for loaders. In South Wales the war bonus to coal trimmers was increased from 37 $\frac{1}{2}$ per cent. to 60 per cent.

Disputes.—In mining and quarrying eight new disputes occurred, affecting 136,931 directly or indirectly. The dispute in South Wales and Monmouthshire regarding examiners and others lasted three days, and the miners' dispute in Rhondda Valley occupied two days. After a four-days' dispute regarding the exclusion of semi-skilled and unskilled engineering workers from the recently-granted bonus, work was resumed pending the decision of the Ministry of Munitions.

Accidents.—Fatalities to underground workers numbered 86, an increase of five on a month ago and 15 on a year ago. The fatalities to surface workers were 17, compared with seven a month ago and 15 a year ago. In the 11 completed months of the year the total number of fatal accidents at mines was 1,198, as compared with 1,154, an increase of 44 on 1916.

FRENCH ADVISORY COMMITTEE ON MINES.

The French Government has created an Advisory Committee to investigate the mineral resources of the country, with a view to increasing the output, and to advise the Minister of Mines on subjects relating to the mining industry.

The Committee, which is attached to the Ministry of Munitions, is to advise on matters concerning mines and mining, particularly on those pertaining to policy and improvement and the extension of mining areas. It will study ways and means for carrying out prospecting work, and suggest modifications of the existing law relating to the granting of concessions and the control of operations if necessary. The Minister of Munitions is President of the Committee, and the official members include:—Former Ministers of Public Works and of Munitions, the President of the Commission on Mines in the Chamber of Deputies, the reporters of the Mining Budget attached to the Finance Committee of the Senate and the Budget Committee of the Chamber, the President of the Mines Department of the Ministry of Public Works, the Director of Mines for the time being, the Directors of Labour at the Ministry of Labour, and the Vice-President of the General Mining Council.

The President of the Public Works Department is vice-president of the Committee, and the Director of Mines secretary. Other members, nominated by Decree, will be six deputies, three of whom are members of the Commission on Mines; five senators; two Councillors of State; ten representatives of industrial undertakings in connection with mines (coal, iron and other metals); five miners' representatives; one representative of the Ministry of Finance; one representative of the Ministry of Commerce; and four inspectors-general of mines.

The Committee may appoint sub-committees from amongst their own members, and their reports may be submitted by the Minister, for consideration by the Committee as a whole.

The official members of the Committee nominated by the Ministry are:—MM. Boudinot, Chéron, Cail, Jeanneney et Perchot, senators; Bouvier, Maréchal, Cachin, Lebrun, Léon Perrier, de Wendel, députés; Cavalier, Darcy, Elby, J. Faure, Léon Levy, Nivoit, Paul Petit, Pralon, Reumaux, Eng. Schneider, industriels; Bartuel, Desgreux, Duranton, Maes, Tourrel, miners' delegates; Dougaos, Henriot, Ternier, Weiss, inspectors-general of mines.

EFFECTS OF STORAGE UPON THE PROPERTIES OF COAL.*

By S. W. PARR.

(Continued from page 1037.)
Summary of Chemical Studies.

The results presented in the foregoing tables, and the data analysed in the discussions, may be summarised as follows:—

(1) After a period of one year, the indicated loss of heat values is relatively low, averaging about 3 or 3½ per cent.

(2) Different coals vary in indicated heat losses, those from the Southern Illinois districts showing less change than those from the central part of the State. Exposure beyond a period of one year accentuates this difference between coals from different localities. The denser coal, such as those from Williamson county, undergo but little additional change, while the coals from the northern parts of the State show a decrease in the indicated heat values. The difference, however, does not exceed about 10 per cent.

(3) Deterioration is consistently greater in the case of screenings than in that of screened nut.

(4) Since the heat values are referred to the unit coal basis, that is, the moisture, corrected ash, and sulphur free material, and since an actual loss of heat values by ordinary processes of oxidation would result in the formation of CO_2 and H_2O , both volatile under the conditions, it follows that the heat losses are largely relative, since they must result from a relative increase in weight of the organic substance of the coal. For example, any increase in weight, as by the addition of oxygen to the chemical structure of the organic material, would result in a lower indicated heat value per pound of the unit substance, as compared with the heat value per pound before such addition had occurred. Similarly, changes in the sulphur combination due to oxidation would increase the weight of the coal in a manner not taken into consideration in deriving the "corrected" ash values. Thus, where FeS_2 becomes $2\text{FeSO}_4 + 7\text{H}_2\text{O}$, the relative weights for sulphur are in the ratio of 1:7; that is, the content of sulphur compounds as the result of the new combinations has increased in weight seven times.

(5) Storage in open bins shows quite consistently a lower percentage of loss of heat value per pound than is the case with storage under cover. This is easily understood when it is considered that the additional material formed, due to the oxidation of the sulphur, is soluble, and tends to leach out under the long continued application of water resulting from exposure to the elements. For this reason, therefore, the increase in weight is greater in the case of the coal under cover than in that of the coal exposed in open bins. The resulting unit coal values should, therefore, be higher for the coal stored in open bins, or the leached coal, than for the coal stored under cover or the unleached coal. Comparisons as to the relative values in covered and uncovered bins should, however, be made only up to and including the three-year period. The removal to new locations of the bins and piles shortly before the three-year-old samples were taken resulted in the reconstruction of the covered bins with flat and leaky roofs through which the water had more or less free access to the coal.

(6) The extent of oxidation or increase in weight is a function of the character of the coal. The coal in which the cellulose residuum seems to predominate has the greater avidity for oxygen, and the coal in which the resinic residuum predominates is less affected. The tabulation of the samples, therefore, is in the order of such activity, namely, Sangamon, Vermilion, and Williamson counties. This feature is consistent with the studies in the absorptive capacities for oxygen of various coals as carried on by Porter and Ralston, and is especially of interest in connection with the studies of Dr. Hadley on the relative avidity for oxygen of the cellulose residuum as compared with the absorptive capacity of the resinic bodies, separation into these two type components being effected by means of phenol.† According to the results derived by Dr. Hadley, the cellulose residue had a far greater avidity for combination with oxygen than the resinic material.

TABLE 9.—PERCENTAGE OF MOISTURE IN WEATHERED COAL, LOSS DUE TO AIR-DRYING AND THE AMOUNT RETAINED BY THE AIR-DRIED SAMPLES.

Coal, county and condition.	Total moisture.	Loss due to air-drying.	Moisture retained in air-dried sample.
Screenings Vermilion Exposed bin	17.70	14.15	4.14
Nut Sangamon Covered bin	19.95	16.54	1.09
Screenings Williamson Exposed bin	12.01	8.59	3.74
Nut Vermilion Covered bin	17.79	14.50	3.85
Screenings Sangamon Exposed bin	19.26	15.79	4.12
Nut Williamson Exposed bin	9.77	7.05	2.93
Screenings Sangamon Exposed bin	20.35	17.01	4.03
Screenings Sangamon Covered bin	22.04	19.36	3.33
Nut	20.02	16.01	4.77
Screenings Sangamon Exposed bin	12.54	9.45	3.30

Ill. Eng. Exp. Sta. Bull. 76, p. 21, 1914.

TABLE 10.—RESULTS OF SIZING TESTS ON NUT COAL STORED IN OPEN BINS.

Round-hole screen.		Original sizes.		In storage for 1½ years.		In storage for 6 years.	
Thro'. In.	Over. In.	Per cent.	Cumulative, per cent.	Per cent.	Cumulative, per cent.	Per cent.	Cumulative, per cent.
3	1	89.4	—	64.3	—	30.9	—
1	3	4.1	93.5	6.9	71.2	9.6	40.5
3	5	3.5	97.0	8.4	79.6	15.9	56.4
5	12	1.2	98.2	3.2	82.8	8.5	64.9
12	30	0.6	98.8	4.0	86.8	3.2	68.1
30	60	0.6	99.4	7.4	94.2	17.0	85.1
60	100	0.6	100.0	5.8	100.0	14.9	100.0
Total		100.0		100.0		100.0	
Av. dia. (in.)		1.854		1.442		0.889	
Vermilion County.							
3	1	66.2	—	42.5	—	25.0	—
1	3	5.0	71.2	8.6	50.5	6.3	31.3
3	5	7.2	78.4	11.8	62.3	12.5	43.8
5	12	4.0	82.4	6.9	69.2	8.7	52.5
12	30	4.0	86.4	6.8	76.0	12.5	65.0
30	60	5.0	91.4	10.6	86.9	16.3	81.3
60	100	8.6	100.0	13.1	100.0	18.7	100.0
Total		100.0		100.0		100.0	
Av. dia. (in.)		1.458		1.074		0.753	
Williamson County.							
3	1	94.0	—	70.2	—	60.6	—
1	3	1.6	95.6	5.7	75.9	9.1	69.7
3	5	1.8	97.4	6.6	82.5	8.3	78.0
5	12	0.7	98.1	3.1	85.6	2.7	80.7
12	30	0.5	98.6	3.2	88.8	3.7	84.4
30	60	0.5	99.1	4.6	93.4	5.5	89.6
60	100	0.9	100.0	6.6	100.0	10.1	100.0
Total		100.0		100.0		100.0	
Av. dia. (in.)		1.910		1.532		1.383	

TABLE 11.—RESULTS OF SIZING TESTS ON SCREENINGS IN OPEN BINS.

Round-hole screen.		Original sizes.		In storage for 1½ years.		In storage for 6 years.	
Thro'. In.	Over. In.	Per cent.	Cumulative, per cent.	Per cent.	Cumulative, per cent.	Per cent.	Cumulative, per cent.
1½	1	38.8	—	15.1	—	10.0	—
1	1½	7.9	46.7	9.3	24.4	8.2	18.2
1½	3	13.2	59.9	15.6	40.0	14.5	38.7
3	6	6.6	66.5	7.7	47.7	10.9	43.6
6	12	7.2	73.7	9.4	57.1	15.4	59.0
12	30	11.2	84.9	17.2	74.3	24.5	83.5
30	60	15.1	100.0	25.7	100.0	16.5	100.0
Total		100.0		100.0		100.0	
Av. dia. (in.)		0.768		0.498		0.452	
Vermilion County.							
1½	1	19.0	—	11.3	—	8.8	—
1	1½	8.9	27.9	6.3	17.6	6.3	15.1
1½	3	14.8	42.7	12.9	30.5	12.1	27.2
3	6	8.5	51.2	9.3	39.8	9.3	36.5
6	12	11.1	62.3	11.8	51.6	13.9	50.4
12	30	16.4	78.7	21.0	72.6	29.0	79.4
30	60	21.3	100.0	27.4	100.0	20.6	100.0
Total		100.0		100.0		100.0	
Av. dia. (in.)		0.548		0.425		0.403	
Williamson County.							
1½	1	18.9	—	19.0	—	6.0	—
1	1½	9.0	27.9	9.2	28.2	5.5	18.2
1½	3	14.4	42.3	15.4	43.6	11.5	32.7
3	6	8.5	50.8	9.5	53.1	9.3	43.6
6	12	10.4	61.2	10.6	63.7	14.4	59.0
12	30	15.4	76.6	17.0	80.7	32.2	83.5
30	60	23.4	100.0	19.3	100.0	21.1	100.0
Total		100.0		100.0		100.0	
Av. dia. (in.)		0.542		0.557		0.255	

Changes in Physical Properties.

Sizing Test.—The extent of the disintegration or "slacking" which takes place in connection with the storing of coal is a matter of considerable importance, because of the effect upon combustion on the grates where a large amount of finely-divided material is present. In order to determine the effect of storage upon slacking, the sizing tests were continued to cover the entire period of six years. The tests were made with a revolving screen with round perforations.

TABLE 12.—INCREASE IN FINE MATERIAL AFTER ONE AND ONE-HALF AND SIX YEARS (BASIS OF REFERENCE, THE TOTAL COARSE MATERIAL IN THE ORIGINAL COAL PASSING OVER ¼ INCH SCREEN).

Coal and county.	How stored.	Initial storage.	After 1½ years.		After 6 years.	
		Dust passing ¼ in. screen.	Dust passing ¼ in. screen.	Percentage increase of fine material referred to original coal over ¼ in.	Dust passing ¼ in. screen.	Percentage increase of fine material referred to original coal over ¼ in.
Nut—Sangamon	Open	1.2	13.2	12.1	31.9	31.0
" Vermilion	Open	13.6	24.0	12.0	35.0	24.7
" Williamson	Covered	1.4	11.0	11.1	13.9	12.6
Screenings—Sangamon	Covered	26.3	38.5	16.5	45.1	25.5
" Vermilion	Open	37.7	48.4	17.1	49.6	19.1
" Williamson	Covered	38.8	45.4	10.7	50.6	19.2

Three sizing tests were made: one at the time the coal was placed in storage, one after a period of 18 months, and one at the end of six years. It should be recalled that approximately three years before the last screening tests the storage piles were removed by wagon to a new location involving a double handling. Since the extent of disintegration was not materially different for the coals stored in the exposed bins and for those stored in the covered bins, and since during the last years of storage the covered bins were almost as much exposed to rain and weather conditions as the uncovered bins, the results of sizing tests on coals stored in covered bins are omitted. Those for the coals stored in open bins are presented in Tables 10 and 11.

A condensed summary of the detailed results presented in Tables 10 and 11 is given in Table 12. The total dust passing through a ¼ in. screen is taken as the factor indicating the increase of fine material,

and percentages of increase for the two periods are based on the total amount of material in the original coal over ¼ in. in size. Moreover, the samples taken from this table vary with reference to the method of storage, three being from exposed and three from covered bins. These particular samples are used in the table for the reason that the same storage lots were selected for making the standard boiler tests, which are hereinafter discussed.

An examination of Table 12 shows that the rate of disintegration is consistent with the variety of coal as already discussed in connection with the absorptive capacity for oxygen, and suggests that the process of oxidation of the organic material may be quite as largely responsible for this breaking down of the particles as the oxidation of the finely-divided pyrites sulphur. The latter may or may not be distributed throughout the texture of the coal; this characteristic, for Illinois coal at least, has not been determined.

Boiler Tests on Weathered Coal.

Upon the completion of the storage experiments at the end of the six-year period, it was decided to conduct if possible a series of boiler tests under standard conditions, and to compare the results of tests with stored coal with those of similar tests in which fresh coal is used. Such an opportunity presented itself in connection with a series of boiler tests being conducted at that time by Mr. A. P. Kratz, who was making a general study of boiler losses.*

The coal used as standard material consisted of screenings from the Mission Field, Vermilion County, Illinois. Nineteen tests were conducted, and five additional tests were made on samples of the weathered coal, one sample each of nut coal being selected from the lots from Sangamon, Vermilion, and Williamson counties, and one sample each of screenings from the Sangamon and the Williamson county lots. In ash content and the percentage of finely-divided material, the properties of the stored coals did not differ greatly from those of the fresh coals. An excellent basis was, therefore, provided for comparing the efficiency of the stored and fresh coals.

On the first test the coal banked slightly at the water back, and the whole amount on the grate became clinkered. It immediately became evident that in order to run at all, the coal had to be kept away from the water back. After the clinker had been removed, a fresh start was made, and care was taken to keep the fuel bed from 4 in. to 6 in. away from the water back. When this was done no further trouble was experienced.

With reference to the relative draughts required for a given rate of combustion with the fresh and the weathered coal, the tests showed that a stronger draught is required for the weathered coal. Moreover, by comparing draught requirements for those lots which were in close agreement as to their dust content, it seems evident that the higher draught requirement is not necessarily due to a higher dust factor. The explanation for this is simple, in view of the avidity of freshly-mined coal for oxygen. This avidity seems to be directly related to the free burning character of the coal. Pillar coal and coal that has been long in storage does not burn so freely as fresh coal. On account of this characteristic, such coal is thought to have lost a large part of its heat, when as a matter of fact it may have the same number of heat units but a very different rate of combustion. Another factor, and probably a minor one, is the loss of combustible gases. Mention has been made of the fact that part of the deterioration which occurs in the first few days or weeks after mining is due to the escape of certain light volatile or gaseous fuel constituents. It is evident, therefore, that either on account of the avidity of the fresh unsaturated coal for oxygen, or the presence of light fuel constituent, or because of both conditions combined, the fresh unweathered coal burns freely and gives up its heat units readily, whereas the opposite is true with weathered coal. This difference, therefore, must be offset by a stronger draught, or by some combination of conditions which will effect a speeding-up of the burning or oxidation process. If by this means the rate of combustion can be made to approach that of

the fresh coal, a corresponding degree of efficiency should result. The correctness of this theory is borne out by the results shown in Table 13. It is to be noted that the over-all efficiency of the weathered coal averages quite as high as that of the fresh screenings.

The general summary covering the behaviour of the coal in steam generation after six years of storage is as follows:—

(1) Burning weathered coal is largely a question of correct handling and ignition. Under these circumstances it gives as good results as fresh screenings.

(2) Weathered coal requires a little thinner fire and more draught than fresh screenings.

(3) When using weathered coal, the fuel bed should not approach any nearer to the water back than from

* A. P. Kratz. "Study of Boiler Losses." Univ. of Ill. Eng. Exp. Sta. Bull. 78, 1915.

TABLE 13.—RESULTS OF BOILER TESTS WITH MISSION FIELD FRESH COAL AND WITH WEATHERED COAL AFTER SIX YEARS IN STORAGE.

Mission field.		Weathered coal.	
Boiler h.p. developed.	Efficiency of boiler, furnace and grate, per cent.	Coal and county (Tables 5 & 6)	Boiler h.p. developed. Efficiency of boiler, furnace and grate, per cent.
554.0	63.96	Nut—Sangamon...	568.5 ... 64.50
569.6	61.21	Screenings—Sangamon...	557.2 ... 63.05
572.7	60.67	Nut—Williamson.	727.1 ... 65.98
589.0	69.87	Screenings—Williamson.	509.6 ... 60.04
555.9	64.75	Nut—Vermilion...	655.0 ... 64.20
506.6	65.50		
644.0	60.84		

4 in. to 6 in., otherwise trouble with clinker is experienced.

(4) Practically as high capacity was obtained with weathered coal as with the other coals used, and, if anything, the fuel bed requires less attention.

The results obtained and the conclusions presented are based on the heat values in the coal as fired, and do not take into account the matter of deterioration. But it has already been shown that the deterioration is largely apparent in a physical change, and that the actual loss of heat value is small. Hence, the efficiency factors developed in the tests may be accepted as fairly representing results obtainable on weathered coal in which the heat loss resulting from weathering is practically negligible.

Conclusions.

The facts presented above justify the following conclusions:—

(1) Bituminous coal can be stocked without appreciable loss of heat values, provided the temperature is not allowed to rise above 180 degs. Fahr. In fact, there is no appreciable evolution of CO₂ at temperatures below 260 degs. Fahr.

(2) The indicated heat loss per pound of coal is due more largely to an increase in weight of a unit mass of coal resulting from the absorption of oxygen than to an actual deterioration or loss of heat units.

(3) Freshly-mined coal has a large capacity for absorbing oxygen which combines chemically with both the organic combustible and the iron pyrites present.

(4) The combination of oxygen with coal at ordinary temperatures generates a small increment of heat.

(5) The rapidity with which oxygen is absorbed depends upon the temperature of the mass and the extent of the superficial area exposed, that is, the fineness of division of the coal.

(6) If heat is generated by this slow process of oxidation more rapidly than it is lost by radiation, the acceleration of the reaction causes a rise in temperature which quickly brings the mass up to the danger point. A temperature of 180 degs. Fahr. is named as the danger point, because, if the coal reaches that temperature, practically all of the free moisture is vaporised, and the further rise in temperature will be very rapid.

(7) Any method of storage to be successful must either check or prevent the absorption of oxygen to such an extent that the generation of heat shall not proceed so rapidly as to exceed natural heat losses due to radiation.

(8) Under-water storage prevents loss of heat values, and is not accompanied by deterioration in physical properties, such as slacking.

(9) Dry storage is far more safely undertaken if the fine material is screened out at the storage yard and the lump only, preferably sized, is stocked.

INSTITUTION OF MINING ELECTRICAL ENGINEERS.

On Saturday, the 15th inst., the members of the West of Scotland branch of the Institution of Mining Electrical Engineers paid a visit to the works of Messrs. Mavor and Coulson Limited, of Glasgow.

This firm, whose "Pick-Quick" bar coal cutter has a wide reputation, is at present engaged in the production of war material, and necessarily the output of coal-cutting and conveying machinery and other electrical work relating to mining has been considerably restricted, in spite of the fact that large numbers of women have been engaged and trained to do the work of men in the machine shops. The amount and the quality of the work turned out by these women engineers is astonishing to anyone only accustomed to the pre-war conditions of machine shops.

The coal cutter and conveyor department is extremely busy, especially in the production of the "bar" machine, which has lately been very much improved in detail.

In the mining switch department, the chief aim of switch design has been to standardise the different parts, with a view of cheapening production, increasing output, and reducing the cost of repairs and renewals on the part of the user. An interesting method of building up a motor controller, with drum-type controller, resistance fuses, switch, etc., in one covered-in combination, was on view, as likewise the method of building up, from separate units, any combination of ironclad switchboards.

We hope shortly to publish a descriptive illustrated article on this firm's specialties, for the information of those who were unable to be present at this meeting.

Another victim of the St. Helens Colliery explosion has died, making eight deaths.

CURRENT SCIENCE AND TECHNOLOGY.

Distillation of Peat and Lignite.

Three papers on the above subject were read at the last Congress of the Technical Gas Association of France. M. Laurain, consulting engineer to the Paris Gas Company, summarised the results of experiments in the distillation of peat at the La Villette Gas Works between 1861 and 1866, and again in 1887, on prepared and raw peat from Seine-et-Marne, Somme, Brittany and Holland, containing 13 to 2.1 per cent. moisture at 100 degs. Cent.

They yielded from 20 to 34 per cent. of gas, with an illuminating value of 90-300 litres per candle power hour, and containing 16 to 25 per cent. of CO₂ before purification. The results also varied considerably with regard to the production of coke, and the ash content of the latter, as well as in respect of the yield of tarry substances. The yield of ammonia varied between 2 and 4 kilograms per ton of peat.

M. Laurain's paper on the distillation of wood treated of the process as practised at one time for the making of illuminating gas in Switzerland and Bavaria, the product being known as Pettenkofer gas. The yield of gas (of poor quality) varied between 25 to 36 per cent., and that of charcoal product from 11 to 18 per cent. The crude gas often contained as much as 35 per cent. of carbon dioxide. Since the war a mixed coal and wood gas has been supplied to several French towns. When the proportions of wood gas, which requires less air for perfect combustion, does not exceed 25 per cent., no trouble is experienced with the working of the burners; nor is there any risk of corrosion of the manufacturing plant and meters. The yield and quality of the gas improve in proportion to the resin content of the wood distilled.

In his paper on the distillation of lignite, M. Laurain stated that distillations of mixed coal and lignite were carried on at Marseilles and Paris, and that the results obtained prove that the high percentages in sulphur and carbon dioxide of lignite, and the powdery character of its very ash-y coke prevents the use of more than 15 per cent. of lignite.

The successful use of any of these coal substitutes depends on the amount available and the cost of transport.

Reinforced Concrete and Corrosion.

In a paper on "The Corrosion of Iron and Steel, with Special Reference to Reinforced Concrete," read before the Concrete Institute, Mr. J. Newton Friend states that the preservation of iron in concrete may be effected in one or more of three ways, namely:—By complete exclusion of air; by complete exclusion of water; or by rendering the concrete sufficiently alkaline to place it within the inhibiting area.

If the engineer can make his concrete conform perfectly to any one of these conditions he has achieved his object, for the reinforcing metal will not rust. Unfortunately, in practice, materials cannot be relied upon to yield perfect result, and the engineer's best policy is to conform as nearly as is reasonably possible with all three conditions. In this way he may hope so to reduce the tendency to corrode as to render it negligibly small within finite time.

The following considerations suggest themselves as worthy of careful study:—None of the concrete materials should be too coarse, otherwise thorough mixing and good contact between the different ingredients will not be as perfect as is desirable. It is essential to press or pun the mixture well into position in order to eliminate voids in so far as is possible. It is obvious that voids tend to increase permeability to water and air, and are in consequence highly dangerous. A sufficient thickness of concrete should be applied to the metal. If too thin the concrete may not be sufficiently impervious or it may crack mechanically, and thus admit air and water to the metal. Stray electric currents must be avoided. If the metal should become anodic, rusting would take place in consequence of the liberation of oxygen, and this, leading to cracking, would rapidly destroy the cement. Substances likely to contain acids or acid-producing bodies should be avoided. Coke breeze and slags are cases in point, as they frequently contain injurious sulphur compounds. The concrete may be advantageously coated with some waterproofing material to render it still more impervious, provided such proofing is entirely free from acid or acid-producing substances.

Air-Lift Pumping.

In his paper before the Institution of Mechanical Engineers, Mr. A. W. Purchas observes that the subject of air-lift pumping has not received the attention it deserves from engineers, and has fallen into disrepute with many, owing chiefly to the lack of a satisfactory theory, the low efficiency of most installations, and the lack of complete and accurate reports of tests, so that the causes of the low efficiency are obscured. An account is given of several series of tests, with a description of the methods and the equipment. The theory of the pump is then reviewed, and a method of approaching the subject is given, from which it should be possible to evolve rational formulae for designing. Among the more important conclusions drawn are the following:—

The apparent lack of agreement of different tests with any definite laws is due to two main causes; one, that the volume of air stated to have been used is too often the displacement of compressor-piston, or too high a percentage of this, which introduces an error of 10 to 60 per cent.; the other is the lack of segregation of the losses. For scientific purposes it is obviously useless to lump together the losses in the compression process and those in the eduction-pipe. The former are fairly well understood, but the latter are quite unknown, and will remain so as long as only tests of the over all efficiency of installations are made. If the laws governing the losses in the pump proper are to be studied, then a test must give the energy contained in the air immediately after passing through the injection foot-piece.

The greatest loss in an air-lift pumping installation is in the air-compressor, and therefore the best compressor is none too good for a permanent installation.

The greatest loss is the loss of head at entry.

Any formula for calculating the submersion required would be better stated in the terms of "the volume of air used per second, at a pressure equivalent to the head of submersion," rather than in terms of the lift. This is suggested by the displacement theory conception of the submerged portion of the eduction-pipe as a space for the air to accumulate and raise the water by displacement.

Every ounce of compression which the air is compressed above that pressure, which is equivalent to the submersion head, is so much energy wasted; and attention should be paid to the design of the foot-piece and the air pipe with the object of reducing those losses to a minimum.

A valuable item of information to include in the report of any test is the ratio of the volume of air to water at a point immediately above the foot-piece; and the ratio by volume of air to water at the outlet of the pump is of little comparative value, since the volume of air is not a measure of the energy contained therein, unless the initial pressure is included in some form.

The hotter the liquid to be pumped, the higher will be the efficiency of the pump. It has been shown by Prof. Randall that an efficiency of 100 per cent. is possible under certain conditions when pumping water at 200 degs. Fahr.

Many flowing oil-wells are in reality "air-lift" pumps, using natural gas in place of air. Mr. A. T. Beazley, A.M.I.C.E., has obtained very encouraging success in making wells flow which had previously to be pumped, by applying to them the principles of the air-lift pump. The great obstacle to be overcome is the lack of control both of the quantity of gas and oil, and of the point of mingling of the two.

Considering the different forms of steam-engines usually used in conjunction with different types of pumps, the fuel consumption of an air-lift installation can be made to compare very favourably with that of any other type for raising liquid more than 75 ft. from a well. For shallow wells centrifugal pumps will probably prove more economical.

OBITUARY.

After a long illness, Mr. N. Macfarlane Henderson died at his residence, Broxburn, on Friday evening of last week. For many years deceased was general manager and a director of the Broxburn Oil Company Limited. A native of Shotts, Mr. Henderson was 78 years of age.

Mr. Luther Horsfall, one of the best known colliery representatives in Bradford, died recently at his residence, 8, Central-avenue, Bradford.

The death is announced of Mrs. House, widow of Ald. William House, who was for many years president and compensation agent of the Durham Miners' Association.

Mr. Robert Calland, under-manager of Hedley Hope Colliery, Tow Law, a position he had held for a considerable number of years, has died at the age of 68.

The death occurred on Thursday, at Dalkeith, of Provost Brown, J.P., secretary of the Scottish Miners' Union and agent for the Lothians Miners' Association. A native of Cowdenfoot, Mr. Brown had for over 50 years taken an active interest in the trades union movement, serving on many committees and attending various congresses abroad. He was a familiar figure at miners' meetings in London, Birmingham, Manchester, and South Wales. He contested Mid-Lothian in the Labour interest five years ago, and was the prospective candidate for the next election. Mr. Brown had been a town councillor of Dalkeith for 23 years, and last month was chosen to fill the Chief Magistrate's chair for the third time.

Control of Steel Supplies.—The Minister of Munitions has extended the Order of November 20, 1916, relating to steel, so that steel in shell discard quality and steel made by electrical process are now included.

Collier Sold for £63,500.—At the Baltic Mercantile and Shipping Exchange, London, on Tuesday, Messrs. T. Pinkney and Sons, of Sunderland, auctioneers, sold the steel self-trimming collier "Karanja" for £63,500. The steamer was built in 1907, is classed 100 A1 Lloyds, and is about 2,710 tons dead weight.

Utilisation of Fuel Waste.—The French Ministry of Munitions has issued a notice recommending the utilisation of waste from screened coal at Government works. Interesting results have already been obtained at Toulouse by briquetting coke dust with the tarry waste produced in the works by the aid of a brick press. These home-made briquettes are used in the furnaces like ordinary fuel. At the same works the sawdust is moulded into cylindrical briquettes, and is found highly satisfactory in heating stoves.

Miners for Shipyard Work.—At the instance of the National Service Ministry, negotiations are proceeding between the colliery owners and the shipbuilders on the north-east coast with a view to obtaining the services of partially employed miners in the shipyards. The need for unskilled or semi-skilled men, possessed of good physique, for work of various kinds in the yards—such as that of platers' helpers—is very great, and miners are particularly suited to this work. The importance of increased output of tonnage is so great that every means are being taken to bring suitable men from all sources into the yards. Many of the miners could be transferred to shipyard work without removing them from their homes. Conferences on the subject are in progress locally, and if the proposals made are accepted, it is understood that efforts will be made to apply them to other parts of the coast.

CONTENTS.

ARTICLES:—	PAGE
tion or Co-operation	1189
nd Expenditure	1189
Safety Lamps by Electrical Ignition	1179
Suzhenk Coal Deposits, Western Siberia	1181
Maximum Prices for French Coals	1182
Anthraxite Culin Briquetting Plant	1183
Pooling Coal Export Business	1184
Mining Employment Statistics	1185
French Advisory Committee on Mines	1185
Effects of Storage on the Properties of Coal	1186
Institution of Mining Electrical Engineers	1187
Obituary	1187
South Wales Mining Timber Trade	1193
The Melting Point of Coal Ash	1193
Belgian Coal and Coke Industry in the War	1194
The American Coal Trade	1194
Miners' Parliamentary Candidates	1194
Making Mine Cars Safe	1195
Labour and Wages	1195
The Freight Market	1198
Open Contracts	1198
Diaries and Calendars	1198
Abstracts of Patent Specifications Recently Accepted	1198
New Patents Connected with the Coal and Iron Trades	1200
Government Publications	1202
Publications Received	1202
REPORTS OF MEETINGS:—	
Coke Oven Managers' Association (Midland Section)	1180
Association of Students of the South Wales Institute of Engineers	1182
Manchester Geological and Mining Society	1184
THE COAL AND IRON TRADES	1190-1193
The By-Products Trade	1191
The London Coal Trade	1192
The Tin-plate Trade	1192
CURRENT SCIENCE AND TECHNOLOGY	1187
PARLIAMENTARY INTELLIGENCE	1194
NOTES FROM THE COAL FIELDS	1196
COAL, IRON AND ENGINEERING COMPANIES	1198
MISCELLANEA:—	
Shortage of Coal in Bohemia—Coal Trade Fund for Huts	1180
Imports of Pit Props—Exports and Imports of Mining Machinery	1181
Supplies of Coke—Wages, Profits, and Prices	1183
Partnership Dissolved	1185
Control of Steel Supplies—Collier Sold for £63,500—Utilisation of Fuel Waste—Miners for Shipyard Work	1187
Imports and Exports of Coal Products—Coal for France and Italy	1189
Residuals from Pit Heaps	1191
Mining in Kuangtung and Kuangsi, China	1192
Mining of Iron Pyrites	1193
The Cinder Order	1196
Revised Working Hours in America	1198
New Caucasian Coal Field—The War Office Peat Fuel Contract	1202

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AND

Journal of the Coal and Iron Trades.

Joint Editors—

J. V. ELSDEN, D.Sc. (Lond.), F.G.S.

HUBERT GREENWELL, F.S.S., Assoc. M.I.M.E.

(At present on Active Service).

LONDON, FRIDAY, DECEMBER 21, 1917.

The London coal market has been greatly stimulated by the wintry weather. Gas coals by sea have arrived in good quantities. Steam coals and small nuts are very scarce. Slacks are improving.

Northumberland steam coal pits are less fortunate than the Durham gas coal collieries, for the latter have obtained a better tonnage supply, and the market tone has improved in consequence. Almost every class of fuel has been offered in Newcastle at minimum figures. Coking and smithy coals are going well. Open market business in Lancashire is small, and prices are unaltered. The demand for slack is easier. An easier tone in the house coal trade in Yorkshire is attributed to cellars having been fairly well stocked. Hull quotations are firm. Apart from the regular supply for Admiralty and Allied requirements, business is stagnant in Cardiff owing to transport difficulties.

In the Scottish coal trade the irregularity of business keeps the market depressed. The industrial demand is good, and household sorts improved on account of the cold weather. The situation in Fife-shire shows some improvement.

Anthraxite has been easy, and the heavy stocks of large sorts led to free offerings on the Swansea market. Machine-made sorts are rather slow, and rubbly culm and duff neglected.

Tonnage is eagerly enquired for in the freight market, but few fixtures result. Tyne to London is 21s., Gothenburg 187 to 190 kr., Gibraltar 100s., Port Said 200s., and Barcelona 300s. Fixtures include Newcastle to Stockholm 195s., and Cardiff to Rouen (coke) 74s. 3d. Vessels are scarcer than ever.

The French authorities notify that all ships, either French or alien, sailing for a French port, must obtain a licence. It has been decided that such licences will only be granted to sailing vessels employed in the coal trade if they agree to limit freights to 90s. for French Channel ports, and 120s. for French ocean ports.

The exports of coal, coke and manufactured fuel in November amounted to 2,801,333 tons, valued at

£3,981,828, compared with 3,224,557 tons, valued at £4,253,124, twelve months ago, and 3,469,302 tons, valued at £3,095,832, in November 1915.

Coke for export is in strong demand, and prices are firm. Gas house coke in Newcastle is quoted at 39s. to 40s. f.o.b.

The Miners' Federation Executive decided to put forward 52 candidates at the next Parliamentary election.

The Coal Controller's proposal for the establishment of mobility bureaux has been accepted in principle by the Miners' Federation, which will work these bureaux for the better distribution of mining labour.

Competition or Co-operation.

SIR A. STEEL-MAITLAND, the new Minister of the Overseas Trade Department of the Foreign Office and Board of Trade, is losing no time in getting into touch with the problems with which this country will be confronted at the conclusion of the war, and, in a speech delivered last week before the British Empire Producers' Organisation, he placed clearly before his audience one of the chief faults in British and American as compared with German methods. If, he said, two British firms were engaged in the same business, they set to work to fight each other; but two German firms, in like circumstances, would seek to make an agreement. That this spirit exists as a fundamental principle in British industrial practice cannot be denied. It has been a growing tendency in modern industry, both large and small; and from being merely a national characteristic it has spread, with the widening of the world's markets, to an international struggle, and has involved trade in the intricacies of diplomacy. That is one reason why Sir A. STEEL-MAITLAND's department is connected with the Foreign Office on the one hand, and with the Board of Trade on the other.

This intense individualism of the British trader has grown with the evolution of modern trade. At the beginning of the seventeenth century the Privy Council still retained a large measure of control over industry and commerce. CUNNINGHAM, writing on the "Growth of English Industry and Commerce," states that this phase was destroyed by the Civil War, and was not recovered at the Restoration. Since that date there has grown up a strong belief in the right of every trader to the unhampered pursuit of self-interest. Even ADAM SMITH taught the doctrine that the public welfare would be best served if each individual were left as free as possible to pursue his own interest. He held that what was true of individuals held good of nations, and hence the doctrine of *laissez faire*. This attitude of ADAM SMITH may, however, be traced to two general causes. In the first place, he was leading a reaction against excessive regulation; and, secondly, those days were essentially the time of the individual manufacturer and the small unit. Now, we have advanced to the opposite pole, and are living in an age of large combines, in which small units suffer serious economic disabilities. But, in some respects, owing to the war, we are again passing through a stage of excessive State regulation, against which there will certainly be a violent reaction when peace is restored. In a recently published work on *Competition*,* the authors point out that the tendency to competitive methods has become legalised upon the assumption that competition involves the increase of production, and impels men to the greatest quantitative effort. Economists have supported it on the ground that it is the best possible regulator of prices, and leads to the most advantageous use of man-power. Thus there has sprung up amongst politicians a rooted antipathy to any form of monopoly. This principle has been carried to such an extreme that the growth of large units has been hampered even where these were demanded on economic grounds. It is only necessary to refer to the history of electrical developments in this country to find an example of the mischief that has thus been done in the wasteful use of fuel for the production of energy. By pushing this principle too far, its advantages have been more than lost by the great social cost involved. The time has, therefore, come when the British trader is

called upon to examine the situation more closely in the light of the experience afforded by the war, and the necessity for reconstruction that will arise when it is over.

There is also another side to the question—viz., the influence of the principle of unbridled individualism in trade upon the workers, many of whom have been led to the belief that the only possible way to remedy the situation is to abolish all opportunities for private profit by the nationalisation of all the means of production—that is to say, by a social revolution and the substitution of State Socialism for what they regard as the wasteful method of competition. This is to fly at once to the opposite extreme. But it ignores many serious difficulties. Even if the machinery of production now in the hands of private owners were confiscated, there still remains the problem of replacing the captains of industry by whose experience and ability the wealth of the nation has been acquired. Thus, at a critical time, when international competition will be intense, and nearly all the world will be engaged in repairing the ravages of war, a revolution of this character would reduce the country to the condition of Russia at the present time. No sane person would advocate such a system. Nor would State Socialism accomplish the object in view. It would not abolish competition, but would merely alter its character. Instead of competing for business and profit, there would be a fierce internal struggle for all administrative posts, irrespective of qualifications and attainments. It would not conduce to large scale production, which alone will restore the depleted resources of the nation. A growing number of workers, therefore, is looking in other directions for those social reforms which will enable the workers to receive a larger share of the rewards of industry, and the much-needed incentive to produce of their best. The Whitley scheme is a well-considered effort in this direction, and we believe there is a growing disposition amongst both employers and men to give it a fair trial.

Undoubtedly, this would mean a considerable departure from old-established practice, and a surrender of certain trade customs; but if it fulfils its promise there will be invaluable compensations for all that will be given up on either side. Times are more serious than is generally realised, and if the nation cannot find a way to work in domestic harmony it must surrender its whole industrial position without hope of recovery. The spirit of the Whitley report is co-operation throughout the whole gamut of industrial life—co-operation between one employer and another by association, and co-operation between Capital and Labour by industrial councils.

Prices and Expenditure.

THE Second Report of the Select Committee on National Expenditure is an interesting document from more than one point of view; it is not confined to the somewhat technical discussion of Parliamentary Estimates and Control of Expenditure in war time, but embraces the wider field of the general rise in prices of commodities—a subject which touches the whole community, and more than any other factor is likely to affect the attitude of the masses towards the war. The Committee finds that the chief causes of the increase of prices are as follow:—(1) Expansion of credits, (2) excess of demand over supply, (3) increase of wages, (4) increase in profits, (5) foreign exchange. It is a common belief among certain sections of the working classes that the rise in the cost of living has been due solely to profiteering. It is, therefore, to the national interest to direct attention to the views arrived at upon this point after a careful enquiry with the best expert assistance that is available. To many people the term expansion of credits probably has but little meaning, but to this factor the Committee assigns the main cause of the rise in prices. It is not, however, easy to express the reason for this conclusion in simple language. If it had been possible to finance the war from day to day solely by taxation and loans drawn from the savings of the people, the effect would have been merely to transfer purchasing power from individuals to the Government, but this course was scarcely possible under the circumstances created by the war. The consequence has been that the creation of large new credits has set up a new purchasing power, resulting in additional demands for goods, in

response to which prices rise in accordance with natural laws. We may, perhaps, put it in this way. If A lends his savings, say £100, to the Government, the latter can use A's purchasing power to this amount; but if the Government uses new credit, instead of borrowing from A, the total purchasing power is doubled. Thus to the extent to which these new credits have been created the total spending power of the nation has been increased and prices have risen. The growth of business thus brought about has necessitated an increase in currency for its accommodation, and has given rise to the popular impression that there is plenty of money about. And this is true, although no one will pretend that the nation is any the better off on this account.

Coming now to the growing demand for increased wages by the working classes, this has been based upon the increased cost of living, and also upon the larger profits employers are believed to be making. Secondary and perfectly natural reasons are the scarcity of labour, the increase of the worker's output, and the determination of each industry to follow the example of others in securing higher wages. As to the increased cost of living, there is no question that this is a fact, although the actual amount of rise is not easily determinable. The Committee is not able to accept without further proof the estimates of the Board of Trade *Labour Gazette*, and it calls for a further enquiry upon this important point. As regards the increased profits of employers, in the early stages of the war these were very large in many cases, but much of this has been appropriated by the State in the form of excess profits duty and income tax. Notwithstanding these, however, there has probably been a certain amount of increased profits due to a larger volume of business and increased turnover. To what extent this has operated it is difficult to say. Upon one thing, however, the Committee is emphatic. Fresh cycles of wage advances succeed one another, and each results in further increases of prices. The workers—i.e., the producers, are thus raising prices against themselves as consumers.

The Committee is deeply impressed by the serious aspect of the position in this respect, and is convinced that if this vicious circle is allowed to continue, the result will be disastrous to all classes of the nation. They recommend that certain measures should be taken to avert this calamity. The Government is urged to avoid as far as possible the creation of new credits, to set on foot an enquiry into the actual increase in the cost of living to the working classes, taking into consideration such counterbalances as regularity of employment and greater facilities for finding remunerative work. It is also recommended that the measures for the limitation of profits should be strengthened and made more widely known to the people, and that before any further advance in wages is conceded the strongest case should be established for its justification. The Committee holds strongly that wage-earners who were in receipt of adequate pay before the war should not be exempted from all share in the economic sacrifices made necessary by the war.

There is expressed some pointed criticism with regard to the way in which Government Departments, acting in competition with each other, have dealt with Labour; and it is suggested that all wage questions should be under a single authority, a step which appears already to have been taken a few weeks ago, by the establishment of a co-ordinating committee, under the chairmanship of Mr. BARNES.

Imports and Exports of Coal Products.—The imports of coal products (not dyes) in November totalled 1,366 cwt., valued at £23,903, compared with 1,432 cwt., valued at £16,368, a year ago. The exports of such products (weight unspecified) were valued at £218,044, compared with £212,704 a year ago, and £178,112 in November 1915. The dyestuff exports aggregated 6,810 cwt., valued at £104,101, showing a great decline on the 17,995 cwt., valued at £158,724, in the corresponding month last year. The exports of sulphate of ammonia were 6,943 tons, valued at £128,910.

Coal for France and Italy.—At a recent meeting of the Central Executive Committee of Great Britain for the Supply of Coal to France and Italy, the Imports and Exports (Temporary Control) Bill was under consideration. The committee unanimously adopted the following resolution, and instructed that a copy be sent to the Board of Trade and other authorities:—"That the existing system of control be continued for six months after the termination of the present war, and that, if, after the cessation of hostilities, further extension be found necessary, such extension be for not more than six months at a time, and be subject to the approval of Parliament."

**Competition. A Study in Human Motive.* By John Harvey, Malcolm Spencer, J. St. G. C. Heath, William Temple and H. G. Wood. London: Macmillan and Co., 1917, price 3s. 6d. net.

THE COAL AND IRON TRADES.

THURSDAY, DECEMBER 20.

Scotland.—Western District.

COAL.

Conditions in the Scotch trade generally are still to the slow side, and while things are far from stagnant there is an occasional lack of business, which has a depressing effect on the markets. In the west of Scotland district most sorts are moving off fairly well, chiefly for home consumption. Industrial demands are large, and no school sales have benefited from the colder weather. Exports are still restricted. Shipments for the week amounted to 100,088 tons, compared with 93,878 in the preceding week and 99,199 tons in the corresponding week of last year.

Prices f.o.b. Glasgow.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	18/-25/
Ell	26/6-28/	26/6-28/	21/-24/
Splint	28/-30/	28/-30/	25/-30/
Treble nuts	23/	23/	23/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The pressure in all departments of the Scotch iron trade is fully maintained. All classes of material are in urgent request, and a special effort is being made in view of the holidays. Pig iron makers find no difficulty in disposing of outputs—in fact, the trouble is all the other way, the problem being to meet requirements. The demand for hæmatite is incessant, and the bulk of the production is absorbed by local steel works. The output of forge and foundry iron, restricted as it is, is quickly accounted for by home users. Export business is of meagre proportions, as makers have practically nothing to offer for shipment. Approximate prices are as follow:—Monkland and Cambroë, f.a.s. at Glasgow, Nos. 1, 140s., Nos. 3, 135s.; Govan, No. 1, 135s., No. 3, 130s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 150s., Nos. 3, 145s.; Glengarnock, at Ardrossan, No. 1, 140s., No. 3, 135s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 145s., Nos. 3, 135s.; Shotts and Carron, at Leith, Nos. 1, 150s., Nos. 3, 145s. per ton. At the malleable iron works there are plenty of orders, but there is difficulty in execution unless under a high priority. Apart from Government demands there are good agricultural requests and general engineering orders. Prices are firm round about £16 per ton for "Crown" bars, but £16 7s. 6d. has been paid for quick delivery of special brands. The heavier gauges of black sheets are particularly active at present. Imported material is becoming scarcer. The enlarged home production, however, is now more equal to the demand. Nothing definite has yet been settled in respect to home prices, but negotiations are in progress, the result of which will be announced shortly.

Scotland.—Eastern District.

COAL.

The position in the Lothians can only be classed as moderately good, but it is said that the outlook is more hopeful. Shipments were 17,759 tons against 17,566 in the preceding week and 24,792 tons in the same week last year.

Prices f.o.b. Leith.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	26/
Secondary qualities.....	25/6	25/6	23/-24/
Treble nuts	23/	23/	23/-26/
Double do.	22/	22/	22/-23/
Single do.	21/	21/	21/-21/6

The situation in Fifeshire is slightly better at present, and, with the exception of third-class steams and certain qualities of smalls, an improvement is noticeable. Shipments were 22,926 tons against 28,016 in the preceding week and 51,131 tons in the same week last year.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L'st week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	30/-35/
Unscreened do.....	24/-25/	24/-25/	28/-30/
First-class steam coal.....	28/	28/	30/-32/
Third-class do.	24/	24/	21/-22/
Treble nuts	23/	23/	23/-25/
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The prices quoted only apply to French and Italian orders for other business 2s. 6d. per ton must be added.

The aggregate shipments from Scottish ports during the past week amounted to 140,773 tons, compared with 139,490 in the preceding week and 175,042 tons in the corresponding week of last year.

Northumberland, Durham and Cleveland.

Newcastle-on-Tyne.

COAL.

Throughout the week under review, the prompt coal market has been harassed by lack of cargo space, and the amount of time lost by the collieries has been very considerable. When this week commenced the situation was aggravated by delays to expected vessels, by reason of the exceedingly wintry weather. At the time of writing, however, matters were just a shade better. The tonnage shortage is still very stringent, many collieries are working only part time, whilst others are idle altogether, and the output is still greatly in excess of the rate at which it can be transported. The feeling is a little improved, official statistics are tending to increase, and with the tonnage. There is, too, no diminution for fuel on home account, a circumstance of the bulk of the output of the collieries and households and is benefiting the some extent and the steam coal pits. The demand for export to Scandinavia are being moved up to 33s. 6d. The bunker market is sluggish, with only special qualities—at from 30s

to 32s. 6d.—in any demand worth mentioning. All descriptions of coke are being readily taken up as soon as produced, home requirements being particularly heavy. Gas coke, especially, is scarce and firm, being quoted, in some quarters, at up to 40s. per ton, although the general quotation remains at from 35s. to 37s. 6d. There is very little forward business of any note, the only bigish enquiry being the bi-monthly request from the Norwegian State Railways for 18,500 tons of Northumberland or Durham best steams for delivery to stipulated ports. On this occasion tenders are to be in by noon on Friday of this week, and shipments are to extend over February and March.

Prices f.o.b. for prompt shipment.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	29/-30/
Do. Tynes (Bowers, &c.)	29/6-32/	29/6-32/	29/-30/
Secondary, Blyths	25/6-28/	25/6-28/	24/-26/
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	24/-26/
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	18/-19/
Do. Tynes.....	18/6-21/	18/6-21/	17/-17/6
Do. specials.....	20/6-23/	20/6-23/	20/-21/
Other sorts:—			
Smithies.....	25/-33/6	25/-33/6	20/
Best gas coals (New Pelton or Holmside) ...	25/-27/6	25/-27/6	25/-27/6
Secondary gas coals (Pelaw Main or similar) ...	23/6-26/	23/6-26/	18/-20/
Special gas coals	26/6-29/	26/6-29/	30/-33/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	17/6-19/
Do. do. Northumbrians	26/6-27/6	26/6-27/6	18/-20/
Coking coals	24/-27/6	24/-27/6	18/-20/
Do. smalls	24/-27/6	24/-27/6	17/-18/
House coals	28/6-32/6	28/6-32/6	27/6-30/
Coke, foundry	42/6-45/	42/6-45/	40/-45/
Do. blast-furnace	42/6-45/	42/6-45/	37/-39/
Do. gas	35/-37/6	35/-37/6	32/-34/

Sunderland.

COAL.

As anticipated, the coal market has opened this week under unfavourable conditions, the north-easterly gale being responsible for a reduced arrival of tonnage, while the snowstorm has caused considerable delay in getting coals down from the collieries. Consequently the market is idle. Many of the pits are short of prompt boats and are working badly. Few of them can reckon on regular work over the week. Requisition shipments are only moderate, and neutral business is slow to a degree, but the home trade in gas, coking, house and manufacturing coals continues to absorb the bulk of the output. Coke is strong, with a fuller enquiry for shipment to France, added to a vigorous home demand. The output is fully taken up, and quotations are very firmly held, the advance in gas coke being well maintained. Coal prices are unchanged at the minimum standard.

Prices f.o.b. Sunderland.

	Current prices.	L'st week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	27/6
Secondary do.	25/-27/6	25/-27/6	18/
House coals:—			
Best house coals	32/6	32/6	30/
Ordinary do.	30/6	30/6	24/
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	29/
South Hetton do.	31/-32/6	31/-32/6	29/
Lambton unscreened	26/6	26/6	17/6
South Hetton do.	26/6	26/6	17/6
Do. treble nuts	22/6	22/6	32/
Coking coals unscreened	27/6	27/6	18/
Do. smalls	27/6	27/6	17/
Smithies.....	27/6	27/6	18/6
Peas and nuts	27/-28/6	27/-28/6	23/6
Best bunkers.....	27/6	27/6	18/6
Ordinary bunkers.....	26/6	26/6	16/6
Coke:—			
Foundry coke	42/6-45/	42/6-45/	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke.....	35/-40/	35/-37/6	35/

Middlesbrough-on-Tees.

COAL.

The coal market is quite depressed, and a great deal of time is reported as being lost at the collieries. Enquiries on behalf of neutrals are now only very moderate, but home demand generally continues strong. Official absorption is below what it has been, but improvement is looked for. Gas coal and coking fuel are in good demand, with special qualities much sought after for home use. Best Durham gas coals are 27s. 6d., seconds 26s. 6d., and Wear specials 29s.; whilst coking coal is well taken up at 27s. 6d. Steam smalls continue very dull, with supply far in excess of needs. Ordinary steam smalls range from 21s. to 23s. In the bunker section there is very little of importance passing, and the few enquiries in circulation are for the better qualities. Unscreened Durhams run from 26s. 6d. to 27s. 6d. Continued heavy demand for coke for local consumption is met by ample supply, and the result is quite an active market. Average blast-furnace kinds are 33s. at the ovens, and qualities low in phosphorus 35s. 6d. at the ovens. Demand for coke for the Allies and for neutrals shows marked improvement, and the consequence is much stiffening of prices. It is reported that for foundry qualities neutral buyers are prepared to pay above schedule minimum figures. The export quotation for both beehive and patent oven is 45s. Gas house product now commands 39s. to 40s. for shipment.

IRON.

The various branches of the iron and steel industries present few new features of moment. So far as Cleveland pig is concerned, business is very quiet, consumers being fully bought. Much apprehension, however, is expressed that the continued shortage of trucks will cause this month's deliveries to fall much below what was hoped for. A very unfortunate feature is that owing to the scarcity of wagons, and the consequent inability to get iron away, some producers are having to stock pig that is greatly needed for consumption. Foreign business is very limited, though there are substantial enquiries in the market for shipment abroad over next quarter. For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all

stand at 95s., and for shipment to France and to Italy these qualities are all quoted 116s. 6d.; whilst No. 1 is 99s. for home consumption, and 121s. 6d. for shipment abroad. So far as east coast hæmatite is concerned, supplies to home customers are maintained on a scale sufficient to satisfy minimum needs, but there is still little surplus hæmatite available for sale abroad, notwithstanding increasing output of steel-making iron. Nos. 1, 2 and 3 are 122s. 6d. for home use, and 147s. 6d. for export to France and Italy. As to finished iron and steel, manufacturers keep too busily engaged endeavouring to cope with the heavy demands of the Government and of the shipyards to pay much heed to the rather numerous ordinary commercial enquiries. Prices are very stiff.

Cumberland.

COAL.

Maryport.

Great briskness is exhibited in the Cumberland coal and coke industries. The improvement which set in last week is being well maintained, some branches are even busier, and in nearly all departments the demand is more than sufficient to tax resources. There is increasing firmness in the home market. All the pits are working on an average of six days a week. Large quantities of both coking and works fuel are being imported from the collieries on the east coast. Landsale is brisker than ever and the demand for house coal is very strong. All the depots are pressed with Christmas orders, but local merchants are seriously handicapped by the shortage of supplies and the scarcity of labour. Industrial fuel is in strong demand, engine fuels are steady, and gas coal is in strong request, but with the exception of shipping, no stocks are being sent out of the country. The coastwise trade is fairly brisk, the clamour for both works and home coal for Ireland is undiminished, but the collieries have so much on hand locally that they cannot possibly deal with more than 50 per cent. of the business now being offered on Irish account. Supplies for the docks are lower than ever. The shipments for the week have amounted to 3,150 tons compared with 2,990 tons at the corresponding period of last year, or a decrease of 2,540 tons compared with last week. Current prices are as follow:—

	Current prices.	L'st week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls ..	19/2	19/2	16/8
Do. peas ..	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit.....	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) ...	31/	31/	25/
Do. (for foreign-going steamers)	31/	31/	30/
Best works fuel.....	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gasworks	21/6	21/6	19/

Yorkshire and Derbyshire.

Leeds.

COAL.

The market on Tuesday was influenced considerably by the approach of Christmas, the attendance being very small and limited mainly to those in urgent need of supplies. On account of the coal owners holding a meeting during market hours, very few colliery representatives were present, and practically the only orders taken were those of an urgent character. The demand remains strong for every quality of coal that is made. The spell of cold weather has given a sharp impetus to the demand for house coal for the Loudon district, and the Coal Controller is pressing for bigger supplies of emergency coal, so that while the trade at the depots is moderated and regulated by the rationing methods, the position at the collieries shows no ease in regard to requests for supplies. This applies equally to the local markets, where deliveries are barely sufficient. In the coastwise trade at the Humber ports there is nothing doing worth mention-

Current pit prices.

	Current prices.	L'st week's prices.	Last year's prices.
House coal:—			
Prices at pit (London):			
Haigh Moor selected ...	21/6-22/6	21/6-22/6	20/-21/
Wallsend & London best	21/-21/6	21/-21/6	19/-20/
Silkstone best	21/-21/6	21/-21/6	19/-20/
Do. house	20/-20/6	20/-20/6	17/-18/
House nuts	18/6-19/6	18/6-19/6	16/-17/
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/	25/6-26/	23/-24/
Silkstone best	24/-25/	24/-25/	22/-23/
Do. house	23/-24/	23/-24/	20/-21/
Other qualities	20/6-22/6	20/6-22/6	19/-20/
Gas coal:—			
Prices at pit:			
Screened gas coal.....	18/-18/6	18/-18/6	16/-17/
Gas nuts.....	17/-18/	17/-18/	15/6-16/6
Unscreened gas coal ...	16/6-17/6	16/6-17/6	15/-16/
Other sorts:—			
Prices at pit:			
Washed nuts.....	18/6-19/6	18/6-19/6	17/-18/
Large double-scrned engine nuts	17/6-18/6	17/6-18/6	16/-17/
Small nuts.....	16/6-17/6	16/6-17/6	15/-16/
Rough unscreened engine coal.....	16/6-17/6	16/6-17/6	15/-16/
Best rough slacks.....	15/6-16/6	15/6-16/6	14/-15/
Small do.	13/6-14/6	13/6-14/6	12/-13/
Coking smalls	14/-15/	14/-15/	12/6-13/6
Coke:—			
Price at ovens			
Furnace coke	32/	32/	25/8

ing. There is keen demand for gas coal. Stronuous efforts have been made, with some degree of success, to get extra supplies, and speaking generally the position from that point of view is moderately satisfactory for the moment. As the industrial districts of the West Riding engaged in the textile trade are to observe holidays for the greater part of next week, not quite so much manufacturing fuel is immediately called for, but there was plenty of enquiry on the market for slacks for those concerns which are short. Coking slacks present a serious difficulty for coke makers, whose ovens will necessarily be kept at work during the holidays. Material for coking is very scarce indeed, and with the collieries idle for two or three days the difficulty of keeping the ovens supplied is intensified. Officially the pits will take two days holiday, an attempt being made to work on Monday, but expectations of next week's output should not go far beyond 25 per cent. of a normal week.

Barnsley.**COAL.**

The usual weekly market does not offer any feature owing to the scarcity of supplies and the impossibility of making any arrangement prior to the holidays. The difficult position all round is practically unaltered, and supplies for the lesser industries are generally subject to the requirements of consumers engaged on war work. The distribution becomes increasingly firmly handled, and, so far as the collieries are concerned, supplies must inevitably be of an irregular character. The export trade continues on very restricted lines, although a substantial tonnage is being sent to France and Italy, and there is a little activity in respect to neutral countries. The tonnage required for Admiralty purposes and on home account continues to be very extensive, and although the production of large steams continues to be well maintained there is no difficulty in dealing with the tonnage. Smaller kinds of steam fuel, including nuts, are yet difficult to procure in anything like adequate bulk, and especially is this the case in regard to slacks required for the by-product plants for coke making, which it is so essential should be kept in full operation. The pressure for a larger production of coke and other products is extremely vigorous, but the result fails to satisfy all the requirements. The scarcity of wagons and the delays in transit also contribute to the difficulty, and the position in regard to gas coal still gives rise to considerable anxiety. The enquiry for extra lots is becoming more general, and stocks at the plants are rather low, but under the scheme of distribution particularly grave cases receive fairly prompt attention. In regard to house coal, although a considerable quantity is still called for on behalf of London and the south, the requirements of the normal markets are being fairly well met; although the position is materially assisted by the fact that panic-stricken consumers are now restricted in their orders.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Best Silkestone	22/6-24/6	22/6-24/6	20/-22/
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/
Secondary do.	19/6-20/	19/6-20/	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/
Secondary do.	18/-18/6	18/-18/6	15/6-16/
Steam coals:—			
Best hard coals.....	20/-21/	20/-21/	17/6-18/6
Secondary do.	19/-20/	19/-20/	16/6-17/6
Best washed nuts.....	18/6-19/	18/9-19/	16/3-16/6
Secondary do.	18/-18/9	18/-18/9	15/9-16/3
Best slack	15/-15/6	15/-15/6	12/6-13/
Secondary do.	13/-13/6	13/-13/6	10/6-11/
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/
Gas nuts.....	18/9	18/9	16/
Furnace coke.....	32/	32/	25/8

Hull.**COAL.**

The rush to get supplies before the Christmas holidays has continued, and though deliveries may, on the whole, be considered good, they are not by any means equal to current demands. Shipments, especially to France, have been maintained on the lower level of the past weeks, the difficulty in increasing the commitment, of course, being due to the stringency in the supply of shipping, and the longer time now occupied *en voyage*. A little business continues to be done with neutral countries when freight room is available, the demand being principally for large steams, 35s. being quoted for best South Yorkshire hards. This class of coal, as well as the Derbyshire and Nottingham output, is, however, in increasing request for Admiralty and official purposes. Screened gas coal is very difficult to buy, and all industrial fuels are firm, and eagerly snapped up. Hull, generally speaking, has been slow to recognise the significance of the Government Imports and Exports (Temporary Control) Bill. The coal trade here has, however, given its strong support to the ship owners' and coal owners' protest, and think that six months after the war will be quite long enough for the continuance of official control.

Chesterfield.**COAL.**

The wintry weather caused a greatly increased demand for house coal, and orders are coming to hand freely. Supplies are not equal to customers' requirements, and householders who are without any coal in stock will experience much delay in getting their orders executed. The cartage question is adding seriously to the difficult situation. Fuel for manufacturing purposes is in brisk demand. Nuts of all kinds are scarce. This class of coal is more urgently wanted than any other for munition works. The steel works particularly require nuts and cobbles for gas producers. There is a brisk enquiry for all classes of slack. Railway and gas companies are now taking a substantial tonnage of locomotive coal and fuel for gas making. There is no change in the condition of the export trade, so far as this district is concerned. It is still impossible to obtain licences for the shipment of Derbyshire coal. The coke market maintains its firm character, the demand for all qualities being active. The full output of the ovens goes regularly into consumption. Coking fuel is in good demand.

IRON.

There is no change in the condition of the iron trade of the district, in connection with which all the works are busily employed.

Nottingham.**COAL.**

A brisker tone has asserted itself in the trade generally. Then, too, the advent of wintry weather has tended, more particularly in the house coal branch, to make matters

more lively. Local merchants have experienced an inrush of orders which are being satisfactorily dealt with, as of late they have had comparatively fair supplies from the collieries, while at the same time the public demand was easier. It cannot be said that the colliery position has undergone much change, there being an insistent demand from merchants generally for full contract supplies, and the daily output is readily cleared, there being no reserve stock to draw upon. Business in steams is very active, and in view of the tonnage required by firms engaged on Government work, ordinary customers find it difficult to obtain an adequate supply. This is particularly the case in regard to steam nuts, for which there is a large demand. Slacks generally are in good request, coking sorts being insufficient to meet full requirements.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/	21/-22/	18/6-20/
Good house coals	20/-21/	20/-21/	18/-18/6
Secondary do.	18/6-19/6	18/6-19/6	17/-18/
Best hard coals.....	18/3-19/	18/3-19/	17/-18/
Secondary do.	17/-18/	17/-18/	16/-17/
Slacks (best hards)	14/6-15/	14/6-15/	12/-13/
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/	13/	11/

Leicestershire.**COAL.**

For the fourth time since the war, the making up of accounts generally discloses very satisfactory results under the abnormal conditions. The advances in wages have involved the employment of larger capital resources, but this has been compensated for to a very large extent by full working. The aggregate output, however, generally exhibits a very serious decline, in consequence of much older men being engaged, as compared with the pre-war period. The outstanding feature for the moment is the increased demand for domestic consumption in consequence of the exceptional severity of the weather. Deliveries for the great centres of population have been wonderfully well maintained under the very trying conditions which prevail. There is no abatement in the great demand for all classes of household for London and district as well as for both deep and main cobbles and nuts. An exceptionally large demand exists for bakers' nuts on account of their great economy in use for general purposes, and the whole of the output is cleared off day by day. Small nuts for mechanical stokers are in keen request. The demand for Government factories and works is still increasing and this absorbs a large proportion of the output. Country coal merchants are under a heavy handicap in consequence of the unavoidable irregularity of deliveries, but there are evidences that the call for economy in consumption is being well responded to. The reserves being created by municipalities are still very small. There are no reserves at country stations or at the pits.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/
Second, hand picked	19/-20/	19/-20/	15/6-17/
Deep screened cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/
Small nuts.....	17/-18/	17/-18/	14/6-15/6
Deep breeze	15/3-16/	15/3-16/	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/
Main nuts for London			
kitcheners	16/-17/6	16/-17/6	14/-15/
Steams, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Steams, seconds	15/6-17/	15/6-17/	13/6-15/
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.**Birmingham.****COAL.**

The wintry weather has hindered transport operations at a time when people were anxious to secure reserves against the approaching holidays. Merchants experience a full demand, and supplies coming forward are no more than sufficient to keep them going. It is doubtful whether wharves were ever so bare, though on the other hand the majority of householders with cellar accommodation have some stock in hand. All descriptions of small fuel are in strong request, and there is practically no tonnage offering on the open market at the moment.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep	24/6	24/6	22/
Do. seconds deep	22/6	22/6	20/
Do. best shallow	21/6	21/6	19/
Do. seconds do.	20/6	20/6	18/
Best hard	21/	21/	18/6
Forge coal	18/6	18/6	16/
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder..	21/6	21/6	19/
Do. hand-picked			
cobs	20/6	20/6	18/
Best hard spires	22/6	22/6	20/
Forge (steam)	18/6	18/6	16/
D.S. nuts (steam)	17/	17/	14/6
Small (do.)	17/	17/	14/6

IRON.

There is no slackening in the pressure in nearly all branches. Perplexity continues in connection with pig iron, and a great deal of uneasiness is being created, not only among pig iron producers but among the dependent industries. Supplies are short. Derbyshire makers are selling in small lots of 50 tons, or thereabouts, instead of in hundreds of tons. Northamptonshire houses also have little to offer, and then only to regular customers. In bar iron demand continues very strong and there is great reluctance on the part of makers to

contract forward, or even to accept orders. Small sizes are noticeably scarce, and producers have raised the price for three-eighths sizes to a basis of 17/10 for orders outside Government work, presumably with the idea of discouraging this class of business, as they have a tremendous amount on hand for the Government. A limited amount of business is being done in puddled iron at £12 15s., in the form of billets it is 5s. more. Fortunate are the consuming firms that make their own puddled iron, as the quantity offered on the market is quite inadequate. Sheet makers are unable to accept any large quantity of business, as they are unable to procure bars, and it is calculated that not more than one-fifth of the productive capacity of the district is employed. Small quantities of Siemens open-hearth billets are being sold at prices which range from £12 up to as high as £16, according to their low or high carbon. All half-finished steel is difficult to get. The pressure upon steel makers for shipbuilding purposes becomes more intense, and aeroplane steel is also wanted in large quantities.

Forest of Dean.**Lydney.****COAL.**

All the collieries producing coals suitable for domestic purposes are still enjoying a very heavy demand, and the pits continue in full work. Merchants are pressing for deliveries of orders on hand, some of which have been placed a considerable time, but so far as the railborne trade is concerned all arrear orders have lapsed and a fixed monthly quantity has been allocated to certain merchants. Steams are still long in the shipping department. Slacks are not so easily placed just now, but all steam qualities are finding a ready market and are fully occupied.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/
Forest	25/6	25/6	23/
Rubble	25/9	25/9	23/3
Nuts	24/	24/	21/6
Rough slack	15/6	15/6	13/
Steam coal:—			
Large	22/6-23/6	22/6-23/6	20/-21/
Small	18/-19/	18/-19/	16/-17/

Prices 2s. extra f.o.b. Lydney or Sharpness.**THE BY-PRODUCTS TRADE.**

Tar Products.—The market has not changed materially since the last report. Neither gas works tar or pitch has altered in value, despite the fact that shipping and railway facilities tend to decrease. Producers still quote 48s. for pitch in London, f.o.b. works, with much lower nominal quotations in the provinces. Advices from the United States do not indicate any particular activity, but transport there is a real problem. The only noticeable movement in market on this side concerns solvent naphtha, for which a remarkably brisk demand set in long ago. Supplies are still scarce on the basis of about 4s. 3d. to 4s. 6d., 90-160 per cent. naked. London. Heavy naphtha is still in substantial request, and the price remains firm. Naphthalenes are not plentiful, but the position has not encouraged any advance. Benzol is coming along freely to meet a good demand. Prices are steady, at about 10½d. to 11½d., 90 per cent. north, and 1s. 3d. to 1s. 4d., naked, north. At the time of writing it is unlikely that a more favourable outlook regarding tonnage can be expected in the near future, either in this country or the United States, so that the course of business in some of the by-products may develop irregularities. The most prominent feature of these products in the States is the commandeering of toluol for explosives, so that there is no actual market position for this product. The output of benzol in America is a large one, with the prospect of becoming still larger. The enquiry for it is fairly good.

Sulphate of Ammonia.—Sulphate is steady at the home trade prices: December delivery, £15 15s.; and January-May, £16 7s. 6d. Nitrate of soda is firm, with limited trading at late prices.

Residuals from Pit Heaps.—In the Wigan coal field, as in other coal mining areas, there are many slag heaps in the neighbourhood of collieries, and the question of utilising these for industrial purposes has more than once been mooted, one proposal prior to the war being that the old pit heaps throughout the country should be planted with trees. A new light on their possible use was given at the last meeting of the Wigan Corporation Industries Committee, when Coun. R. Alstead, the chairman of the committee, reported that he had had an interview with Mr. Tom Ellis, of Messrs. Peace and Ellis, solicitors (of which Sir Thos. R. Ratcliffe-Ellis is the principal), in regard to the report that a syndicate had been formed for the purpose of using up pit heaps with a view to obtaining certain residuals. Mr. Tom Ellis informed the chairman of the Wigan Corporation Industries Committee that it was a fact that this question was being seriously considered, and that certain experiments had shown that certain shale had been proved to contain a certain amount of oil. Mr. Ellis further said that, so far as he could say, it was intended that the refuse should be treated at each colliery, and he added that he did not know whether the Industries Committee would be of any great assistance in the matter. He informed Coun. Alstead that further experiments were being made, and that the Admiralty were greatly interested in the work, adding that if any further developments were made he would be pleased to report to the Corporation Industries Committee. At the same meeting of the Industries Committee, the question of the geological examination of the local strata was considered, and in this connection the chairman reported that the vice-chairman, Coun. Bamford, and himself, had waited upon Mr. S. C. Laws, the principal of the Wigan and District Mining and Technical College, and discussed the question of the geological examination of local strata, with the object of obtaining information from the point of view of establishing new industries. Mr. Laws, the chairman explained, considered the suggestion an excellent one, and promised to bring the matter before the governors of the Mining and Technical College, with a view to the geological staff of the college being allowed to make a survey and examination of the strata in the district. The question of the provision of an annual prize for geological students engaged on this work at the Wigan Mining and Technical College was discussed by the Corporation Industries Committee, and was adjourned for further consideration.

THE WELSH COAL AND IRON TRADES.

THURSDAY, DECEMBER 20.

Monmouthshire, South Wales, &c.

Report.

COAL.

The stormy weather at the beginning of the week interfered with the arrival of such tonnage as was due for coal loading, though later there was some improvement. Still, with stocks very heavy, particularly in small coal, there was a good deal of intermittent working at the collieries owing to the congested state of the railways. Suggestions have been made that the position might be met by a number of districts agreeing to work only six hours a day or five days a week. The stoppage of three days which has been arranged during the Christmas holidays will to some extent tend to diminish the large stocks, but *per contra* there is the fact that there will be no work at the docks for two days. There is no variation from scheduled prices. Gas and house coals have been in very strong request. There has been a slight improvement in the patent fuel market. Coke is still in heavy demand, and as there is none too much for home consumption. The overseas export of coke from this district is still prohibited.

Prices f.o.b. cash 30 days.

	Current prices.	Last week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	32/6	29/-30/-
Western-valleys, ordin'y	31/6	31/6	28/-29/-
Best Eastern-valleys ...	31/6	31/6	26/-28/-
Secondary do.	30/6	30/6	25/-26/-
Best small coals	23/6	23/6	17/-19/-
Secondary do.	22/6	22/6	14/-16/-
Inferior do.	20/6	20/6	12/-14/-
Screenings	25/6	25/6	19/-20/-
Through coals	29/6	29/6	—
Best washed nuts.....	32/6	32/6	—
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	24/6-26/6
Secondary do. do. ...	33/3	33/3	22/-24/-
Patent fuel	32/6	32/6	35/-37/-
Furnace coke	47/6	47/6	47/6-52/6
Foundry coke	47/6	47/6	57/6-62/6

IRON.

The iron and steel works of the district are still employed up to their fullest capacity and there is a suggestion that a number of hands who do not now get much work at the docks might well be drafted into some of the vital industries so that the maximum output may continue to be assured. Prices are purely nominal, as the bulk of the work turned out is on Government account. Pitwood arrivals have not been very large, and the top price, viz., 75s. for best French fir, is still maintained.

Cardiff.

COAL.

The chief topic of conversation on 'Change this week has been the new pooling scheme in connection with the supply of coal to France. The principle of the proposal has already been agreed to, but details still require to be worked out, and it is anticipated that the difficulties with regard to several of the clauses will be definitely overcome at a meeting which is to be held at the end of the present week. A compromise has been effected by which all parties will be represented on the committee, without a chairman, but in case of dispute the point will be submitted to the representative of the Coal Controller for decision. In this way difficulties have been overcome, and the work of the committee is to be proceeded with immediately. The tonnage position has not improved, and in influential quarters it is recognised that it is likely to become worse before it gets better. It is understood that the report of the Commission appointed to deal with slack working at the collieries has been presented to the Controller, but there are no drastic recommendations, and it is not anticipated that any action which may be taken will materially retrieve the situation. In the mean-

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

	Current prices.	Last week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—
Seconds	30/9	30/9	29/-30/-
Ordinary	30/	30/	28/-29/-
Steam smalls No. 1	21/6	21/6	19/-20/-
Do. 2	21/	21/	—
Do. 3	20/6	20/6	18/-19/-
Do. 4	20/	20/	—
Do. 5	19/6	19/6	14/-16/-
Do. 6	19/	19/	—
Do. 7	18/6	18/6	12/-14/-
Do. 8	18/	18/	—
Best dry coals	30/	30/	28/-30/-
Ordinary dries	28/6	28/6	25/-27/-
Best washed nut	30/	30/	25/-26/-
Seconds	28/6	28/6	24/-25/-
Best washed peas.....	27/6	27/6	23/6-24/6
Seconds	26/6	26/6	22/6-23/6
Monmouthshire—			
Black Veins	30/	30/	29/-30/-
Western-valleys	29/	29/	28/-29/-
Eastern-valleys	29/	29/	27/-28/-
Inferior do.	28/	28/	26/-27/-
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	23/-30/-
Small	26/	26/	19/-20/-
No. 2 Rhondda—			
Large	27/	27/	25/-26/-
Through	22/-23/6	22/-23/6	21/-22/-
.....	17/-19/	17/-19/	18/-20/-
.....	30/	30/	36/-37/6
.....	30/	30/	35/-36/-
.....	47/6	47/6	62/6-67/6
.....	47/6	47/6	57/6-62/6
.....	47/6	47/6	50/-52/6
.....	75/	75/	49/-50/-

Nominal.

time, business is almost entirely restricted to official orders and commitments under contract, and there is little or nothing doing outside this radius. Admiralty collieries are fairly well situated, but other concerns dealing in inferior grades have difficulty in disposing of their outputs, stocks of which are constantly increasing. The slight improvement of a few days ago has received a check owing to the recurrence of inclement weather, which retarded the arrival of vessels, and at some of the docks very few tips have been constantly employed. But for the inland demand for Monmouthshire coals it is probable that many collieries in that section of the coal field would be in a bad way, but fortunately clearances of wagons have been reasonably satisfactory, and regularity of working has been fairly maintained. In the early part of the week, however, stoppages were reported in many districts, and at some of the miners' meetings suggestions are being made that there should be an all round decrease in the number of shifts worked, whilst in other cases the men's leaders are advocating a reduction in the working hours from eight to six. There continues to be a brisk demand for furnace and gas producing coals, and in some cases it is difficult to adequately meet the pressure. Patent fuel is plentiful, and enquiries are on the slow side, chiefly owing to the lack of transport facilities. Coke continues in good request, and producers are turning out maximum quantities. There is no improvement in the pitwood trade. Supplies are short, and in the absence of regulations as to maximum rates, importers have no difficulty in obtaining 75s. per ton ex ship for best French fir.

IRON.

Shipments of tin-plates, last week, were on a small scale, only amounting to 5,699 boxes, whilst receipts from works were 24,396 boxes, thus bringing stocks up to 113,083 boxes, compared with 94,386 the preceding week, and 170,426 boxes at the corresponding period of last year. The demand continues heavy, but makers are well placed with orders for several months ahead, and they are very cautious in undertaking new commitments, especially as the price of block tin is steadily soaring. Some weeks ago it was anticipated that the quotation would reach £300 per ton before the end of the year. This has now been exceeded, and on Tuesday spot business was done as high as £304 10s., whilst forward contracts were entered into at £296 to £298. For Bessemer standard cokes the prices are now 31s. 6d. per box, with other sizes in proportion. There has been little improvement in dealing with oil sizes of wasters owing to the difficulty of obtaining permits, and manufacturers complain that the excessive stocks are causing them considerable inconvenience. In all departments of the iron and steel industry works are engaged at high pressure, and it is stated that operations will be continued uninterruptedly throughout the Christmas holidays, provided the necessary quantities of gas-producing coal can be secured for the furnaces. In the galvanised sheet trade there is no change, and the only demand appears to be for black plate and trench sheets, on which works are chiefly engaged. Iron ore supplies are well maintained. The scrap metal market is unaltered.

Llanelli.

COAL.

The tone of the market continues quiet, and there is no new feature to report. Tonnage is the important question at the moment, and as arrivals are below market requirements, supplies of practically all qualities are on offer. Large anthracite qualities are easier, and buyers are able to get supplies of all kinds for prompt business. Cobbles are also feeling the effect of lack of clearance facilities, and are offering more freely. Nuts and beans are not so difficult to secure, and for prompt clearance of wagons buyers are able to secure grades which a week ago were very scarce, with sellers finding it difficult to meet their obligations. Peas are easier, and there is at present no difficulty in securing parcels. Culm and duff are both inactive, and stocks on hand very heavy. There is no improvement to report in the position of steam coals. Large kinds are generally easier, with parcels of all grades offering for prompt business. Throughs are also very slow, and stocks hold up wagons. Smallalls are offering very freely, and supplies of all descriptions are much in advance of market requirements. Stocks of the lower grades in particular are very heavy. Manufacturing coals are moving freely, and local works taking heavy supplies. House coals are brisk and in good demand, with no stocks on hand at the collieries.

Prices f.o.b.

	Current prices.	Last week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	29/6-32/
Seconds	29/	29/	27/6-30/
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	24/-25/-
Machine-made cobbles.....	42/6	42/6	37/6-40/
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken boans (best).....	35/	35/	28/6-29/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/-22/
Rubbly culm.....	13/	13/	10/6-11/6
Red Vein culm.....	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	27/-28/6
Seconds	27/	27/	—
Cargo through	23/6	23/6	19/6-22/6
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Smallalls	19/	19/	13/6-17/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smallalls.....	24/	24/	17/-19/6
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

Swansea.

COAL.

There was an excellent attendance on 'Change, but the enquiry for anthracite was very slow, owing to the easy tonnage position; supplies are offering very freely, but

there is not much business doing. The demand for Swansea Valley large has fallen considerably. Machine-made varieties were not quite so firm. Rubbly culm and duff were without movement. Steam coals are very easy, and sellers unable to secure anything like sufficient orders to cope with outputs.

THE LONDON COAL TRADE.

THURSDAY, DECEMBER 20.

The sudden arrival of wintry weather considerably increased the flow of orders for house coal, but the pressing orders are all from the poorer neighbourhoods and the smaller consumers. The large houses have undoubtedly taken advantage of the urgent request of the Coal Controller to lay in as much stock as possible during the summer months, and now that the actual consumption has increased, they are falling back upon the stocks in hand. There is a good demand for all kinds of coal on the market, but some of the depots are asking for the supplies to be eased off, pointing unmistakably to the fact of having a fair supply on hand. Double-screened nuts and steam coal are unusually scarce. The munition works and the railway companies are absorbing all the output, and factories on the Thames side and around London are keenly anxious for a better supply. Slacks also are selling more freely, as it is found to be essential to use coke and slack whilst the hard steam coals are so short. The seaborne market is brisk; 27 cargoes arrived in the River for Monday and 14 for Wednesday. The slippery state of the roads in London and the heavy fall of snow in the suburbs rendered it very difficult to deliver the ordinary daily quantity of coal, but as the bulk of the demand is now for the smaller consumers, the dealers and trolley men have been excessively busy. Altogether a fair tonnage has been delivered. A good deal of attention has lately been given to the serious question of the position of many of the Durham collieries which are dependent upon the arrival of vessels to carry away their output. It is reported that whilst so many of the Midland and Yorkshire collieries are pressed beyond measure for the coal on order, many of the Durham collieries are compelled to work short time because of the difficulty in obtaining a sufficiency of boats. At the same time the Controller's recent regulations prevent coal from this district being sent by rail to London or any of the southern stations. An important meeting has been held during the week between the owners of coal wagons and the Coal Controller with reference to the number of coal wagons which it is understood will be withdrawn from the mineral traffic for war purposes. The approximate number is given at 20,000, and the matter is, of course, seriously debated by all the representatives of the wagon interest. The outcome of the conference is not definitely known yet. The Board of Trade announced this week that there are ample supplies of gas coke at the various works of the gas companies in the Metropolitan area, and request consumers to take advantage of the position by placing immediate orders. The difficulty, however, is that the gas companies find an increasing difficulty in delivering the coke, and it is incumbent upon the merchants and dealers to fetch it. On Monday, the annual meeting of the Coal Merchants' Society was held, and after the usual formalities of the balance sheet and report, it was unanimously resolved to re-elect Mr. G. A. Warren as chairman for another year.

From Messrs. Dinham, Fawcett and Company's Report.

FRIDAY, DECEMBER 14.—Although the weather was somewhat milder, there was a good enquiry for seaborne house coal, but the supply was very limited and nothing on offer. Cargoes, 16.

MONDAY, DECEMBER 17.—The sudden appearance of winter caused a good enquiry for seaborne house coal, but supplies were again somewhat short. No outside sales reported. Cargoes, 27.

WEDNESDAY, DECEMBER 19.—There was no alteration in the seaborne house coal market, which continued fair with short supplies. Cargoes, 14.

THE TIN-PLATE TRADE.

Liverpool.

Business has again been very quiet. Makers are entitled to ask about 31s. 6d. basis for cokes net f.o.t. at works, on the present cost of tin, but few are holding out for this, most works being willing to accept less money owing to the fact that specifications are not coming along very freely lately. A good deal of dissatisfaction is expressed at the action of the Government in encouraging the placing of orders for plates with America, and it is hard to know what the explanation can be, seeing that Welsh works can do with more business than they have been recently getting. Further, plates can be bought cheaper in Wales than in the States, and delivered quicker; and, incidentally, we should have thought cargo space could have been used to better advantage. Wasters are accumulating, permits coming along very slowly.

A meeting of coal exporters in Cardiff on Thursday rejected by 36 votes to 16 the proposal to pool shipments to France.

Mining in Kuangtung and Kuangsi, China.—The Acting British Vice-Consul at Canton (Mr. R. S. Pratt) has furnished, under date October 15, the following notes on the mining industry in Kuangtung and Kuangsi:—The extraordinary demand for metals caused by the war has attracted attention to the mineral resources of China, the neglect of which has nowhere been more pronounced than in the two provinces of Kuangtung and Kuangsi. A certain impetus has, however, now been given to mining there, which has caused foreign money to flow into the provinces. Of real mining, in the proper sense of the word, there has been none. The surface of the deposits, whatever they are, is merely scratched, and the workings, which consist of gopher holes driven into the hillsides, are abandoned as soon as the lack of ventilation or the presence of water makes them unsafe. The real body of the ore is never reached at all. The coal, for instance, that finds a local market is of most inferior quality, but experts are satisfied of the existence of vast beds of excellent steam coal, which only require efficient methods and supervision to yield handsome profits. Mr. Pratt states that although the proper exploitation of the mineral wealth of these provinces is impossible under present conditions, nothing can be more certain than that when adequate working is possible, the keenest competition will ensue.—*Board of Trade Journal.*

SOUTH WALES MINING TIMBER TRADE.

The first meeting of the Allocation Committee for the Distribution of South Wales Mining Timber was held on Friday last. Mr. J. Dyer Lewis was appointed chairman. The meeting decided to recommend to the Controller of Mines that as little interference as possible should be made with existing organisations for the distribution of supplies. Deliveries of timber are irregular, and the totals are comparatively small. These factors will involve a system of allocation which, to be efficient, must not clash with transport facilities. The committee will have to meet at frequent intervals. The next business of importance is the fixing of maximum selling prices for all descriptions of mining timber. Maximum prices are essential for the success of the allocation scheme, as it will then be a matter of indifference to sellers as to whom the wood will be sold. In all probability the allocation scheme and maximum selling prices will come into force January 1, the date on which the Cardiff, Newport, Port Talbot and Swansea districts begin to pool the profits of all coal exporting business to Italy and France.

The market for pitwood this week was very firm at 75s. per ton ex ship Cardiff. Imports for the week ended December 14 were upon a better scale, a total of 9,807 loads being received. Of this quantity 1,560 loads were consigned to the Admiralty Pitwood Committee, whilst 8,247 loads were taken by the approved importers. The following shows the actual consignments:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Dec. 8	W. H. Williams and Company	1,200
" 10	Morgan and Cadogan	3,040
" 10	Morgan and Cadogan	120
" 10	Morgan and Cadogan	120
" 10	Morgan and Cadogan	120
" 10	Lysberg Limited	204
" 10	Lysberg Limited	156
" 10	Lysberg Limited	108
" 10	Lysberg Limited	840
" 10	Franklin Thomas and Company	1,000
" 10	Lysberg Limited	156
" 10	Lysberg Limited	96
" 11	A. Bromage and Company	120
" 11	Grant Hayward	150
" 11	Grant Hayward	96
" 11	Grant Hayward	144
" 11	Grant Hayward	150
" 11	Budd and Company Limited	180
" 11	Budd and Company Limited	204
" 11	E. Marcesche and Company	48
" 12	Franklin Thomas and Company	875
" 14	Morgan and Cadogan	80

Total..... 9,207

Newport:—

Dec. 6	Morgan and Cadogan	600
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THE IRISH COAL TRADE.

THURSDAY, DECEMBER 20.

Dublin.

Business in all departments is very brisk owing to the nearness of Christmas and the colder weather, and the cross-Channel deliveries of coal have generally improved since last report. Prices have again been advanced, and may be still higher this week. Present quotations:—Best Orrell, 51s. per ton; best Arley, 50s.; best Wigan, 49s.; Pemberton Wigan, 47s.; best Whitehaven, 49s.; best kitchen coal, 48s.; Orrell slack, 43s.; all less 1s. per ton discount for cash. Steam coals are also advanced in price, but coke remains unchanged at 46s. 6d. per ton delivered. Irish coals from the Wolfhill Collieries, Queen's County, are:—Best coal, 47s. 6d. per ton; culm, 15s. to 20s. per ton, all f.o.r. Athy, the nearest railway connection with the mines. Best large coal at the Castlecomer Collieries, co. Kilkenny, is 28s. 4d. per ton at the pithead. It is stated that at these collieries the distribution of coal has been partly held up owing to the deterioration of the roads through the heavy motor traffic, and the possibility of improving transit facilities is at present under consideration by the Department of Agriculture and the Board of Trade. The total quantity of coal discharged upon the Dublin quays during the past week from English, Scotch and Welsh ports was 25,000 tons, being an increase of over 12,000 tons upon the week previously.

A later report states that on Tuesday some of the merchants had only one quality left in stock—viz., Wigan house coal, which has been advanced to 50s. per ton net.

Belfast.

Conditions in the port are somewhat more favourable for the carrying out of the numerous orders on hand, supplies being a little more plentiful with the removal of navigation interruptions and the resumption of the usual cross-Channel traffic. At the moment, prices are unchanged, but advances may be made any day, as freight rates are very stiff in consequence of the recent delays at the ports of shipment. Current quotations for household coals are as follow:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kitchen coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Approximate prices of Scotch steam coal are 31s. 6d. per ton for the inferior sorts, the better qualities being as high as 37s. 6d. to 40s. per ton. Gas coke is about from 42s. 6d. to 45s. per ton, and foundry coke from 63s. 6d. to 68s. 6d. per ton.

Mining of Iron Pyrites.—It is officially announced that the Ministry of Munitions is prepared during the period of hostilities to purchase iron pyrites mined in the United Kingdom. The pyrites must contain not less than 37½ per cent. of sulphur, and not over 1 per cent. of arsenic. The price payable will be 35s. per ton of pyrites, f.o.r., for quantities of not less than one truck load, but the Minister reserves the right to revise the price after December 31, 1918, or if over 5,000 tons are delivered from one deposit before that date the price may be revised in respect of further deliveries from such deposit forthwith. In the first instance samples of all ore tendered will be selected by the local agent of the Ministry, and if, on analysis, the ore proves suitable, payment of 75 per cent. of the amount of the purchase price for each consignment will be made on receipt of the railway company's certificate that the pyrites has been put on rail. The balance will be paid within 16 days of the receipt of correct accounts. Producers can obtain detailed particulars on application to the Department of Explosives Supplies, Storey's-gate, Westminster, S.W. 1.

THE MELTING POINT OF COAL ASH.

Addressing the members of the Newcastle-upon-Tyne Section of the Society of Chemical Industry, at their monthly meeting in Newcastle last week—Mr. HENRY PIRIE, of the Priestman Collieries Limited, presiding—Dr. J. T. DUNN, F.I.C., City Analyst for Newcastle, dealt with "The Melting Point of Coal Ash."

Dr. Dunn stated that, in 1913, it became his duty to ascertain the melting points of the coal ashes of a number of samples of coal for certain industrial purposes. He made the determinations from a briquetting plant of iron ore, where the briquettes were taken in wagons through the furnaces, in the course of which operation considerable trouble had resulted from the ash from the furnaces being deposited in the wagons until they became clogged up. There turned out to be so much variation amongst these melting points that he had proposed to investigate the matter further. Unfortunately, he had never had time even to verify the temperatures he now gave for the melting points; and he asked his audience to take these as only very rough indications, because he had not been able to calibrate the thermopile with which they were taken, and he knew that that was not absolute accurate at the time.

Many years ago Richters made a very elaborate and interesting investigation of refractory materials—fire-clays—and enquired into the conditions under which their melting points varied. He arrived, empirically, at results which were now known to be the general behaviour of mixtures of more or less fusible substances. He found that, if one melted alumina and silica together, the melting point of the mixture lowered as one got from pure silica to more and more alumina, and then rose again until it reached the point of pure silica. He then examined the effects of different weights of different materials, and came to the conclusion that the effect produced upon the melting point was determined by the quantity of added material and its molecular weight; so that, if one added to a given mixture of alumina and silica a quantity of another metallic oxide, the amount by which the melting point was lowered was almost independent of the nature of the material, provided that its quantity was proportionate to its molecular weight, and that, if one had a number of different oxides mixed together with the alumina and silica mixture, the reduction of the melting point depended upon the number of molecules of the oxides which were added to the given number of molecules of alumina and silica. Working on that system, the speaker had dealt with 14 or 15 samples of coal ash, nearly all from Northumberland, Durham or Scottish coal, together with ash from Natal coal. He exhibited a number of tables of the different compositions of the ash, with the result of his research into the question of the melting points—ranging from 1,020 degs. Cent. lowest, which happened to be the Natal coal, to a highest figure of 1,500 degs. Cent., in the case of a British coal—tending to prove Richters' rule that the greater the amount of materials other than alumina and silica present the lower was the melting point.

These tables, he explained, were not analyses in the ordinary sense of the term. They did not represent percentages but molecules of different oxides, as compared with 1,000 molecules of silica. The following data relate to those ashes which fused at the lowest and the highest temperatures respectively:—

	Molecules.	
Alumina	382	410
Iron oxide	255	41
Manganese oxide	nil	nil
Lime	238	9
Magnesia	185	44
Alkalis	67	42
	745	136
	Degs. Cent.	Degs. Cent.
Melting point	1,020	1,500

Prof. HENRY LOUIS, Newcastle, stated that a good deal of progress had been made since Richters' time. He did not think they could accept Dr. Dunn's theories as correct. Lead oxide would fuse any of these silicates immediately. Magnesia rendered silicates far more infusible than did many other bodies of lower molecular weight. The modern view, he thought, was that each silicate had its own melting point, and, in the cases of complex silicates, the very elaborate work of recent years, favouring the view that these silicates formed eutectics, should be considered. The subject was exceedingly complex, and could not be disposed of by the simple theory of molecular weight. Had Dr. Dunn determined the state of oxidation of the iron as ferric or ferrous? If the former, it should be borne in mind that ferric oxide rendered silicates highly infusible.

Mr. C. S. RIDSDALE, Middlesbrough, said he had always maintained there was far more needed in the study of coal than merely the ordinary analysis or, even, the analysis of the calorific power. The fusibility of ash had a very important practical bearing on the use of coal. When they were raising steam, if they were unfortunate enough to get a kind of coal with a very fusible ash, they would very quickly find their grate bars silted up or their air space reduced, and the amount and evaporative power of the fuel they could burn would be very much reduced also. If they could get an approximately accurate idea of the fusion point from analysis, that would be very important. In fact, perhaps, the simplest way was to determine the fusion point direct, but, in any event, it was a big thing to be reckoned with in buying fuel, because that fusing-up in the furnaces had very serious prejudicial effects.

Mr. S. H. COLLINS, lecturer in agricultural chemistry at Armstrong College, referred to the potash content of ash, and said the Board of Agriculture particularly wanted information from all chemists and that, if anyone knew of any large quantities of coal ash likely to contain potash, even in very small amounts, he would be glad to hear of it. It did not depend upon the percentage of potash in the coal ash, but upon the quantity which could be washed out with water. The expense of so washing it out was very small.

The HON. SECRETARY (Mr. H. Dunford Smith) said he believed that some of the Continental railway com-

panies had a specification for the melting point of coal ash and would not accept a coal with a melting point below 1,400 degs. Cent. for use on the Continent.

Mr. WEYMAN remarked that there was often a gap between the first fluxing of the material and the final flow.

Dr. J. H. PATERSON suggested that, because of the importance of the subject to coal users, a special night should be allocated to its discussion.

It was intimated that the matter might be raised again at next meeting on January 16, when Mr. G. W. HEWSON is to speak on "Coke as a Fuel for Blast-furnaces."

Replying on the discussion, Dr. DUNN expressed his entire agreement with Prof. Louis as to the progress made since Richters' day, and said it was quite true that subsequent research had proved that Richters' rule did not always hold good. The speaker's experiments were performed in an ordinary furnace, with an oxygen blow-pipe. The coal ash cones he used were allowed to melt down completely, and the temperature was taken when they had sunk down entirely. It was very noticeable that different coal ashes behaved in very different ways. Some of them melted quickly—like ice, so to speak—but others went through a long period of gradually decreasing viscosity, and the temperature at which they began to show signs of motion was many degrees below that at which they finally liquefied in a drop or blob. Most of these ashes contained anything from 1 to 3 per cent. of potash. He took it that the iron oxide was always there as ferric oxide, but he did not make any definite determination of its state. Replying to Mr. O. Smalley, he had not compared the briquetting properties of these coals with the composition of the ash.

The CHAIRMAN remarked that, although it was very important, he did not think it was at all customary for buyers to insist upon a particular melting point of the ash of coals.

BELGIAN COAL AND COKE INDUSTRY IN THE WAR.

The following report on the Belgian coal and coke industry during the war has been furnished to *Coal Age* by a Belgian coke-oven specialist, residing at Mons, who remained in the country for two years during the German occupation.

During the years that immediately preceded the war, Belgium produced in round figures 24,000,000 metric tons of coal a year. About 1,350,000 tons of this was coked, yielding a trifle more than 1,000,000 tons of commercial coke, including breeze, sold for domestic use. All coke was, of course, by-product coke, as none other has been made in Belgium since 1892 or 1893.

Belgium was a pioneer in the by-product industry. The oldest by-product company now in existence is the Société Anonyme du Charbonnage des Produits, at Flénu, Belgium, which was incorporated in 1856 for the mining of coal and the manufacture of by-products. This company may have become better known abroad as a coal company than a by-product concern, but this was due to the extraordinarily fine natural condition of its coal deposits, which enabled the company to pay big dividends earned in mining and selling coal while weathering the difficult times it had in developing the by-product end of its business. But no matter how hard the times, the Produits company never ceased for a single day, since 1856, to make by-products; and the first aniline colours ever put on the market were made at Flénu by this company at a time when its coke and by-product department was managed by the noted Belgian chemist Neyrinck.

With the advent of the Coppée vertical-flue coke oven the Produits company became quite a factor in the by-product industry. That was about 1870, at a time when Germany had only beehive coke ovens and when all coke made in Belgium was produced in retort ovens, of the original Coppée style. Not only was Germany behind Belgium in getting rid of its beehive ovens, but even to this day there is not in Germany a single coke oven which is not of the vertical-flue kind first invented by Coppée, a Belgian, or the horizontal-flue style developed by Solvay and Smet, the former a Belgian, the latter a Frenchman. There are many people, even among those in the by-product industry, who believe that the by-product oven is of German origin and development. To this day, Belgian coke ovens have always kept at least one step ahead of all others.

It has been stated that Belgium, in the year 1916, produced roughly 17,000,000 tons. As a matter of fact, the output cannot have been one-half that figure. The tonnage mined during the first eight months, minus two weeks, was less than 4,000,000 tons, and the official figure as given out at Brussels for the first six months of 1916 was less than 3,000,000 tons. That is 5,000,000 tons less than reported from other sources. How could it have been otherwise, when the mines worked only, on the average, one and a-half days a week?

The output would have been even less, had it not been for the very large amount of coal used in coke ovens and gas producers to make gas for the blast furnaces and open-hearth furnaces in which were cremated the countless thousands of German corpses brought from the Verdun slaughter.

It was not because there was no work for them to do that the miners did not work. It was because they did not want to produce coal that would be used either to keep the enemy's gun factories running or to take the place of coal which the Germans had sold to neutral countries in exchange for provisions, clothing and supplies of which the German armies were in such great need. Many of the miners literally allowed themselves to starve to death rather than do a stroke of work that would be useful to the enemy.

The deportations of Belgians to Germany were intended to break the men's refusal to work for their oppressors. The Germans thought that, by removing the Belgians from their homes and the zones in which the American Relief Commission was allowed to operate, they would be willing to work at anything to save themselves from starvation. Numerous notices were posted notifying

the working men that they would be sent to the German front. They persisted in staying away from the Belgian front. The Germans thought they would thus break the "bad spirit" of those miners. They were mistaken in their calculations, as it is a record that only 2 per cent. of the men sent to the front of Westphalia consented to do some work, and very little at that.

As to the coke output, counting the ovens that kept working more or less spasmodically in 1916, the output could not have been more than a paltry 85,000 to 90,000 tons. Practically all the coke plants which thus remained at work were operated by German labour, or rather by all kinds of men of all ages and descriptions, brought from all kinds of countries, some of them as far as Syria and Sinai. But even with the few coke ovens that were kept going, they could not be charged regularly, due to the scarcity of coal. It happened (and this was the rule, not the exception) that ovens which ought to have been pushed once a day were pushed only, on the average, once a week.

Since there were more coke ovens in the country than the enemy could keep in operation, and since all the Belgian coke ovens are by-product ovens, no new by-product ovens have been built in either Belgium or the invaded part of France.

Several plants were nearing completion in the Province of Hainaut when the war began. It was thought the war would not last over the winter, and work was continued for a time but was stopped as soon as it became evident that the war would be long. The enemy took possession of them, and intended to complete them, but not finding the plans of the ovens, which were of a new design, they tore the construction down, brick by brick, measuring everything with the greatest care and reconstructing the ovens on paper.

The plans thus made were sent to Germany; and where the several expensive and nearly completed installations had previously stood, there remained only piles of useless materials, all the special and expensive brick shapes being removed. It is also certain that the nearly new batteries of ovens at Hourpes, Genly, Strépy and Bracqneignes have been also razed to the ground, all serviceable material being sent to Westphalia during the winter and early spring of this year.

It has been stated that the Germans have constructed by-product ovens in the province of Limburg, but as a matter of fact that province has probably suffered more, comparatively, from German barbarity than any other part of Belgium. The Coppée family—the descendants of the coke oven inventor—have for a long time contemplated the erection of large by-product plants in Limburg, and it is probable that, had it not been for the war, they would have commenced construction about the end of the present year, in order to have the plants completed early in the spring of 1919, ready for the time when the first coal from the new coal field of Limburg would be available. There is a vast new coal basin now in the process of development in Limburg, but the Germans have had nothing to do with this development except possibly to retard it and even to destroy much of what had been accomplished by the ceaseless labour of nearly 20 years. Mine shafts, some of which had reached depths of more than 2,000 ft., were being sunk through quicksands by the freezing process. Only a few of the shafts had passed the quicksands, some of them having safely traversed nearly 700 ft. of this dangerous ground.

During the early summer of 1916, the men were corralled by German soldiers at the same time, on the same day, at all the shafts scattered in an area of 31 by 18 miles. Stokers, engine-men, electricians, blacksmiths, carpenters, were packed into waiting trains and sent to Germany. The refrigerating machines have not made a revolution since then, and all shafts that were not safely past the quicksands have been destroyed for ever. Two of these shafts, the property of the Coppée family, had been commenced in March 1900; they had cost millions, and were expected to be finished for coal hoisting at the beginning of 1919. They also had four other shafts that had just reached a depth of 1,730 ft. where the head of the quicksand formation was encountered, when the war began. Evence Coppée decided to wait better times to sink these shafts.

As to the six new mines opened during the German régime in the province of Hainaut, this is another story of the same kind as that of the Limburg coal field development. It does not take as long to sink a shaft in Hainaut as it does in Limburg. The record for fast sinking of a shaft in Hainaut is held by the old Belle et Bonne Company, which sunk its No. 28 shaft to a depth of 1,900 ft. in five and a-half years. The favourable conditions encountered at this shaft will probably never present themselves again anywhere else in that region.

The six new mines that evidently form the basis of the German story are well known to all Belgian mining men. Work on them was started in 1909 (one shaft), in 1910 (three shafts) and 1912 (two shafts). As the shafts were not producing mines when the war broke out, no coal could be taken out of them; and consequently, the miners had no scruples about working in these shafts. Work went on uninterruptedly until the German authorities (in December 1915 or January 1916) served notice on the different companies owning the shafts that, unless work could be prosecuted uninterruptedly in their producing shafts, the shafts that were sinking would be taken possession of by the military authorities. The miners refused to mine coal for the benefit of their masters, and the six shafts have been stopped ever since. All the machinery was dismantled and shipped to the land beyond the Rhine. The shafts in question are at Monceau-Fontaine, Sacré Madame, Anderghes and Trazegnies.

It has reached us from other sources that the average coal output in Belgium was only 50 and 75 per cent. of pre-war output. The coal that was despatched to Holland and other countries was despatched to Holland and other countries. The lack of shipping facilities has restricted this traffic,

which has also been interrupted, for days or weeks at a time, by the closing of the frontiers by the German authorities. A great many loads are also stated to have been pillaged in transit. Belgian coal has been employed by Germany as a means of negotiating with neutral countries; but the Belgian coal owners are powerless in the matter, for if they refused to export to neutrals they would run the risk of their collieries being commandeered. In Belgium itself the means of transit are practically nil, there being no trains, trucks or lorries available, and no horses or fodder to feed them with. Consequently, the consumption of coal in the country is restricted to the immediate neighbourhood of the pits. Moreover, the possibility of raising coal is faced with numerous difficulties arising from the shortage of material—explosives, timber, oil for safety lamps, rubber for pump clacks, brass for bearings, copper for electrical machinery, steel for engines and winding ropes, plates for boilers, lubricating oils, horse feed, pit ponies, and food for the miners.

THE AMERICAN COAL TRADE.

Cable advices this week state that the shortage of railway trucks is blamed as the cause for a coal famine which threatens grave difficulties throughout the United States. The suffering in New York is asserted to be the worst within living recollection. The skyscrapers are forced to manage without the steam heating, and the schools are being closed in order to economise fuel. Early relief is promised.

Reports by mail indicate that transportation is the key of the situation. The clearing house plan is recommended as a means of economising transport, while preserving the identity of coal shipments to a certain extent. The *Black Diamond* (Nov. 24) says that at best it is going to be a tremendous struggle for the next four months to save the country from disaster.

In several cities (according to the *Coal Age*) the dealer who sells in small lots is receiving particular attention. Also in many places single deliveries to householders seldom exceed one ton, and in some cases not more than one such delivery is made each 10 days. The market is, as a whole, deluged with orders to such an extent that it is doubtful if deliveries on many of them can be made for weeks, or possibly even months, to come. In Boston the conditions appear to become worse, for there are no spot offerings, and interruptions to mining are frequent. Contract coal movement is good in New York, but spot coal is unobtainable there. Some of the Philadelphia merchants doubt whether the expiration of many contracts on January 1 will have the effect of throwing any spot coal on the market, as it is felt that between the Government orders and railway fuel requirements, together with the remaining contract business, there will still not be sufficient coal to go around. As it now stands, there is little, of any, coal to be had at the Government price of 2.45 dols. per net ton. Supplies in Baltimore have become so light that the poorest qualities are eagerly purchased. Operators in Pittsburgh would be glad to sell coal at the set price if it could be moved.

Anthracite movements show little improvement. The first local fuel committee report in New England to receive official sanction was that for Boston. A maximum retail price of 9.50 dols. for stove and 8.50 dols. for pea per ton of 2,000 lb. was fixed, the price for stove also applying to broken, egg, and chestnut, whether red ash or white. Egg and stove sizes in Philadelphia are short, and will continue so until the Government's requisitions are greatly reduced. Chestnut and pea are easier, and gladly accepted. The steam sizes are very active, and prices range about as quoted last week. Buckwheat sells from 4 to 4.25 dols.; rice, 3 to 3.25 dols.; barley, 2 to 2.25 dols.; and culm of ordinary preparation, 55c.

Coke production, according to reports from Connellsville, has decreased owing to railroad congestion. The market is largely nominal, on account of restricted output, and is quotable at the Government prices: 6 dols. for furnace, 7 dols. for foundry, 7.30 dols. for crushed beehive, and 6.50 dols. for crushed by-product, per net ton at ovens.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.—December 17.

Coal Transport.

Col. F. HALL asked the President of the Board of Trade whether the Coal Controller obtained from the principal railway companies, including the London and North-Western, the Midland, the Great Central, the Great Northern, the Great Western, the North-Eastern, and the Lancashire and Yorkshire, the estimated saving in ton miles or train miles in the event of his coal redistribution scheme being brought into operation; and, if so, what were the estimates in each case, and how so far had the results agreed with the estimates.

Mr. WARDLE said that his estimate of the saving in ton miles to be effected by the coal transport reorganisation scheme was framed by reference to the effect on each colliery district as a whole. It would not be practicable for the matter to be dealt with in the manner suggested by the hon. member.

December 18.

Coal Output.

Mr. HASLAM asked the President of the Board of Trade whether, in order to accelerate the production and distribution of coal, and to enable an increasing quantity of coal to be raised per man employed, and to make more effective use of the railway wagons employed, and to ameliorate the position caused by the enlistment of large numbers of the younger men employed, he was taking steps to close unproductive mines temporarily in order to free labour for the other pits, and whether proper maintenance allowance would be given to men during absence from home.

Sir A. STANLEY replied that in certain cases the Controller of Coal Mines had already granted permission for

the closing down of mines having a low rate of output. It was essential that provision should be made for the transfer of the labour that may be displaced to more productive work, and for that purpose the Controller placed before the Miners' Federation of Great Britain a proposal for the institution of mobility bureaux to be worked by the Federation. This proposal had been accepted in principle, and it was hoped that the bureaux would shortly be set up. The provision of separation allowances formed a part of this scheme.

December 19.

Coal for France and Italy.

Mr. PRINGLE asked whether the arrangements made by the Board of Trade with the exporters of coal in May 1916, for the export of coal to France and Italy, had worked to the complete satisfaction of the French and Italian Governments; and, if so, why the arrangement then made had been departed from in respect of the coal supplied to the United States forces in France. Mr. Pringle also asked for the name of the firm which had obtained the contract for coal for the United States forces in France; whether this firm had been engaged in the export of coal to France in the past, and, if not, why a firm not formerly engaged in this trade had been enabled to obtain a contract contrary to the basis of the arrangement made by the Board of Trade with the coal exporters in May 1916.

Mr. WARDLE replied that the arrangement to which the hon. member referred related to coal for French and Italian requirements. The President of the Board of Trade was not prepared to interfere with the purchasing arrangements which the United States Government had adopted as best suited to their own requirements.

Mr. HOGGE asked whether Mr. Wardle was aware that the name of the firm was Harris and Dixon. Was one of the partners of that firm a member of the Government?

Mr. WARDLE said he had no knowledge of it.

MINERS' PARLIAMENTARY CANDIDATES.

A special conference of the Miners' Federation of Great Britain was opened at Southport on Tuesday, to consider the Federation's scheme for Labour candidates at the next General Election. Mr. Robert Smillie (president) was in the chair, and there were present 144 delegates. The executive proposal was that 43 candidates, including six sitting members, be adopted by the Federation.

It soon became evident from the discussion that the scheme as drafted was not big enough to satisfy the districts. It was resolved to refer the proposal back to the committee, with a view to revising the scheme and increasing the number of candidates.

On Wednesday, the conference decided in favour of 52 candidates. The districts in the Federation may nominate more candidates if they desire, and use local political funds.

The President said the committee had, so far as possible, met the wishes of the conference by re-arranging the number of candidates as follows: Yorkshire, 7; Lancashire and Cheshire, 5; Scotland, 6; South Wales, 10; Nottinghamshire, 2; Derbyshire, 3; Northumberland, 3; Durham, 8; Midland Federation, 4. Small districts: Group 1 (including North Wales, Cleveland, and Cumberland), 2; group 2 (including Leicestershire, South Derbyshire, Bristol, Somerset, Forest of Dean, and Kent), 2. The revised scheme allots two additional candidates each to Durham and South Wales, and an additional candidate each to Scotland, Derbyshire, Midland Federation and group 2 of small districts.

Mining Mobility Bureaux.

It was unanimously decided to accept the scheme arranged by the executive with the Coal Controller for the establishment in the various districts of mining mobility bureaux, as already published. Under this scheme, miners who are members of the Federation can be voluntarily removed from a district where work is slack to other districts where miners are required.

It was reported to the conference that the "combing out" of men who had entered the mines since August 1914 was being carried out in the various districts.

Miners and Labour's War Aims.

The Federation has decided to give the support of the mining vote of 700,000 at next week's National Labour Conference in favour of the draft proposals of the Parliamentary Committee of the Trade Congress and the Labour Party executive. It was decided, on the proposal of the executive, to recommend districts to send delegates to the Labour Conference of next week.

Mining Disputes.

The executive had under consideration disputes at iron ore mines in the Forest of Dean and Scotland. Mr. Thomas Ashton (secretary) reported that a letter had been received from Mr. Rowlinson (Forest of Dean) stating that the men employed at the Easter iron ore mine, Coleford, had stopped work because the management refused to pay the war bonus recently granted by the Coal Controller and the Ministry of Munitions, despite the fact that the Ministry of Munitions had instructed him to pay the increased wage. The executive appointed a deputation to see the Minister of Munitions on the dispute.

Mr. John Robertson reported that the men employed at the iron ore mine of Messrs. William Baird and Son on Raasay Island were on strike for an advance of wages and for the removal of certain grievances. It was stated that the wage paid was considerably less than for similar work on the mainland. The position was aggravated by the fact that German prisoners of war, who were on the island, had taken the place of the men on strike, thus causing considerable ill-feeling. A resolution was passed condemning the action of Messrs. Baird and the Ministry of Munitions for putting German prisoners to blackleg the men on strike. Mr. Smillie said it was agreed that the resolution should be immediately forwarded to the Ministry of Munitions.

MAKING MINE CARS SAFE.*

By C. SCHOLZ.

Within the experience of the present generation of mining men, the wooden rail, or "2 x 4," has given place to steel rails of 50 lb. and 60 lb. section; powerful locomotives have taken the place of car pushers and mules; the mine car has grown from a one-half ton tub to a five- and six-ton car; roller- or ball-bearing wheels are now used instead of the old-fashioned wheel which, if not oiled every trip, squeaked so loudly that the noise could be heard through the mine above the rumbling of the wheels.

It is not possible to adopt a mine car standard that will fit all conditions. The mining industry cannot adopt standards similar to those that the interchangeability or railroad equipment has made necessary on railroads. Nevertheless, there is a certain need corresponding to each condition, and it is most important that this need be met at each specific mine. The conditions differ so much that the standard for each mine must be varied to suit its particular problem, and roof and floor conditions, thickness of seam, grades, distance of hauling and method of hoisting must be borne in mind when we speak of a standard car.

The design of a suitable car is one of the most important features for the consideration of a mining engineer charged with the development and equipment of a mine. The first consideration should be to so plan the car that accidents will be reduced, and it is gratifying that much has been accomplished in this direction. Nevertheless, there is a great deal of room for further improvement, statistics showing that there is a much larger percentage of injury due to the transportation of the coal than to the mining of the fuel and to the other operations conducted at the working face.

With the increasing use of mechanical means for hauling, the dangers increase in certain directions and diminish in others, the hauling of longer trains and the coupling of trips increasing the dangers of transportation, and calling for special attention to couplers and bumpers.

The first aim of every operator is to increase the size of his cars so as to obtain the largest possible carrying capacity. The track gauge is usually fixed by roof conditions, and this generally decides the width of a car, and length to some extent. A short wheelbase car can take shorter curves, and is more easily replaced in case of derailment; but may perhaps be subject to many derailments that would be avoided if the wheelbase were of the proper length. The establishment of the correct wheel centres, therefore, is of the utmost importance; and from the safety standpoint it may be better to err on the side of making the wheelbases too long rather than too short.

The design of the car bumper has a far-reaching effect on the life of the car and the safety of the men hauling it—a feature which is quite important now on account of the great increase in the weight of trains and the severe service which cars are subjected to by mechanical haulage. The mining laws of several American States prescribe how far the bumper shall extend beyond the end of the car, and 7 in. should be the minimum requirement. A bumper extending the full width of the car is considered the better practice, because this provision prevents inter-locking when couplings are made on curves.

By far the greater number of accidents are due to the design of couplings, and wherever possible couplings should be adopted which do not hang between the bumpers, and which can be coupled when the cars are standing still, because every coupling which requires the movement of a car increases the risk.

A car which has a capacity of 10,000 lb. when topped 15 in. above the car body, has been adopted as standard by a large mine in Illinois. The height of the car is kept to the minimum, because it seems that, in practice, coal can be lifted by hand shovelling no higher than over a 4 ft. car side with satisfaction. To fill this car level full requires an expenditure of 24,000 ft.-lb. of energy. If the sides of the car were 6 in. higher, this would be increased to 27,000 ft.-lb., a reduction in effort readily observed by the miners. A mine where cars are loaded easily is more attractive to the men.

In order that the height of the car might be kept down to 3 ft. 10 in., it became necessary to widen the gauge to 44 in. in a district where 42 in. was usually considered the standard, but since the company in question has no other mines, the question of interchangeability of equipment did not need consideration. The car has no end gate, because the coal is dumped in a rotary tippie.

There are many advantages in this scheme of handling coal, especially in the elimination of the end gate. End gates spill much coal along the roadways. By eliminating stirrups and irons that fasten the front gate, the cost of the car is reduced, and projections which are dangerous to those along the roadway are removed. The bumper and couplings are designed so that it is not necessary for the coupler to subject himself to the danger of being crushed. Without his guidance the coupling link will slide between the jaws of the drawhead. In order to increase the tractive power of the locomotive, and to offset the advantages gained by a loose-link coupling, one drawhead is equipped with a spring. The wheelbase is nearly one-third the length of the car, and this provision should prevent many derailments.

All the car irons are rounded at the ends so that they will not catch the clothes of passers-by. Particularly is this need kept in view in providing for the three supports by which the cars are held in position while in the rotary dump. On account of the flatness of the bed in which the equipment is used, no brakes are required.

Even with the most perfect design of equipment, accidents will occur which will be charged to mine cars,

but for some of these they will not be responsible. Some accidents are listed as mine car accidents which are due not to the hazards resulting from the car design, but to the lack of clearance between the cars and the ribs or timbers. Wherever possible, and where employees must move between cars, a minimum clearance of 24 in. should be provided. It seems far preferable to have ample clearance on one side of the track, even if there is none on the other, rather than to have too little on both sides. The definite choice of one side as the side for passing will avoid confusion.

The great rapidity with which cars must be handled calls for the selection of cool-headed men for this class of work. Undoubtedly a great number of accidents to drivers and motormen are due to the spirit which is often inspired by a desire of the men to outdo each other. They not only bring injury upon themselves, but interfere with the steady operation of a mine, and often damage and destroy much equipment in the gratification of their high spirits.

LABOUR AND WAGES.

South Wales and Monmouthshire.

The Conciliation Board met on Friday, under the presidency of Mr. T. H. Deakin, and dealt with a letter from the Coal Controller wherein he agreed to the customary holidays being taken at Christmas, and stated that "such days will be recognised holidays within the meaning of the war wage circulars." The hope was expressed in his letter that any difference of opinion would be settled by conciliation, and that where continuous processes have to be maintained—coke ovens, blast furnaces, loading of Admiralty coal—the employers and workmen would co-operate to reach agreement, war wage to be paid the men who so work. It was arranged by the Board that the men should be granted three days holiday—the Monday, Tuesday and Wednesday of Christmas week. An appeal was made from the employers' side that the mine leaders would urge miners engaged in producing coal for gas purposes to return promptly after the holidays, as that class of coal is so urgently required for munition works, &c. A joint sub-committee is to be formed to deal with the question of payment to colliers when called upon to do hauliers' work.

The Vivian Lodge, in the Western Valleys of Monmouthshire, has passed a resolution stating that as workmen they will not support the firemen in their cause "unless they are prepared to give us written guarantees that they will support us under similar conditions." The resolution further states: "We demand a six-hours day, five days a week, and £1 a day as a minimum wage for all workers over 21 in and about the mines, such minimum wage to be paid in the event of the colliery being idle." It is stated that the resolution was unanimously passed, and ordered to be sent to the Federation executive at Cardiff.

For the Garw Valley the district meeting took place at Bridgend, and the agent's report dealt with the question of income tax and food supplies. His advice to the delegates was that they should at the forthcoming conference vote in favour of using the machinery of the Triple Alliance in order to ensure compulsory rationing, cheaper food, and relief of taxation for the wage-earner. Mr. J. Woolley was elected chairman, Mr. Evan David, J.P., secretary of the district, and Councillor Jenkin Jones as treasurer.

The ballot for election of miners' agent in the Merthyr district has now concluded, and Mr. Noah Ablett, of the Rhondda has been chosen by a vote of 2,721 against 1,358 given for Mr. B. Williams, who had acted temporarily during the illness of the late agent. Mr. Ablett is a checkweigher at Mardy Collieries, has been very active in propaganda work, and was one of the students of Ruskin College.

In the Ogmre and Gilfach district new officers have been elected for the following year: Mr. O. Jenkins as chairman; Mr. D. Bonar as secretary, and Mr. Lewis Lewis as treasurer. The meeting on Saturday passed a resolution calling upon the Government to institute at once a system of compulsory rationing to ensure equality in distribution of food. Another resolution instructed the executive to approach the colliery proprietors in order to secure free house coal supply for the widows of soldiers who had been miners and had been killed in action.

The anthracite miners met at Swansea on Saturday, and re-elected Mr. J. D. Morgan and Mr. J. James as members of the Federation executive. The monthly report referred to the decision of the Coal Controller upon Sunday night shifts—namely, that the week's war-wage (where Sunday is a customary shift) shall be 9s. for the full six days' shifts, and the same amount for afternoon work of five shifts.

At a meeting of the Western District colliers on Saturday, the Checkweighers' Act came under discussion, and the executive will be asked to take steps to ensure discussion upon suggested amendments. Protest was made against statements by Mr. Clem Edwards, M.P., alleging that "pacifists' gold" was spent in South Wales, and the Federation executive is desired to press upon the Government to obtain proof of the statements which have been made.

The miners of the Eastern Valley district in Monmouthshire, at a meeting on Monday, accorded permission to Mr. W. Cook (deputy agent) to sign a price list for the Three-quarter seam in the Eastern Valley Colliery. This gives a cutting price of 4s. 3d. per ton, and Mr. Cook said it was one of the best lists he had ever negotiated. The meeting passed a resolution calling upon the Federation executive to demand from Mr. Clem Edwards, M.P., proof as to his allegations as to German gold having been spent amongst the miners, or else to obtain an unreserved apology.

The East Glamorgan district met in Caerphilly on Monday, and it was stated in regard to the dispute at Bedwas Colliery that although permission had been granted by the executive for tendering notices, the agent hoped that a settlement would be arrived at before the notices took effect.

A discussion arose as to supply of house coal for the wives and dependants of miners who were on active service in the Army. It was stated that some of the collieries did supply coal in this way and that others did not; and a resolution was passed appealing to all employers who had not hitherto done so to supply the persons indicated.

Tredegear Valley district meeting took place at Blackwood, and here again the question of food supply and high prices was discussed. Upon the question of income-tax, it was argued that every effort should be used to induce the Government to raise the limit of exemption to £200 per annum, so that all wages should be free of tax. The agent reported that the executive had considered the colliery

stoppages due to lack of tonnage, and there was a strong position to favour the idea of the five days a week as a temporary war measure; but in his own personal opinion the conditions that would be set up by such a measure would be made better by a reduction to six hours a day instead of curtailing the number of days per week. The assistant agent reported that negotiations with the income-tax officials had secured an abatement of £1 per annum per man for pit clothes, or £5 for a man working with an electric lamp. This would be in addition to the £15 per man for explosives and tools. A resolution was passed that the conference on December 31 should be asked for a stop-day in protest against the way in which the Government was dealing with the food supply.

North of England.

A joint meeting promoted by the Seaham, Dawdon and Silksworth lodges of the Durham Miners' Association, held on Saturday last, unanimously adopted the following resolution:—"Having regard to the hardships inflicted on the inhabitants of New Seaham, Silksworth and Dawdon collieries, on account of the pits working little more than half time for over 12 months, we call upon the Government, first, to so re-arrange the area for supply of coal as will find markets for our produce and, second, to provide the necessary transport for conveyance of our coal to market, so that the workmen may be found something like reasonable employment. Failing this, we call upon the Government to guarantee at least the minimum rate of wages applicable to each class of labour affected, so that the people may be able to live in something like pre-war comfort." It was agreed that copies of the resolution should be sent to the Prime Minister, the Coal Controller and members of Parliament for the divisions affected. Mr. James Hoy, secretary of the New Seaham Lodge, stated that they were prepared to facilitate the efforts of their executive committee to bring the question to a head with the Government, for their people could not starve. The matter had been before the House of Commons on several occasions, but things were getting worse instead of better, and it was for them to move the Government by some means. They had suffered terribly at Seaham Colliery for over 12 months. From November 1916 to November 1917 they lost 20 weeks' work through broken time, and for the last four weeks they worked ten days. That state of affairs was an abomination. Coal was still as essential as ever for war purposes, so that there must be something wrong somewhere, and it was for them to see that that wrong was put right. At Seaham Colliery, for the week ended December 1 they investigated 321 claims for relief. These claims represented 451 males and 444 females over 14 years and 845 children, a total of 1,740. In these claims the average income, where there was more than one worker, was 34s. per week, including war bonus, and the average where there was only one worker was 24s. 2d., which worked out at the rate of 6s. 3d. for each individual. Mr. James Robson, president of the Durham Miners' Association, also spoke, and said the hardships and great sacrifices they were making were felt by the working-class population sooner than other classes, because their margin of resources was less, and they could only be urged to continue these hardships so long as they were supported by the knowledge that they were being endured equally by all classes of the community. It was further agreed to support the executive council in its appeal to the Government to refund to the Durham Miners' Association the amount paid for the relief of members through loss of work.

A special council meeting of the Northumberland Miners' Association is to be held on Monday next to consider the county coal owners' offer in respect of the men's request that a larger portion of the wages percentage should be added to minimum wages. This follows on a conference between owners and miners held last Saturday, at which the offer was made. At present half the county percentage over 50 per cent. is added to minimum wage rates—i.e., with the percentage standing at 120, as now, the men on the minimum receive 35 per cent. on the fixed basis. It is stated that there are not a great many men affected by the request, as most mineworkers are able to make more than minimum wages. Shifters, drivers and trappers are most concerned. The average earnings of hewers amount to from 12s. to 12s. 6d. per shift at present, but there are shifters, for example, who, through adverse circumstances, can earn only the minimum of 5s. 8d. per shift, plus 35 per cent.

Mr. Tom Wing, M.P. for Houghton-le-Spring, has received, under date December 14, the following letter from Mr. G. J. Wardle, Parliamentary Secretary of the Board of Trade:—"In reply to your enquiry, I may say that, while we have not yet received the report of the Commission recently appointed to enquire into the difficulties experienced as the result of the short time being worked at the pits in Durham, it is hoped that it will be received at an early date, and I can assure you that it will have the immediate attention of the Coal Controller as soon as he receives it. In the meantime, substantial assistance is being given to the Durham pits by the transport of large quantities of gas coal to meet increased demands in Yorkshire and elsewhere, while the Coal Export Committee are doing what they can in the way of encouraging the shipment of coal from collieries most in need of trade. I think you may be assured that nothing is being left undone to overcome the difficulties from which Durham workers have been suffering."

Gateshead Town Council, on Wednesday, received a letter from the Redheugh Colliery miners stating that the pit had only worked half-time for the last two months, and asking whether an appeal could not be addressed to the Prince of Wales's Fund on their behalf. The letter was referred to the Fund.

Forest of Dean.

After 31 years' service as trade union agent for the Forest of Dean Miners' Association, Mr. G. H. Rowlinson finds himself in the position of being left out on a ballot vote of the want of confidence. It arose out of the coming-out question. Strife was stirred up by persons who ran away to the collieries to avoid military service, and eventually it was resolved to take a ballot vote to see exactly how the agent stood with his men. The rank and file wanted a clean sweep. The agent maintained that the coming-out was justified. His action was condemned by a majority of 2,160 votes (3,460 against 1,300), so that all the votes that were unpollled, namely 1,300, would have given him a majority.

Scotland.

The men employed in a section of Berryhill Colliery, Wishaw, were recently thrown out of employment in consequence of a fire. It has now been announced by the manager that the section will be closed for an indefinite period.

* *Coal Age.* From a paper read before the Mining Section of the National Safety Council.

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Transfer of Colliers—Insidious Propaganda Among the Miners—Criticism of the Control Methods—Tank Contributions—Compensation for Accidents—Miners' Income Tax.

In view of the slackness of work at so many collieries, arrangements will be made, as part of the general effort of the National Service Department, to transfer men from the colliery areas to the ship building and ship repairing yards, the Bristol Channel being a chief repairing centre, and the demand for men being continuous and insistent. How far the collier can take up anything more than general labouring work is one point now under discussion; but that the men individually will benefit and the national interest effectively be served admits of no doubt at all, the wage rate being high and the shipyards urgently requiring help.

It has been decided by the executive council of the South Wales Miners' Federation that a conference shall be called for December 31, to consider questions of income tax, food supplies and prices, and the feeding of children.

Upon the latter points, it is noteworthy that Mr. Vernon Hartshorn has publicly expressed his opinion that the Triple Alliance of miners, railwaymen, and transport workers will be required to take action in the direction indicated, his view being that whereas the organised trade unionists have been able to secure wage increases, there is a mass of unorganised labour that has not achieved improvement; these, with the dependants of soldiers and sailors, being still under heavy stress. The ultimate aim will be that the Government shall take complete control of food, regulating its apportionment at reasonable prices, the Triple Alliance to insist upon a removal of all increases in price which are due to excess profits and war risks. It will be seen, therefore, that the conference of December 31 is the initiation of a drastic policy, with far-reaching effects.

The Monmouthshire colliery tribunal dealt on Friday of last week with a number of cases; and Mr. Greenland Davies, H.M. inspector, who presided, stated that he had communicated with the Home Office respecting boys who had reached military age, and it had been decided that for the present, at all events, those who had not reached military age when the war began should not be "combed out," but that if it could be proved that any such person had entered the colliery to avoid military service, the tribunal could refuse exemption. The tribunal then dealt with the cases, and exempted boys who had entered the collieries from school, but those who had come from other occupations were refused, it being shown that in a number of cases the applicants had come from shops, factories, hotels, docks, etc. Two men of military age, who had been discharged from the Army with distinction, were exempted. Mr. Fox Tallis (National Service representative), in the course of the hearing, made a suggestion that companies of the Monmouthshire Volunteer Regiment should be formed at each colliery, and expressed the hope that this matter would be taken in hand by the managers, remarking that colliers had more leisure time than other persons in the country to devote to drill, and that it would do them good.

Speaking at a meeting in Pontypridd, Mr. Clem. Edwards, M.P., referred to the "comb out" from the collieries, and remarked that it was monstrous that, while the owners of small businesses had to give up everything and enter the Army, and while men temporarily discharged from the Army through wounds and sickness had been recalled, there were tens of thousands of young men, having no domestic responsibilities, who had found refuge in the collieries. As to the pacifists' propaganda in the coal field, the opinion of the Government was that such activities were illegal and a breach of the Defence of the Realm Regulations. He considered that in the recent coal field ballot East Glamorgan (the constituency which he represented) had vindicated itself magnificently, for whereas throughout South Wales as a whole the majority against "down tools" was 3 to 1, in East Glamorgan it was as high as 8 to 1. As for himself, he should continue to fight until men were prosecuted for the gross illegality they had been guilty of, it being unfair to the great body of miners, many of whom had not had the opportunity of education, that men of university training and large wealth should come with insidious speeches and pamphlets, trying to seduce the miners in the great cause for which all were fighting.

At a subsequent meeting, Mr. Edwards referred to the operation of the Miners' Federation of South Wales, which he considered anti-democratic, stating that in every other part of the country the Federation upon any vital matter referred the question to its members, whereas in South Wales all power was reposed in the monthly delegate meeting. This gave opportunity to the Independent Labour Party pacifist and syndicalist caucuses, who had captured the lodges; and by the vote of a dozen or 15 members they elected a delegate who subsequently claimed to represent all the men, whereas they represented only an organisation that was as much outside the purposes of trade unionism as were the Liberal or Conservative associations. He considered that the Federation should devote itself to industrial matters only.

At the meeting of the Gwaun-cae-Gurwen Colliery shareholders, Mr. D. R. Llewellyn, who was in the chair, referred to the control of collieries, of which he said they had had 12 months' experience. He criticised the action of the Coal Controller in having undertaken the duty of adjusting disputes arising out of wages questions and the conditions of labour, and especially as to his having increased wages without consulting employers in different parts of the country. One result of this, he said, had been that the burden was unequally distributed. He contended that South Wales, in particular, had sustained very unfair and onerous conditions. Mr. Llewellyn added that the company had renewed their main lease for a period of 60 years on satisfactory terms, and had taken an additional 60 acres wherein the seams of best anthracite were intact.

As a result of a series of meetings from the new constituency which will be formed out of Mid-Glamorgan, Mr. Vernon Hartshorn, executive member of the Federation and miners' agent at Maesteg, has been unanimously adopted as Labour candidate in the next Parliamentary election.

Peculiar interest is manifested in this district in the announcement that the National Provincial Bank is to be amalgamated with the Union of London and Smiths Bank, the National Provincial being so closely associated with the coal trade in all its developments here.

Individuals and firms at "the Docks" have been specially prominent in contribution to the Tank which has been on exhibition in Cardiff collecting war savings, and some heavy subscriptions were announced. Two firms in the coal trade opened the week with investments of £50,000

each, and meetings were held on the Coal Exchange to stimulate interest. The two firms were Pymon, Watson and Company and T. Beynon and Company. Sir Edward Nicholl subscribed a similar amount; Mr. Emlyn Jones, £10,000; Mr. P. H. Coward, £10,000; Morgan and Cadogan, £10,000. Messrs. John Cory and Sons followed with £50,000; and Messrs. Evans and Reid, £50,000; Mrs. W. P. Miles, £10,000. On Thursday of last week, Mr. R. O. Sanderson, chairman of the War Savings Committee, collected and brought from "Docks" office a bundle of cheques totalling £316,000, among them that of the United National Collieries Company for £7,500. Later, the Ocean Coal Company came on with one more £50,000, and a prominent colliery owner, who desired to remain anonymous, though the name was freely mentioned, ended the week with £100,000. The total amount subscribed exceeded a million sterling.

One matter which came before the meeting of miners in the Monmouthshire Western Valley had relation to the cottage hospital at Abertillery, as to which about £5,000 had been collected. The miners' agent (Mr. Barker) stated that the committee were desirous of erecting a cottage hospital without delay, a good site having been obtained. A resolution was passed expressing the satisfaction of the committee with the report, and they decided that an application should be made to the Government department for the necessary permission to erect the building. It further stated: "The council desire to point out to the Government that owing to the collieries working very short time, the occasion is most opportune for utilising this labour in making the necessary excavations for the foundations of the building, and it strenuously appeals to the Government to sanction the work with the least possible delay."

The Pontypridd and Rhondda district of miners on Monday passed a resolution calling upon the Federation executive to take immediate steps with the Miners' Federation of Great Britain for bringing pressure upon the Government so that an increase in compensation paid to injured workmen and their dependants might be obtained. It was considered that the present allowance was altogether inadequate, having regard to the high cost of living, and that there should be a minimum of 30s. per week paid.

The adverse action of South Wales miners in regard to income tax is evidently based upon the distinction between "earned" and "unearned" income; and it is of importance, in view of the inevitable heavy income tax which must exist in the future, that this distinction shall be duly noted, for certainly if the miners succeed in obtaining a concession on the ground that their wages are "earned," all payers of income tax, whatever the income may be, if "earned," will put forward equal claims. The matter has already aroused attention in South Wales because of this feature of the agitation, all the more so seeing that concession has already been made by the Chancellor of the Exchequer to wage earners through allowances for wife and children and for tools. As a matter of fact, the financial position of the men is scarcely different from what it was in pre-war times, notwithstanding the alteration in the limit of exemption. The central point of interest is that the question which comes before the conference on December 31 really at bottom is as to "earned" as distinct from what is termed "unearned."

The Avon Valley miners, at Port Talbot on Saturday, dealt once more with the difficulty which peculiarly affects their area in colliery stoppages due to lack of shipping. It was stated by their agent (Mr. W. Jenkins) that there had been an enormous decrease of coal shipments from Port Talbot and Swansea. He contended that the docks at the first-named place possessed better facilities for loading coal than any other port in the Channel, and therefore he failed to see why their district should have to suffer through lack of arrangement between the Shipping and Coal Controllers. He said that unless steps were taken promptly to relieve the present situation, the miners throughout the country would have to adopt the five days a week policy, as much restlessness prevailed owing to the continued depression in various parts, especially in view of lack of food supplies and exorbitant prices. They should not, however, adopt any sectional action, but should wait for united support. Another subject dealt with at the meeting was as to Parliament representation of miners, and the opinion was expressed that a much larger number of seats should be contested than those already ear-marked by the Federation. Instruction would be given to delegates to the Miners' Federation of Great Britain conference that they should advocate an increase in the miners' representation for South Wales.

The South Wales representatives, at the meeting of the central executive dealing with the supply of coal to France and Italy were: from Cardiff, Mr. J. T. Callaghan, Mr. W. Hann, Mr. P. Miles, and Mr. D. Barnett; whilst Swansea was represented by Mr. T. Cooke, Mr. O. L. Harries, Mr. A. W. Wynne, Mr. Evan Williams, and Mr. W. Farr. A resolution of the central committee approved of existing powers of control being continued for six months after the termination of the war, with further extension if Parliament approved. Mr. Wynne has been nominated as president of the Swansea Chamber of Commerce for the forthcoming year.

Northumberland and Durham.

Forced Draught and Coal Economy—Hardness Testing—Potash from Furnace Flues—Miner's Claim—November Shipments.

The coal economy resultant from the use of forced draught for marine boiler furnaces was touched upon by Mr. John Gray, in his address to the Newcastle members of the Association of Engineering and Shipbuilding Draughtsmen on Friday evening of last week. Mr. Gray remarked that the rate of combustion depended a great deal upon the quality of coal, but far more on the strength of the draught. With Howden's system of forced draught for merchant ships, the average indicated horse-power was about 17 per square foot grate, as against from 10 to 12 with natural draught. The evaporation was about 10 lb. water per pound of coal with forced draught, as against 8 lb. with natural draught. Natural draught boilers could only allow 20 lb. of coal per square foot of grate, as against easily from 30 to 40 lb. per sq. ft. for forced draught. A good average of coal burned per indicated horse-power was 1½ lb. per hour with forced draught, as against from 2 to 2½ lb. with natural draught.

At last week's meeting of the Newcastle section of the Society of Chemical Industry, following a paper on "Hardness Testing," with special reference to steel, etc., the chairman (Mr. Henry Peile, of the Priestman Collieries Limited) asked if there was a reliable method of testing the hardness of coke. Dr. Henry Louis replied that there was an attrition test, which consisted of rumbling a number of pieces of coke in a rumbler for a given length of time, and then seeing what quantity of particles had been rumbled off. Mr. Ridsdale, of Middlesbrough, stated that the sort of thing that was generally done in a works was to

The arbiter in the dispute at Udston Colliery, Hamilton, and his award. He has given a considerably modified award to that claimed by the management, and which would have meant a week's idle time at the colliery.

At Wood Colliery, Coatbridge, a reduction of 9d. per ton has been intimated in one of the sections, the manager stating that the reduction is on account of the increased thickness of the coal. Two members of the executive committee of the Lanarkshire Miners' Union have been deputed to examine the section and to report.

A section of the men employed in Bridgeness Colliery, West Lothian, who were paid on the make-up system, desired a ton rate to be fixed which would do away with, or at least considerably modify the present arrangement. As the result of negotiation, the manager has agreed to give an increase of 8d. per ton on the nominal rate paid in the section, and the men have decided to give this arrangement a fair trial.

At East Plean Colliery, Stirlingshire, trouble is threatened on account of an announcement by the management of a change in the system of pay. As the result of a ballot the miners have decided, by a seven to one majority, to strike work unless the management revert to the pre-war system of payment.

At Maddiston Colliery, in the Polnout district of Stirlingshire, a ballot vote of the men is to be taken until every worker is a member of the union.

An important case has been raised by the Lothians Miners' Union of a miner and his son having been asked by the manager at a colliery to leave their working place with a view to cleaning up a machine wall. It seems that the manager paid 5s. 8d. less for that shift than the miner and his son would have earned at their ordinary work. The union has instructed the general secretary to take steps for the recovery of the sum due, and the miners are to be warned not to comply with similar requests in the future unless guaranteed the current county wages.

A reduction is threatened in the 4 ft. section of Grasshill Pit, Glenbuck, Ayrshire. The reduction, however, is not to be enforced until the union agents have met the management.

For the past two or three weeks work has been somewhat irregular at the various pits throughout Ayrshire.

The men employed at the various rescue stations throughout Scotland have made an application to the Scottish coal masters for the war bonus, but have been refused. The Scottish Mine Workers' Union have agreed to support the men's claim, as also their demand for increased wages to the extent of 20s. per week.

For a number of years past the drawing scale at Broomfield Colliery, in the Larkhall district of Lanarkshire, has been felt to be irksome when it passed a certain stage, and repeated applications have been made to have it altered. Messrs. Gilnour and Small are now carrying through further negotiations on behalf of the Lanarkshire Miners' Union.

There have been difficulties at the Auchinlea Coal Company's pits in Lanarkshire regarding the war wage. The matter has been dealt with by the executive of the Lanarkshire Miners' Union, and a number of concessions have been granted.

After a strike of 12 weeks at Wheatrigg Colliery, Kilmaurs, Ayrshire, the men have returned to work on the understanding that the points in dispute will be taken up by the union officials, the management and the Coal Control Office. The original dispute arose out of an arbitration on machine-cutting ton rates and drawing rates. There was a difficulty as to the interpretation of the award, but no rupture took place until a reduction of 6d. per ton was made because of shortened roads.

At No. 2 Kames Colliery, Muirkirk, Ayrshire, the men in the Ell coal section who have been on the "make-up" system have been warned by the management that they must now depend solely upon ordinary rates. The Ayrshire Union agents have been asked to intervene on behalf of the men.

There has been trouble in securing the 1s. 1d. per day of war bonus to those engaged at the colliery saw mills. It has been contended that they did not come under the award of the Coal Controller, and it was only this week, after much negotiation, that some of the saw mill workers received it.

Consideration has been given by the Fife Miners' Board to a claim by the colliery surface workers for an increase in wages and an eight hours day.

A new body has sprung into being amongst a certain section of the Fife miners, which calls itself the Fife Miners' Reform Committee. The object of this committee is to reform the existing constitution of the Union of Mine Workers. The programme it claims to have mapped out is composed of three demands—i.e., "immediate demands," "amendment of Minimum Wage Act," and "ultimate demands." Amongst the many items in the first part are:—Abolition of 14 days' notice, abolition of income tax on wages; abolition of contracting system; the Miners' Association to seek powers to prosecute colliery owners for any breach in the Coal Mines Act or of any regulation governing the safe working of the mine; where men are rendered idle through falls, bad air, or water, lack of timber, etc., to be found work in some other part of the mine or be paid the recognised average wage for all loss of time involved. The ultimate demands consist of five days a week, six hours working day, abolition of piece work, direct control of the industry by the workers.

The men employed at rescue stations have made an application for the 1s. 6d. per day recently awarded the miners, but they have been refused. The Scottish Miners' Union have agreed to support the men's claim.

Iron, Steel and Engineering Trades.

The Ministry of Munitions has notified the general labourers of the steel trade in Scotland that their claim for an advance of 5s. per week has been sanctioned, and will be paid from the first full pay in December.

The Paddington Council have arranged to establish a reserve of 700 tons of coal on condition that it is to be retailed to small consumers at the rate of not more than 2 cwt. to each person, if merchants' stocks are proved to be inadequate and the scheme has the approval of the Coal Controller.

Under Order.—The Minister of Munitions has issued an order, under which mill cinder, flue cinder, and scale from the manufacture of iron and steel, and from the manufacture of mechanical treatment of steel, are to be classed as war material. Dealings in these materials are subject to the maximum prices fixed by the War Office, and a special permit has been granted, under which the cinders must be in accordance with the directions of the Minister of Munitions.

lift a piece of coke to a certain height, probably as high as one could reach, and drop it on a hard floor, to test its fragility; and, secondly, to drop a brick of about 7 lb. weight upon a piece of coke from a certain height. These were exceedingly rough-and-ready tests, but were the sort of thing that needed to be standardised.

At a meeting of agriculturists held at Newcastle on Saturday, and addressed by a representative of the Ministry of Food, it was mentioned that the great scarcity of potash for fertilising purposes was to be met, in a measure, by a supply of potash through the medium of dust taken from the flues of blast furnaces, which would be supplied through approved agents at moderate prices, for direct application to the land.

The final ballot for the choice of Parliamentary candidates by the Durham Miners' Association is at present being taken. The names of candidates in the result of the earlier ballot are as follow (eight required):—R. Richardson, checkweighman, Ryhope, 217 votes; T. Neville, checkweighman, Bewick Main, 184; J. E. Swan, checkweighman, Delight, 172; W. Whiteley, agent, Durham, 156; J. Gilliland, political agent, Chester-le-Street, 151; J. Herriotts, checkweighman, Windlestone, 150; J. Cullen, miner, Marsden, 122; J. Ritson, checkweighman, Monkwearmouth, 119; W. Lawther, miner, Chopwell, 115; H. James, miner, Shield Row, 90; F. Bell, checkweighman, Hebburn, 88; E. Cook, checkweighman, Handon Hold, 78; T. Davis, checkweighman, Gordon House, 74; R. Wren, checkweighman, Clara Vale, 69; E. Stoker, checkweighman, Spen, 68; and F. Chapman, checkweighman, St. Helen's, 65. The name of Mr. P. Lee, who headed the poll on the last occasion, does not appear, as he does not desire to stand.

Thos. Rowntree, hewer, lost the case in his action at Newcastle County Court for compensation from the Ashington Coal Company Limited, at whose Bothal pit he was employed. He stated that he was working alone in a place deep down which was badly ventilated, a circumstance of which he had complained. On January 10, 1916, he fired a shot, and, as a consequence of the fumes, he was not able to go back to the place for half an hour. Later, in consequence of the firing of certain other shots, he became sick and giddy, and rushed out of the place. He collapsed, and was carried out semi-conscious. Since then he had suffered from gas poisoning, and consequently had developed chronic bronchitis, and was unable to follow his employment. Judge Greenwell pointed out that there was an absence of corroboration of applicant's statement that the pit was badly ventilated. He found for the respondent company.

At the December meeting of the Tyne Improvement Commission, the Docks Committee reported that the coal and coke shipped from the river during November was as follow: Coal as cargo, 690,481 tons, a decrease of 245,880 tons when compared with the shipments for November 1916, and of 763,047 tons when compared with the corresponding period of 1913 (the last pre-war year); coal as bunkers, 73,436 tons, decreases of 39,721 tons and 90,054 tons respectively; and coke, 42,269 tons, a decrease of 19,852 tons when compared with the 1916 figures, but an increase of 23,978 tons when compared with those of 1913. Thus far this year the shipments had been: Coal as cargo, 9,310,819 tons, a decrease of 2,552,341 tons when compared with the shipments for the 11 months of 1916, and of 6,946,473 tons when compared with those for the corresponding period of 1913; coal as bunkers, 992,530 tons, decreases of 403,367 tons and 1,033,529 tons respectively; and coke, 625,109 tons, a decrease of 195,343 tons when compared with the 1916 figures, but an increase of 343,370 tons when compared with those for 1913.

An outbreak of fire in an engine house at Burnhope Colliery completely destroyed the building, but the colliery firemen prevented the spread of the flames. The engine concerned was that used for hauling coals from the small shaft of the Betty pit to supply the fire holes of the boilers.

The Annfield Plain and District Gas Company, pleading the higher cost of coal, increased wages, and the great advance in the price of all materials, has raised the price of gas to the extent of no less than 10d. per 1,000 cu. ft.

Interviewed with reference to the "comb out" of miners in Northumberland, Mr. William Weir, president of the county Miners' Association, states that the number of men obtained is relatively small, there not having been such an influx to the mines since the outbreak of war as in other districts. Mr. Weir refers to the hotel pages, policemen, chemists' assistants, butchers, sweet makers, clerks, printers, etc., who have been "combed out" elsewhere, and says that such a mixed lot was not to be found in the Northumberland pits. Most of those who took up mining work in the county after the war began were men who previously worked at the pits, and, after being away a few years, came back. They were not strangers to pit work, although, of course, if they are of military age, they are now liable to be "combed out."

There is a prospect of an electoral contest between two Labour sections in the new Spennymoor Division of Durham. The situation arises from the fact that Mr. Arthur Henderson's old seat at Barnard Castle has been "redistributed," as has also Ald. Samuel Galbraith's at Mid-Durham. Spennymoor may be viewed as the connecting link between these two constituencies, and, for this (at present) "No Man's Land," Mr. Henderson and Mr. Galbraith are likely to cross swords. The mining vote will probably be very much divided, Mr. Galbraith claiming the support of those who adhere to Liberalism, whilst Mr. Henderson will have the allegiance of the newer Labourites.

Mrs. Reah, widow of an ex-soldier who had worked as stoneman at Bournmoor Colliery, and died suddenly whilst at work in June, recovered at Durham County Court £300 compensation from the owners of the colliery. It was stated that whilst the man was filling a tub with clay, he ruptured himself and died within a few minutes. The respondents' case was that death was not the result of an accident, but was due to a ruptured aneurism of the aorta. His Honour Judge Bonsey decided that the work contributed to the cause of death.

Cleveland.

Mr. A. J. Dorman gave the shareholders in Messrs. Dorman, Long and Company Limited, at their annual meeting at Middlesbrough on Monday, a very full statement as to the firm's position and progress, even although, owing to Government requirements, he was not able to present them, as yet, with the annual report and balance-sheet. He stated that the directors were satisfied that the profits would be at least equal to those of the preceding year, and would permit of the payment of the same dividend, viz., 8 per cent., with a cash bonus of 6 per cent. Instead of the cash bonus, however, it was proposed to take £240,406 from the reserve to be distributed to the shareholders in fully-paid shares, in the approximate proportion of one share for every 5½ shares already held. This

would bring the ordinary share capital to 1½ millions sterling. The directors felt justified in recommending this course because, as the new works at Redcar came into operation, as they were rapidly doing, the additional profits therefrom should be sufficient to pay dividends on the increased capital on the scale to which the shareholders had been accustomed in recent years. As to the acquisition of the undertaking of Sir B. Samuelson and Company Limited, there were no debentures or other charges on that property. The shares were all held by members of the Samuelson family or by the officials and staff of the company. As to the future, it was very difficult to form any reliable estimate. Their total output was at the disposal of the Government. It was to be hoped that the latter would recognise the increasing cost of everything entering into the manufacture of a ton of steel. The demand for what they produced continued very urgent, and taxed the full resources of the company.

The *Middlesbrough Monthly Circular* for December, issued by Messrs. Hanson, Brown and Company Limited, states: "There have been several changes and variations in production during November. At the beginning of the month another furnace on Cleveland iron was blown in, increasing the total number of furnaces in blast in the North of England to 76, of which 34 were on Cleveland, 28 on hæmatite, and 14 on special kinds of iron. Subsequently, the blowing out of a furnace on special iron reduced the total to 75—34 on Cleveland, 28 on hæmatite, and 13 on special irons. Preparations for the putting in of several additional furnaces on steel making iron are being completed, and there should be a good addition to the total early in December."

Cumberland.

For some time rumours have been current as to important changes which were likely to take place shortly in connection with some of the industries in West Cumberland. At the annual meeting of the Workington Iron and Steel Company in August last, Sir John Randles, M.P., chairman of the directors, stated that "During the year there have been rumours or hints of combinations or amalgamations. There is nothing definite in prospect, but suggestions and proposals have been brought forward pointing in this direction. If ever anything is seriously contemplated, affecting the company, the shareholders will be informed at the earliest possible moment. In the iron and steel trade large combinations will probably be the order of the day. A small concern will have poor prospects in the world contest that must come for predominance in so important an industry."

Yorkshire.

Fewer Summonses for Absenteeism — Short Weight Allegations.

There has lately been some falling-off in the number of Yorkshire miners summoned for neglecting their work. The repeated magisterial warnings, the payment of damages, and the pointing of the finger of scorn may have had some effect. Summonses issued against miners for non-payment of the income tax appear to be on the increase. At Doncaster, for instance, this week no fewer than 11 miners from all parts of the colliery district around were summoned for this offence, and were ordered to pay amounts ranging from £4 to 18s.

At Leeds Police Court last week, Sarah Cliffe, coal merchant, of Norwich-avenue, Hunslet Carr, was fined £20 on four summonses for alleged offences under the Weights and Measures and Coal Acts; 22 summonses remained to be dealt with. The case was brought before the court again on the following day, when Mr. A. E. Masser, for the defendant, announced that an arrangement had been reached, subject to the approval of the Bench, whereby the defendant would pay costs on the summonses and refund to all persons found in the investigations of Chief Weights and Measures Inspector Rutherford and Inspector Short to have received short weight any moneys wrongfully obtained from them. The proposed restitution applied to over 100 customers. Mr. Dunn, prosecuting, agreed, and the magistrates having approved, the whole matter was adjourned for the fulfilment of the agreement.

Half a dozen employees of the Denaby and Cadeby Colliery Company were before the Bench at Doncaster on Saturday for various offences in the Denaby Colliery. For cruelty to ponies, Henry Bradley and James A. Lees were fined 30s. and 12s. 6d. respectively. For taking 16 tubs on a clip on the rope instead of eight, and causing a smash, Fred Bonsal, haulage hand, Denaby, was fined 30s. For damaging a safety lamp, Gordon Woolridge was fined 25s.; and William Hobson was fined a like amount for not leading his pony, which ran away and was injured. Tom Smith, ex-soldier, was ordered to pay costs for leaving a safety lamp in the pit bottom.

Lancashire and Cheshire.

After five days' continuous work in repairing the collapsed roof, the body of James O'Neill, a victim of the St. Helens Colliery explosion, has been recovered.

An inquest was held at Standish on Wednesday night of last week into the peculiar death of Henry Ashton, a colliery engineman, 37 years old, of Wigan, who was found dead in the crank pit at the Gidlow pit of the Wigan Coal and Iron Company Limited, where he was employed, at Standish, two days previously. It appears that the deceased, who was in charge of the pumping engine at the colliery, was last seen alive about 4.45 p.m. on Monday by a fitter, and when his mate came to relieve him at 5 p.m. he was not to be seen. The mate got a lamp, and on inspecting the pumping engine found the deceased dead in the crank pit, his body, which was terribly mangled, having stopped the engine. The supposition is that the deceased slipped, and got caught in the machinery. The jury returned a verdict of "Accidental death."

At a meeting of the executive council of the Lancashire and Cheshire Miners' Federation, held last Saturday at Bolton, it was decided to withdraw the Parliamentary candidature of their president, Mr. Thos. Greenall, from the Leigh Division, agreeing that his name should be submitted to the Labour conference representatives of the new Farnworth Division, with a view to his becoming a candidate for that division. It was further decided that Mr. J. McGurk be adopted as one of the five Labour candidates allocated to the Lancashire and Cheshire Federation to contest a Parliamentary division at the next election.

The Midlands.

Satisfaction is expressed that coal supplies in Birmingham are to receive some municipal supervision. London is no longer quite the claimant she has been in the Warwickshire district, and the position of local householders in respect of the chance of getting supplies is improving. It is announced that although the Birmingham co-operative societies will sell direct, under the municipal scheme, the supply of coal provided for the poorer classes this winter

by the Coal Controller, the selected merchant has not been bracketed with the co-ops, will only distribute the supplies, and not sell in small quantities to consumers.

At Dudley on Friday of last week, a joint meeting of the arbitrators to the South Staffordshire Mines Drainage Commission and the Commissioners was held, for the purpose of hearing appeals against the draft award for the Old Hill district for a drainage rate of 3d. a ton on fireclay and limestone, and 9d. a ton on ironstone, coal, slack, and other mineral, with the exception of those mines which had been graduated as appearing in the schedule. The appeal was in respect of Warren's Hall and the Knowle collieries, owned by Messrs. H. S. Pitt and Company, and Mr. Donaldson Harward (Stourbridge), for the appellants, said that while it might be a favourable time to increase the rate so that colliery proprietors could shift four-fifths of their burden to the State by paying out of excess profits, the appellants had not yet paid a penny excess profit, and there seemed to be no possibility of having any excess profit to pay. The only other point he could make was that the Warren's Hall Colliery had been re-modelled, and from that time there would be a rapidly increasing output, and shortly they would be drawing 3,000 tons a week. Therefore, if they were given the graduation asked for, the Commissioners would be indemnified in the long run. Evidence was called for the appellants, and the Commissioners, and eventually the appeal was dismissed, and the award confirmed.

Kent.

The output at Tilmanstone and Snowdown collieries last week again closely approximated to 6,000 tons.

The syndicate who are negotiating for the purchase of the Wingham and Stour Valley Colliery are stated to be French.

The syndicate which was formed with two of the directors of the East Kent Colliery Limited to build miners' houses near the colliery at Tilmanstone, has not yet been able to give out a contract. A meeting was held a few days ago, but our correspondent understands that the tenders, owing to the very high prices prevailing for building material, were such as to preclude proceeding with the work at present on the lines originally proposed.

Scotland.

Burntisland Shipments—Explosives Case—Agent Injured—Arbitration Case.

The members of the West of Scotland branch of the Association of Mining Electrical Engineers on Saturday visited the works of Messrs. Mavor and Coulson, electrical engineers, Bridgeton, Glasgow. The party, which numbered considerably over 100, was received by Mr. Sam Mavor, managing director, and Mr. Davis, works manager. At the close of the inspection tea was served in the canteen, when Mr. H. A. McGuffie, branch president, in proposing a vote of thanks to the firm, mentioned that in 1916 only one death occurred in Scottish collieries by electricity, there being 10 deaths in the United Kingdom from this cause. Mr. Sam Mavor, on behalf of the firm, acknowledged the vote of thanks.

At a meeting of the Andersonian Naturalists' Society, held in the Royal Technical College, Glasgow, on Saturday, Mr. H. R. J. Conacher read an informative paper on "The Formation of Coal."

In connection with the new Parliamentary areas, as defined by the Boundary Commissioners, considerable activity is being shown in the mining districts throughout Scotland, and numerous requests are being made to have more than five mining candidates for Scotland. A special conference is to be called to go into the whole question of political representation.

Burntisland shipments of coal for the past week aggregated 8,120 tons, as compared with 14,760 tons in the corresponding week of last year. The whole of the consignments went coastwise. The shipments for the year have reached a total of 427,850 tons, which is just fully half of the 1916 total for the same date. At Methil, the exports of coal show a considerable decrease. The total was 14,139 tons, against 19,833 tons in the previous week.

At Linlithgow Sheriff Court, a miners' drawer was charged with having contravened the Explosives in Mines Order in No. 3 Blackrigg Colliery by allowing a naked light to be within 4 ft. of a ½ lb. of powder which was not contained in a securely closed case or canister. Accused pleaded guilty. The Fiscal stated that accused had been sent for the explosives by the man to whom he was working, and when he got the powder he put it in a tub, which he pushed forward. There was a naked light on his cap, from which a spark came off and caused an explosion. The lad was severely injured. The Sheriff said he concurred with the Fiscal in believing accused had paid the penalty already, and he was under the orders of another man, and he would be allowed to go. At the same time, he (the Sheriff) warned accused that the Coal Mines Order must be obeyed.

Mr. David Beveridge, mines agent, Wemyss Coal Company, was severely injured at the Wellesley Colliery while examining some pumping plant in course of being erected. A large iron valve door fell on him, breaking both legs.

The colliery and electric plant belonging to the Bogside Colliery, Greengairs, Airdrie, was offered for sale on Friday of last week by Shirlaw, Allan and Company, auctioneers, Hamilton. A large part of the plant was practically new, having been erected within the last two years.

The coal shipments during the past week from the Clyde amounted to 100,088 tons, as compared with 93,878 tons during the previous week, and 99,119 tons for the corresponding period last year. From the Forth the shipments were 17,759 tons, against 17,566 tons for the previous week, and 24,712 tons a year ago; and from Fife, 22,926 tons, against 28,046 tons for the previous week, and 51,131 tons 12 months ago.

The appeal in an arbitration under the Workmen's Compensation Act, 1906, was at the instance of Archibald Russell Limited, coal masters, Loanend Colliery, Cambuslang, who had been found liable to pay £1 weekly of compensation to a miner during disablement from miners' nystagmus, and 10s. weekly thereafter during partial incapacity. The coal owners contended that the disease was not contracted in their employment, and that the miner had not given them information as to when the employers were previous to entering their employment, that those employers might be conjoined in liability for compensation, they were entitled to be freed from liability. The Appeal judges upheld the award, and took the view that the workman had given all the information in his possession as to his previous employment, and that as he had no employment underground other than with Messrs. Russell during the 12 months prior to disablement, the coal owners were liable to pay compensation.

THE FREIGHT MARKET.

Shortage continues to thwart attempts to do the outward coal tonnage chartering market, time of writing, is being intensified by the wintry weather, which is delaying the arrival of vessels. On the north-east coast, the volume of business is exceedingly small, being represented by the engagement of a vessel for Tyne loading to London at the firm rate of 21s., two steamers for Gothenburg at from 187½ kr. to 190 kr., and one for Stockholm at 195 kr.—rates which betoken some weakening—and a few small vessels for the French Atlantic. Orders for tonnage are still very numerous, with Sweden as the only direction in which any case in rates is shown. Thus, Spanish Atlantic ports are firm at 180s. to Bilbao or Santander, Portuguese destinations at 100s. to Lisbon and 110s. to Oporto, the coaling stations at 100s. to Gibraltar and 200s. to Port Said, and the Spanish Mediterranean at 300s. to Barcelona. At South Wales, actual transactions have been wholly confined to near destinations, and the tonnage problem is well-nigh as acute as on the north-east coast. Orders are very plentiful, and rates firmly maintained. The Clyde has established a new record for Barcelona discharge, a 3,800-ton vessel having been fixed at 275s. For loading at the same district, a 1,300-ton vessel has been taken up for the River Plate at 137s. 6d. A sailing vessel has been chartered at Liverpool for the carriage of sand to New Caledonia at 125s.

Homewards, the River Plate is firm, but the demand is small, and chartering consequently very slow. Coal freights from Virginia are quoted much cheaper, 80s. to the Plate and 84s. to Brazil being the top figures. Tonnage on net form basis at the United States is steady, at 260s., Northern Range to French Atlantic, with 360s. for West Italian discharge. On Committee account for heavy grain cargoes, Northern Range to the United Kingdom is 10s. advanced, being quoted at 50s., and to the Mediterranean is 5s. dearer, being listed at 75s. At the Far East, Madras Coast to Marseilles with kernels is steady at 550s. Saigon-Haiphong to French Atlantic with rice is firm, at 500s. Kurrachee to the United Kingdom on scale basis is unaltered, at 250s. Bombay to the same destination is steady, at 275s., on d.w. basis, with Mediterranean discharge still 400s. There is a good enquiry at firm figures from the Mediterranean and Bay ore ports.

Tyne to Calais, Boulogne, Dieppe, or Treport, 350. 100s., sail, six months voyages, commencing January; Dieppe, 360, 65s., pitch; Gothenburg, 2,000, 190 kr.; 2,500, 187½ kr.; London, 1,050, 21s.; and Stockholm, 2,100, 195 kr.

Cardiff to Dublin, 280, 21s.; Rouen, 1,300, 74s. 3d., coke, neutral; 1,200, 1,300, and 1,350, 48s. 9d., neutral; 800, 26s. 3d., fuel; and St. Malo, 700 and 900, 22s.; and 1,150, 43s. 6d., neutral.

Swansea to Trouville, 600 and 650, 48s., neutral; Rouen, 650, 850, and 700, 50s. 3d., neutral; 850, 26s. 3d.; St. Malo, 900, 22s.; Dieppe, 150, 100s., sail; and Caen, 950, 48s., neutral.

Glasgow to Barcelona, 3,800, 375s.; and Buenos Ayres or Monte Video, 1,300, 137s. 6d.

Port Talbot to Trouville, 700, 48s.; La Rochelle, 1,250, 1,300, and 1,450, 61s. 6d., neutral; Guernsey, 370, 42s., three voyages.

Burryport to St. Malo, 1,150, 43s. 6d., neutral; and Guernsey, 400, 42s., three voyages.

Liverpool to New Caledonia, 3,250, 125s., sand, sail.

COAL, IRON AND ENGINEERING COMPANIES.

REPORTS AND DIVIDENDS.

British Metals Extraction Company Limited.—Net profits for the year ended May 31 were £6,560, increasing the surplus brought forward to £30,854.

Cleveland Bridge and Engineering Company Limited.—The directors announce a final dividend of 7½ per cent., tax free, on the ordinary shares, making 10 per cent., free of tax, and equivalent to 13½ per cent. for the year. Considerable additions will be allotted to reserve fund after making adequate provision to meet special taxation and excess profits duty.

Mond Nickel Company Limited.—The directors have declared interim dividends of 7 per cent. per annum on the cumulative and non-cumulative preference shares for the half-year, and 1s. per share (5 per cent.) on the ordinary shares—the same as last year.

Minerals Separation Company Limited.—For the year revenue exceeded expenditure by £29,124.

Skinner and Holford Limited.—The directors state it is not possible to complete accounts for year ended Sept. 30 in time for the meeting, owing to there being several questions outstanding arising out of war legislation, and it is intended to adjourn.

Witbank Colliery Company Limited.—The report of the directors for the year ended August 31 last states that the despatches from the mine reached a total of 887,331 tons, being an increase of 36,483 tons upon that of the preceding year. The working profit for the year amounted to £84,492. This amount, together with the balance of £89,535, unappropriated at the commencement of the year, making a total of £174,028, has been dealt with in the appropriation account. On February 15, 1917, the directors declared an interim dividend of 2s. 6d. per share for the half-year, and on August 16 a dividend of 2s. 6d. per share, making 25 per cent. for the year.

NEW COMPANIES.

Antrim Minerals Company Limited.—Private company. Registered office, 8, Princess-street, London. Registered December 10. To acquire lands, rights, etc. Nominal capital, £1,500 in 30,000 1s. shares. Subscribers (one share): B. Quincey and H. Allen.

Bentley Brothers Limited.—Private company. Registered December 10. To acquire the business of colliery proprietors. Nominal capital, £12,000 in 12,000 £1 ordinary shares. Directors: W. Bentley (Cherterton), E. Bentley, and J. Bentley. Qualification, £1,000.

Flexo Shafting Limited.—Private company. Registered office, 13, St. Helen's-place, E.C. Registered December 11. To carry on business of engineers, founders, and makers of buildings, contractors, etc. Nominal capital, £4,000 in £1 shares. Directors: H. J. Hardy, J. E. Parritt, and C. W. Thomas.

G. and Son (1917) Limited.—Private company. Registered office, Haigh, near Barnsley. Registered December 11. To carry on the business of colliery manufacturers, coal merchants and general engineering. Nominal capital, £50,000 in £1 shares.

Thames and Jones Limited.—Private company. Registered December 12. To acquire the business of iron

founders, etc. Nominal capital, £5,000 in £1 shares. Directors: D. Higgin (Eccles), D. Higgin, and J. H. Higgin.

Thames Side Engineering Company Limited.—Private company. Registered December 8. To acquire the business of engineers, marine, electrical, hydraulic, aeronautical and motor engineers, etc. Nominal capital, £2,000 in £1 ordinary shares. Directors: C. Whinerah, H. Pichard, W. Riley, and five others.

Wellman Seaver Rolling Mill Company Limited.—Private company. Registered office, King's House, Kingsway, W.C.2. Registered December 7. To carry on the business of iron founders, mechanical and general engineers, etc. Nominal capital, £20,000 in £1 shares. Directors: J. Cadderwood, A. West, F. G. Smith, F. J. Sanderson, and two others.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

CROYDON, DECEMBER 31.—Coke for the Guardians. Forms from the clerk, Union Offices, Thornton Heath.

ETWALL (DERBY), DECEMBER 29.—Coal for the Isolation Hospital. Forms from the clerk, Union Offices, Burton-on-Trent.

HUNSLET, JANUARY 1.—Coal for the Guardians. Forms from the clerk, Union Offices, Glasshouse-street, Hunslet.

KING'S LYNN, DECEMBER 26.—Coal for Freebridge Lynn Union. Forms from the clerk, King-street, King's Lynn.

POWICK, JANUARY 2.—Coal for Worcester County and City Asylum. Forms from the storekeeper.

SHEERNESS, DECEMBER 24.—1,000 tons good Yorkshire or Langwith nutty slack, to pass through a 1½ in. mesh, for the Urban District Council. Forms from the clerk, Council Offices, Trinity-road.

WARRINGTON, JANUARY 8.—15,000 or 7,500 tons of slack for the Electricity Works, Howley, Warrington. Particulars from the borough electrical engineer.

WRENHAM, DECEMBER 28.—Coal for the Croesnewydd Auxiliary Military Hospital. Forms from the matron.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

LONDON, JANUARY 7.—Pitch, etc.—Pitch, tar, creosote oil, carbolic powder, and coke (12 months) for St. Pancras Borough Council. Forms from the borough engineer.

MADRID, MARCH 22.—Railway.—Secondary railway from Villadrid to Villafraanca del Bierzo. Estimated cost, 51,165,079 pesetas. Tenders to Direccion-General de Obras Publicas, Ministerio de Fomento, Madrid.

WARRINGTON, DECEMBER 31.—Steel Shaft.—Mild steel shaft, 7½ in. square by 17 ft. 9 in. long, and turned at ends. Particulars from the manager, Longford Sanitary Depot, Warrington.

DIARIES AND CALENDARS.

Peckett and Sons Limited, Bristol.—An office brightener in these times is particularly welcome, and the cheerful colouring of Messrs. Peckett and Sons' tear-off calendar sets a good example. Tank locomotives are the firm's speciality, and a prime mover in green and red on the calendar typifies a British industry which has gained a well-earned celebrity for excellence of workmanship.

Syren and Shipping Limited, London.—The International Mercantile Diary and Year Book makes a useful desk companion for any business man with interests abroad. A mass of practical information, which appears to have been carefully sifted and brought up to date, sets out freights, foreign exchange, industrial productions, decimals, population, trade facilities, etc. Two salient features are compactness and clear printing.

J. Hopkinson and Company Limited, Huddersfield.—The two words, "Hopkinson, Huddersfield," accompanying an illustration of the Hopkinson-Ferranti patent stop valve, remind one of the important manufacture which has supplied 30,000 of these successful valves to a great number of countries. The calendar is a neat, business-like tear-off sort production, which does not take up too much wall space.

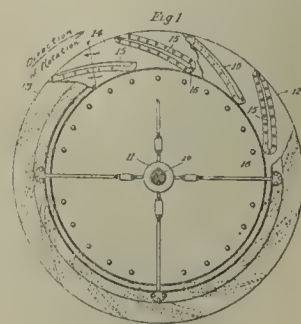
George Fletcher and Company Limited, Derby.—Chocolate coloured ink on white ground, with a neat binding of chocolate coloured silk at the top and lower corners, impart an agreeably restrained appearance to the business-like wall calendar. The firm's specialities in colliery, mining, and cement works plant are illustrated and briefly described on the sheets. The matter is very useful for those who are interested in mining of any kind.

The Home Office has issued a report on the manufacture of silica bricks and other refractory materials used in furnaces, with special reference to the effects of dust inhalation.

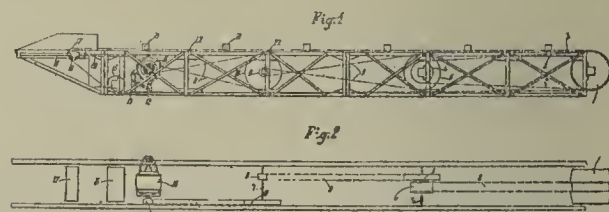
Reduced Working Hours in America.—According to a report issued by the United States Department of Labour Statistics, the production of anthracite this year is materially in excess of the production of 1916. Last year's decline in the total production was due to the fact that fewer men were engaged in mining operations during 1916 than in 1915. The production per man-day in 1916 exceeded that in 1915 by 2.9 per cent. in the case of miners and miners' labourers, and by 1.4 per cent. taking all labour together. In conclusion, the report states that the evidence seems to be decisive that such decrease in productivity as did occur during the months following the introduction of the eight-hour day was due to a marked falling-off in the number of workpeople, and not to the shortening of the work-day. Judging from the figures given, it appears that no gain in production would result from increasing the hours of labour in the anthracite mines at the present time. If greater production is to be obtained, it would seem that some other method than increasing the number of hours per day must be devised.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

101094. *Improvements in Centrifugal Fans.* The Green Fuel Economizer Company, 90, West-street, New York City, New York.—This invention relates to the noise made by centrifugal fans. Fig. 1 is a front view of an impeller provided with blades embodying this invention, with parts broken away to illustrate the method of attaching the blades. In detail, the reference character 10 designates the shaft of a typical radial flow fan, to which the hub 11 is secured by any suitable means. To the outer portion of the hub 11 is secured a back plate 12, which is arranged substantially at right angles to the axis of the shaft 10, and forwardly is secured a shroud 13. This shroud, in conjunction with hub 11 and back plate 12, constitutes the walls of the fan, and defines a passage through which the fluid is adapted to pass in stream lines, as will be understood to those skilled in the art. At an intermediate portion is located an annular stiffening ring 14 arranged parallel to the mean stream line flow of the fluid through the fan. Secured to the back plate 12, shroud 13, and stiffening ring 14, are blades 15 to avoid the discontinuity pointed out above. The entrance edges 16 of the blades 15 are rounded, and preferably taper gradually from the entrance edge to the trailing edges of the same. The rounded entrance portion of the blade may be of various sizes, but it is found that a rounded portion of ¼ in. radius is best adapted for ordinary forms of centrifugal fans. Any further increase in the size of the entrance edge of the blade correspondingly decreases the area of the fluid passage in the fan, and consequently the efficiency of the same. Most high speed fans have backwardly curved blades, and consequently the face shown in the drawing has been shown with blades curved back from the direction of rotation. The invention, however, is equally applicable to fans having blades with a radial tip to those having blades with the tips curved forwardly in the direction of rotation. (Five claims.)



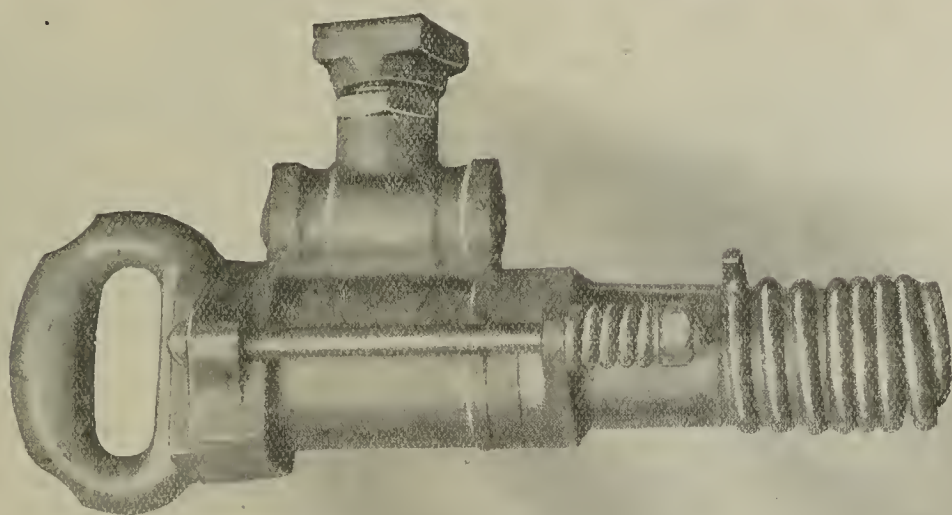
106613. *Band Conveyor.* C. Mascart, 40, Boulevard de Courcelles, Paris.—The invention relates to a band conveyor of the kind in which the driving mechanism is enclosed within the interior of the frame upon which the band rollers are mounted and located between the upper and lower portions of the endless conveyor band, the latter of which is driven by a belt located within a groove formed on the driving cylinder. According to the present invention, adjustable bearings are provided for the conveyor band cylinder located at the opposite end of the frame to that at which the driving cylinder is located for varying the tension of the conveyor band, as will be hereinafter described. The apparatus, according to fig. 1, is composed essentially of three sections—the head section, the motor section, and the hopper section. The head section comprises the driving cylinder 1 of the conveyor band 3. The surface of this cylinder (fig. 2) is provided with a groove in which is located the driving belt 2. Thus the driving belt passes under the conveyor band, and the driving cylinder can be set in motion without any external transmission belt pulley. By means of this arrangement, the width of the frame is reduced substantially to that of the conveyor band, and the space occupied is reduced to a minimum. The driving belt 2 is operated by a roller 4 secured on the same shaft 5 as the belt pulley 6. The belt pulley 6 is operated by a driving belt 9. The motor sec-



tion contains the motor 15 and an intermediate shaft 7, on which are secured the belt pulleys 8 and 10. In the majority of cases, the conveyor being sufficiently short to absorb but little energy, the motor may be mounted transversely to the longitudinal axes of the frame, at the same time remaining entirely within the frame. In these circumstances, the motor is supported by brackets 12 and 13 secured to the frame in such a manner that the band can pass under these brackets. A driving belt 11 passing over the belt pulley 14 of the motor operates the pulley 10, the latter of which being mounted on the shaft 7, effects the rotation of the pulley 8 and the consequent operation of the driving belt 9. The motor section also comprises a roller 16, under which the band passes. The hopper section, in the form of a bracket, comprises essentially a return cylinder 17, the shaft of which is supported in bearings 18. These bearings are adapted to travel in a groove 19, and can be adjusted by means of adjusting screws 20. By this means the variations in the length of the band, due to variations in heat and moisture, can be compensated for, and the band maintained at a suitable tension. The edges of the band are suitably covered and protected to prevent the transported material, supplied with a shovel, for instance, from falling on to the cylinders. (Two claims.)

109653. *Improvements in Tipping Wagons.* W. Hawthorne, 11, The Grove, Benton, Northumberland; and J. D. Twinberrow, 15, Regent-terrace, Gateshead, Durham.—This invention relates to tipping wagons of the type in which the body rolls laterally on the underframe, and has for its object to effect certain improvements in the construction and arrangement of the parts, and in the means by which the tilting is effected. Fig. 1 is as to the left-hand portion a longitudinal sectional elevation of the improved tipping wagon, and as to the right hand portion a side view of the same; fig. 4 is a diagram illustrating the action of the controlling chains. In this form the body consists of a trough-shaped receptacle of steel plating 1, depending between a pair of longitudinal beams 2 arranged along its upper edges, these beams being connected transversely by the ends of the body, and by intermediate diaphragms or stiffeners 3. At each end and under each diaphragm is a tread 4 of steel, and these treads rest upon and roll upon steel tracks 5 affixed to the underframe. The said treads and tracks are arc-shaped (the word is used literally, and not necessarily in its geometric sense), the tracks being upwardly convex and the treads downwardly convex. When, therefore, the body is at its central and

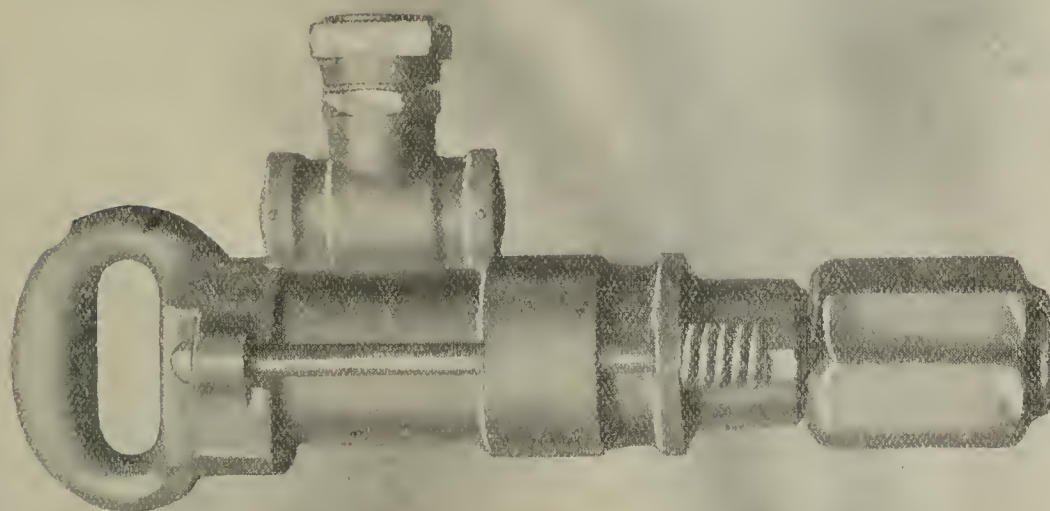
SUPREME!



HARDY "SIMPLEX"

Type B5.

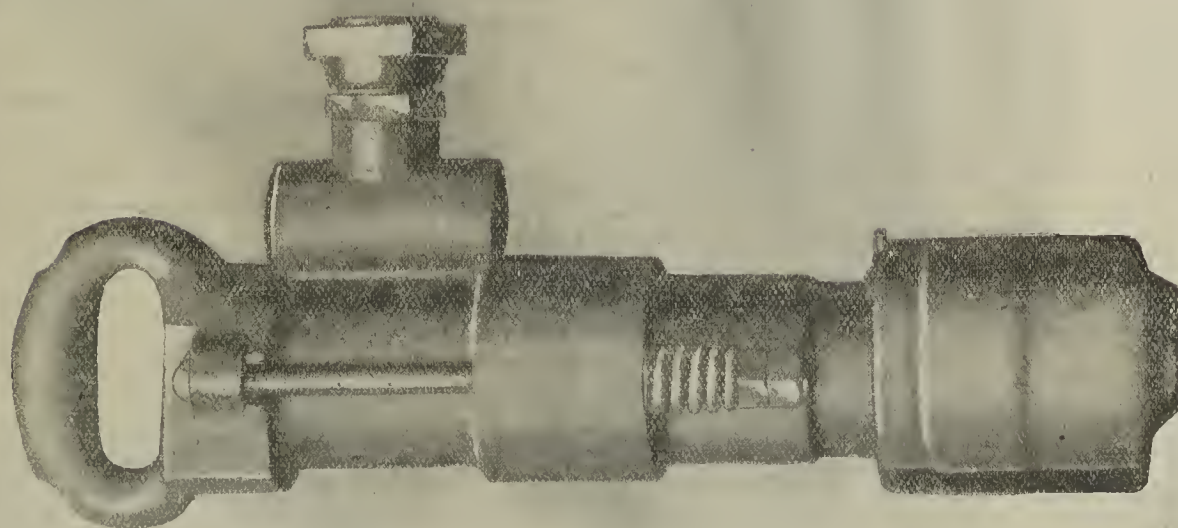
Extra light, for
ripping & brushing.



HARDY "SIMPLEX"

Type B6.

Medium, for
drifting, etc.



HARDY "SIMPLEX"

Type B7.

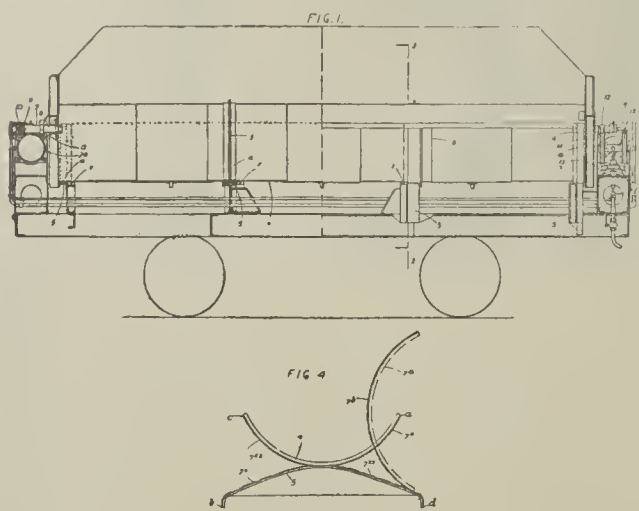
Heavy, for sinking.

These machines are in use to the number of many thousands all over the world. They have utterly defeated all competition, and stand supreme as examples of fast-boring rock drills of immense durability and superb engineering finish.

TRIALS ARRANGED.

THE HARDY PATENT PICK CO. LD.
SHEFFIELD.

position on the underframe, the middle and lowest track. It will now be understood that any body resting upon the middle and highest track will cause it not only to tilt angularly round the middle track, but will cause it to be moved laterally to one side or the other, according to the direction (right or left) of the force applied. This centre is moved in a horizontal line transversely to the underframe as tilting takes place. Upon the axis through the point which moves horizontally or close thereto is affixed trunnion pins 6. To prevent any transverse slip between the body and the underframe chains 7, hereinafter termed the controlling chains, or other suitable connecting devices, are employed. In the normal



position of the parts these chains cross each other in transverse view somewhat after the manner of the letter "X," as is more clearly shown in fig. 4. Here it will be seen that chain 7* is attached at its upper end to a point *a* just below a side beam of the body, whilst its other end is attached at the point *b* to the side of the underframe. Similarly, the upper end of chain 7** is attached to a point *c* (corresponding with the point *a*), whilst its lower end is attached at the point *d* (corresponding with the point *b*). When, however, the body is tilted, as, for example, to the right, as shown by the curved line 7*a*, then the chain 7** occupies the position shown by the dotted line 7*b*, whilst the chain 7* follows the line of the track 5. In order to retain the body in its normal position with respect to the underframe, a trunnion pin 6 is fixed at each end of the body, and in the position of the centre hereinbefore referred to. Each trunnion pin projects into a depression formed at the end of a ram 9, having two different diameters, and arranged to travel in a cylinder 11. A spring 10 keeps the ram and the trunnion pin in engagement, so as to lock the two together, and unlocking is effected by admitting fluid pressure to the cylinder, thereby moving the ram to act against the said spring in a well known manner. The body is tilted by applying pressure in any convenient way (such, for example, as pneumatically, electrically, or by hand) in a horizontal and transverse direction and at the position of the trunnion pin 6. In the particular form now being described, each trunnion pin is fitted with a collar 12, to which chains 13, hereinafter termed the actuating chains, are shackled. These chains are brought away in opposite directions, passed round pulleys 14 journaled on cross heads 16 at the end of piston rods 17, and after passing over guide pulleys 15, are anchored to the underframe near the centre line, say, at the points 13*, 13*. Both piston rods 17 are guided by slide bars 18, and are attached to a piston 19 operated by fluid pressure in a cylinder 20 of suitable length. (Six claims.)

109710. *Improvements in Gas Generators or Producers.* Kilner Brothers Limited and F. W. Knowles, Thornhill Lees, near Dewsbury, Yorkshire.—This invention relates to furnaces for the production of combustible gas, such as those employed in glass works, wherein steam is introduced through the furnace door frame into a perforated steam box under the fire. The drawings represent three detail views. Fig. 2 is a front elevation of the door frame without doors; fig. 3 and fig. 4 are sections. The reference letter *a* indicates the producer generally, *b* the steam box, provided at each side with perforations *c* for the exit of steam, and drainage holes *d*. Along the front of the setting runs a steam pipe *e* (fig. 4), with nozzles delivering steam to trunks *f*, which lead the steam to holes or inlet ports *g* in each door frame. The steam travels around the periphery of the frame to the lower part of the vertical central rib *h*, whence it passes to the steam box *b*. Fig. 2 shows hinge staples *i* for two doors (not shown), and a latch member *j* for securing such doors when closed. The letters *k, k* indicate plugged openings for drainage and inspection of the steam flues or ducts within the frame. The sloping floor aforesaid is indicated at *m*, see especially fig. 4. (Three claims.)

109717. *Improvements in Steam Boiler Economisers.* Babcock and Wilcox Limited, Oriol House, 30, Farringdon-street, London, E.C.—This invention relates to steam boiler economisers of the type wherein the feed water is heated in a low pressure stage, is then taken away from the heating apparatus, air or other gases allowed to escape therefrom, and the water then fed, preferably by a pump, to a second stage of the economiser under boiler pressure. It is known in connection with plural stage economisers that the removal of air or gases between the stages of different material, the use of a material better adapted to the low pressure stage than the high pressure stage, while the high pressure stage may be made of material, such as cast iron, adapted to withstand pressure. In accordance with the invention, the features above mentioned are combined, i.e., there are three features, namely, formation of the

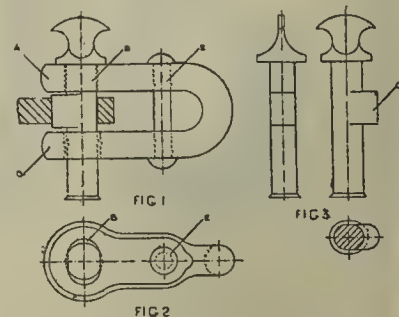
economiser in stages subject to different pressures, provision for removal of air or gases between the stages, and construction of the stages of different materials. An economiser according to the invention fully satisfies requirements, as it will be observed that the high pressure stage of wrought iron or steel, though liable to corrode if the water flowing therethrough should contain air or gases, will not be liable to corrode in the present instance, in that air or gases are largely eliminated before the water enters the high pressure section. (Four claims.)

109752. *Improvements in Introducing Combustion Gases into the Flues of Coke Ovens.* D. Bagley, 92, Victoria-street, Westminster; and E. A. Bagley, of the same address.—This invention relates to the introduction and control of the combustion gases supplied to vertical or horizontal heating flues of rectangular coke ovens or gas heated furnaces. Fig. 1 is a sectional elevation partly through the chambers and heating flue of a rectangular oven fitted with vertical heating flues, showing the method of using the vitreous gas conduits, in an oven in which the gas pressure main is situated below and parallel to the oven chamber; fig. 2 is a section of a vitreous gas conduit, and its containing chamber, showing the method of protecting the tube against radiated heat from the heating flue, maintaining a temperature below the point at which devitrification occurs, and fitting the conduit to the gases supply main and connecting the same to the nozzle situate in the heating flue. *h, h* are sections of the oven chambers *m*, the vertical heating flue *k*, the air for combustion flue *f*, and *g* the ports admitting air to the vertical flue *m*. *o* is a branch from the gas pressure main, fitted with a cock or valve *n*, carrying the flange *c*. The fused silica or vitreous porcelain or other ware impermeable to gases gas conduit *a*, is provided with a flange or collar *b*, the said collar being provided with and surrounded by a soft packing, making a gastight joint with the branch pressure main *o*. The gas conduit *a* is contained within a circular, oval, or rectangular chamber *x*, provided at its lower extremity with a cover *s*, for varying the admission of air controlling the temperature of the gas conduit *a*. *d* is a perforated cap composed of refractory material preventing radiant heat from the flue *m* raising the temperature of the gas conduit *a* above the prescribed limit of 1,200 degs. Cent. *r* is the flange fitted to the gas conduit *a* containing a bevelled recess for the reception of the perforated cap *d*, and fitted with a recess for containing a resilient refractory packing for the purpose of securing a gastight junction with the nozzle *e*, the lower and upper packings permitting movement of the tube due to temperature alterations. The gases for combustion are admitted through the branch from the gas pressure main *o*, controlled by the valve or cock *n*, and flow into the gas conduit *a*, the pressure in which may be varied or controlled by the nozzle *e*. The gases for combustion are preheated by heat radiated from the refractory material forming the chamber *x* to any desirable degree, regulated by the volume of cold air admitted through the cap *s*, which is finally drawn through the ports *p* into the conduits leading to the air ports *f*. The gases flow upwards, and pass through the protecting cap *d*, and through the nozzle *e*, into the vertical flue, when combustion is effected, the pressure of the gases admitting any desired length of flame or zone of combustion within the flue, the air for combustion being admitted in stages through the controlled ports so that the said flame or zone of combustion may be extended from the bottom to the top of the flue, thus evenly heating the side walls of the oven from bottom to top, in contradistinction to a short flame or zone of combustion restricted to the vicinity of the lower portion of the oven. By modifying the dimensions of the gas conduit *a*, in order that it shall contain at any given moment a weight of gases proportionate to the available heat in a proportion of the hot air passing to, or the hot products of combustion flowing from, the vertical heating flues *m*, and by arranging a passage communicating between the air conduit *k* and the chamber *x* for either combustion products or hot air, heat may be imparted to the gases contained within the conduit *a* by the said hot air or combustion products to any degree desirable, limited by their temperature. Similarly, heat radiated or conducted from the refractory material may be utilised directly or indirectly for imparting heat to the gases contained within the conduit *a*. Therefore, the provision of a second system of regenerators for preheating gases of relatively low thermal value, such as producer, water, or blast furnace gas, before admitting such gases to the heating flues may be avoided, the preheating medium being the conduits *a*, and these gases may be employed without necessitating alteration to the system of heating flues and regenerators of an oven, which may therefore be operated at will with the gases referred to, or with coal gases. (Seven claims.)

109834. *Improvements in Deep Well Pumps.* R. L. Matthews, Pendleton, Manchester.—This invention is an improvement in double-acting pumps, enabling such pumps to be worked with only two valves, although more valves may be used if desired. It consists of an arrangement of a piston and bucket, connected in tandem fashion, working in separate barrels, one below the other, the lower barrel having an outer sheath forming an annular space which constitutes a port, whilst other ports are formed in a casting connecting the two barrels and sheath together. This connecting casting also forms a seating for the retaining clack, the rod which connects the bucket and piston passing through this clack. The invention consists of a double barrel, one below the other, the lower barrel having an outer sheath or tube, leaving a space between this barrel and sheath which acts as a port or waterway. A retaining valve is placed between the two barrels in a taper seat allowing upward withdrawal. This seat is formed in a special casting, which connects the two barrels and the sheath, and the bucket rod of a single-acting bucket working in the top barrel is prolonged through this retaining valve to a piston working in the lower barrel. The casting connecting the upper and lower barrels and the sheath is formed in such manner as to provide a seating for the

retaining valve, horizontal ports for the admission of water on the suction stroke, and vertical ports for the transmission of the water to and from the lower barrel. (Four claims.)

109878. *Self-Locking Pin and Shackle for Colliery Trams and the like.* T. Williams, Nant-Morlais Villa, Caeracra, Dowlais, Glamorganshire.—This invention relates to shackles of miners' trams and the like, and especially to those wherein the pin is secured in position by means of the eye or projection in centre of pin, and has for its object to provide an improved construction to prevent dislodgment of the shackle pin and consequent uncoupling of trams and the like under such conditions as shocks, bumps, etc., to which such vehicles are subjected in use in collieries and other mines, especially when the trams run off the rails and are turned over. Referring to the accompanying drawing, fig. 1 is a part front elevation showing the shackle and pin in position when on the draw-plate of tram; fig. 2 is a plan of shackle showing the holes or openings for inserting the pin; fig. 3 is a front and side elevation and also part sectional plan of pin for the said shackle. The upper eye A of shackle has an oval hole B formed or cut in it to allow the tongue C on pin to pass through, and the said hole must be at an angle of 90 degs. to the draw-plate. The bottom eye D of shackle has a round hole made sufficiently large to allow the pin to pass; also on the said shackle a pin E, which is riveted to shackle, is to prevent the opening of shackle and the coupling links coming in contact with the pin. The shackle pin, fig. 3, is made flat, with its edges rounded off. In the centre it has a projection or tongue C, about $\frac{3}{4}$ in. larger in width than the diameter of pin. Its length is the thickness of the draw-plate. Above this projection a collar is made on the pin, allowing enough space for the shackle to turn round. The collar is intended as a second preventative to stop the pin from falling through shackle. (One claim.)



109885. *Improvements in Governors for Gas Plant Blowers, etc.* J. Mitchell, 17, Holborn-hill, Birkenhead, Cheshire.—This invention has reference to governors for gas plant blowers or air compressing or exhausting systems, such governors being of the type in which the speed of the engine or motor, driving an air or gas compressor or exhauster (e.g., a fan), is regulated by a diaphragm acting on the motor controlling device through mechanism giving a mechanical advantage, the movement of the diaphragm being cushioned by a dashpot. This type of governor comprises in combination a diaphragm acted upon by the fluid (the pressure of which is to be regulated), a system between the diaphragm and the motor controlling device of the compressor or exhauster (such system affording a mechanical advantage and imparting a movement to the motor controlling device proportionate to the movement of the diaphragm), and a dashpot arrangement for cushioning the movement of the diaphragm. The upward pull on the diaphragm when arranged for working with a vacuum, or the upward pressure of the diaphragm when arranged for regulating a pressure instead of a vacuum, is regulated or balanced by weights, springs, or the like, placed on a tray or other support affixed to the central stem of the diaphragm, and in order to obtain a variation of this loading, the weights have hitherto been generally added or removed by hand. This present invention is designed to provide an automatic arrangement whereby if the diaphragm rises the loading is decreased, while if the diaphragm falls the loading is increased. (Four claims.)

NEW PATENTS CONNECTED WITH THE COAL AND IRON TRADES.

Applications for Patents.

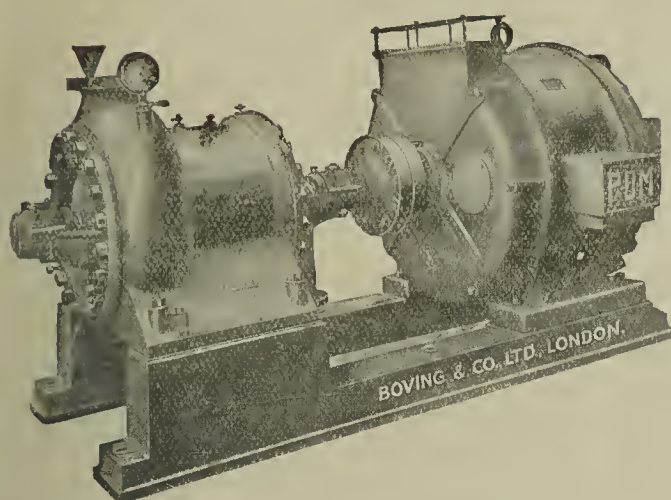
[NOTE.—Applications arranged alphabetically under the names of the applicants (communicators in parentheses). A new number will be given on acceptance, which will replace the application number.]

- Anderson, J. Electric current controllers. (18283)
- Anderson, W. Manufacture of briquettes. (18656)
- Angold, A. E. Miners' electric hand lamps. (18343)
- Arthur, J. Pneumatic percussive hammers, etc. (18345)
- Askam, J. F. Tilting furnaces. (18423)
- Barber, T. W. Lifting gear. (18270)
- Bennis, A. W. Internal combustion engines. (18473)
- Best, R. H. Air compression pumps. (18673)
- Bircumshaw, J. Pit props. (18316, 18317)
- Blackmore, S. P. Tool for securing detonators to fuse in priming charges for blasting, etc. (18365)
- Brindley, J. Internal combustion engine. (18260)
- British Thomson-Houston Company. Electric transformers. (18442)
- British Westinghouse Electric and Manufacturing Company. Liquid rheostats. (18281)
- Butterley Company. Pit props. (18316, 18317)
- Candlot, C. Vibrating shock conveyors. (18672)
- Carroll, T. H. J. Production of a substitute for pig iron, and its utilisation in steel manufacture. (18554)
- Connell, J. C. Fire extinguishing and temperature indicating apparatus for ships' bunkers. (18338)
- Cooke, F. W. Electric transformers. (18442)
- Dellwik, C. Furnace or heating chambers. (18424)
- Dixon, T. Means for operating switches for tram roads in mines, etc. (18527)
- Elliott, B. W. Elevator or load raising device. (18359)
- Ellison, G. Electric current controllers. (18283)
- England, A. Process for gasifying hydrocarbons. (18315)
- Ennis, L. Overhead travelling cranes. (18294)
- Feuerherd, E. Turbines, etc., applicable as pumps. (18469)
- Fraser and Chalmers. Governing turbo-compressors and turbo-blowers. (18602)
- Greenlees, R. Reciprocating engines. (18630)
- Hall, S. Z. Internal combustion engines. (18286)
- Handoll, P. G. Cleaners for water tube boilers. (18529)
- Hewat, H. A. Steam superheaters. (18397)
- Huxley, F. M. Compressing and exhausting apparatus. (18488)
- Jack, A. Overhead travelling cranes. (18294)
- Job, P. A. Production of a substitute for pig iron, and its utilisation in steel manufacture. (18554)

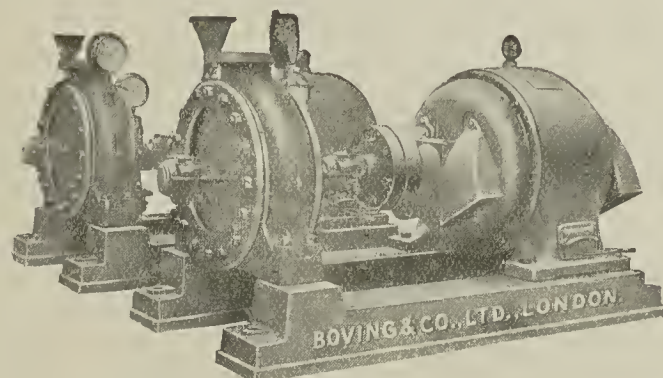
(Continued on page 1202.)

BOVING TURBINE PUMPS.

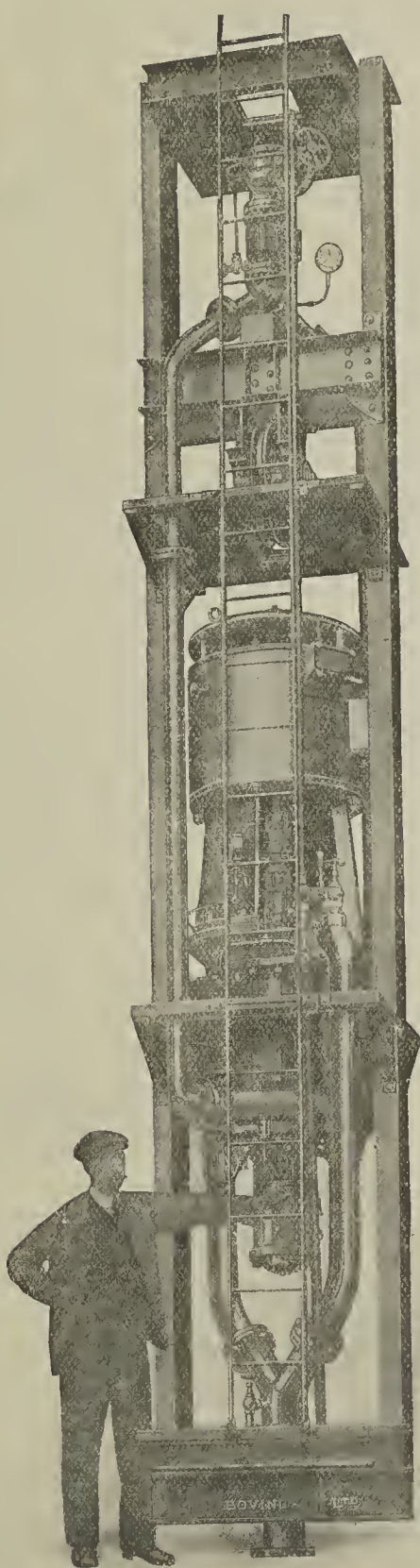
THE MOST RELIABLE AND EFFICIENT
BRITISH MADE PUMP.



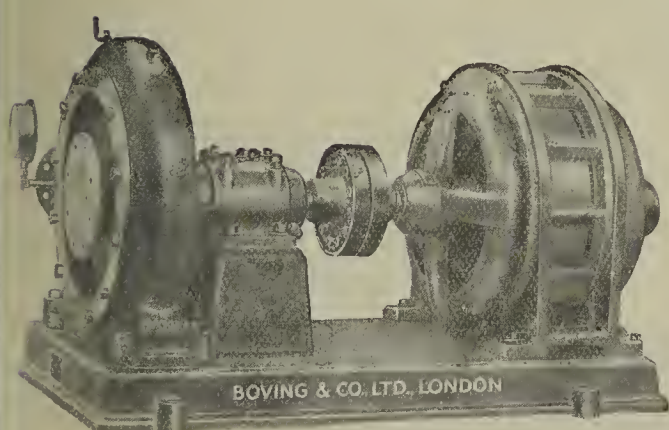
LARGE MINING PUMP
(6 Repeat Orders).
860 g.p.m.
755 feet.
1,450 r.p.m.



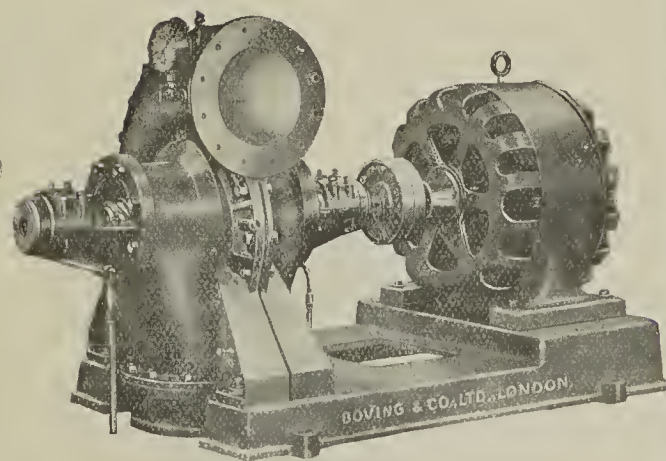
2 SMALL MINING PUMPS.
220 g.p.m.
328 feet.
2,900 r.p.m.



2 SINKING PUMPS
as shown (Repeat Order).
333 g.p.m.
475 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Medium Pressure.
800 g.p.m.
125 feet.
1,450 r.p.m.



STEEL WORK PUMP,
Low Pressure.
3,000 g.p.m.
40 feet.
725 r.p.m.

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56, Kingsway,
LONDON, W.C. 2.

Jaffet, H. V. J. Internal combustion engines. (18416)
 J. T. Apparatus for distillation or carbonisation of
 canal. (18578)
 Oil fuel furnaces. (18310)
 D. Surface condensers. (18540)
 Feed water heating apparatus for boilers.
 Rotary pressure blowers, exhausters, pumps,
 etc. (18253)
 McElrath, W. W. Internal combustion engines. (18652)
 McLean, J. Brick for furnaces, etc. (18322)
 Mavor and Conlon. Cutter disc machines for mining
 coal, etc. (18382)
 (Mills, H. S.). Electric current rectifiers. (18700)
 Morison, D. B. Condensing steam. (18481)
 Munro, H. J. Lifting or hoisting apparatus. (18398)
 Pattison, C. M. Apparatus for generating combustion pro-
 ducts under pressure. (18262)
 Pochobradsky, B. F. Governing turbo-compressors and
 turbo-blowers. (18602)
 Railing, A. H. Miners' electric hand lamps. (18343)
 Rees, D. E. Steam generators. (18439, 18440)
 Rudberg, S. Pneumatic rock drilling machines. (18696,
 18697)
 Sharman, P. A. Doors for steam boilers. (18492)
 Siemens-Schuckertwerke. Electric transformers. (18413)
 Sieurin, S. E. Method of transforming anthracite coke,
 etc., rich in carbon into a product suitable for mann-
 facture of carbon electrodes. (18689)
 Soc. Anon. pour l'Exploitation des Procédés Westinghouse-
 Leblanc. Internal combustion engines. (18282)
 Spencer, A. L. Hitchcock, and Spencer and Company,
 W. H. Doors for steam boilers. (18492)
 (Sturtevant Company, B. F.). Turbines. (18485)
 Techno-Chemical Laboratories Limited. Furnace or heat-
 ing chambers. (18424)
 Uecké, G. H. Processes for softening water. (18524)
 Uecké, G. H. Apparatus for softening water. (18525)
 Verity, O. R. Condensers. (18602)
 Watson, J. Fire extinguishing and temperature indi-
 cating apparatus for ships' bunkers. (18336)
 Whyte, S. Manufacture of iron and steel and alloys
 thereof. (18428)
 Wild, M. B. Braking devices for winches, etc. (18361)
 Willans, G. H. Feed water heating apparatus for boilers.
 (18617)
 Williams, H. Air compression pumps. (18673)
 Wood, E. Steam boilers. (18663)
 Yates, H. J. Tilting furnaces. (18423)

Complete Specifications Accepted.

(To be published on January 3, 1918.)

[NOTE.—The number following the application is that
 which the specification will finally bear.]

1916.

9055. Steinberg, S., and Gramolin, I. Electric furnace
 for steel melting. (111679)
 15500. Sandycroft Limited, Cleaver, R. L., and Potts,
 H. E. Construction of dynamo electric machines.
 (111689)
 17289. Lecesne, N. Manufacture of refractory materials,
 and their use in manufacture. (102507)
 17375. Crossley, C. W. Rotary engines or turbines.
 (111700)
 17528. Rees, E. S. G., and Armistead, W. Dynamo elec-
 tric machinery. (111709)

17571. McGee and Son, W., and Walls, A. G. Pumps.
 (111714)
 17626. Stone and Company, J., and Darker, A. H. Dynamo
 electric generators and reversing mechanism
 therefor. (111718)
 17751. Galloways Limited, and Pilling, H. Cylinders for
 uniflow steam engines. (111721)
 17856. Slater, J. M. L. Control of electric motors.
 (111723)
 17865. Stowe, C. B. Process of making basic refractory
 materials. (110147)
 1917.

158. Podiebrad, B., and Freeman, P. Pumps. (111743)
 1197. Westinghouse Machine Company. Turbine appar-
 atus. (104169)
 1745. Monk, C. T., and Monk, J. Two-stroke cycle
 internal combustion engines. (111758)
 2831. Cole, C. M., and Adams, W. S. Liquid level indi-
 cators. (111770)
 5830. Brotherhood, P., and Bryant, C. W. Internal com-
 bustion engines of the super-compression or
 super-charging type. (111792)
 6773. Robson, G., and Marshall, F. Apparatus for
 measuring liquids, pulverulent materials such as
 coal and coke, grain, and the like. (111799)
 7138. Bagley, D. Regenerative coke ovens. (111801)
 14404. Draper, J. M., and Rhondda Engineering and
 Mining Company. Apparatus for separating
 substances of different specific gravities, such as
 fine coal or ores and the like. (111826)

Complete Specifications Open to Public Inspection Before Acceptance.

[NOTE.—The number following the application is that
 which the specification will finally bear.]

1917.

14411. Siemens-Schuckertwerke Ges. Electrical trans-
 formers, etc. (111837)
 17218. British Westinghouse Electric and Manufacturing
 Company. Electrical control systems. (111849)
 17288. Voorwinde, W. Safety hook for lifting devices.
 (111850)
 17454. Kennedy, H. A. Refractory material and process
 of making the same. (111853)

Mr. Justice Younger on Monday revoked Letters Patent
 No. 27838, for an invention for adding cobalt to high-speed
 tool steel. The invention was stated to have revolution-
 ised the manufacture of this material. The petitioners
 were Arthur Balfour and Company, of Sheffield, who
 alleged that they had been using cobalt for at least a year
 prior to the patent. The petition was resisted by the
 patentees, Stahlwerk Becker, of Germany, and Darwin and
 Milner, of Sheffield, licensees. His lordship granted a stay
 of six weeks, in order to allow the licensees to communi-
 cate with the patentees. Counsel for the patentees said he
 intended to apply for leave to amend the patent drastically.

New Caucasian Coal Field.—The Russian Caucasian
 Minerals Exploitation Company is undertaking the work-
 ing of the Ottinsk coal deposit and the construction of a
 railway from Kars to the deposit, a distance of 130 versts.
 The coal is long flame, but poor for coking, though quite
 suitable for fuelling locomotives and other furnaces.

GOVERNMENT PUBLICATIONS.

** Any of the following publications may be obtained
 on application at this office at the price named **post free.**

Colonial Reports (Annual).—(No. 943), Jamaica, Report
 for 1916. (London: H.M. Stationery Office). Price 3d.

PUBLICATIONS RECEIVED.

"Modern Coking Practice," by J. E. Christopher, includ-
 ing the "Analysis of Materials and Products," by T. H.
 Byrom. Second edition, in two volumes. (Vol. 1),
 "Raw Materials and Coke"; (Vol. 2), "By-products."
 (London: Crosby Lockwood and Son, 7, Stationers' Hall-
 court, E.C. 4). Price 7s. 6d. net each volume.
 "The Journal of the South African Institution of Engi-
 neers" (Vol. 16, No. 4), November 1917, single copies
 2s.; "Compressed Air Magazine" (Vol. 22, No. 11),
 November 1917, single copies 10c.; "The Mining Maga-
 zine" (Vol. 17, No. 6), December 1917, price 1s.;
 "Kelly's Monthly Trade Review" (Vol. 4, No. 38),
 December, price 3d. net; "Proceedings of the Engineers'
 Society of Western Pennsylvania" (Vol. 33, No. 7),
 October 1917, 50c. a number.

Rapporten en Mededeelingen van het Ryksbureau voor
 Drinkwatervoorziening: (Mededeeling No. 1), "Het
 Watergevend Vermogen van Een Groep Putten," by Dr.
 J. Versluys, M.I. (Engineer under the Water Supply
 Department of the Dutch Government); (Mededeeling
 No. 2), "Duinverming aan het Marsdiep met zes kaarten
 en vier profielen," by Dr. J. Versluys, M.I. (Publishers:
 Gebrs. Belinfante, The Hague). Price 0-50 fl. each.

The War Office Peat Fuel Contract.—In the second report
 of the Select Committee of the House of Commons on
 National Expenditure, an appendix gives the facts about
 the War Office contract for the manufacture of peat fuel.
 The British Armies in France require large quantities of
 fuel, including coke and charcoal for use in dug-outs and
 trenches. In view of the difficulty in obtaining charcoal
 and its high cost, the possibility of using a form of
 briquettes made from peat was considered. Wetcar-
 bonising Limited offered to manufacture peat briquettes,
 costing 35s. at factory, and samples, after being tested,
 were pronounced satisfactory for trench warfare and
 economical in transportation. In the course of the negoti-
 ations considering proposals for re-starting Wetcar-
 bonising's factory and also the establishment of another
 factory in France, but the latter scheme fell through on
 account of the Ministry of Munitions withdrawing its pre-
 vious undertaking to release the necessary steel for build-
 ing purposes. Afterwards it was considered that the pro-
 bable saving in fuel was not worth pursuing as a financial
 proposition, but that the saving in tonnage deserved con-
 sideration. The War Office advanced £13,000 to Wet-
 carbonising Limited, secured on the company's assets. A
 new contract is now under consideration, providing for the
 reinstatement of the factory at Dumfries, and for its
 utilisation for the production of 60,000 tons of briquettes
 a year.

STEAM, MOTOR, BELT, OR ROPE-DRIVEN

AIR & GAS COMPRESSORS

From 50 to 15,000 cubic feet

FOR

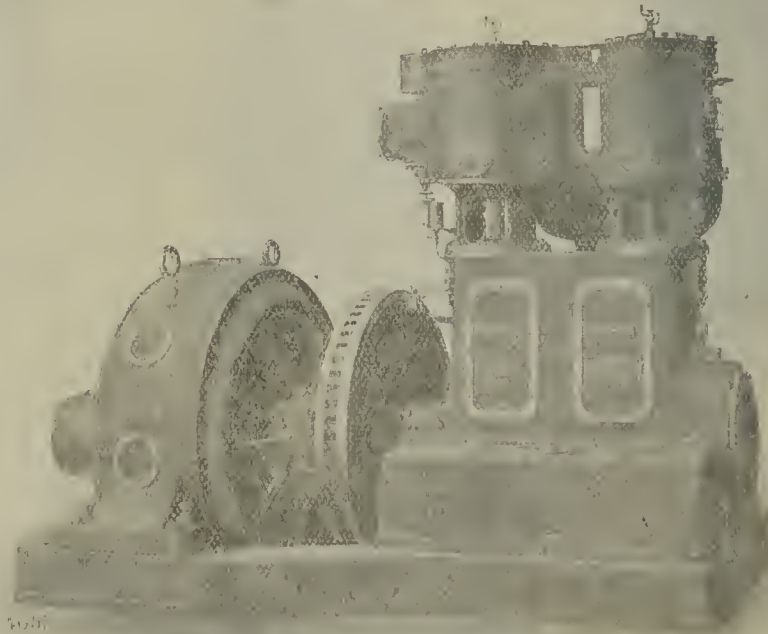
COLLIERIES, MINES, Etc.

ADVANTAGES:—

SIMPLICITY.
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 MINIMUM MAINTENANCE



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MOTOR-DRIVEN AIR COMPRESSOR.

BELLISS & MORCOM LIMITED,
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Telegrams:
 BELLISS, BIRMINGHAM."

London Office:
 8, VICTORIA STREET, S.W. 1.

THE COLLIERY GUARDIAN

AND

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Factor of Safety of Winding Wire Ropes.*

By J. A. VAUGHAN.

It is the universal practice to regard the factor of safety of a wire rope used for winding in mine shafts as the quotient resulting from dividing the strength of the rope by the sum of the maximum load to be hoisted plus the total weight of the rope in the shaft when the conveyance is at the lowest station.

In most countries the breaking strength of the rope is taken as that given in the manufacturer's certificate. Some manufacturers assess the strength of the rope as the sum of the strengths of the composing wires, while others make some deduction.

The differences existing between the estimated and the actual test breaking load for any of the usual sizes or constructions of rope are fairly well known; but it may be mentioned that in all calculations presented in the paper, the strength of the wire rope is taken as the product of 108 short tons into the sum of the sectional areas of the wires forming the rope. The value of 108 tons (of 2,000 lb.) is taken as being 90 per cent. of 120 tons per sq. in., representing a class of wire very commonly used on the Rand.

In recent years various commissions and committees have presented reports dealing with mining matters and including the particular point now under consideration.

About 1901 the Dortmund Commission reported that experience had shown that the minimum factor of safety prescribed by the Mining Regulations—viz., six, was sufficient.

In 1907 the Transvaal Commission reported that a minimum factor of safety of 6 was sufficient, dealing with the winding ropes at work and not when about to be put on the drum. Although they felt that, in deep level winding, the long rope should receive some consideration on account of its better ability to meet the shocks incidental to winding, they were not prepared to disregard other stresses, such as those due to bending, to which the rope was subjected. These stresses had not been exactly determined or proved to be independent of the depth of winding. The author agreed with this finding at that date—viz., 1907, but since then, from fatigue experiments on steel wire, conducted in the Mines Department Laboratory, he has come to the conclusion that the bending stress is of little importance when, as in good practice, the ratio of D:d is kept as high as 1,000.

In 1909 the British Royal Commission on Mines agreed with the report of its professional committee that three and a-half years should be the maximum life of a winding rope. This committee found that the factors in vogue varied from 6 to 10, but noted that even the minimum factor of safety would be difficult to maintain in cases of great depth. They favoured in preference the maintenance of a "reserve of strength," but did not specify what this reserve was to be or how it was to be attained.

In 1915, in *Bulletin* 75 of the Bureau of Mines, Washington, U.S.A., there was published the draft for a mining law, with explanatory notes, prepared by a committee appointed by the American Mining Congress in 1906. Section 34 of this draft law contained the provisions that the factor of safety of all such ropes or cables when newly installed in shafts less than 3,000 ft. deep should in no case be less than six, and should be calculated by dividing the breaking strength of the rope, as given in the manufacturers' published tables, by the sum of the maximum load to be hoisted, plus the total weight of the rope in the shaft when fully let out. It should be unlawful to use any rope or cable for raising or lowering men when its factor of safety, based on its existing strength and dead load, should have fallen below 4.5. It should be unlawful to use any rope cable of the so-called 6 by 19 standard construction for the raising or lowering of men, either when the number of broken wires in one lay of said rope exceeded six, or when the wires on the crown of the strands were worn down to less than 65 per cent. of their original diameter, or when the superficial inspection provided for in this section showed marked signs of corrosion: Provided, however, that when such broken wires were reduced by wear more than 33 per cent. in cross section, the number of breaks in any lay of the rope should not exceed three.

The author would have taken the minimum factor of 4.5 to apply to all shafts, were it not that in another place the committee stated that the code imposed a minimum safety factor for all installations, and another below which no rope should fall and remain in service; very deep shafts were exempted altogether.

In discussing the figures 6 and 4.5 for original and final factors of safety the committee advised mining operators in their own interests to conform to the specifications given in the report. These specifications were drawn up by an advisory committee formed from the leading rope manufacturers in the country. These recommendations are shown in the following table:—

HOISTING-ROPE SAFETY FACTORS FOR VARIOUS DEPTHS OF SHAFTS.

Length of rope. Ft.	Minimum safety factor		Per- centage reduction.
	For new rope.	When rope must be discarded.	
500 or less	8	6.4	20
500 to 1,000	7	5.8	17
1,000 to 2,000	6	5.0	16½
2,000 to 3,000	5	4.3	14
3,000 and over	4	3.6	10

The framers of this table explained that the basic principle is an actual safety factor of four. This figure is increased for the shallower shafts, because in them the stresses due to acceleration and extraordinary circumstances are normally greater, there not being sufficient spring in the rope to moderate the effect of shocks. This proposal may be designated the "stepped" factor, as contrasted with the fixed factor of safety.

Other propositions have been advanced by various individual engineers, the most interesting being the composite formula $ma + nb$, m and n being numerals, while a and b represent the weight of load and rope respectively. This formula of safety gives the breaking load of the winding rope.

Mr. J. F. Cook proposed the formula $8a + b$ as giving a constant "margin of strength."* Mr. Greer advocated the modification of the present six factor of safety by a sliding scale after a depth of 2,500 or 3,000 ft.

The author, in 1904,† was of opinion that for all depths greater than the dangerous limit the maintenance of a standing reserve of strength in the rope appeared a suitable provision against the effects of kinetic shock, and that this reserve might be secured by the use of a sectionally tapered rope.

The dangerous limit alluded to was what might be called the "critical depth" for each rope of a certain lower-end loading, within which depth the effect of a shock of given magnitude was augmented, owing to reflections of the wave of stress, and became much more intense than at this or a greater depth. The calculations dealing with this and some allied matters are dealt with in the appendix to the paper.

Investigation shows that not one of the safety systems previously mentioned is quite satisfactory, and the author will now proceed to introduce an alternative scheme which appears to him to be sound and to possess at least the quality of simplicity.

The "critical depth" below which the kinetic shock for a definite sudden change of velocity is either constant or diminished, is, as shown in the appendix, at a point where the length of the rope weighs very nearly 0.35 (actually $\frac{1}{2} \log_2 = 0.3466$) of the load carried at its end.

The following steps are taken with the idea of utilising this result as a justification for the reduction (below six) of the factor of safety of winding ropes in the deeper shafts:—

Let a denote the supported load (tons) at end of rope.

Let b denote the weight of rope (tons).

Let y_1 denote the factor of safety at lower end of rope.

Let y_2 denote the factor of safety at upper end of rope.

Let s denote the cross wire section of rope (sq. in.)

Let x denote any specified vertical depth (feet).

It is a fact that new rope, of usual construction, of 1 sq. in. wire section weighs, very approximately, 4 lb. per ft., and that ropes of larger or smaller section weigh proportionately.

The steel that will be considered initially is of 120 tons per sq. in. reduced in efficiency to 108 ton stuff as laid up in the rope.

It will be seen that the following relations exist:—

$$a = \frac{108}{y_1} s, \quad b = \frac{4x}{2,000} s.$$

$$\text{Now } y_2 = \frac{\text{Strength of rope}}{\text{Maximum load}}$$

$$\text{So that } y_2 = \frac{108s}{\left(\frac{108}{y_1} + \frac{4x}{2,000}\right)s} = \frac{108}{y_1 + \frac{x}{500}}$$

$$\text{whence } x = \frac{(y_1 - y_2) 54,000}{y_1 y_2} \quad (I)$$

If $y_2 = 6$, or $y_2 = 5$, or $y_2 = 4.5$, then this equation becomes:—

$$x = \frac{y_1 - 6}{y_1} 9,000 \quad (IIa)$$

$$x = \frac{y_1 - 5}{y_1} 10,800 \quad (IIb)$$

$$x = \frac{y_1 - 4.5}{y_1} 12,000 \quad (IIc)$$

In the equation $x = \frac{y_1 - 4.5}{y_1} 12,000$, the value of x for various values of y_1 are as follow:—

$$\begin{array}{l} y_1 = 6, \quad 7, \quad 8, \quad 9, \quad 10. \\ x = 3,000, 4,286, 5,250, 6,000, 6,600 \end{array}$$

To obtain the critical depth for various values of y_1 , it is necessary to substitute these values in the equation:—

$$\frac{4xs}{2,000} = \frac{35}{100} a = \frac{35}{100} \times \frac{108s}{y_1}$$

$$\text{whence, } x = \frac{18,900}{y_1} \quad (IIIa)$$

or from substituting in equation (I):—

$$x = \frac{14,000}{y_2} \quad (IIIb)$$

so that if $y_1 = 6, 7, 8, 9$, and 10 successively, x will be 3,150, 2,700, 2,362, 2,100, and 1,890. When these depths are compared with the depths obtained from equation (IIc), and also with those obtained from equation (IIa) (in which $y_2 = 6$, as at present on the Rand)—viz., 0, 1,285, 2,250, 3,000, and 3,600, it will be seen that, in the case of $y_1 = 8$, the values nearly coincide, and that for higher values of y_1 the increases of winding depth that would be obtained by the adoption of 4.5 as a factor of safety are all outside the limiting position for augmentation of kinetic stress arising from wave reflections.

It can be calculated that the curves corresponding to IIa and IIIa meet at a point $y_1 = 8.1$, $x = 2,333$.

If B denotes the available breaking stress of the steel wire in the rope, i.e., say 90 per cent. of the actual, then equation (I) becomes: $x = \frac{y_1 - y_2}{y_1 y_2} 500 B$, and equation (III) becomes: $x = \frac{175}{y_1} B$.

The curves corresponding to the value of $y_2 = 6$ meet at a point $x = 21.6 B$; $y_1 = 8.1$, this latter value being independent of B .

By plotting a diagram with y_2 as ordinate, the curves denoted by equation (I) after the substitution of various values of y_1 , and also the curve of "critical" depth, it can be shown that the "critical" curve meets the curve $y_1 = 8$ at a depth of 2,362 ft., while this latter curve cuts the horizontal line $y_2 = 6$ at 2,250 ft.

Considering that theoretical results are about to be applied to a practical problem, and that there is every probability of the speed as well as the strength of the wave of kinetic stress being reduced in the practical case, the writer feels perfectly justified in assuming that the "critical" curve falls within the 2,250 ft. mark on the $y_2 = 6$ line—that is to say, to the left of the point where the curve $y_1 = 8$ cuts this line.

The factor y_1 , which may be called the "capacity-factor" of the rope, denotes how many times its breaking load is greater than the load it has to transport.

In winding a load of, say, 10 tons, from a depth of 5,250 ft. to the surface, with a rope of 80 tons breaking load, the curve $y_1 = 8$ shows what the factor of safety (y_2) will be when the conveyance is at any particular depth, e.g., 5.02 at 4,000, 5.538 at 3,000, 6.17 at 2,000, 6.97 at 1,000, and 8 at the surface, where there is only a small weight of rope to effect any difference between y_2 and y_1 .

Seeing that a minimum factor of safety 6 has been found sufficient at shallow and moderate depths, and seeing that the rope denoted by $y_1 = 8$ provides for a factor of safety of 6 within the danger zone, the author proposes to allow this rope, or a rope with the same capacity factor, to go down further, to depths where the factor of safety is 5 or even 4.5.

If a larger rope is used in order to attain a factor of safety of more nearly 6 outside the danger zone, then this rope will have an unnecessarily high factor of safety within this zone. It would be represented by the curve $y_1 = 8.5$ or $y_1 = 9$.

A rope of capacity factor of 8 may not have actually its greatest reserve of strength at a point just beyond the critical curve, for the following reasons:—

(1) The intensity of the wave of stress due to shock in all probability diminishes during its passage along the rope.

(2) The longest rope possible is at the greatest advantage in the case of certain shocks.

From long experience in winding operations it has been found that a rope with a minimum capacity factor of $y_1 = 8$ is strong enough to withstand stresses due to both static and kinetic conditions up to certain depth where $y_2 = 6$. In the midst of uncertainty and conjecture it is, however, known that the kinetic stresses are less below this depth, in some cases the difference increasing with depth. Is it not, therefore, a good practice to allow the static stress to slightly increase?

Some reduction of y_2 may be adjudged to be permissible, and this reduction should be gradual in proportion to the depth. A constant capacity factor such as $y_1 = 8$ meets the case, but the question remains to be answered as to what limit should be set to the reduction in y_2 .

Before answering this question it is best to carefully consider the other proposals that have been made in the way of safety factors or formulae.

* Paper read before the South African Institution of Engineers.

* *Journal of the South African Institution of Engineers*, vol. xi., No. 4, page 126.
† *Ibid.*, March 1904.

and conservative idea of the fixed factor of safety is very harsh on all deep level mining schemes where ropes are used. Taking for minimum factor of 6, for 2,000 ft. the capacity factor will be 10.8, and for 6,000 ft. the enormous factor of 18. These values of y_1 give directly the values of y_2 when the load is at the surface, whence the differences in the reserves of strength that have to be maintained in the ropes may be readily gathered.

The inventors of the "stepped" factor of safety system, as advised by the U.S.A. manufacturers, appear to have overlooked the fact that, in winding from 2,000 ft. the 1,000 ft. step has to be passed, and that, in winding from 4,000 ft., all the intermediate stages have to be negotiated. This system calls for a minimum factor of safety of 5.8 at 1,000 ft., but allows a factor of 5 directly the 1,000 ft. depth is passed, and so on at each step. Finally, it permits a minimum factor of safety of 3.6 for 3,000 ft. and over. The winding rope for 6,000 ft. would have a capacity factor of 6, while that for 3,000 ft. would have only 4.5.

With regard to the effect of using either of the composite formulae $8a + b$ or $7a + 2b$ in deciding the breaking load of the winding rope to be adopted for depths of 2,000 ft., 4,000 ft. and 6,000 ft., both these formulae result in the same rope of capacity $y_1 = 9$ for 6,000 ft., where $y_2 = 4.5$. The $8a + b$ formula becomes $y_1 = 8.64$ at 4,000, where $y_2 = 5.26$; and $y_1 = 8.308$ at 2,000 ft. depth, where $y_2 = 6.353$. The $7a + 2b$ formula becomes $y_1 = 8.22$ at 4,000, where $y_2 = 5.102$; and $y_1 = 7.56$ at 2,000 ft., where $y_2 = 5.906$. The latter results in values of y_2 below 6 within the critical depth, while the former (*i.e.*, $8a + b$) errs on the generous side within this danger zone, being always higher than $y_1 = 8$.

Tapered ropes, generally sectionally tapered ropes, have been used in a few cases in deep levels on the Rand to maintain the legal minimum factor without accumulating an undue reserve of strength. The best friends of this class of rope will hardly claim that it has been a great success. It has to be especially designed for each shaft, and is naturally expensive. By reducing the factor of safety below 6 after the critical depth is reached, the necessity for tapered ropes is done away with.

If a winding rope is installed of capacity factor $y_1 = 12$ it can be allowed to wear down one-third before it reduces in capacity to $y_1 = 8$. The author proposes this practice for general adoption, considering that it would not create any hardship in the case of any shaft under 2,000 ft. in depth.

The limit of $y_2 = 4.5$ appears a reasonable one to adopt in the light of American experience in deep level winding. Between the depths of 5,250 ft. and 6,000 ft. the 4.5 limit could be maintained by allowing less than one-third loss of strength in the rope, or, as shown later, by initially adopting a higher value for B.

The regulation dealing with the relation of breaking load of the rope to the maximum working load would require to be entirely altered, and should read somewhat as follows:—

"No winding rope shall be used when the breaking load at any point therein has become reduced to less than eight times the load carried at its lower end, provided, however, that in no case shall its factor of safety, based on its existing strength and maximum working load be permitted to fall below 4.5." The latter provision in the proposed regulation is necessary if shafts of over 2,250 ft. in depth are taken into consideration, if steel of unnecessarily low ultimate stress is used in the manufacture of the rope, or in case of abnormal wear in the upper part of the winding rope.

The initial values of y_1 , as found in the vertical shafts on the Rand, are shown in the following table, from which it will be seen that the proposal to start off at $y_1 = 12$ and permit wear down to $y_1 = 8$ will afford relief to the deeper levels without pressing hardly on the shallower mines.

Depth of shaft, in feet.	Average value of capacity factor = y_1 .	
	Calculated for maximum load of persons plus weight of conveyance.	When hoisting ore.
Less than 1,000	18.33	14.02
1,000 to 2,000	17.00	11.08
2,000 to 3,000	20.08	14.52
3,000 to 4,000	21.73	14.17
4,000 and over	22.4	15.3

In sorting out the values of y_1 in this table an opportunity was afforded of checking the rule on which the author's formulae were based, viz., that rope of 1 sq. in. wire section weighs 4 lb. per foot. In the licensed hoists on the Rand there are 101 ropes working in vertical shafts. These ropes range in size from 0.78 in. dia. to 2 in. dia., or from 1 lb. to 7 lb. per foot. The ultimate stress of the steel varies from 100 to 149 tons (of 2,000 lb.) per sq. in.

The breaking load of each rope was calculated and then compared with the actual test result. The calculation consisted in dividing by 4 the product of weight per foot by 90 per cent. of the ultimate stress of steel. The actual breaking load was slightly greater than the calculated breaking load in 40 instances and slightly less in 61 instances. The average actual breaking load of the 101 ropes was 74.48 tons, while the breaking load calculated from the average ultimate stress and average weight per foot was 75.67 tons.

In the 40 instances just mentioned the average weight of the rope per foot was 1.1973 lb., while in the 61 instances the average was 3.058. Ropes of all intermediate sizes and of various types of construction were included in the category, and no definite modification was made either size of rope or type of construction, as suggested by the author, but it is interesting to note the average results that the heavier ropes were stronger than the lighter ones if the breaking load is accepted as a standard. It is remembered what is really meant by $y_1 = 12$ is that, for the sake of brevity $y_1 = 8$. It is also remembered that for various values of x and y_2 , obtained by substituting this particular value of y_1 in the equation

$x = \frac{y_1 - y_2}{500} B$. Substituting this value of y_1 , the equation becomes $8xy_2 = (8 - y_2) 500 B$. If $y_2 = 4.5$ and $B = 90$ per cent. of 130 = 117, then $x = 5,688$ ft., while if $y_2 = 4.5$ and $B = 90$ per cent. of 140 = 126, then $x = 6,125$ ft. The number 500 was arrived at by dividing 2,000—the number of pounds in a short ton—by 4, the alleged weight per foot of a rope of one square inch wire section.

It is evident, therefore, seeing the position of the quantity 500 B in the equation, that corrections to suit all circumstances, including loss of efficiency in the rope, *i.e.*, the lowering of its strength in comparison with its weight, can be introduced readily by an adjustment of the value of the numerical factor.

The simplicity of the author's proposal need hardly be enlarged upon, but it may be mentioned that, in selecting a rope for a winding proposition, the fact that the depth of the shaft may be left out of the calculation is of some little assistance.

This investigation has only been concerned with vertical shafts, but its application may, with modifications, be extended to incline and compound shafts.

Appendix.

In this appendix are given the calculations for estimating the stress occasioned in the winding rope (x feet long, of weight b tons and carrying a load of a tons) by a kinetic shock at velocity v feet per second occurring under three different circumstances, described under Cases I., II., and III., the wave of stress travelling at the rate of V feet per second. The rope is regarded as a single wire of section s square inches.

In translating the results the following points have to be remembered:—(1) A wave transmitted along a wire rope will probably suffer considerable diminution in intensity due to the friction between the strands and wires as it travels, and, this being so, the stress will not reach such high values as in the case of a single wire. (2) The reflections at the top and bottom ends of the rope will be by no means perfect, especially so in the case of the former. (3) The length of the wire spiral may be from 5 to 10 per cent. greater than the length of the rope, so that, if the wave splits up into components along the separate wires the rate of travel will be lessened. By neglecting to take account of these considerations and applying the theoretical results directly to the case of a wire rope the error is on the side of safety.

It would be extremely interesting to evaluate these considerations by means of practical tests in a deep mine shaft.

Case I.—The rope is lowering the load a when motion of the former is suddenly stopped.

A wave of stress, $S = E \frac{v}{V}$, travels down the rope and is reflected when it reaches the lower end, stress $2S$ resulting. The force retarding the motion of the load (equal to a tons) consists of two parts, one of which is constant, viz., $P = K.E \frac{v}{V}$, and the other part, viz., $K.E \frac{v_r}{V}$, varies with the velocity of the load at the moment.

Equation of motion:— $\frac{a}{g} \frac{dv}{dt} = K \frac{E}{V} (v + v_r)$, whence $dt = \frac{a}{g E K} \frac{dv}{v + v_r}$.

Integrating between limits $v_r = 0$ and v we obtain $t = \frac{a V}{g E K} (\log_e 2v - \log_e v)$, whence $t = \frac{a V}{g E K} \log_e 2$.

If L feet be the length of the wave, $L = 693 \frac{a V^2}{g E K}$, independent of v —the shock velocity.

Substituting the value $V^2 = \frac{E}{\rho}$, $L = 0.693 \frac{a}{g \rho K}$, or $L g \rho K = 0.693 a$.

Thus the weight of rope included in the wave is equal to about 0.7 of the weight of the load carried. If the length of rope, x , is equal to one half L , the wave will, after reflection at the upper end (where the stress will be increased to $3S$), return to the lower end just as the load a has been brought to rest. If the rope is shorter than $\frac{L}{2}$, or less than $0.35 a$ in weight, then the stresses mentioned will be increased.

When x is such that $b = \frac{35}{100} a$, this depth may be called the "critical," the shock being greater for lesser depths, but no less for any greater depth.

Case II.—A load a with velocity v downwards is suddenly attached to the end of the rope previously at rest. This may occur as the result of the cage sticking in the shaft while being lowered and slack rope accumulating. The driver perhaps notices something wrong and stops winding. Before the slack rope is taken up, the cage may free itself and fall.

The lowest section (infinitely thin) of the rope is instantly jerked into motion downwards with velocity v feet per second. This section communicates its motion to the section next above, and would thereby come to rest were it not that it is still moved downward by a , but now, with reduced velocity, some of the kinetic energy of a being expended. A wave of stress travels up the rope, of head $E \frac{v}{V}$ and of gradually reducing intensity.

The load is experiencing retardation proportional to its velocity, and cannot, mathematically speaking, be stopped until the wave reflected from the top end has reached it.

Equation of motion of a downwards:— $\frac{a}{g} \frac{dv}{dt} = K \frac{E}{V} v_r$.

Integrating between limits $v_r = v_1$ and v

$t = \frac{a V}{g E K} (\log_e v - \log_e v_1)$

Substituting for t the time $\frac{2x}{V}$ taken by the wave to go up and down the rope, we find:—

$$\log_e \frac{v}{v_1} = \frac{2x g E K}{a V^2} = \frac{2x g \rho K}{a} = 2 \frac{b}{a}$$

If $b = .35 a$, then $\frac{v}{v_1} = 2$ and the velocity has been reduced to one-half. The wave now doubles on itself and goes up the rope again, the force retarding a 's downward motion at that instant being $2 \frac{1}{2}$ times $K \frac{E v}{V}$.

This rope is evidently long enough to ensure that the motion of a downward may be arrested before the next return of the wave. If the rope were not long enough a still greater stress would be created at the subsequent returns of the wave.

The longer the rope the more nearly will the maximum stress at the lower end reduce to $2S$ where $S = \frac{E v}{V}$.

The least length of rope could be calculated which would allow of the downward motion of the load a being arrested just before the head of the wave reaches the lower end of the rope for the second time.

For the purpose of this paper, however, it is sufficient to have shown that the second time, for the reason that as the load is sufficient to have shown that the "critical" depth calculated for Case I. provides safety in this Case II.

Case III.—Starting to hoist with the rope slack, so that the load is suddenly jerked into motion. If the rope is suddenly given a velocity v feet per second, the lower end when the wave of stress reaches it would, if there was no load attached to it, respond with velocity $2v$. The load being there, no motion of the lower end of the rope can take place until this load is accelerated upwards. The equation of motion will be:—

$$\frac{a}{g} \frac{dv}{dt} = 2k \frac{E}{V} v - k \frac{E}{V} v_r - a$$

Integrating between the limits $v_r = 0$ and v we find $t = \frac{a V}{g E K} \log_e \frac{2Cv - a}{Cv - a}$ where $C = k \frac{E}{V}$. If $t = \frac{2x}{V}$

$$\log_e \frac{2Cv - a}{Cv - a} = 2 \frac{b}{a}$$

If $Cv = 1.1a$ then $b = 1.242a$
 $Cv = 3a$ then $b = 0.458a$
 $Cv = 100a$ then $b = 0.35a$ approx.

The advantage of a long rope is apparent, as it will allow the load to be fully accelerated before the return of the wave of stress to the lower end of the rope.

The shock velocity here appears as the determining factor in the length of the wave. Although for moderate shock velocities the "critical" depth arrived at in Case I. is exceeded, it has to be noted that the extreme shock is only likely to occur at starting the upward trip, when the rope is the longest.

The General Formula:—The factor of safety = $y_2 = \frac{a y_1}{a + b}$ whence $\frac{b}{a} = \frac{y_1 - y_2}{2}$ but, $\frac{b}{a} = \frac{x s}{c} \times \frac{y_1}{m s B}$, where m = fraction of wire section remaining in a worn rope. Combining these equations, there results the general formula:— $x = \frac{y_1 - y_2}{y_1 y_2} m.C.B = \frac{y_1 - y_2}{y_1 y_2} D$, where $D = m.C.B$.

If $y_1 = 8$ and $y_2 = 4.5$, $x =$ (very nearly) $\frac{1}{10} D$.

If $y_1 = 9$ and $y_2 = 4.5$, $x = \frac{1}{9} D$.

VALUES OF D.	
B × C.	
m.	108 × 600 ... 108 × 500 ... 108 × 400 ... 120 × 600 ... 120 × 500 ... 120 × 400 ...
1.0	64,800 ... 54,000 ... 43,200 ... 72,000 ... 60,000 ... 48,000 ...
0.9	58,320 ... 48,600 ... 38,880 ... 64,800 ... 54,000 ... 43,200 ...
0.8	51,840 ... 43,200 ... 34,560 ... 57,600 ... 48,000 ... 38,400 ...
0.7	45,360 ... 37,800 ... 30,240 ... 50,400 ... 42,000 ... 33,600 ...
0.6	38,880 ... 32,400 ... 25,920 ... 43,200 ... 36,000 ... 28,800 ...

The value of C depends on the weight per foot of the rope. As the rope decreases in weight owing to abrasion or corrosion, or stretching, so does C increase.

Dust Barriers in Coal Mines.—In order to prevent as far as possible the propagation of explosions, inert dust barriers have been installed in several bituminous coal mines in Alberta. These barriers extend from 175 to 200 ft. in length, and consist of shelves 18 to 24 in. wide, with spaces of 24 in. between them. These shelves are loaded with incombustible dust taken from the combustion chambers of steam boilers, the analysis of this dust showing that it is very satisfactory for this purpose.

Coal Shortage at Hong Kong.—The coal outlook in Hong Kong is very unsatisfactory, and no immediate change for the better is in prospect. Dearth of ships is the main factor. On account of the increased cost of mining, and also because the producers can secure a higher price for their product, the price of coal at the mines in Japan (which dominate the Hong Kong market, and furnish normally about 70 per cent. of the total imports in Hong Kong and South China) has been greatly advanced. The continued withdrawal of shipping from the South Asia routes, and the disposition of ship owners to seek other and more profitable cargo than coal, have caused prices to so advance that ordinary grades of Japanese soft coal are retailing in Hong Kong at 18 dols. gold per ton, as compared with 4 to 5 dols. gold per ton three years ago. A large Hong Kong industrial concern, which three years ago secured its coal supply by annual contract at about 3.70 dols. gold per ton, has recently contracted for its supply at a trifle over 15 dols. gold per ton. Coal is imported into Hong Kong not only for local industrial purposes, but also to supply ships' bunkers. The price of bunker coal has risen so sharply that Hong Kong is no longer regarded as a coaling port for any vessels but those compelled to take coal here in emergencies. The cost of all local steamer transportation (inland and coastwise) has advanced, coasting lines advancing fares usually 20 per cent., and inland steamers usually 16½ per cent. One result of current high prices has been increasing use of Chinese coal, particularly that from North China, but also coal obtained at various points in Kwangtung and Kwangsi provinces from outcrop mines. A continuation of present fuel conditions for any considerable length of time will unquestionably lead to important development of the South China coal deposits.

SALINE CORROSION OF COKE OVEN WALLS.*

By H. SCHWENKE.

The endeavour to solve the problem of increasing the resistance of the refractory linings of coke ovens to the corrosive action of the alkalis liberated from the saline substances in washery water, has met with varying success. The salts in this washery water consist of the chlorides and sulphates of the alkalis and alkaline earths, common salt usually forming about 80 to 90 per cent. of the whole. Decomposition of this salt begins at about 900 degs. Cent., and the acid, which combines with the ammonia in the gas, is recovered, as ammonium chloride, in the condensed gas liquor, whilst the alkali combines with the alumina silicates in the oven lining and forms readily fusible alkali and double silicates. These, first of all, coat the bricks with a kind of glaze, which cracks under the changes of temperature resulting from the charging of the ovens with fresh coal; and the penetration of the alkali into these cracks results in an extension of the corrosion into the heart of the brickwork.

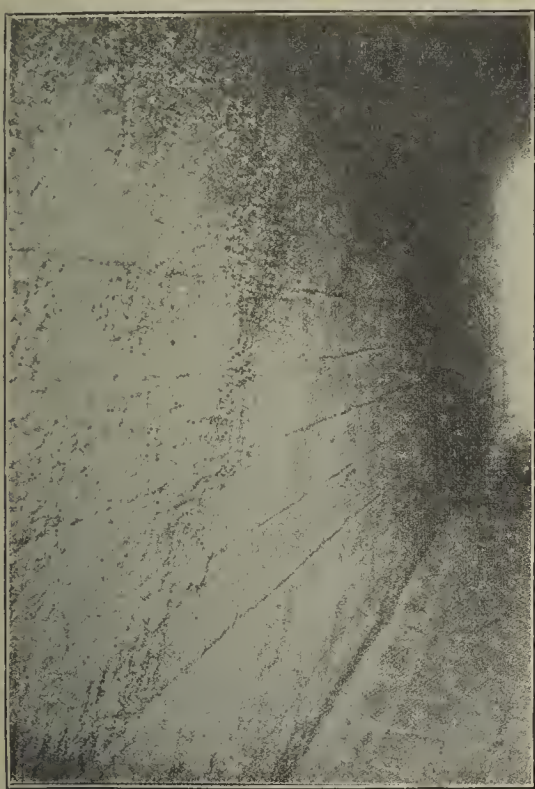


FIG. 1.—OVEN AFTER 2½ YEARS' USE.
ORDINARY LINING.

To guard against this destructive influence, it is the practice to regulate the supply of fresh water to the coal washing plant, so that the amount of salt in the washing water does not exceed 1 grm. per litre. In many cases, however, this measure is impracticable, by reason of the comparatively large amount of salt in the coal itself and in the adjacent rock. At one plant where these conditions obtained, it was found impossible by this means to keep the NaCl content of the water from the drainage belt below 5 grms. per litre. Since the coking coal contained, on the average, 13 per cent. of water, each 10-ton charge of coal introduced nearly 14½ lb. of salt into the coke oven, so that, as each charge took 33½ hours to coke, approximately 34 cwt. of salt were put into the oven in the course of a year. The only effective way in which the life of the oven linings could be prolonged satisfactorily was by employing a suitable refractory, selecting a type of oven which enabled the heating of the various flues to be accurately regulated (preventing local overheating), and carefully supervising the heating of the ovens when in work.

The type of oven selected was the Koppers' regenerative oven, lined with good, compact acid brick containing about 85 per cent. of SiO₂. The result was so successful that the ovens could be kept running for five years without needing any repairs. The corrosion in the oldest ovens penetrated to a depth of 1¼ to 1½ in., and was, naturally, greatest in the lower courses, where the temperature is hottest, just above the gas nozzles. No extensive internal fusion, due to leakage between the furnace chamber and the heating chamber, could be discovered.

In the oven chamber, which showed the greatest corrosion, about 12,400 tons of coal had been coked in five years, during which time at least eight tons of chlorides had passed through. The most severe corrosion was found in the two bottom courses, close above the gas inlets, in the zone of maximum temperature. Slaggy encrustations close to the door were attributable to local overheating from the burning of de-gasified coke. The loun luting of the doors ceases to be airtight when the pressure in the oven becomes negative toward the end of the coking period; whereupon a little air leaks in and the coke begins to burn—a condition revealed by an increase in the CO₂ content of the gas. These slaggy encrustations have nothing to do with saline corrosion, and can be easily chipped off with a chisel.

Another oven, which had been running three years and five months, had coked 8,800 tons of coal, only showed any serious corrosion in the three bottom courses, the rest of the lining being in very good repair. Another (fig. 1), after running for 2½ years, exhibited only slight incipient corrosion, with rather more pronounced slagging (seen in the foreground); and very similar results were found in one that had been in use for two years, during which time 4,000 tons of coal had been coked.

Whereas the foregoing ovens were lined with acid firebrick, with a clay base, fig. 2 shows a chamber in

which the 12 lower courses were of Dinas brick (over 90 per cent. of SiO₂), with a lime base. After two years' use under the same conditions as the other ovens, these courses showed not the least trace of corrosion, in spite of the very salty coal treated. There was no sign of peeling or slagging, whereas the upper courses on the pusher side exhibited a rough, cracked surface in marked contrast to the smoothness of the silica bricks. This behaviour affords the strongest proof of the high suitability of the lime base silica brick for use with salty coals, and that, with this class of brick, the thickness of coke oven linings can be reduced, thus facilitating the transmission of heat from the flues to the coking chamber, accelerating the coking process, and increasing the productive capacity of the ovens. In proceeding along these lines, however, it will be necessary to take care that the production of ammonia is not impaired.

With regard to repairs—a subject on which little has been written—out of the group of ovens which had been in use for five years, only two of the chambers needed re-lining, having warped so as to cause trouble in pushing the charge. In the others, the badly corroded bricks (those eaten half-way through or more) were taken out and replaced; but for the most part it was found sufficient to patch up the defective places with fine grained fireclay mass. With this object, they were chipped off with a chisel, until the sound brick was exposed, the splinters and dust being blown off with compressed air, and the wall plastered over after being heated up a little. The plaster was composed of 50 to 70 parts of firebrick (crushed to a grain of 1 to 3 mm.) and 50 to 30 parts of finely-ground quartzite clay, fusing at the temperature of Seger 25 to 27 (about 1,000 degs. Cent.), and containing 88 per cent. of SiO₂, and fluxes equivalent to 1½ per cent. of K₂O. The plaster should be applied in thin layers in order to prevent peeling, which would result in the whole mass becoming detached during the subsequent heating up of the oven, each layer being allowed to dry before the next one is laid on. For this latter reason, it is advisable to have the oven warm before commencing to apply the plaster. The floor of the oven is repaired with a similar plaster, of somewhat coarser grain, rammed and smoothed down.

The ovens repaired in the above manner have given satisfactory results, the improved yield of by-products showing that leakage had been prevented. At the end of a further 2½ years, several of the ovens gave rise to difficulty in discharging, owing to corrosion of the floors; and on the occasion of executing these repairs, after a total run of 7½ years, it was found that the floors had suffered considerably from the mechanical attrition set up in pushing the charges, and that the rammed plaster was not an efficient substitute for good well burned bricks. The plaster on the walls either peeled off on cooling, or became so loose that its removal and renewal became necessary, thus disproving the claim, put forward on its behalf, that it would sinter to a homogeneous mass with the brickwork. In view of the high fusing point of the aluminous material, such a union with the bricks

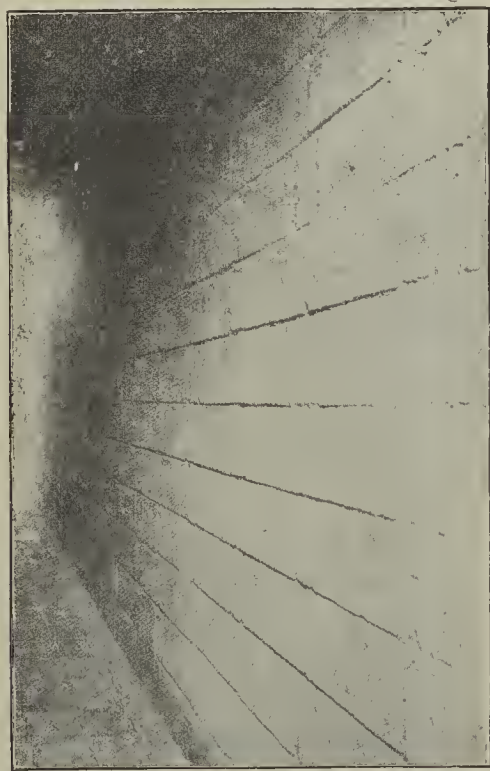


FIG. 2.—OVEN AFTER 2 YEARS' USE.
THE LOWER 12 COURSES OF SILICA BRICK.

could not take place except at a temperature which would melt the flues. Nevertheless, the plaster protected the bricks from any further corrosion, and completely fulfilled its purpose of keeping the walls in good condition and checking decomposition, all that was necessary in carrying out the second repairing being to remove the old plaster with care and apply fresh. In this way the necessity for putting in new bricks was limited to places where, owing to excessive overheating, the bricks had been corroded half-way through. The floors also, as already mentioned, needed re-laying, in consequence of their greatly dilapidated condition.

This method of repair by plastering has greatly contributed to lowering the cost of maintenance, especially in view of the present high prices of refractories, but is not unconditionally advisable in all cases. The plant in question deals with a very gassy coal, which shrinks in coking, and therefore the walls of the ovens are not subjected to much attrition in the operation of pushing; but in the case of expanding lean coals, the plastering method of repair should preferably be confined to small patches, the lack of cohesion with the underlying brickwork rendering it unsuitable for large surfaces.

ELECTRIC POWER SUPPLY.

Far-reaching proposals in connection with an important phase of national reconstruction are set forth in an interim report presented to the Reconstruction Committee by the Coal Conservation Sub-Committee, of which Viscount Haldane is chairman. The Sub-Committee proposes, with the object of economising and more effectively utilising our coal resources, to supply all our industries with electrical power generated at big "super-power stations," not more than 16 in number for the whole country, and to eliminate or combine all smaller stations.

Dr. Addison, Minister of Reconstruction, states in a prefatory note:—

The primary object of the scheme is to economise our coal supplies. The amount of coal used in the United Kingdom for the production of power is 80,000,000 tons, at a cost of, say, £40,000,000 at the pithead. The Committee confidently states that, by an up-to-date and national scheme of electrification, 55,000,000 tons of this (£27,000,000 a year) could be saved. This, with a saving of the by-products now wasted by the burning of coal in open grates and boiler furnaces, and a reduction in the cost of coal transport and distribution, would effect a national economy of £100,000,000 a year.

It has been settled conclusively during the past 15 years that the most economical means of applying power to industry is the electric motor. In the factories put down for the production of munitions during the war, 95 per cent. of the machinery is driven by electricity, and it is only a question of time for all power to be applied in this way. The problem is not how to apply electric power, but how best to generate it.

Proposed Central Authority.

It is pointed out that the development of electricity in this country has been hindered by the numerousness and the smallness of the electrical undertakings. At the present time the supply is split up among about 600 companies and municipal undertakings. The average generating capacity of such of these undertakings as possess power stations is only 5,000 horse-power, or about one-fourth of the capacity of one single generating machine of economical size, and about one-thirtieth of that of a power station of economical size. Technically and commercially, the big generating station is admittedly the best. The reform proposed by the Committee is to supersede all these small undertakings by laying down throughout Great Britain main trunk lines to be fed by some 16 "super-power stations."

The generating machines in these stations should be of large size, not less than 20,000 horse-power each. In more important industrial districts machines of as much as 50,000 horse-power might be used with even greater advantage. The generating stations should be on large sites with ample coal and water transport facilities. It is contemplated that at each generating station by-products might be extracted from the coal before it is used for the production of power, and that various electro-chemical processes which are essential for this country should be carried on near by. The sites for the stations must be outside, not inside, towns. This would improve the health of the great industrial centres by the reduction of smoke, and would relieve the congestion of the railway lines in their neighbourhood by practically abolishing the carriage of coal. Various forms of electricity supply authority, both public and private, are considered, but the Committee, on the whole, favours private enterprise.

The 16 great power authorities, whether private companies or public bodies, would be controlled by a National Board of Electricity Commissioners. Existing plants would be handed over on equitable terms to the new authorities. In addition to the main generating stations, subsidiary generating plants would be set up wherever there was surplus gas or waste heat, as at blast furnaces and coke ovens, and the electricity so generated would be fed into the main trunk system. In the same way, waste coal, which is not at present worth the cost of carriage, and is, therefore, left at the pits, could be used on the spot.

A Far-Reaching Reform.

There already exists in this country a practical example of centralised production of electricity for a large area. The north-east coast district, rather larger in area than Lancashire, is served by a group of power companies from one inter-connected electrical system. The population of this area is less than that of Lancashire, and the area is, therefore, less advantageous for electrical supply. But, whereas in Lancashire, with its multiplicity of electrical undertakings, the price per unit for electric power varies from 1d. to 2d. or more, the average price paid in the north-east coast district is less than ½d. a unit, and the use of electric power per head of population is three times as great. A great saving of coal and reduction of smoke have resulted. Apart from the electric power companies' consumption, practically no coal is burnt on the Tyne for power purposes, except by the railways and some collieries. The Tyne shipyards may be said to have adopted electricity to the exclusion of all other forms of power.

As a result of the adoption of electric traction on the suburban railways, the traffic facilities of the district are greater than those of any other district of similar size. New industries have been established in the district, solely on account of the cheap electric power available. Waste heat and gases have been extensively used for the production of electricity, so that the power is produced as a by-product of two of the local industries—the making of pig iron and coke.

Tin a War Material.—In exercise of the powers conferred upon him by Regulation 30b of the Defence of the Realm Regulations, the Minister of Munitions has specified tin as being a metal required for the production of war material, and therefore subject to the provision of that Regulation.

* Glückauf.

MODERN BELGIAN BRIQUETTE FACTORY, WITH THE "CAVA" PITCH PROCESS.

By E. GEVERS-ORBAN.

The new briquetting factory of the Charbonnages Espérance Bonne-Fortune, Montegnée-Liège, was in operation three years before the war.

The handling, preparation, and pressing of the coal slack present no new features, and they are referred to merely to explain the results obtained with the new method of preparing and mixing the "Cava" pitch.

The washed slack is an intimate mixture of two semi-bituminous steam coal qualities, say, 15 per cent. volatile matters and 11 per cent. volatile matters (making an average of 13 per cent. volatile), and 8.5 per cent. ash.

The slack arrives from the washeries in tipping wagons of 40 tons capacity. It generally contains 12 per cent. of moisture.

than standard dry pitch. This binding power cannot easily be measured by laboratory instruments, but is a result of the process of preparation, as hereinafter described.

The "Cava" pitch is a coal tar, which has been strongly oxidised and deprived of its lighter constituents. The oxidation of the tar has a drying action, which increases the proportion of bituminous, *i.e.*, sticky, constituents, a property similar to the well-known "drying" property of linseed oil. It also brings the pitch nearer to the condition of the asphaltum obtained as a product of oxidation of petroleum.

On the other hand, the "Cava" pitch contains less free carbon, and thus less inert material than ordinary dry pitch. For instance, the same tar, with 12 per cent. of free carbon, will make "Cava" pitch containing 18 per cent. of free carbon, or dry pitch with 30 per cent. of free carbon.

As a result and a confirmation of these properties, the Bonne-Fortune briquettes with 6 per cent. "Cava"

portion of 6 per cent., introduces into the briquette less volatile matters, and produces far less smoke than would 8 per cent. of a dry pitch with 65 per cent. of volatile matter.

Handling the "Cava" Pitch.

The "Cava" pitch is stored in a hot liquid state, and then admixed in that condition with the coal. The pitch is easily handled, owing to its poor heat-transmitting properties and its high latent heat of fusion. Consequently, a small amount of heat, *i.e.*, a small steam coil, keeps the pitch liquid; and it can, without setting, be mixed with the cold coal, the best temperature for stirring the paste being about 45 degs. Cent. (113 degs. Fahr.).

This high latent heat of fusion explains also why the dry pitch, for melting in the mixing vessel, requires the high temperature of 100 degs. Cent. (213 degs. Fahr.), and the use of superheated steam, which stirring under high temperature is not only a waste of steam, but also entails subsequent energetic cooling, in order to bring the paste down to a suitable temperature for pressing.

The rate of feed of the "Cava" pitch is easily effected by means of a pump, with adjustable stroke, driven by an electrical motor with controllable speed.

In this way the liquid pitch can be more exactly proportioned than powdered dry pitch, and is easier to control. The one small pump replaces the whole of the tackle required for handling dry pitch: breaker, elevator, and measurer. The handling of dry pitch—unloading wagons, removing the stacks, breaking by hand, grinding, and measuring—produces a quantity of dangerous corrosive dust, thus making it necessary for the labourers to protect their skins with a coating of clay, whilst ophthalmic disorders are set up despite

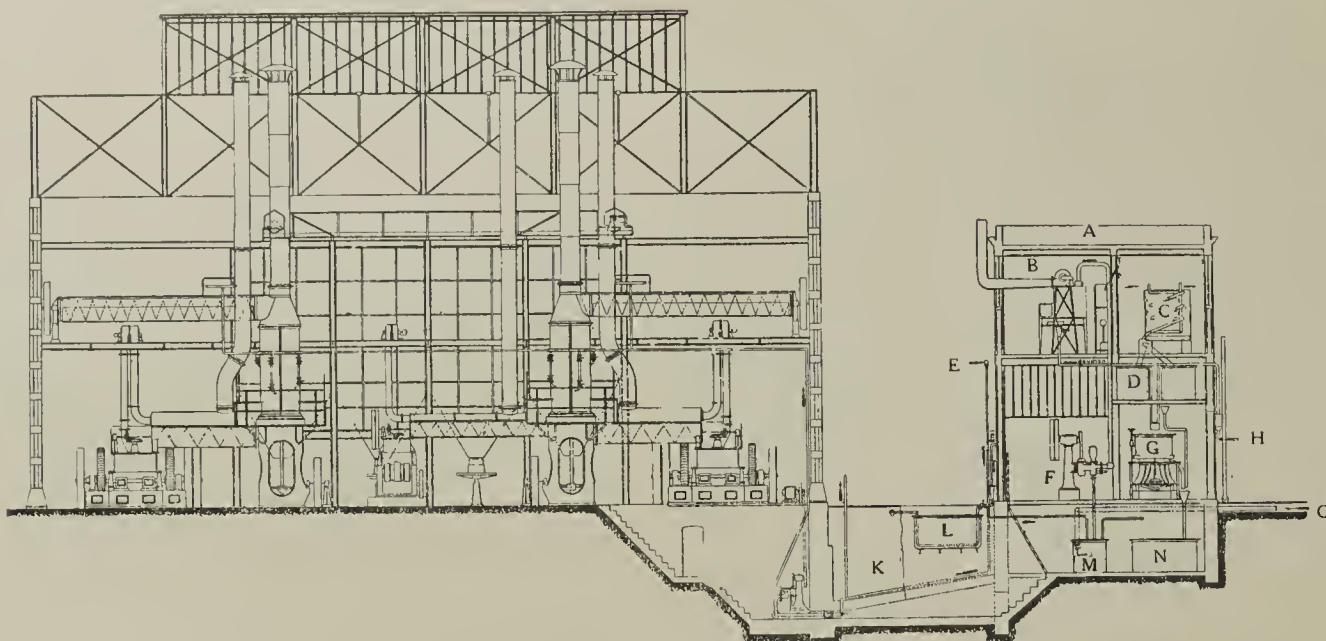


FIG. 1.—LONGITUDINAL SECTION OF BRIQUETTING PLANT.

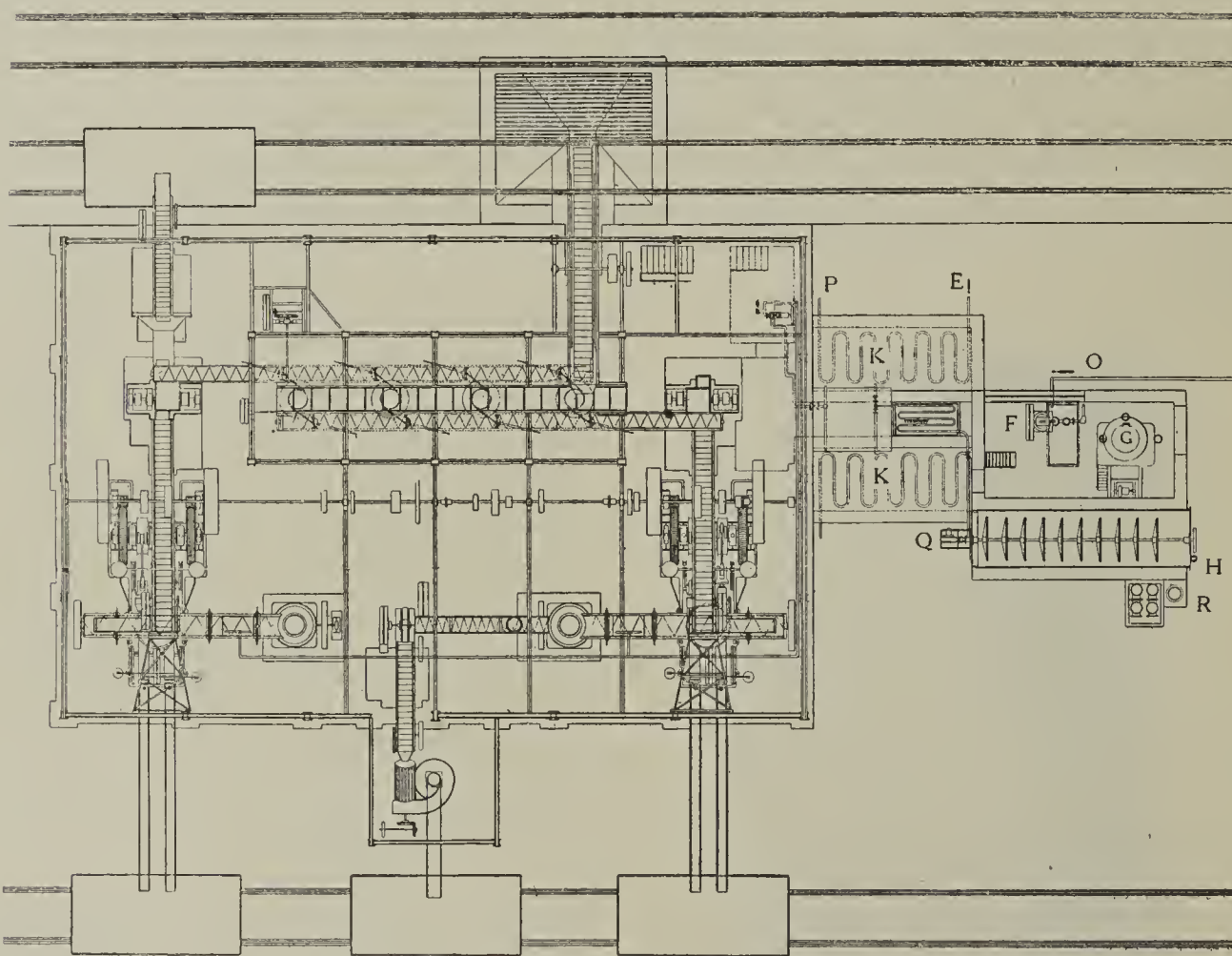


FIG. 2.—PLAN OF BRIQUETTING PLANT.

A—Water tank. B—Tar. C—By-products condenser. D Naphthalene crystalliser. E—Steam pipe. F—Tar pump. G—Naphthalene whizzer. H—Tar feed to still. I—Pitch pump. K—Pitch tank. L—Pitch softener. M—Tar tank. N—Tar oils. O—Pipe from tar tanks. P—Discharge. Q—Fan. R—Stack. S—Furnace. T—Exhaust air. U—Condensed oils.

The presses are of the "rope press" type, which, dealing with wet coal, dispense with the costly, cumbersome, and troublesome necessity of drying the coal in an oven.

Of course, these briquettes, having two non-polished faces out of six, are not quite so nice looking as those made in double compression presses, and they also contain some 4 per cent. of moisture, against 2 per cent. in the case of dried coal. But the Belgian market does not object to these slight defects, and thus the rope press, with its simplicity and large output, is a distinct advantage for the manufacturer.

The Bonne-Fortune factory has four coal bins, each of 50 tons capacity, with outlets into worm conveyors, which ensure the intimate mixture of any required proportions of the different qualities of coal.

Each of the two rope presses ("Bourrier presses") turns out 13 tons of 11 lb. briquettes per hour. These are the standard size briquettes for the Belgian and French railway engines.

The Pitch.

The Bonne-Fortune works, instead of using standard pitch, employ a special form, known as "Cava" pitch, of which is mixed with the coal.

Value of the Pitch.—The commercial value of the pitch depends chiefly on its binding power, and the "Cava" pitch has this power in a higher degree

pitch (three years' average) have the same hardness and qualities as briquettes made, under the same conditions, with 8 per cent. of dry pitch.

Smokeless Combustion.

It might be objected that "Cava" pitch is softer than dry pitch, that it introduces in the briquette an additional proportion of volatile matters, and thus tends to produce smoke. This objection would have been true formerly, when soft pitch was a mixture of extra dry pitch containing 50 per cent. of free carbon, diluted with crude tar. This compound soft pitch thus consisted mainly of light products and free carbon, both non-binding and smoky; whilst the pure bituminous adhesive material was in minor quantity. Briquettes made with this material were obviously smoky.

The same considerations explain the failure of the addition of naphthalene to pitch, as naphthalene has no binding properties, and is so smoky that it is used for manufacturing lampblack.

The chief quality of "Cava" pitch is that it contains a minimum proportion of the non-binding constituents, no light oils, little free carbon, and consists chiefly of bituminous compounds which bind the coal and make no smoke.

In view of these considerations, "Cava" pitch, although showing in the laboratory 80 per cent. of volatile matter, when mixed into the coal in the pro-

the best goggles. The noxious effect of pitch dust is due to the action of the phenol products on the human skin and especially the mucous membranes, sores and blisters being the result. To abolish these dangers is a considerable improvement. The dust, however, is not the only danger in briquetting factories, the stirring of the paste with dry pitch at high temperature liberating vapours which are also corrosive. In warm countries, in the South of France and in Italy, the corrosive dust and vapours from dry pitch are prohibitive, and liquid soft pitch alone is in general use; and in England, France, and Holland drastic new safety regulations have of late years been proposed for the handling of pitch.

With "Cava" pitch, stirred at a moderate temperature in the mixer, no corrosive vapours are raised, and consequently the workers are fully protected from vapours and from dust. Moreover, the number of men required for handling the pitch is very small, the Bonne-Fortune works, with an output of 250 to 300 tons of briquettes a day, employing only two attendants and two helpers.

Manufacturing the "Cava" Pitch.

The "Cava" pitch is prepared in a small factory forming a department of the briquetting works. The process consists in developing, by oxidation, the adhesive properties of the bituminous components of the tar, thus improving the quality of the pitch. A soft

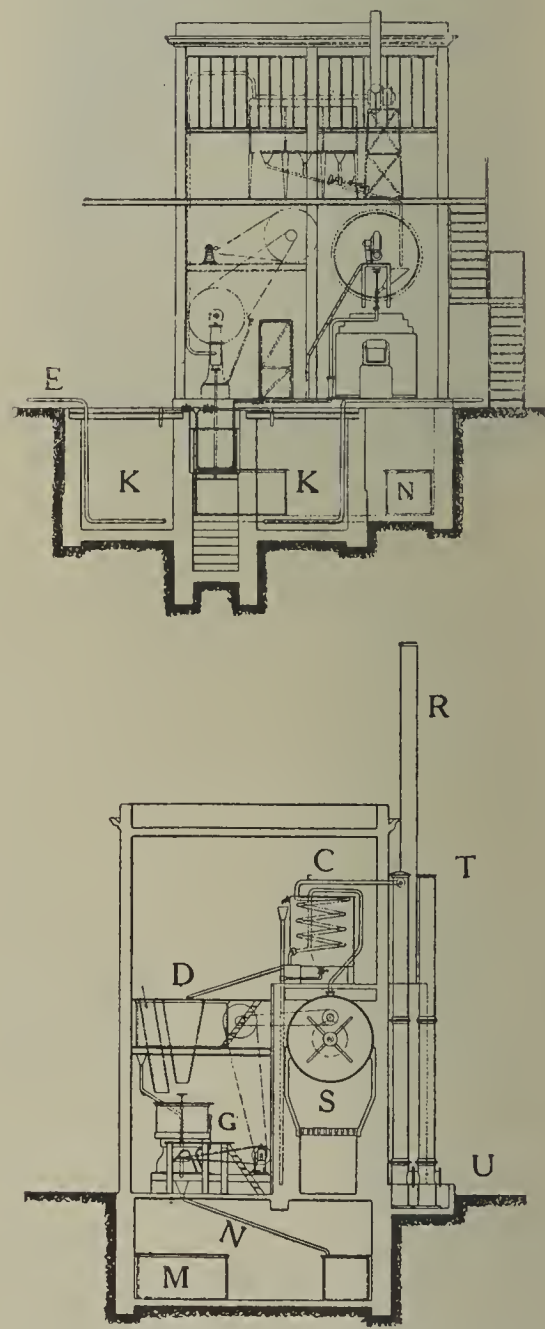


FIG. 4.—CROSS SECTIONS OF PITCH PLANT.

or hard pitch can be prepared as required. For the Bonne-Fortune factory the soft quality was elected owing to its technical advantages, as already described.

A drawback of the soft pitch is that, if carried a long distance in tank wagons, it cools down and sets, in which case it requires a large coil, plenty of steam, and considerable time for re-melting, before the tank wagon can be emptied. In America, the new factories build special tank wagons for this purpose; but at Bonne-Fortune it was found easier to erect the small pitch factory close to the briquette works. If soft pitch has to be conveyed overseas, the trouble of unloading the cooled pitch is still greater than in the case of wagons. These slight physical difficulties, however, are negligible in comparison with the cost and trouble of handling dry pitch. At Bonne-Fortune the coke oven tar is stored in two reinforced concrete tanks, of 200 tons capacity each, which, as a precaution against fire, are located 100 yds. away from the pitch factory. The tar flows through a heated pipe line to the pump which feeds the continuous stills.

These stills are horizontal cylindrical vessels, 5 ft. in diameter by 20 ft. in length, and are half-filled. The tar flows slowly from the back end to the front end, whilst broad vanes fixed on a horizontal revolving shaft raise and convey thin films of the tar, which are thus exposed to the oxidising and evaporating actions of a current of air.

By the time the tar reaches the front of the still it has become pitch, at a temperature of 225 degs. Cent. (437 degs. Fahr.). At this moderate temperature no carbonisation occurs, and thus there is no formation of free carbon in the pitch. The hot pitch overflows continuously into the storage tanks.

The illustrations, which were prepared in 1913, show only one still, but a second still has since been installed

STORAGE AND SPONTANEOUS COMBUSTION OF COAL.*

A committee of the National Electric Light Association has collected much data in connection with the problem of storing coal, and finds that the literature on this subject is voluminous and also contradictory; but the investigations of the United States Bureau of Mines and the University of Illinois Engineering Experiment Station have thrown a good deal of light on the subject.

Heating and spontaneous combustion of coal are caused by absorption of oxygen by both the organic and inorganic constituents, and are more active in coals exposing large surfaces to chemical action. In other words, lump coals generally absorb oxygen to a lesser degree than slack coals, because of the relatively smaller surfaces exposed to the action of the atmosphere.

A pile of coal is, in itself, a very poor conductor of heat. This is shown by the fact that fire has often been detected within a very few feet of thermometers placed in the pile to check rise of temperature.

The oxidation of coal is continuous over a wide range of time and conditions, and begins (at ordinary temperatures) with the freshly mined coal. A number of oxidation processes are involved, which are more or less distinct in character, some being relatively slow and moderate in form, while others are rapid and vigorous in their action.

In general, it may be said that for a given coal a point exists, as indicated by the temperature, below which oxidation is not ultimately destructive. The continuance of this point is dependent upon certain accessory conditions; if these conditions are withdrawn the oxidation ceases. On the other hand, above

Easily Oxidisable Compounds.—A first or initial stage of oxidation exists in bituminous coals, which does not result in the formation of CO_2 . Unstable compounds are at present in coals of this type, which have a marked avidity for oxygen at ordinary temperatures, the products being humic acid or other fixed constituents of the coal texture. Coals vary widely in this respect, and it has been proposed by some to regard this content as an index of the liability to spontaneous combustion. It is, however, very largely dependent upon the freshness of the coal and upon the fineness of division, and should be looked upon as a contributing factor, although in coals of the Illinois type, at least, with their high percentage of sulphur, this action should doubtless be considered second in importance to that of iron pyrites.

Iron Pyrites.—The presence of sulphur in the form of iron pyrites is a positive source of heat due to the reaction between sulphur and oxygen. This may be conveniently referred to as the second stage in the process of oxidation. Here, again, rapidity of oxidation is directly dependent upon fineness of division. Since coals, as a rule, have a much higher earthy or ash content in the fine dust, and since iron pyrites is a large component of this material, it follows that the presence of dust in all coals of the Illinois type is a positive source of danger. Since the majority of coals of the Illinois or mid-continental field run over 6 per cent. pyrites, the heat increment from the oxidation of only one-fifth of this material is sufficient to raise the temperature of the mass approximately 70 degs., assuming that there is no loss by radiation. Under usual conditions, and especially considering the greatly accelerated rate of chemical activity accompanying a rise of temperature, this oxidation may proceed with such rapidity that the heating up of the mass will be but little affected by loss of heat due to radiation, except in relatively shallow piles.

Moisture.—While essential to pyrites oxidation, moisture is given separate mention because its importance is apt to be under-estimated. The oxidation of any coal will be facilitated by moisture under favourable conditions. It is to be noted in this connection that the normal water content or vein moisture of coals in this region is rarely below 10 per cent., and ranges usually from 12 to 15 per cent. The presence of such water must be borne in mind in considering the likelihood of chemical activity on the part of the pyrites present. Without exception, in all the series of tests the wetting of the coal increased the activity, as shown by the ultimate temperature.

The Oxidation of Carbon and Hydrogen.—A third stage in the oxidation of carbonaceous material exists by reason of the tendency of certain of the hydrocarbon compounds of coal to oxidise with the formation of CO_2 and H_2O at temperatures in excess of 120 to 140 degs. Although this type of oxidation does not appreciably take place at ordinary temperatures, it must be looked upon as an exceedingly dangerous stage in the process, owing to the very much higher quantity of heat which is discharged by the oxidation of carbon and hydrogen, so that the temperature of authigenous action, although ordinarily occurring at a higher point by 100 degs. or more, may be quickly attained as a result of this form of oxidation. Any initial heat increments, therefore, which threaten to bring the chemical activities along to the point where the oxidation processes invade the carbonaceous material in this manner must be looked upon as dangerous. For example, any of the initial or contributory processes which result in raising the temperature of the mass 50 degs. above the ordinary temperature would, in all probability, have enough material of the sort involved in such action to continue the activity until another 50 degs. have been added, and would thereby attain to the condition wherein this third type of oxidation would begin.

The fourth stage of oxidation may be indicated as occurring at temperatures above 200 to 275 degs., and differs from the previous stages in that the action is authigenous and not dependent upon other sources of heat to keep up the reacting temperatures. Activity in this stage is further accelerated by the fact that above 300 degs. the decomposition of the coal begins, which is exothermic in character, thereby contributing somewhat to a further increase in temperature. The ignition temperature is reached at a point still further along, usually in excess of 300 to 400 degs. Cent.

Preventives.

The above formulation of the various stages and types of oxidation clearly indicates the principles which must be observed in any attempt at the prevention of spontaneous combustion. The following enumeration, therefore, of preventative or precautionary measures is to be suggestive rather than complete in character.

(a) The avoidance of an external source of heat which may in any way contribute towards increasing the temperature of the mass is a first and prime essential.

(b) There must be an elimination of coal dust or finely-divided material. This will reduce to a minimum the initial oxidation processes of both the carbonaceous matter and the iron pyrites. These lower forms of oxidation are to be looked upon as forces, without which it would be impossible for the more active and destructive activities to become operative.

(c) Dryness in storage and a continuation of the dry state, together with an absence of finely-divided material, would practically eliminate the oxidation of the iron pyrites.

(d) Artificial treatment with specific chemicals or solutions intended to act as deterrents does not offer great encouragement, though some results warrant further trial in this direction.

(e) By means of a preliminary heating, the lower initial stages of oxidation are effected. These sources of contributory heat being removed, the forms of destructive oxidation are without the essential of a high starting temperature, and are therefore inoperative.

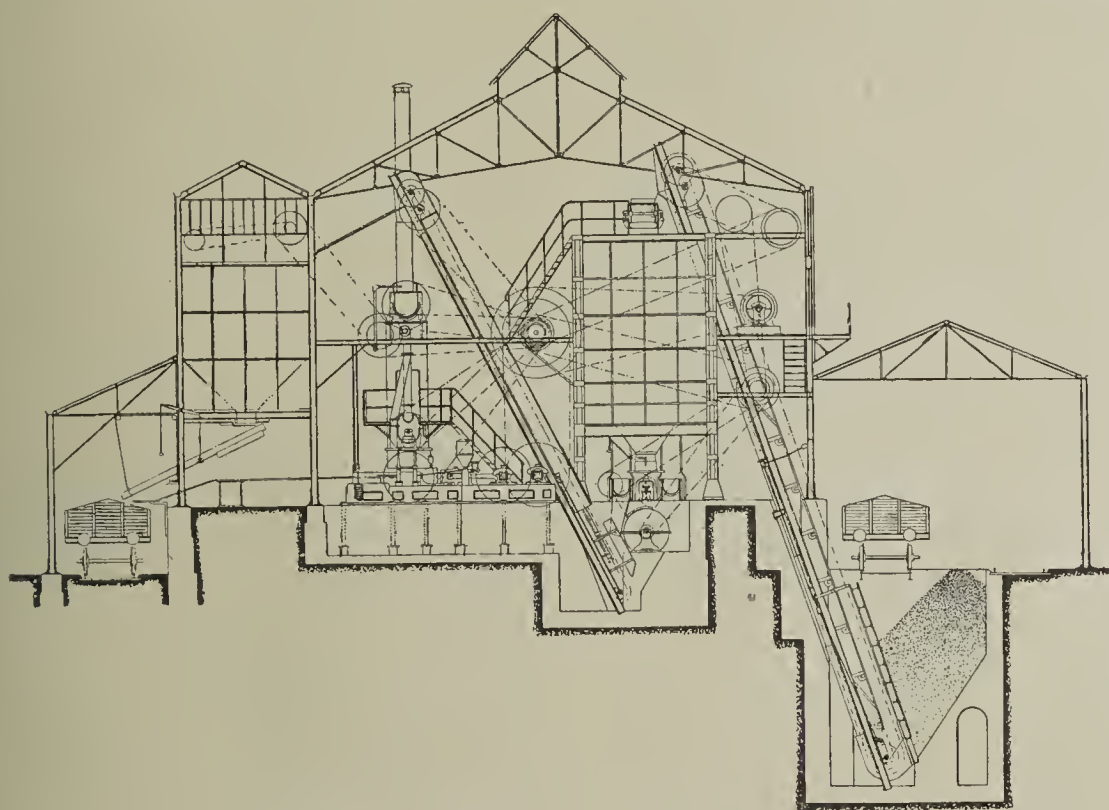


FIG. 3.—CROSS SECTION OF BRIQUETTING PLANT.

by the side of the first. When worked in series, they give light creosote oil, naphthalene, and anthracene oil, but when worked in parallel they furnish only heavier creosote oil and naphthalene. At the Bonne-Fortune works, owing to market conditions in 1914, they were worked parallel, giving the following average monthly result: From 100 per cent. (400 tons) tar, 75 per cent. (300 tons) pitch, 7 per cent. (28 tons) naphthalene, 13 per cent. (52 tons) creosote oil, and 5 per cent. (20 tons) water (lost).

The 300 tons of pitch made 5,000 tons of briquettes. The creosote oil was sold for impregnating timber, for Diesel engines, and for heating all kinds of small metallurgical furnaces.

Owing to the continuous distillation process, the small pitch factory at Bonne-Fortune can treat up to one ton of tar per hour. The highly adhesive qualities of the "Cava" pitch make it possible to produce first-class briquettes with a somewhat larger proportion of anthracite duff than is practicable with ordinary commercial pitch. This, however, is a special and delicate side of the question, and requires to be dealt with separately.

Queensland's Iron Ore.—Both the Premier of Queensland and the Minister for Mines are keenly interested in the excellent results of the tests which have been made of iron reduced from the Biggenden iron ore. Arrangements have been made for the smelting of the ore at the Ipswich railway workshops, at which place large quantities of pig iron are used. The Premier, who is hopeful the industry will develop into an important undertaking, has stated that the Public Works Commission are making investigations in North Queensland respecting the deposits.

Wigan Mining and Technical College.—Owing to inability to attend the meetings, Mr. H. Ackerley has retired from the position of co-opted member of the foundation. Mr. Ackerley was a member of the committee of the Wigan Mining and Mechanical School from 1879, being chairman of the executive committee for many years prior to the establishment of the college on the existing basis. At the recent meeting of governors, Mr. William Clark, of the Park Lane Collieries, was elected to succeed Mr. Ackerley on the governing body of the Mining College. Coun. A. Guest, the vice-chairman of the Wigan Corporation Education Authority, was elected as vice-chairman of the College Staffing Committee, in succession to Mr. Harold Sumner, J.P., who recently tendered his resignation from the position. Amongst other business transacted at the meeting by the governing body was the approval of arrangements which had been made for a public distribution of medals and certificates to be held at the college on January 25.

this critical point, which is best indicated by temperature, oxidation is ultimately destructive, and is characterised by the fact that it does not depend for its continuance upon external conditions, but is self-propelling or authigenous.

The point of authigenous oxidation, while varying for different conditions, may be indicated by the temperature of the mass ranging from 140 to 160 degs. Cent. in an atmosphere of oxygen, or approximately between 200 to 275 degs. Cent. in oxygen diluted with nitrogen, as in air, depending to a great extent upon the fineness of divisions. The phenomenon of fire or actual kindling does not occur until a much higher temperature is reached, usually beyond 350 degs. Cent.

The temperature at which authigenous oxidation begins is the sum of numerous temperature components, each one of which, either because of its own contribution to the total heat quantity, or because of its function as a stimulus for chemical activities, must be looked upon as a dangerous factor, tending directly to the ultimate result of active combustion throughout the mass. An enumeration of the more important elements which contribute toward this end follows.

External Sources of Heat.—Oxidation, especially of the lower or moderate form, is greatly accelerated, and in certain phases directly dependent upon an increase of temperature. What may be external or physical sources of heat, and thus presumably avoidable, are suggested by the following list:—

- (1) Contact of the mass with steam pipes, hot walls, or floors under which are placed heat conduits of any sort.
- (2) The heat of impact or pressure due to the method of unloading, or to the depth of piling.
- (3) Climatic or seasonal temperature at the time of storage.
- (4) Direct absorption of heat from the sun or from reflecting surfaces.

Fineness of Division.—Coal in a fine state of division presents a very much larger surface, and brings a much larger quantity of reacting substances in contact with oxygen than when in solid masses. Under these conditions, with a condensation or accumulation of relatively large amounts of oxygen immediately surrounding or in contact with the particles of carbonaceous matter, the circumstances are exceedingly favourable for rapid oxidation upon the arrival of the mass to a suitable temperature. But more especially does this fineness of division facilitate the initial form of oxidation described in the following paragraph.

* Metallurgical and Chemical Engineering.

CURRENT SCIENCE AND TECHNOLOGY.

(f) The submerging of coal, it is very evident, will contribute all of the elements which contribute toward the temperatures. As to its industrial practicality under the conditions under (e), this can best be determined by actual experience.

Other processes may be suggested by the formulation of the principles involved. Such, for example, would be the distribution throughout the coal of cooling pipes through which a liquid would circulate having a lower temperature than the mass. This would serve to carry away any accumulation of heat, and confine the oxidation to the lower stages only. The proposition sometimes made to provide circulating passages for the transmission of air currents is, on the contrary, of questionable value, since it might by the added accessibility of oxygen result in the contribution of more heat than would be carried away by the movement of the air.

Storage Under Water.

For complete protection of coal from spontaneous heating, the only sure method to-day is the storage of coal under water. This method is used by the United States Government at its coaling stations on the Panama Canal, by the Western Electric Company in Chicago, and in other places. The objections to this method are the moisture contained in the re-claimed coal and the liability of freezing in localities where low temperatures prevail.

Two methods of storing coal are in general use: one where the storage is purely a reserve and the coal is of such character as will store without material loss; the other is where spontaneous heating is to be expected. This indicates the advisability of using the storage pile for freshly mined deliveries, withdrawing from it for daily use. This last method is applicable without large additional expense only to storage piles adjacent to generating plants.

It is very difficult to arrive at a definite conclusion regarding the qualities and characteristics of coal that can be stored without danger of spontaneous heating. A fair assumption is that coal which has such characteristics as enable it to resist atmospheric influences resulting in air slaking, is better suited for storage than coal of opposite characteristics. The presence of sulphur and moisture has a bearing on the subject, but contrary to many expressed opinions, as indicated above, it seems reasonable to conclude that sulphur is not a governing factor, but simply one of many causes. Moisture in small quantities without doubt accelerates the absorption of oxygen, and increases chemical activity. In connection with the sulphur content of coal and its effect on spontaneous heating, it should be noted that the instantaneous combustion of 1 per cent. sulphur in the coal would raise the temperature to about 135 degs. Fahr. This rise in temperature is entirely insufficient to bring the coal to a point of ignition, and it must be borne in mind that the oxidation of the sulphur must necessarily extend over a considerable time during which radiation from the pile would generally dissipate all of the heat.

Many authorities have recommended that stored coal be piled not to exceed 12 to 20 ft. in depth. Undoubtedly, where space limitations are not to be considered, such advice is good, but it must be borne in mind that the depth of the pile affects practically only the loss of the heat in the pile itself by radiation and convection. Therefore, no arbitrary height can be set as a limit for coal storage piles, as this depends largely on the nature of the coal stored. It has been a matter of general observation that freshly-mined coal heats more rapidly than coal which has been exposed to atmospheric conditions for some length of time. Therefore, it has been necessary in certain cases to re-handle freshly-mined and stored coal after a short period, exposing the coal to the atmosphere and allowing it to cool down by radiation, and then re-stocking it, after which there has been no trouble from heating.

This has not been the experience with all observers, but in all probability the different results which have been noted were due to differences in the characteristics of the fuel both as regards constituents and size.

It must be borne in mind that one of the most important considerations in connection with coal storage is the matter of size. As has been noted already, it is the surface of coal exposed to atmospheric conditions that governs the absorption of oxygen. Lump coal becomes oxidised on its surface, and after absorption to a small degree is practically inert unless such oxidation results in a breaking up of the lumps, although even without this breaking up there may be more surface exposed by the creation of fissures or a crazing of the surface.

In all of the literature consulted, the committee has found no case on record of lump coal having suffered from spontaneous ignition. This is true for coals of widely different characteristics, and is as true for high volatile gas coals as for low volatile steam coals. Where, however, coal is stored with a large percentage of slack, heating to some extent is practically universal. Re-handling has checked further heating, but if left in the pile spontaneous ignition is bound to occur.

The committee has undertaken no research work in connection with this problem, the plan being to gather in a practical way such ideas and suggestions as may be of use to those who have the storage problem in mind. Protection of storage piles by admitted ventilation has proved more dangerous than no protection. Suggestions have been made for the introduction of gases which will not support combustion and of steam for subduing fires already in progress, but such methods have as yet been marked by any process which can be accepted as final that the handling of stock coal is the one which must be guarded against. Check-weighing is a good method, but it must be used because of the poor conductivity of coal within very short distances of

Benzol and Toluol from Carburetted Water Gas.

Messrs. R. J. Moore and G. Egloff submitted at a recent meeting of the American Chemical Society some experimental results (abstracted in *Gas Journal*) of the extraction of benzol derivatives from carburetted water gas.

They used a scrubber 10 ft. high and 18 in. diameter, packed with lattice woodwork, through which the oil was circulated; and a coil condenser was fixed at the outlet, with a fall back into the vessel as a preventative against portions of the oil spray being mechanically carried away with the current of gas. A charge of 25 gals. of straw oil was used for each test; and 1,000 cu. ft. of gas was taken direct from the outlet of the superheater, and measured through a meter before admission to the scrubber. The treated oil was distilled in a 42-gal. still, by steam and direct gentle firing, until a temperature of 180 degs. Cent. was registered in the space above the liquid. At this temperature, practically all the light oil was separated. A sample of the oil was analysed, after use in the scrubber and subsequent distillation, and showed no difference other than experimental errors, compared with the composition of the fresh delivery.

The product of the distillation was 0.32 gal. of yellow light oil per 1,000 cu. ft., possessing the characteristic odour of a cracked oil, and a high unsaturated hydrocarbon content. The proportion that would combine with sulphuric acid (sp. gr. 1.84) was 35 per cent. The temperature induced by the reaction had to be kept down by the application of cooling agents, so as to avoid evaporation losses or chemical changes. There was reason to believe that the condensate obtained at 180 degs. Cent. retained 6 or 7 per cent. of the washing oil. The following figures were obtained by fractional distillation:—

	Per cent. by volume.	Specific gravity.	Per cent. unsaturated.
Below 95 degs. (benzol)...	51.8	0.866	46.0
95 to 120 degs. (toluol)...	24.1	0.869	18.0
120 to 150 degs. (xylene)...	6.0	0.868	24.0

The high percentage of unsaturated olefines was an objection, as it involved a complicated low-pressure washing system and purifying, with the attendant losses. Addition of hydrogen to the blue gas had been shown to be of little use as a means of reducing the olefines. Whittaker and Rittman tried the effect of making gas under various pressures. Egloff and Twomey found that cracking the gas oil under higher temperatures than the usual would to some extent reduce the proportion of olefines. In view of the urgent demands for aromatic hydrocarbons, alterations on these lines might advisedly be considered, in the manufacture of carburetted water gas. Independent cracking of the oil, and subsequent mixing with the blue gas, might prove advantageous; and the benzol fraction obtained from the light oil might be returned to the gas.

One litre of the light oil was carefully saturated with sulphuric acid, neutralised with sodium hydroxide, washed, dried over fused calcium chloride, and distilled in an efficient fractionating column. It contained 22.1 per cent. of benzene, 20 per cent. toluene, and 5.1 per cent. xylene—equivalent to 0.071, 0.064, and 0.016 gal. per 1,000 cu. ft. of gas respectively, and to rather less than 50 per cent. of the crude light oil extracted.

Use of Low-Grade Mineral Fuels.

In the *General Electric Review*, Mr. F. Parkman Coffin, of the research laboratory of the General Electric Company, presents some interesting and important data on pulverised coal and the use of low-grade fuels having a low calorific value due to the presence of impurities such as ash and moisture. Fine screenings and dust produced in preparing certain high-grade fuels for the market may also be included, since it is often difficult to burn them on the grate, when using forced draught, even when mixed with lump coal.

There is little doubt that the most perfect combustion of highly gaseous coals, like lignites, could be brought about by burning the pulverised material in a properly constructed combustion chamber in a draught of air. Such a method, to a limited degree, has been employed with bituminous waste for years in connection with several industries in which large ovens are used, but the machinery and appliances required have hitherto been too large and costly to permit their general adoption in small heating or boiler plants. There seems no good reason why some satisfactory method of using lignite in this manner in small plants cannot eventually be evolved. Pulverisation of highly gaseous lignites produces fuel with properties closely similar to those of crude petroleum or crude gas; in fact, pulverised highly gaseous coal like dry lignite, when fed into a furnace with an air blast, gives very largely a gaseous fuel.

With the temperature of the furnace or the combustion chamber once at the proper point, by means of valves the relative supply of coal and air can be regulated so quickly and so perfectly that nearly complete combustion of the heat producing constituents can be obtained. Besides, with the proper equipment, the feed and the fire should be closely uniform, almost automatic, and requiring comparatively little work from the fireman. When dry pulverised lignite can be used in small boiler settings to advantage, there is no reason why it should not produce a relatively high heating efficiency, for in a proper combustion chamber, besides the combustion of fixed carbon, this method would utilise nearly all the volatile gases, which have high calorific power, a proportion of which is lost by the ordinary methods of combustion to which lignite is subjected.

Coal can be pulverised more cheaply than it can be gasified, and the first cost of a plant for drying and pulverising is less than for a producer gas plant. When thoroughly mixed with a blast of air in correct proportion it is practically a gaseous fuel. Powdered

coal firing has most of the advantages of gas or oil firing for steam boilers, when properly applied, and in industrial heating its field of application is constantly growing.

Low-grade fuel may be burned on grates in furnaces of special construction for each class of fuel, and mechanical stokers are available for burning high ash coal and lignite. It is probable, however, that low-grade solid mineral fuels of all kinds can be burned to better advantage in pulverised form.

Lump coal, when burned on the grate in a hand-fired furnace, usually requires about 100 per cent. excess air. With modern mechanical stokers the usual practice is to use about 50 per cent. excess air. With most kinds of pulverised fuel, 25 or 30 per cent. excess air is sufficient, and with proper attention the amount may be reduced almost to zero. However, the resulting temperature of the fire is a limiting factor. Other factors having a bearing on this are the construction of the furnace, the proportion of heat radiated directly on the tubes, and the fusibility of the ash. A properly constructed furnace and burners should be able to burn any form of pulverised fuel which has sufficient volatile content.

For the firing of steam locomotives, pulverised fuel offers a method of mechanical stoking that is beyond competition in all parts of the country where oil is not already in use. It also furnishes a means of utilising neglected fuel.

REPORT ON REFRACTORIES.

The Home Office has issued a report, by Mr. W. S. Smith, H.M. Inspector for Dangerous Trades, and Dr. E. L. Collis, H.M. Medical Inspector of Factories, on the manufacture of silica bricks and other refractory materials used in furnaces, with special reference to the effects of dust inhalation upon the workers.

The report gives a description of the materials from which these refractories are made, and of the manufacturing processes employed, and then proceeds to deal with the question of dust inhalation.

Phthisis in Silica Brick Makers.

An investigation by Dr. Legge, in 1900, into the mortality experienced by ganister workers, disclosed a high mortality from phthisis among these men, and his report contained a thorough clinical and pathological description of the condition which supervenes upon inhalation of ganister dust.

The report of the Royal Commission on Metalliferous Mines and Quarries, issued in 1914, has pointed to the identity of this condition with that suffered by gold miners, tin miners, stonemasons, Sheffield grinders, and other operatives exposed to silica dust, and has emphasised the high mortality from pulmonary phthisis experienced by such operatives.

Dr. Legge's enquiry had reference to ganister miners as well as to makers of ganister and silica bricks; mortality data, brought up to 1911, relating to such workers suggest that, although the number of deaths is small, some improvement has taken place in recent years, due almost certainly to precautions adopted to minimise exposure to dust. This enquiry left little doubt that silica brick makers are exposed to, and are affected by, dust inhalation as well as ganister miners, and further investigation has fully established the point. Thus, in the neighbourhood of Kidwelly, in South Wales, where the only bricks made are silica bricks, for the manufacture of which silica stone is brought from a distance, there were 18 deaths from phthisis and eight deaths from other diseases of the lungs among 60 men during eight years, i.e., a mortality from phthisis of 37.5 per 1,000, and from all other respiratory diseases a mortality of 16.7 per 1,000, or a death rate, from respiratory diseases only, of 54.2 per 1,000. For the town itself, with a population of just over 3,000 inhabitants, the death rate from all causes for 1911 was 17 per 1,000, and for 1913 and 1914, 15 per 1,000.

Although the total number of deaths among silica brick makers upon which the death rates are calculated is small, the death rate from lung diseases, especially from phthisis, is sufficiently excessive to justify the conclusion that the occupation of making silica bricks is attended with a serious mortality from respiratory diseases among those employed, and that this mortality is far in excess of that suffered by males in general, by the population among whom they live, and by makers of ordinary bricks from plastic clay.

The effect upon the male phthisis mortality of Kidwelly produced by this industry is shown by the following figures: During the nine years 1905-1913, among persons aged 20 years and over, 21 deaths from phthisis occurred among males and 15 among females; but when the ages at death are considered, it is found that under the age of 44 there were 14 deaths among males (six of which were brick makers) and 14 deaths among females; while for ages over 44 there were seven deaths among males (six of which were brick makers) and only one among females. This conclusion is in accord with the report of the Royal Commission on Metalliferous Mines and Quarries, wherein inorganic dusts are divided into two groups, of which the second is "dusts the inhalation of which is associated with excessive mortality from respiratory diseases and especially from phthisis; to this class belong quartz, quartzite (i.e., ganister and buhrstone), flint, and sandstone."

While the above mortality statistics are in agreement with those of other investigators into the effect produced by the inhalation of dust containing silica, this enquiry has revealed an unsuspected fact, viz., that the influence of silica dust in favouring tuberculous infection is modified when the silica is mixed with certain clays. Ganister or other stones containing a high percentage of free silica are mixed with clay sufficient for binding purposes in the manufacture of certain refractory bricks and other articles;

and stone is added in varying proportions to fireclay to increase its refractory properties, or to modify or reduce the amount of shrinkage when subjected to high temperatures. During this enquiry no history has been obtained, up to the present, either from workers or occupiers that a high mortality from phthisis is experienced by those employed in the manufacture of such articles containing clay as an admixture.

In order to investigate this point further, mortality data have been obtained relating to brick workers employed: (i.) In Stirlingshire, where a large proportion of the bricks made were, in the past, composed of ganister mixed with fireclay; and (ii.) at Elland, Yorkshire, where no other kind of brick used to be made. The total number of deaths concerned is few, but the percentage, 4.5 due to phthisis, which is below that, 12.8, for occupied and retired males, offers such a contrast to that, 76.3, experienced by the silica brick makers of Stocksbridge, as to leave no doubt that silica in the dust, even after allowance is made for the lower percentage present, has not the same dangerous properties. For this reason, the authors have restricted their recommendations to those processes in which silica dust is generated apart from admixture with clay.

Prevention of Dust Inhalation.

The high mortality instanced above is undoubtedly due to inhalation of silica dust arising from the materials used during the processes of crushing rock, elevating, grinding, and sieving the dry material previous to manufacture of bricks or other goods, handling dry bricks, dealing with *débris* on the drying flats, filling and drawing the kilns, and loading the bricks at railway sidings.

Prevention of dust inhalation is therefore necessary to reduce this mortality, and in the report of the Royal Commission above referred to, the following principles are laid down for protecting workers:—"First of all, the prevention of the generation of dust by watering or otherwise; secondly, if this is not possible, the efficient removal, by exhaust ventilation or otherwise, of dust generated so that it does not gain access to the atmosphere of work places; and thirdly, if neither of these means can be adopted, the protection by the use of respirators of individual workers who are compelled to work in a dust-laden atmosphere." These principles have been considered in relation to the various processes now in question.

Crushing.—Chutes, to guide the stone into the cracker jaws, are useful in keeping the men away from the place where dust is generated; but when chutes are used the dust can be effectively dealt with at its point of origin by the use of a water spray, or, better still, of steam playing in jets into the jaws of the cracker.

Ganister mines and quarries are notoriously wet, and the stone, if porous, may be so damp that little or no dust is generated in crushing; but even in such cases on dry hot days dust is generated. And since simple means for dust prevention, if not in regular use, are liable soon to get out of order, it is suggested that no stone breaking machine should be used unless provided with efficient means to prevent the escape of dust into the air. Such preventive measures, however, must be properly applied, and a mere trickle of water such as can be seen at some places dripping through the cracker jaws is quite inadequate to prevent the escape of dust.

Should the crushed rock be required in a dry state for subsequent manufacture of dry silica powders, silica paint, etc., the moistened material should be dried before dry grinding and sieving. The alternative means, if a water or steam spray is not used, will be the provision of a powerful exhaust draught induced by a suitable fan and properly constructed hood placed above the cracker jaws. Installation of exhaust ventilation plant must also include the provision of efficient dust collection appliances, such as textile filters, cyclone collectors, water tanks, or chambers fitted with water sprays.

Some blocks of stone, as got from the mines, are too large to go through the jaws of the stone breaking machine, and these blocks are usually broken up by sledge hammers manipulated by hand. This process generates much fine dust, which, as it arises from the centre of the stone, cannot be prevented by damping; nor can it be removed at the point of origin by any localised exhaust draught. When this process of hand breaking is carried out in any place, not in the open air, where other men are employed, the fine dust generated, rising like smoke, is liable to be inhaled by such men, as well as by the man using the hammer. In the open air, the dust does not accumulate in the atmosphere breathed by others, but it is generated in such amounts that, except on windy days, the worker is bound to inhale it; moreover, the exertion of wielding a sledge hammer calls for deep inhalation. It is considered that this process should always be carried out in the open air, and that the person employed should always be provided with and wear a suitable respirator, unless wet brattice cloth is placed over the lump to be broken.

Much, however, of the hand breaking of stone could be avoided by the installation of an additional powerful stone breaking machine, with jaws specially set for dealing with large blocks. The crushed stone from the first crusher could then be passed through the second crusher in which the jaws had been set finer. Such re-arrangement of the stone breaking plant should reduce the wear and tear in the grinding pans in the next process, and would probably mean also a saving of power expended in crushing and subsequent grinding. All dust generated in crushing would thus be prevented by the use of water or steam sprays for the two stone breaking machines.

Grinding and Brick Making.—The material is usually kept damp in these processes; no dust is therefore generated, and no preventive measures are called for. Attention, however, should be drawn to the practice, observed in some works, of dusting the brick making moulds and the bottom board and top of the

newly-made brick with fine dust, usually ground ganister or sweepings from the drying flat floors. In other works sawdust is used. The use of silica or ganister dust should not be allowed for this purpose.

Drying Flats or Floors.—Newly-made bricks are too moist for the generation of dust, but when dry their surface becomes powdery, and when handled fine dust is generated which settles on the floor of the drying flats. Such dust is readily raised by the workers moving to and fro for the purpose either of placing the newly-moulded bricks on the floor, or of removing the dried bricks to the kilns. By careful attention, much of this dust can be prevented; and each time the floor has been cleared of bricks, and before a fresh lot has been set out to dry, all dust and *débris* should be removed by a damp method. Dry sweeping, which is too often resorted to, raises dusts in clouds, and is more dangerous than the smaller amount produced by the movements of the workers. A rubber squeegee, a scraper, or a shovel, may be used to greater advantage than even a brush of which the bristles have been wetted.

Damping, however, must be carefully carried out, or the falling water will cause a cloud of fine dust to rise, just as occurs when a very dusty road is watered by a water-cart; and, further, as the flats are heated, sweeping must follow within a few minutes of damping, or the moisture will evaporate and leave the floors dry. All sweeping should be done with some tool kept constantly wet by dipping in water.

While such precautions are necessary to lessen the dust, it is not considered that the amount of dust generated can be brought within harmless limits, and there seems no alternative to suggesting that, in addition, all operatives employed in placing and removing bricks from drying floors shall be provided with and wear suitable respirators.

In parts of the country, especially in South Wales, the newly-made bricks are placed in stoves of large dimensions, where they are baked for one night by fires which are lighted after brick making has ceased for the day. These stoves are usually hotter and dustier than the worst flats, and it is hoped they will soon all be abolished for improved methods of drying.

With the introduction of tunnel dryers into the silica brick trade, stoves and drying flats should soon be a relic of the past. In one dryer inspected, the bricks are immediately placed on racks on a wheeled trolley, which, as soon as full, is pushed into the tunnel, a brick structure about 40 yds. long. The tunnel is heated with hot air drawn from a fire grate at the exit end of the tunnel by means of an exhaust fan installed near the entrance. The trolleys gradually pass through the tunnel, and the bricks are thoroughly dry and ready for the burning kilns when they emerge at the exit end. There is less handling and carrying of bricks, and all the discomfort and dust of hot stoves and steamy drying flat floors are avoided.

Setting and Drawing Kilns.—Dust is generated in these processes which cannot be prevented by damping, or removed by exhaust draught. The ordinary method of filling a kiln is for one man, standing by a barrow load of dried bricks, to take two bricks and throw them up to the man who is stacking. A trail of fine dust follows the bricks in their flight. In another method of filling, the man at the barrow hands the bricks separately up and into the hand of the man who is setting, and there is no trail of dust. These men, who are employed on piecework, do not earn any less through adopting this simple precaution. At one factory at each kiln a bucket of water is also kept, from which the kiln floor, and also the bricks if they come too dry from the flats, are sprinkled. It is considered that, in filling kilns, the practice of throwing bricks from hand to hand is unnecessary, and should be prohibited.

Less dust is generated in the process of kiln drawing than in kiln setting, and much of the dust so generated does not consist of such fine particles. Still, taking into consideration that the atmosphere, when a kiln is being drawn, is usually warm, promoting perspiration and deep breathing, this dust is not negligible; and it is recommended that, for both processes—kiln setting and kiln drawing—the practice of throwing bricks should be prohibited, and those employed should be provided with and wear suitable respirators.

Recommendations.

The inspectors recommend that the manufacture of silica bricks and the crushing, grinding, and sieving of silica should be certified as dangerous under section 79, Factory and Workshop Act, 1901; and, further, that Regulations should be made under section 79 to apply to all factories and workshops, or parts thereof, in which any of the following processes are carried on: The manufacture of silica bricks; the crushing, grinding, and sieving of silica.

Suggested Code of Regulations.—In these Regulations, "silica" means material containing not less than 80 per cent. of silica (SiO_2), and includes ganister, silica stone, bastard ganister, firestone, quartz, quartzite, flint, chert, gritstone, and sandstone.

"Silica brick" means any brick composed of silica, bonded with lime, or any "ganister brick," bonded with clay, and containing not less than 80 per cent. of silica (SiO_2).

1. No silica shall be broken in pieces by manual labour unless the process is carried out in the open air.

2. No silica shall be crushed or ground in a stone-breaking machine or a grinding machine unless such machine—(a) is provided with an exhaust draught and efficient dust collecting appliances, so arranged as to prevent the escape of dust into the air of any place in which work is carried on; or (b) is provided, and kept provided, with an efficient water or steam spray or other arrangement to prevent the escape of dust into the air; or (c) is so entirely enclosed as to prevent the escape of dust into the air.

3. All elevators, screens, and sieves used for manipulating silica shall be so entirely enclosed as to prevent the escape of dust into the air, or be provided

with an exhaust draught so arranged as to prevent such escape of dust.

4. The floors of all places where silica is broken or dried shall, after each lot of bricks has been broken or dried, be carefully freed from all *débris* by a moist method. Provided always that this Regulation shall not apply to the floors of tunnel driers.

5. No drying stoves in which bricks are baked by fires before being placed in the kilns shall be used after January 1, 1923, unless the Chief Inspector of Factories shall certify in writing that, in his opinion, the use of such stove involves no danger to the health of the persons employed therein. Provided always that this Regulation shall not apply to tunnel driers.

6. The use of silica dust or powder for dusting the moulds in brick making shall be prohibited.

7. There shall be provided suitable respirators for the use of all persons employed in:—(i.) Breaking silica into pieces by manual labour, unless wet brattice cloth is properly used to prevent escape of dust in this process; (ii.) placing or removing bricks from drying flats and drying stoves, other than tunnel driers; and (iii.) setting or drawing silica bricks in kilns—which respirators when required for such use shall be washed or renewed at least once every day.

8. When placing or drawing silica bricks in kilns, no person shall throw the bricks to another.

9. No person shall work or cause or allow to be worked any stone-breaking machine unless such machine complies with the requirements of Regulation 2.

10. Every person for whose use a respirator is provided in pursuance of Regulation 7 shall wear the respirator while employed in any process to which Regulation 7 applies.

THE GERMAN COAL AND IRON TRADES.

We give below further extracts from foreign periodicals that have reached us, showing the course of the coal and iron trades in Germany:—

Accelerating Canal and River Traffic.

In order to accelerate traffic on the Rhine and the Rhine-Herne Canal, the authorities have issued an order that the time taken in unloading coal from craft is not to exceed six days for cargoes up to 400 tons, seven days up to 500 tons, eight days up to 600 tons, nine days up to 800 tons, and 10 days up to 1,000 tons, and so on, with one extra day for each additional 200 tons, up to a maximum period of 18 days. In the case of coke, the same time is allowed up to 600 tons, nine days for 750 tons, 10 days for 900 tons, and an extra day for each 150 tons up to the 18 days' maximum. No contracts for times longer than the above are valid.

The Silesian Iron Industry.

The situation in the iron and steel market remains much the same as in the last few months, the works being fully occupied on war orders, and having to refuse all others, whilst the cost of all materials is rising, and there is a great shortage in pig iron, raw steel, and other materials, and railway wagons. This latter factor has been particularly intensified of late, with the result that supplies of fuel, pig iron, scrap, fluxing materials, refractories, cement, etc., are short; and as applications for more wagons have proved unsuccessful, the works have experienced great difficulty in keeping up the output. Skilled labour is very scarce, and the high food prices have led to demands for increased pay, and consequent tension. In spite of the higher cost of production, the selling prices have been kept down by the military authorities; but the manufacturers claim that they cannot go on much longer without an adjustment which will restore the ratio between cost and return to a more equitable figure. Supplies of oversea ore have declined, large quantities having had to be stocked at transhipment ports owing to lack of carriage facilities. In manufactured products, the chief demand is for high-grade stuff, and makers are paying little attention to ordinary rolled iron, joists, girders, and semis. Plate mills and tube makers are busy on Government orders, and nothing can be obtained except with an urgency certificate from the authorities. The iron and steel foundries are working under difficulties caused by the insufficient allotments of pig iron; and they cannot supply civilian requirements at all.

Wagon-Shortage in Mid-Germany.

In Mid-Germany the shortage of wagons is so acute that some of the largest brown coal mines can only obtain about 30 per cent. of their requirements, and have therefore to stock most of their output, with the result that partial cessation of work is necessary. It is reported that of late even munitions works have had to put up with two-thirds of their coal requirements, only the ammonia works and similar establishments receiving a full supply.

THE TIN-PLATE TRADE.

Liverpool.

There is nothing of importance to report since our last. The tone of the market is perhaps a shade better, permits having come along a little more freely this last few days. The maximum price for cokes may be called, on present value of tin, about 31s. 4½d. to 31s. 6d. per box net, f.o.t. at works, with a few sellers willing to take a little less money for suitable specifications.

Proposed Chemical Cartel.—Regarding the cartel of chemicals, explosives, and dyestuffs manufacturers, steps are being taken to form a mutual cartel of coal tar distillers and other producers of the primary and some intermediate chemicals necessary for building up ultimately explosives, aniline dyes, colours, etc. A meeting has been convened in London for next week of the primary chemical manufacturers with the object of the formation of an initial cartel.

CONTENTS.

ARTICLES:—	PAGE
Mineral Bank of Industry	1239
Coal Peace and Goodwill	1239
Factor of Safety of Winding Wire Ropes	1231
Saline Corrosion of Coke Oven Walls	1233
Electric Power Supply	1233
A Modern Belgian Briquette Factory, with the "Cava" Pitch Process	1234
Storage and Spontaneous Combustion of Coal	1235
Report on Refractories	1236
The German Coal and Iron Trades	1237
South Wales Mining Timber Trade	1241
Utilising Boiler Clinker in France	1243
Coastwise Shipments in November	1243
Labour and Wages	1243
The Freight Market	1248
Open Contracts	1248
Abstracts of Patent Specifications Recently Accepted	1248
Explosives in Coal Mines	1250
Diaries and Calendars	1250
THE COAL AND IRON TRADES	1240-1242
The Tin-plate Trade	1237
The By-Products Trade	1239
The London Coal Trade	1242
CURRENT SCIENCE AND TECHNOLOGY	1236
INDIAN AND COLONIAL NOTES	1243
NOTES FROM THE COAL FIELDS	1244
MONTHLY LIST OF RECENT COAL LITERATURE	1246
COAL, IRON AND ENGINEERING COMPANIES	1247
MISCELLANEA:—	
Dust Barriers in Coal Mines—Coal Shortage at Hong Kong	1232
Tin a War Material	1233
Queensland's Iron Ore—Wigan Mining and Technical College	1235
Proposed Chemical Cartel	1237
State Grant for Purchase of Peat Machines—To Utilise Mine Gases	1242
United States Coal Prices	1243
Lighting of Safety Lamps—Maximum Prices for French Coals—Partnership Dissolved	1248
Austria's Iron Supplies	1244
Judgment in Irish Demurrage Action	1250

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(At present on Active Service.)

LONDON, FRIDAY, DECEMBER 28, 1917.

The London trade during the week has been largely suspended owing to the holidays. The depot trade has been unusually brisk with small orders, but only very limited supplies have been brought forward. Hard steam coals and double screened nuts are the only qualities unobtainable.

Quotations this week are only nominal, owing to the holidays, but the general position on the Tyne and Wear shows more briskness owing to a marked increase of official requisitioning and of tonnage available for such requirements. Bunkers are still lethargic. Movements in Lancashire, Yorkshire and the Midlands show no important change so far. Stocks appear to be unusually heavy in South Wales, practically all descriptions being freely offered. The lack of tonnage remains the hindrance to business in Scotland.

Chartering business on the Tyne is idle owing to the absence of free tonnage, and rates are unaltered.

The Coal Conservation Sub-committee issued an interim report to the Ministry of Reconstruction regarding the electrical power supply in Great Britain, the proposal being to supply all industries with electrical power, generated at big "super-power stations." The primary object of the scheme is to economise coal supplies.

The Council of the Northumberland Miners' Association accepted the coal owners' offer regarding an increase of the county percentage on minimum wages.

The Association of Mining Electrical Engineers (West of Scotland Branch) will hold a meeting on Saturday, January 12. A paper on "Cable Complaints," by Mr. J. H. C. Brooking, will be read, followed by a display of cable joint boxes, and a demonstration of repairing cab tyre trailing cable.

The coal shortage in Europe reached an acute stage in many European countries this week owing to severe frost. Transport has been impeded. In the United States official action is foreshadowed regarding profiteering.

A new form of general agreement for goods carried by railway companies at owners' risk, which is intended to operate as from January 1, is now being rather sharply criticised by merchants on the ground, *inter alia*, that it relieves the railway companies of liability for such a risk as "misconveyance." It also relieves them of liability for loss, damage, misdelivery, delay, or detention in respect of a trader's trucks or covering sheets.

An Imperial Bank of Industry.

SOME time ago we drew attention to the Report of Lord FARINGDON'S Committee, advocating the formation of a British Trade Bank, designed for the purpose of facilitating British trade abroad. This proposal ultimately took shape in the establishment of the British Trade Corporation, which is now in process of perfecting its arrangements for carrying out the objects defined in its charter. In the meantime a Committee on Banking, under the auspices of the British Empire Producers' Organisation, has issued a report containing proposals for the formation of another financial institution to be called the Imperial Bank of Industry, with somewhat similar functions. At the same time, there are rumours that many of the leading banks of this country have been considering the expediency of adopting more progressive methods, designed, as far as can be seen, to enable them to give greater assistance in financing British trade after the war than it is possible to do under existing methods. A somewhat similar step was taken late in 1912 by the leading New York bankers, who formed, in conjunction with prominent captains of industry in the United States, a trade bank known as the American International Corporation, with a capital of 50,000,000 dols., the object in view being to finance American foreign trade.

All these schemes seem to be designed to act as a counterpoise to pre-war German banking methods, the operation of which has done much to establish German control in various foreign markets and to handicap free competition in favour of that country.

The committee of the British Empire Producers' Organisation call attention to the effect of this action in enabling Germany still to maintain a secure foothold even in our own markets; and, as an example, they show that, in South Africa, the Rand gold mines are still enmeshed by the German "Ring," which continues to maintain a tight grip upon the largest business concerns in that country. Where the names were obviously German, changes have been made, but the control remains as before, and the tied concerns have not been emancipated, notwithstanding violent public protests. One of the prominent objects of the proposed Imperial Bank of Industry is to secure that this state of things shall not extend, and that there shall be no longer an opening for German financial intrigue in obtaining control of any group of industry.

The present proposal appears to rest upon the assumption that the State—that is to say, the British Empire—can and ought to take advantage of its credit and immortality to assist in developing industry as the sole source of national wealth and prosperity. For this reason it is suggested that the proposed Bank of Industry should be constituted as an Imperial trust, and not delegated solely to private interests, as in the case with joint stock concerns. Thus this scheme differs essentially from those referred to above, which are mainly interested in private profit. This principle of a State Bank, founded upon credit alone and managed by trustees, has already been put into practice by the Commonwealth Bank of Australia, with considerable success.

Lest there should be any misunderstanding as to the functions of such a State Bank, the Committee disclaim any idea of assisting in setting up a Communist State "that shall absorb all means of production and exchange." It is designed to assist individual effort, and to take the place of those large amalgamations of wealthy concerns which occasionally secure monopolies over certain branches of industry. It would tend to prevent small concerns from being eaten up by large combines, by placing them, more or less, upon a more stable foundation than they could hope to secure by their own unaided efforts.

An important feature of this scheme is the expressed intention to co-operate rather than compete with other banking institutions, although a certain amount of competition would be inevitable. When the British Trade Corporation charter was discussed in the House of Commons, it was disclosed that the joint stock banks regarded the establishment of such an institution as being opposed to their own interests. Apparently, however, in the present case, it is the intention of the proposed Imperial Bank of Industry to use its financial credit in such a manner as to enable the joint stock banks to have a freer hand in the discount and acceptance of bills of exchange. Its stability is proposed to be secured

by guarantees to the extent of £50,000,000, given by various parts of the Empire in stated proportions. The bank would operate by making advances on approved securities, by accepting drafts made against shipments of industrial products, by buying and selling bills of exchange against collateral security, by issuing letters of credit, discounting trade bills, making advances upon secured time payment accounts, by assisting in underwriting new issues, and by collecting and collating information likely to be useful to its customers.

Thus it is clear that the proposed Bank would be also a profit-earning concern, and it is suggested that a proportion of these should be divided amongst debenture holders and depositors, and the balance transferred to capital account.

It is too soon to forecast whether this scheme will materialise. The launching of the British Trade Corporation was not altogether a smooth operation, and it may legitimately be asked what would be the relation of the proposed State Bank to this institution. There will be a general agreement as to the extreme desirability of taking all necessary steps to eliminate enemy influence in our vital industries, and it may well be that there is full scope for each of these organisations in the furtherance of British overseas trade.

Industrial Peace and Goodwill.

THE Director of Food Economy has reminded us that the festival of Christmas is symbolical of peace and goodwill, and that it is for these very things that our soldiers are fighting and dying abroad. Paradoxical as this may appear, it is no less true, and it is equally true that if we are to ensure that this shall be the last Christmas of war, we must more than ever show a united front, both in a military and industrial sense. The occasion, therefore, is appropriate for the consideration of the elements that make for the unison or discordance of the national effort, more particularly on the industrial side, for it is there that our chief difficulties are to be apprehended, largely owing to the existence of divergent views upon the fundamental principles of economics.

If we take a broad view of the present position of what may be termed the Labour problem, it is possible to distinguish two opposing tendencies. On the one hand, there is a large majority in favour of the gradual elimination of labour grievances by well-considered measures of social reform; while, on the other, there is a minority in favour of various kinds of State Socialism, whereby our existing economic system would be ruthlessly scrapped, and a fresh start would be attempted upon more or less revolutionary lines. The Whitley scheme, as we have pointed out on more than one occasion, is a carefully devised plan for improving our existing industrial organisation in order to ensure that every labour grievance shall receive its due proportion of attention. Signs are not wanting that the Labour party, as a whole, is inclined to give this scheme a fair trial, and it is legitimate to believe that excellent results will follow, and that, by an extension of the representative system, Labour and Capital may be united in their mutual interests.

Let us, therefore, examine some of the outstanding elements of opposition to this tendency. In the first place, there are still some who either cannot or will not understand that the interests of Labour and Capital are identical. The more rational of these maintain that as human nature is at present constituted, the majority, both of masters and men, are seeking to secure the maximum profit for themselves. This can, of course, be admitted, and as we cannot in a moment, or in a generation, alter human nature, it must be accepted as an inevitable factor in every labour problem. The answer is equally clear. All private profits earned either by labour or capital depends upon the prosperity of the industry concerned; and this, and this alone, is the ultimate test of the soundness or fallacy of every economic doctrine. Those who are desirous of abolishing the system of private profit by the "appropriation of all the means of production" are, therefore, running counter to the fundamental facts of human nature. There are two main schools of opinion under this head—viz., the advocates of State Socialism on the one hand, and of Syndicalism on the other. These differ mainly in the methods proposed to be adopted. The adherents of State Socialism are clamouring for the acquisition by the State—that is, by the

community at large—of all the instruments of production, with the avowed purpose of preventing the accumulation of capital in private hands. As a natural consequence they admit the probability of less production, the destruction of initiative, and the enslavement of the masses under a single employer, the State. The more advanced and thoughtful Socialists are able to see that this would not materially alter, except for the worse, the happiness of the working classes. The second school, embracing the Syndicalist and the Guild Socialist, distrusting the State as a universal employer, and desirous of retaining for the working man a measure of personal freedom and initiative, are seeking another method. According to the tenets of this school, while the State is to be the ultimate owner of all the means of production, each group of producers is to be responsible for the actual working of its own industry. Thus has arisen the cry of "the mines for the miners." Under this system, each group of producers would form a co-operative society, managing its own business upon a strictly socialistic basis.

As explained above, the fundamental weakness of each of these systems lies in a total disregard of human motives and human nature. The idealists who support these views try to overcome this objection by various devices. Men, they say, should labour for the joy of work. When faced with the obvious question as to how certain kinds of less interesting but essential labour are to be apportioned, their only answer is that instead of making some men do such work all the time, all men would, for the sake of the community, have to do it some of the time. The absurdity of such a scheme is apparent. Under such a system nothing could be properly done at all. We are aware that military authorities have recently attempted to carry out such a plan by setting skilled engineers to scrub floors, but nobody would pretend that it is an economical form of employment.

Any scheme which ignores individual aptitude, and a natural basis of selection of competent men, is not worth serious thought. To imagine that human nature and human motives can be suddenly altered by any radical change of heart, or that mankind can be brought to the necessary attitude of self-sacrifice for the good of the community, is too visionary a doctrine for a practical world. Yet this is the dream of every sincere advocate of each of these Utopian schemes.

We have, therefore, to return to the more materialistic, but also more scientific principle of accepting the facts of human nature, upon which modern industries have been built up, and by means of which mankind has emerged from a state of primitive barbarism. We return to our former theme of the identity of interest of Capital and Labour; and of production as the main test of efficiency. This is not to shut the door against every effort to ameliorate the workers' lot, but to promote his happiness and well-being; for experience has shown that this is sound industrial policy and the very best incentive to that maximum effort which these critical times demand.

THE BY-PRODUCTS TRADE.

Tar Products.—In such a week as this, the labour question and the closing of works for the holiday make a market report practically a nominal matter. Stocks and quotations alike are carried over for a few days, and the only point of importance is to be found in the accumulated orders this week-end. These do not show any material change in the tendency. Tar and pitch are unchanged, on the basis of 48s. per ton f.o.b. London for pitch (50s. quoted in some instances). Tar prices in the provinces have been rather unequal, according to location, and the best figure so far appears to be the estimated average of 32s. 1d. per ton for the tar sold in the Manchester district during November. As this figure exceeds the price commonly mentioned, it illustrates the difficulty of fixing a fair average for the provinces. So far as actual purchases are concerned, there is little to note beyond the fact that "expectations" are commonly attributed to holders of pitch. A fact which governs those holders to a very great extent is constant difficulty of railway and shipping arrangements. As those arrangements cannot very well improve much in the near future, it seems idle to expect large movements of stock, except for special requirements. Nevertheless, the market for both tar and pitch is sound in the sense that the demand is hindered by difficulties of transport, and not by the lessened needs of consumers. Indeed, there is so much work in arrears that if the market were unhampered, there would be a rush of business. The quotations for other products are firm. Solvent naphtha is steady in London and the provinces, but the market appears to have become less urgent. Benzol, 50 per cent. washed, is 1s. 3½d. to 1s. 4½d. nominally in London. 90 per cent. prompt 1s. 0½d. (north 11½d.). Pitch, naphtha, benzol, toluol, and cresylic acid are firm. Cresylic acid, crude, 60 degs., is quoted 3s. 4d. ex works. Crystals 1s. 3d.

Sulphate of Ammonia.—The market is in a stationary condition in regard to prices, as these are controlled. The business is of a holiday character. Nitrate of soda is nominal, and unchanged.

THE COAL AND IRON TRADES.

THURSDAY, DECEMBER 27.

Scotland.—Western District.

COAL.

Business in the west of Scotland proceeds with little variation. Industrial demands are well maintained, and household requirements have been very heavy owing to the colder weather. Deliveries are not so regular as could be desired, as wagons are scarce at present, and a considerable amount of delay results. However, most qualities of coal are managing to avoid any great accumulation of stocks.

Prices f.o.b. Glasgow.

	Current prices.	L't week's prices.	Last year's prices.
Steam coal.....	27/6	27/6	19/-25/
Ell	26/6-28/	26/6-28/	19/6-24/
Splint.....	28/-30/	28/-30/	23/-32/
Treble nuts	23/	23/	23/6
Double do.	22/	22/	22/
Single do.	21/	21/	21/

IRON.

The approach of the end of the year and of the holiday season has caused the pressure in the iron trade to become more intense. Every effort is being made to ensure adequate supplies. Pig iron continues to be a scarce commodity. Outputs, particularly of hæmatite, are quickly absorbed by local consumers chiefly engaged on Government account. The export trade is practically a thing of the past in the meantime. Approximate prices are as follow:—Monkland and Carnbroe, f.a.s. at Glasgow, Nos. 1, 140s., Nos. 3, 135s.; Govan, No. 1, 135s., No. 3, 130s.; Clyde, Summerlee, Calder and Langloan, Nos. 1, 150s., Nos. 3, 145s.; Glengarnock, at Ardrossan, No. 1, 140s., No. 3, 135s.; Eglinton, at Ardrossan or Troon, and Dalmellington, at Ayr, Nos. 1, 145s., Nos. 3, 135s.; Shotts and Carron, at Leith, Nos. 1, 150s., Nos. 3, 145s. per ton. In the malleable iron trade the production is on a very high level. The demand for small-sized bars is heavy, and works are fully engaged day and night. Very little of this class of material is available for shipment, and while the price is in the vicinity of £16 per ton, £16 7s. 6d. has been paid for guaranteed deliveries. Business in black sheets is in a similar condition. All departments of the engineering trade are as busy as possible.

Scotland.—Eastern District.

COAL.

Conditions in the Lothians coal trade remain unsatisfactory. General orders are scarce, and supplies are more than equal to the demand.

Prices f.o.b. Leith.

	Current prices.	L't week's prices.	Last year's prices.
Best screened steam coal...	26/6	26/6	26/
Secondary qualities.....	25/6	25/6	24/6
Treble nuts	23/	23/	25/
Double do.	22/	22/	22/
Single do.	21/	21/	19/6

The situation in the Fifeshire district is hardly so good again, owing to the lack of boats, but on the whole the collieries are fairly well employed.

Prices f.o.b. Methil or Burntisland.

	Current prices.	L't week's prices.	Last year's prices.
Best screened navigation coal.....	29/-31/	29/-31/	30/-34/
Unscreened do.....	24/-25/	24/-25/	27/-29/
First-class steam coal.....	28/	28/	29/-30/
Third-class do.	24/	24/	22/
Treble nuts	23/	23/	23/-25/6
Double do.	22/	22/	22/
Single do.	21/	21/	21/

The prices quoted apply to French and Italian business; other orders are subject to an additional charge of 2s. 6d. per ton.

Northumberland, Durham and Cleveland.
Newcastle-on-Tyne.

COAL.

Since last report, the local coal market has brightened up wonderfully. There has been a marked revival in official requisitioning of fuel; requisitioned tonnage to take away these cargoes is coming to hand at quite a satisfactory rate when compared with the boggary amount of transport facilities on offer during many recent days, and, altogether, business has brisked up in a most gratifying fashion. True, very many more steamers will be needed to afford full satisfaction of the cargo-spaco needs of the local collieries working full time, but, as things are, with the output from many pits restricted and with others laid idle, the carrying capacity placed at the disposal of the collieries is enabling inroads to be made upon recently accumulated stocks and is taking up the present production very nicely. The demand for such coals as smithies, coking sorts and households on inland account continues to be large; sufficient, indeed, to absorb the great bulk of the coal produced, and gas coals, also, are benefiting from the good of the enquiry for home consumption. Special smithies for export to Scandinavia are still sought after to a large extent, and are scarce and dear at up to 33s. 6d. The bunker market is still very lethargic, the only movement being in Durham specials, which are listed at from 30s. to 32s. 6d. Coke is in very keen demand, and the output is readily being taken up, mainly on home account, at full recent prices. The enquiry, both for home and export, at the production is sadly in arrears of 18,500 tons of best steams, Northumberland, for the satisfaction of the local and always' requirements over February—on last Friday, based on scheduled output, the usual 5 per cent. for merchants'—other forward business of any note—prospect of local collieries for the year—allowing for the inevitable holidays, are now regarded as much more promising.

Prices f.o.b. for prompt shipment.

	Current prices.	L't week's prices.	Last year's prices.
Steam coals:—			
Best, Blyths (D.C.B.) ...	30/-32/6	30/-32/6	30/
Do. Tynes (Bowers, &c.)	29/6-32/	29/6-32/	29/-30/
Secondary, Blyths	25/6-28/	25/6-28/	24/-26/
Do. Tynes (Hastings or West Hartleys) ...	27/-29/6	27/-29/6	24/-26/
Unscreened	23/6-27/6	23/6-27/6	20/-22/6
Small, Blyths	20/-22/6	20/-22/6	18/-19/
Do. Tynes.....	18/6-21/	18/6-21/	17/-17/6
Do. specials.....	20/6-23/	20/6-23/	20/-21/
Other sorts:—			
Smithies.....	25/-33/6	25/-33/6	20/
Best gas coals (New Pelton or Holmside)	25/-27/6	25/-27/6	25/-27/6
Secondary gas coals (Pelaw Main or similar)	23/6-26/	23/6-26/	18/-20/
Special gas coals	26/6-29/	26/6-29/	30/-33/
Unscreened bunkers, Durhams	26/6-27/6	26/6-27/6	17/-19/
Do. do.			
Northumbrians	26/6-27/6	26/6-27/6	18/-20/
Coking coals	24/-27/6	24/-27/6	18/-20/
Do. smalls	24/-27/6	24/-27/6	17/-18/
House coals	28/6-32/6	28/6-32/6	27/6-30/
Coke, foundry	42/6-45/	42/6-45/	40/-45/
Do. blast-furnace	42/6-45/	42/6-45/	37/-39/
Do. gas	35/-37/6	35/-37/6	32/-34/

Sunderland.

COAL.

On the eve of the Christmas holidays business was practically non-existent, and the market closes with an idle tone, and with the position generally unaltered. Owing to the colliery holidays this week the output will be considerably reduced, but there are hopes that shipping will accumulate in the interval and so place a better supply of prompt coals at the disposal of the pits on their return to work. The foreign enquiry continues dull, and official requisition shipments of steam coal are only moderate, but the home demand remains brisk. There is no change whatever in prices, which are nominally steady at the usual schedule figures, but coke values are firmly held in view of the pressing enquiry for all classes, alike for home and foreign consumption.

Prices f.o.b. Sunderland.

	Current prices.	L't week's prices.	Last year's prices.
Gas coals:—			
Special Wear gas coals	29/-32/6	29/-32/6	27/6
Secondary do.	25/-27/6	25/-27/6	18/
House coals:—			
Best house coals	32/6	32/6	30/
Ordinary do.	30/6	30/6	24/6
Other sorts:—			
Lambton screened	31/-32/6	31/-32/6	28/6
South Hetton do.	31/-32/6	31/-32/6	28/6
Lambton unscreened ...	26/6	26/6	17/6
South Hetton do.	26/6	26/6	17/6
Do. treble nuts	22/6	22/6	31/6
Coking coals unscreened	27/6	27/6	18/
Do. smalls	27/6	27/6	17/
Smithies.....	27/6	27/6	18/6
Peas and nuts	27/-28/6	27/-28/6	24/
Best bunkers.....	27/6	27/6	18/6
Ordinary bunkers.....	26/6	26/6	16/6
Coke:—			
Foundry coke	42/6-45/	42/6-45/	40/
Blast-furnace coke (dld. Teesside furnaces) ...	28/-35/6	28/-35/6	28/
Gas coke.....	35/-40/	35/-40/	35/

Middlesbrough-on-Tees.

COAL.

The fuel trade shows little change, but more disposition to do business is evident in certain branches. New enquiries from neutral areas are scant. Gas coals, especially the better qualities, are sought, and the demand for all descriptions of manufacturing coals is strong, whilst household kinds are also in very good request. Steam smalls continue plentiful and weak, and bunkers are in poor request, with what orders there are confined to superior qualities. Best Durham gas coals are put at 27s. 6d., seconds at 26s., and Wear specials at 29s. Steam smalls range from 21s. to 23s. Unscreened Durham bunkers are quoted 26s. 6d. to 27s. 6d. Coking coals are well taken up at round about 27s. 6d. Demand for all descriptions of coke is heavy. Gas-house product readily realises 37s. 6d. for export, and neutrals are prepared to pay a higher figure. Both beehive and patent oven cokes keep at 45s. for shipment to neutrals, and 42s. 6d. for export to the Allies. Blastfurnace coke is well taken up for local consumption, average kinds realising 33s. at the ovens, and qualities low in phosphorus commanding 35s. 6d. at the ovens.

IRON.

It has been found impossible to anything like carry through the heavy home sales of Cleveland pig iron under the December allocations, scarcity of trucks, and consequent stoppage of all but the most urgent deliveries over the holidays, causing much disappointment and inconvenience. Owing to inability to distribute their make, some producers have been compelled to stock iron that was much needed for consumption, and in these days of shortage of labour iron is not stocked if it can possibly be got away. Foreign transactions are very few and small. For home consumption, No. 3 Cleveland pig, No. 4 foundry and No. 4 forge all stand at 95s., and for shipment to France and to Italy these qualities are all quoted 116s. 6d.; whilst No. 1 is 99s. for home use, and 121s. 6d. for shipment abroad. The hæmatite department shows no change of moment. Conditions continue stringent, though relief is now being felt to some slight extent by increasing production of basic iron. Nos. 1, 2 and 3 east coast brands are 122s. 6d. for home use, and 147s. 6d. for export to France and Italy. Manufactured iron and steel works are closed this week, and advantage is being taken to execute much needed repairs and renewals to plant.

Cumberland.

COAL.

Although the Christmas trade is now practically over, the coal industry in West Cumberland is as busy as ever. During the last few days the clamour for fuel for shipping and local use has increased so quickly that it has been almost impossible to cope with requirements. Probably

the shortage on landsale account is not so marked as a week ago, but no outside business can be dealt with. Severe weather sharpened the demand for house coals, and some of the depots have enough orders in hand until the middle of January. Gas and locomotive fuels are scarce and firm. Cross-Channel trade is remarkably active. Prices are unchanged.

	Current prices.	L't week's prices.	Last year's prices.
Best Cumberl'nd coal at pit	25/10	25/10	23/4
Best washed nuts at pit...	24/2	24/2	21/8
Seconds at pit	23/4	23/4	20/10
Washed nuts at pit	23/4	23/4	20/10
Do. smalls ..	19/2	19/2	16/8
Do. peas ..	17/6	17/6	15/
Buckhill best coal at pit...	25/	25/	22/6
Do. double-scrned washed nuts at pit	23/6	23/6	21/
Oughterside best coal at pit	25/	25/	22/6
Oughterside best washed nuts at pit.....	23/6	23/6	21/
St. Helens (Siddick) best coal at pit	25/	25/	22/6
St. Helens best house nuts at pit	23/6	23/6	21/
Best Cumberl'nd coal, f.o.b.	22/	22/	19/6
Best washed nuts, f.o.b. ...	20/	20/	17/6
Best bunkers (coastwise) Do. (for foreign-going steamers)	31/	31/	25/
Best works fuel.....	22/6	22/6	20/
Best coal for gasworks ...	22/6	22/6	20/
Best washed nuts for gas-works	21/6	21/6	19/

IRON.

The hæmatite pig iron trade on the west coast continues very firm and brisk. The demand for both ordinary and low-phosphorus iron is, if anything, keener than ever, but production is not quite so satisfactory as it was. Owing to a shortage of raw materials, one or two of the furnaces have been put off blast, but they will probably be in full operation again in the course of a few days. All the output of iron in this district is going into immediate use. The bulk of the output of Bessemer iron is being absorbed locally, and all the special and semi-special iron is going to Midland and Scotch users, who are engaged exclusively on Government work. The steel trade is exceedingly brisk, and all the mills in the district are in full swing. The Cumberland iron ore industry is very busy, and production is steadily increasing.

South-West Lancashire.

COAL.

The inland house coal trade presents no change. Deliveries continue below merchants' requirements, and pressure is exerted for full daily supplies. Shipments and bunkering are much as reported last week. In the coastwise and cross-channel section the difficulty is to get vessels. Freights are nominally at a very high figure, and the Irish merchants are not nearly getting the tonnage of house fuel they require. Some of the inland gas works are urgent for supplies. Even where they have fair stocks to draw upon there is the labour scarcity with them. Slacks and small fuels for steam raising are much called for, and in the better qualities there is difficulty in getting out adequate quantities.

Prices at pit (except where otherwise stated).

	Current prices.	L't week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	21/
Do. (f.o.b. Garston, net)	26/	26/	25/6
Medium	21/6-22/	21/6-22/	19/-20/
Do. (f.o.b. Garston, net)	25/	25/	24/6
Kitchen	20/6	20/6	18/
Com. (f.o.b. Garston, net)	24/	24/	24/ upwds
Screened forge coal	20/6	20/6	18/
Best scrnd. steam coal f.o.b.	30/6	30/6	22/6-23/6
Best slack	18/6	18/6	16/
Secondary slack	17/6	17/6	15/6
Common do.	16/6	16/6	14/6

South Lancashire and Cheshire.

COAL.

In the coal trade there is pressure upon the collieries for larger quantities than are going out—house, gas and steam fuel users being alike short of the daily tonnages they desire to have. Some of this, doubtless, is to enable users and retailers to make adequate provision to cover the holiday stoppages at the collieries, but the winter requirements are ever increasing, whilst the production is scarcely holding its own. Bunkering requirements are not more than normal, and the tonnage available for export is restricted owing to the heavy inland demand.

Prices at pit (except where otherwise stated).

	Current prices.	L't week's prices.	Last year's prices.
House coal:—			
Best	24/6	24/6	22/-23/
Medium	22/-23/	22/-23/	19/6-21/
Common	20/6-21/	20/6-21/	18/-18/6
Furnace coal.....	20/-20/6	20/-20/6	17/6-18/
Bunker (f.o.b. Partington)	—	—	25/-26/
Best slack	18/6 upwds	18/6 upwds	16/ upwds
Common slack	17/ upwds	17/ upwds	14/6 upwds

* As per official list.

Yorkshire and Derbyshire.

Leeds.

COAL.

Both work at the pits and business in the coal trade have been largely suspended this week. Officially, the pits were at work on Monday, but the attendance of miners suffered, and it is expected that on the resumption of work to-day (Thursday) the output will be much below normal for the same reason. The tonnage raised for the whole week will do well to equal two days' work. Tuesday being Christmas Day there was no market at Leeds, and there is nothing to note that alters the general position, except

that the sharp weather is likely to give an impetus to the demand for coal. Most of the textile wool towns in Yorkshire are holidaying all the week, and consequently the demand for manufacturing fuel is not at the moment so pressing, but both house and gas coals are greatly needed, and will be affected by this week's loss of output. The latter also increases the difficulties of coke makers, owing to the chronic scarcity of coking smalls.

Current pit prices.

House coal:—	Current prices.	L'st week's prices.	Last year's prices.
Prices at pit (London):			
Haigh Moor selected	21/6-22/6	21/6-22/6	20/-21/-
Wallsend & London best	21/-21/6	21/-21/6	19/-20/-
Silkstone best	21/-21/6	21/-21/6	19/-20/-
Do. house	20/-20/6	20/-20/6	17/-18/-
House nuts	18/6-19/6	18/6-19/6	16/-17/-
Prices f.o.b. Hull:—			
Haigh Moor best	25/6-26/-	25/6-26/-	23/-24/-
Silkstone best	24/-25/-	24/-25/-	22/-23/-
Do. house	23/-24/-	23/-24/-	20/-21/-
Other qualities	20/6-22/6	20/6-22/6	19/-20/-
Gas coal:—			
Prices at pit:			
Screened gas coal	18/-18/6	18/-18/6	16/-17/-
Gas nuts	17/-18/-	17/-18/-	15/6-16/6
Unscreened gas coal	16/6-17/6	16/6-17/6	15/-16/-
Other sorts:—			
Prices at pit:			
Washed nuts	18/6-19/6	18/6-19/6	17/-18/-
Large double-screened engine nuts	17/6-18/6	17/6-18/6	16/-17/-
Small nuts	16/6-17/6	16/6-17/6	15/-16/-
Rough unscreened engine coal	16/6-17/6	16/6-17/6	15/-16/-
Best rough slacks	15/6-16/6	15/6-16/6	14/-15/-
Small do.	13/6-14/6	13/6-14/6	12/-13/-
Coking smalls	14/-15/-	14/-15/-	12/6-13/6
Coke:—			
Price at ovens			
Furnace coke	32/-	32/-	25/8

Barnsley.

COAL.

Efforts have been directed to increase the tonnage required by certain industries which will be set down for a shorter holiday period than in the case of collieries. The experience of the week in regard to output is problematical, for though the men are recommended to restrict suspension to a couple of days, the broken week will, it is feared, cause a good deal of absenteeism. There was practically no work after the morning shift on Monday, and with a restart to-day (Thursday) only a couple of other shifts will be possible, but the holiday spirit has been abroad. Business in the way of extra supplies has been almost out of the question, though special requirements have received all the possible attention, particularly in regard to fuel for gas, electricity and by-product concerns, which will have little reduction in the calls upon them. The question of gas coal supplies is indeed urgent, and is receiving the careful attention of the district committees owing to the low stocks held and the essential products they are yielding, whilst that of a full supply of slack is equally pressing. Industries of a less essential character which are using considerable quantities of slacks will have to manage with curtailed deliveries, and this may become increasingly felt with the immediate prospect of pressure in other directions. House coal collieries are placing practically every ounce of the output on rail, owing to the more active request which has followed upon the advent of more severe weather, whilst there are indications that the problem of the London supply has not yet been solved with full certainty. The export trade continues to be of quiet dimensions, particularly so far as the neutral markets are concerned, and apart from the shortage of shipping tonnage the needs of the Allies and the home centres must be first fully satisfied. The vigorous demand for furnace coke is in no way abated, but cannot be fully met.

Prices at pit.

House coals:—	Current prices.	L'st week's prices.	Last year's prices.
Best Silkstone	22/6-24/6	22/6-24/6	20/-22/-
Best Barnsley softs	21/-21/6	21/-21/6	18/6-19/6
Secondary do.	19/-20/-	19/6-20/6	17/-17/6
Best house nuts	18/6-19/6	18/6-19/6	16/-17/-
Secondary do.	18/-18/6	18/-18/6	15/6-16/6
Steam coals:—			
Best hard coals	20/-21/-	20/-21/-	17/6-18/6
Secondary do.	19/-20/-	19/-20/-	16/6-17/6
Best washed nuts	18/6-19/6	18/9-19/9	16/3-16/6
Secondary do.	18/-18/9	18/-18/9	15/9-16/3
Best slack	15/-15/9	15/-15/6	12/6-13/-
Secondary do.	13/-13/6	13/-13/6	10/6-11/-
Gas coals:—			
Screened gas coals	19/-19/6	19/-19/6	16/6-17/6
Unscreened do.	18/-18/6	18/-18/6	15/6-16/6
Gas nuts	18/9	18/9	16/-
Furnace coke	32/-	32/-	25/8

Hull.

COAL.

The lull in ordinary business operations caused by the holiday gives opportunity to cast a glance back upon the year that is just closing. It may truly be said that 1917 has been one of the most remarkable in the history of the Humber export trade. Very largely "controlled" by a Government department, business abroad has been done only under licence, and subject to restrictions which have resulted in the constantly diminishing volume of export trade. France and Italy have, of course, been supplied by agreement at fixed prices. Probably about the same quantity has been sent from the Humber to these destinations as in 1916. Much smaller quantities have been shipped to neutral countries; likewise London and coastwise and for bunkering purposes. The average monthly arrivals at Hull from collieries have been close upon 250,000 tons per month, or about 12 per cent. below last year; and possibly not more than one-third has been exported abroad, the remaining two-thirds being accounted for by the demands for "official" purposes, land consumption, and so on. The serious falling off in overseas trade, occasioned to a very large extent by the shipping shortage and the loss of neutral markets, is a matter for concern among exporters, who are very strongly of the opinion that no hindrance should be put in the way of these markets being recovered when hostilities cease. Given plenty of freedom to trade, there seems to be no reason why the Humber export trade should not re-establish itself on a strong foundation and play an important part in the building up again of our overseas commerce.

Chesterfield.

COAL.

An acute demand for all classes of coal preceded the stoppage for the Christmas holidays, consumers being anxious to secure sufficient supplies to carry them safely over the intervening period. The cold weather caused an urgent call for fuel for domestic use, orders for which being much in arrear. Coal for manufacturing purposes continues in pressing request, especially for the large steel works of Sheffield. It is feared that supplies will be difficult during the next few days, and collieries will be inundated with orders for every kind of coal. Wagons are scarce at present and it is with the greatest difficulty that the pits have been able to work full time. It is most fortunate that the weather has not been so troublesome as is frequently the case just before Christmas and that the colliery districts have been specially free from fog. This has contributed greatly to the freedom from congestion of railway traffic. No change in the condition of the export trade has occurred. The coke market continues in a satisfactory state.

IRON.

The iron trade maintained its great activity up to the stoppage of operations for the holidays and the resumption of work is eagerly awaited in many directions.

Nottingham.

COAL.

The trade in this district has been upset to some extent during the past week by the intervention of the Christmas holiday, which came as a very welcome break to all engaged in the industry after a period of intense activity and strain. In the domestic fuel section, the demand on local merchants has increased in consequence of wintry weather setting in, and it has had the effect of intensifying the pressure for deliveries on collieries, which are distributing the available supplies in as fair a manner as possible to the centres of population served by this county. All classes of households are eagerly accepted by merchants, who have practically to rely on current supplies, as they have little or no reserve stocks to draw upon. Towards last week-end there was a slightly easier tone in the steam coal branch in view of the fact that munition works were being closed down for about a week to give the workers a well-earned rest. Otherwise, the demand is such that the full output is rapidly disposed of. The trade in stocks is active, the supplies of coking sorts being barely sufficient to keep all the ovens in full swing.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
Hand-picked brights	21/-22/-	21/-22/-	18/6-20/-
Good house coals	20/-21/-	20/-21/-	18/-18/6
Secondary do.	18/6-19/6	18/6-19/6	17/-18/-
Best hard coals	18/3-19/-	18/3-19/-	17/-18/-
Secondary do	17/-18/-	17/-18/-	16/-17/-
Slacks (best hards)	14/6-15/-	14/6-15/-	12/-13/-
Do. (second)	13/-13/6	13/-13/6	10/6-11/6
Do. (soft)	13/-	13/-	11/-

Leicestershire.

COAL.

For the first time in the history of this coalfield the Christmas season has been attended by day-to-day working. It had been hoped that the National Amalgamated Union of Engine Drivers and Firemen would have ignored the trivial circumstance that one or two men had joined the miners' organisation in view of the critical times, but so far this has not been realised. In consequence of this normal conditions have not yet been resumed. By mutual agreement, it was arranged to observe Tuesday, Wednesday and Thursday as holidays, with working on Monday, Friday and Saturday. The prevalence of severe weather has placed an exceptional strain on colliery administration in consequence of the increased and urgent demands for supplies to meet the larger domestic consumption at the great centres of industry. The demand for London and district is still remarkably heavy, but deliveries have been well maintained under the circumstances. The demand includes all classes of household as well as main and deep cobbles and nuts. Bakers' nuts are cleared off as fast as they are available and the demand is much in excess of the supplies. Small nuts for mechanical stokers are in very urgent demand. Country merchants are experiencing a very trying time through the ice-bound roads, which has greatly interfered with the successful working of the depleted transport. Privately-owned wagons are coming to hand very freely, and no shortage has yet been experienced. There are no reserves at country stations or at the collieries.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Best household coal	20/-21/6	20/-21/6	17/-19/-
Second, hand picked	19/-20/-	19/-20/-	15/6-17/-
Deep screened cobbles	18/6-19/6	18/6-19/6	16/6-17/6
Deep large nuts	18/6-19/6	18/6-19/6	16/-17/-
Bakers' nuts	17/6-18/6	17/6-18/6	15/-16/-
Small nuts	17/-18/-	17/-18/-	14/6-15/6
Deep breeze	15/3-16/-	15/3-16/-	12/9-13/6
Peas	14/6-14/9	14/6-14/9	12/-12/3
Small dust	8/6-9/6	8/6-9/6	6/-7/-
Main nuts for London			
kitcheners	16/-17/6	16/-17/6	14/-15/-
Steams, best hand picked	16/6-17/6	16/6-17/6	14/6-15/6
Steams, seconds	15/6-17/-	15/6-17/-	13/6-15/-
Main cobbles for kitcheners	16/-17/6	16/-17/6	14/-15/-
Main breeze	14/9-15/6	14/9-15/6	12/6-13/6

South Staffordshire, North Worcestershire and Warwickshire.

Birmingham.

COAL.

There has been practically no output from the pits this week. An attempt was being made to resume work at the end of the week, but it will not be general before Monday. Neither was any business done at the depots for three days. Merchants were anxious to get the men back in order to work off some arrears, but they met with limited success. Not many people are without coal. Those who could afford it have laid in stocks, and the scheme of distribution

evolved by the Birmingham Coal Supplies Committee enabled persons buying in small quantities from collieries or bag wagons to get fair supplies.

Prices at pit.

	Current prices.	L'st week's prices.	Last year's prices.
Staffordshire (including Cannock Chase):—			
House coal, best deep	21/6	21/6	22/-
Do. seconds deep	22/6	22/6	20/-
Do. best shallow	21/6	21/6	19/-
Do. seconds do.	20/6	20/6	18/-
Best hard	21/-	21/-	18/6
Forge coal	18/6	18/6	16/-
Slack	13/6	13/6	11/6
Warwickshire:—			
House coal, best Ryder	21/6	21/6	19/-
Do. hand-picked			
cobs	20/6	20/6	18/-
Best hard spires	22/6	22/6	20/-
Forge (steam)	18/6	18/6	16/-
D.S. nuts (steam)	17/-	17/-	14/6
Small (do.)	17/-	17/-	14/6

IRON.

Business has been at a standstill all the week, and there will be very little passing before the quarterly meeting, which falls early in the new year. Buyers are willing enough to place orders, but producers are holding off until the price question is solved. Negotiations are still in progress, not only with the furnace owners, but also with the representatives of labour, who are naturally deeply interested. Best foundry pig iron is most difficult to get, even in small quantities, and sellers declare that they are unable to open new accounts. It is suggested that the allocation of pig iron supplies, on the same principle as basic iron is now allocated to steel works, is a probable development in the new year. Bar iron makers have no desire to sell under existing circumstances, and they quote conditionally. Following are the leading prices:—Marked bars, £15 10s., less 2½ per cent.; unmarked bars, £13 15s., net, at makers' works; North Staffordshire bars, £13 15s., net; black sheets, £17; steel joists and sections, £11 2s. 6d. Uncontrolled: Nut and bolt iron, £14 10s.; puddled bars, £12 15s.; gas strip, £15 10s. to £16; steel strip, £17 15s. to £18.

Forest of Dean.

Lydney.

COAL.

The position of the house coal trade has not changed in any material particular during the week. Severe weather and the proximity of holidays increased the demand for all qualities, and the owners are taxed to the utmost endeavouring to satisfy, to some extent at any rate, the heavy calls from their customers. A very large proportion of the steam and manufacturing fuel is being reserved for firms engaged in work of national importance.

Prices at pithead.

	Current prices.	L'st week's prices.	Last year's prices.
House coals:—			
Block	26/6	26/6	24/-
Forest	25/6	25/6	23/-
Rubble	25/9	25/9	23/3
Nuts	24/-	24/-	21/6
Rough slack	15/6	15/6	13/-
Steam coal —			
Large	22/6-23/6	22/6-23/6	20/-21/-
Small	18/-19/-	18/-19/-	16/-17/-

Prices 2s. extra f.o.b. Lydney or Sharpness.

SOUTH WALES MINING TIMBER TRADE.

Foreign Imports Poor.

Business was confined within narrow limits owing to the holidays, and also to the general scarcity of vessels. The shortage of vessels is most acute, and has exercised a most adverse influence upon the coal export and subsidiary trades. The imports of foreign mining timber during the past few days have been upon a very slow scale. Pitwood, both foreign and home grown, was in short supply, and values were strongly maintained. For the week ending December 21 the imports of foreign timber amounted to 4,200 loads, of which 1,320 loads were reserved for the Admiralty Pitwood Committee, and the balance, 2,880 loads, for importers. The actual consignments were as follow:—

Cardiff (Barry and Penarth):—

Date.	Consignee.	Loads.
Dec. 17	Morgan and Cadogan	180
" 17	Lysberg Limited	360
" 17	Lysberg Limited	960
" 19	Morgan and Cadogan	300
		Total..... 1,800

Newport:—

Date.	Consignee.	Loads.
Dec. 15	F. R. Howe and Co.	1,140
" 15	F. R. Howe and Co.	960
" 18	Morgan and Cadogan	300
		Total..... 2,400

Quotations were strongly maintained at 75s. per ton ex ship Cardiff or Newport. The deliveries of home-grown timber were slow owing to the difficulty of transport as well as to the hard weather, which tries even the most robust of those who have been engaged for the woods.

Allocation and Maximum Prices.

It is generally conjectured that supplies of both foreign and home-grown timber will be allocated through the Allocation Committee, recently formed, from January 1, and that maximum selling prices will be fixed for the sale of the wood to the collieries. It is stated that the maximum price will be fixed at 65s. on rail, which is 10s. below the present market price of French fir.

Mr. Wm. Stephens (69), of Mountain View, Lydney, died at the Pontypool and District Hospital on Thursday last week, as a result of injuries received on the surface of the Blaenserehan Colliery. It appears that Stephens was directing a tram of coal to the screens when another tram ran along the metals and crushed him. At the inquest a verdict of "Accidental death" was returned.

THE WELSH COAL AND IRON TRADES.

THURSDAY, DECEMBER 27.

Monmouthshire, South Wales, &c.

COAL.

Just before the Christmas holidays there was a good deal of increased activity in the coal trade of this district. There was an improvement in the arrival of tonnage, and things all round showed a better tone. Stocks are still very heavy, particularly small coal. House and gas coals have been in great request. Patent fuel was a slow market, but coke was much enquired for. There was a difficulty in meeting home requirements in the matter of coke. Values all round were stationary.

Prices f.o.b. cash 30 days.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Black Vein large...	32/6	32/6	—
Western-valleys, ordin'y	31/6	31/6	—
Best Eastern-valleys ...	31/6	31/6	—
Secondary do.	30/6	30/6	—
Best small coals	23/6	23/6	—
Secondary do.	22/6	22/6	—
Inferior do.	20/6	20/6	—
Screenings	25/6	25/6	—
Through coals	29/6	29/6	—
Best washed nuts.....	32/6	32/6	—
Other sorts:—			
Best house coal, at pit ..	35/6	35/6	—
Secondary do. do. ...	33/3	33/3	—
Patent fuel	32/6	32/6	—
Furnace coke.....	47/6	47/6	—
Foundry coke	47/6	47/6	—

IRON.

There is very little change in the iron and steel markets of the district. All the works are fully employed, and many of them have recently installed extra plant. The tin-plate trade, though fully controlled, is looking healthier. There has not been a very great arrival of pitwood, which was still ruling at 75s. for best French fir.

Cardiff.

COAL.

This has been a blank week as far as market operations are concerned, and for several days before the holidays the attendance on 'Change was meagre in the extreme, exporters confining their attention to completing arrangements for carrying on over the Christmas vacation. The miners took a three days holiday, and it was not expected that there would be anything like a full resumption of operations until next week. Fortunately, stocks of almost all descriptions are heavy, and even should arrivals of tonnage be heavier than has been the case during the past few weeks, it is not anticipated that there will be any shortage. In fact, the lull in production is viewed in most quarters as a blessing in disguise, for it will have the effect of clearing the sidings, which have been heavily congested for many weeks past, and will enable collieries to start with a comparatively clean sheet when the holidays are over. Since last week the only outstanding feature of interest has been the turning down of the proposed pooling scheme with regard to the supplies of coal to France. At the first meeting of the exporters the proposals were defeated on a show of hands by 36 votes to 16. A poll was then demanded on a tonnage basis, and this was conceded by the chairman (Mr. T. E. Watson), with the result that the pooling scheme was rejected by a large majority. Those in favour of the proposal represented 6,552,709 tons, whilst those against, on the basis of pre-war shipments, totalled no less than 9,696,484 tons, or a majority against the scheme of 3,143,775 tons. Opinions were freely expressed that business should be continued in accordance with the terms of the original limitation scheme, and that trade should flow in its normal channel as far as practicable. Against this, however, it is urged that a number of exporters had received authorisations in excess of the number under the schedule, and there will be a considerable amount of revision required by the Allocation Committee, the returns

Prices f.o.b. Cardiff (except where otherwise stated), plus 2s. 6d. per ton, except for shipments to France and Italy.

	Current prices.	L'st week's prices.	Last year's prices.
Steam coals:—			
Best Admiralty steam coals	33/	33/	—*
Superior seconds	31/6	31/6	—*
Seconds	30/9	30/9	29/-30/
Ordinary	30/	30/	28/-29/
Steam smalls No. 1	21/6	21/6	19/-20/
Do. 2	21/	21/	—
Do. 3	20/6	20/6	17/-19/
Do. 4	20/	20/	—
Do. 5	19/6	19/6	14/-16/
Do. 6	19/	19/	—
Do. 7	18/6	18/6	13/-15/
Do. 8	18/	18/	—
Best dry coals	30/	30/	28/-30/
Ordinary dries	28/6	28/6	25/-27/
Best washed nut	30/	30/	25/-26/
Seconds	28/6	28/6	24/-25/
Best washed peas.....	27/6	27/6	23/6-24/6
Seconds	26/6	26/6	22/6-23/6
Monmouthshire—			
Black Veins	30/	30/	29/-30/
Western-valleys	29/	29/	28/-29/
Eastern-valleys	29/	29/	27/-28/
Inferior do.	28/	28/	26/-27/
Bituminous coals:—			
Best house coals (at pit)	33/	33/	25/6-26/6
Second qualities (at pit)	30/9	30/9	23/6-24/6
No. 3 Rhondda—			
Bituminous large.....	30/9	30/9	28/-30/
Small	26/	26/	18/-20/
No. 2 Rhondda—			
Large	27/	27/	27/-28/
Small	22/-23/6	22/-23/6	20/-23/
.....	17/-19/	17/-19/	17/-19/
.....	30/	30/	36/-37/6
.....	30/	30/	35/-36/
.....	47/6	47/6	62/6-67/6
.....	47/6	47/6	55/-60/
.....	47/6	47/6	47/6-52/6
.....	75/	75/	49/-50/

Nominal.

of which it was suggested should be published monthly, so that the market may know the exact position from time to time. No further action has been taken, except that the decision has been communicated to Mr. Stewart, the secretary of the Central Committee. As previously indicated, stocks of most grades are in abundant supply, and all transactions are on the basis of the Controller's schedule, plus the 2s. 6d. per ton for increased wages. Patent fuel is a slow market, chiefly due to lack of tonnage, but there is an active demand for coke for inland consumption, and also for bituminous and gas-producing coals. Pitwood continues scarce, and the quotation remains at 75s. per ton ex-ship for best French fir.

IRON.

Work has been continued throughout the holidays, but it is not anticipated that the outputs have been maintained at their maximum. In the tin-plate trade there is a firm enquiry, but makers are proceeding with considerable caution owing to the continued increase in the price of raw materials. Spot business in block tin has been done as high as £308 10s., and forward at £299 to £300. This means that Bessemer standard cokes 20 by 14 by 112 sheets are 1s. 6d. per box in excess of the scheduled rates, and are now quoted at 31s. 6d., with other sizes in proportion. Stocks of wasters are still excessive, particularly of oil sizes, and it is urged that the Ministry of Munitions might grant more liberal permission to utilise these plates for home consumption, especially as the quantities on hand are in some cases causing embarrassment and inconvenience. In the galvanised sheet trade there is little doing, and the few mills working are engaged in producing black plate, for which there is a limited demand. In all other departments conditions are unchanged. Quotations in every instance are nominal.

Llanelli.

COAL.

With tonnage supplies still unfavourable it is not possible to report any improvement in the position of the local market. The want of satisfactory clearance is holding up business generally, and also causing many idle days at the collieries. Stocks on hand are also accumulating, with the result that buyers have a wide selection of coals to choose from. Large anthracite qualities are nothing like so active as during the past few weeks, and even the better grades are at present offering freely for anything like prompt business. Cobbles are also not so active, and no difficulty experienced in securing supplies for prompt clearance. Nuts and beans are much easier and supplies of all qualities available, but there is likely to be an early return of activity of these sorts in view of the coming holidays at the collieries. Peas are not in demand, and stocks on hand are getting heavy. Culm and duff are both very slow. Steau coals are not moving freely. Large kinds are not a strong enquiry, and throughs are not well supported and many wagons are standing under load. Smalls are a very disappointing market, and supplies offering more freely than buyers can entertain. There are heavy stocks of the lower grades on hand, and no present prospect of clearance. Manufacturing coals and house coals are very firm.

Prices f.o.b.

	Current prices.	L'st week's prices.	Last year's prices.
Best malting anthracite...	30/	30/	29/6-32/
Seconds	29/	29/	27/6-30/
Thirds	27/6	27/6	—
Red Vein large.....	25/6	25/6	24/-25/
Machine-made cobbles.....	42/6	42/6	37/6-40/
Seconds	41/	41/	—
Thirds	39/	39/	—
Red Vein cobbles.....	36/	36/	—
Machine-made nuts.....	42/6	42/6	—
Seconds	41/	41/	—
Thirds.....	39/	39/	—
Red Vein nuts	36/	36/	—
Machine - broken beans (best)	35/	35/	28/6-29/6
Seconds	34/	34/	—
Thirds.....	33/	33/	—
Red Vein beans	31/	31/	—
Peas (all qualities)	20/	20/	20/-22/
Rubbly culm.....	13/	13/	10/6-11/6
Red Vein culm	11/	11/	—
Breakers duff	8/	8/	—
Billy duff	6/6	6/6	6/-6/6
Steam:—			
Best large steam	30/	30/	27/-28/6
Seconds	27/	27/	—
Cargo through	23/6	23/6	19/6-22/6
Seconds	22/	22/	—
Bunkers through	23/6	23/6	—
Smalls	19/	19/	13/6-17/
Second smalls	17/	17/	—
Bituminous:—			
Bituminous through ...	27/	27/	—
Smalls.....	24/	24/	17/-19/6
Gas through	23/6	23/6	—
Gas smalls	21/	21/	—

According to a recent issue of the *Stockholms Dagblad*, a peat company has recently been formed in Malmo, with a minimum capital of 5,000,000 kr., and a maximum capital of 15,000,000 kr. The company will manufacture fuel from peat by the process of Dr. Wielandt, and will also utilise the by-products.

To Utilise Mine Gases.—Presidents of Boards of Trade in the seven anthracite counties of Pennsylvania have been summoned to Harrisburg to confer with Governor Brumbaugh on a plan to utilise the vast quantities of mine gas permitted to escape into the air each day. The movement is a conservation movement, and is looked upon as a means of saving coal by supplying a substitute that is now going to waste, but which can be adapted to uses of anthracite coal. It is the intention to offer a prize of from 10,000 to 25,000 dols. for the most successful method devised for making waste mine gas answer the purposes of coal.

State Grant for Purchase of Peat Machines.—The *Dagens Nyheter* (Stockholm) states that the Swedish Government has taken steps to promote the working-up of peat. The Railway Committee has been authorised to work the peat beds belonging to the State, and has been requested to make an estimate for the cost of the work necessary to carry out the scheme which has been adopted. The Government has also decided to place at the disposal of the Agricultural Committee a sum of 200,000 kr. for the purchase of small peat machines, to be supplied by the local authorities to private persons who have undertaken to work up more peat than they need for their own use.

THE LONDON COAL TRADE.

THURSDAY, DECEMBER 27.

The market has been practically suspended during the whole of the week on account of the holiday season. The merchants decided at their annual meeting not to meet on the Monday before Christmas Day, so that there has been no market from Friday, December 21, until Friday, December 28, but the depots have been fairly supplied with coal, and the delivery trade has been very brisk for each day except Christmas Day and Boxing Day. Before the holidays the railway companies hurried forward all the trucks loaded, but during the week practically all the transport has been stopped owing to the stringency of the traffic and the heavy increase in goods and passenger requirements. The continuance of the wintry weather has largely stimulated the demand amongst the small consumers, and all the depots in the Metropolitan area, especially those in the eastern and southern districts, have been unusually busy with deliveries in small quantities to tide over the Christmas season. Unfortunately, in many cases the stocks on hand have been drawn upon to meet the pressing demands, so that the quantity in hand is being depleted somewhat rapidly. Happily, the turn of the new year is usually a quieter period for household orders, and the prospect for the winter supply is fairly satisfactory, especially as some of the North London depots are comfortably off with loaded wagons, awaiting unloading. Here and there, merchants have cancelled all further supplies, and this at the present season is not only unusual, but points directly to a good supply in hand. Hard steam coal has been exceedingly short for a considerable period, and the pressure is still very keen. All pit prices are stationary, as in every case they are controlled by the Price of Coal (Limitation) Act, and for the most part are entirely nominal, owing to the inability of nearly all the collieries to accept orders except from contract merchants or factors. Current quotations have been unchanged for many months past, and Silkstones have ranged from 20s. to 21s. per ton for railway trade; Derby brights, from 18s. 6d. to 19s.; hard cobbles, 17s. 6d. to 18s.; hard steam coals and double-screened nuts are practically withdrawn; bakers' nuts are 17s. 6d. to 18s. 6d.; nutty slacks, 13s. to 14s.; and fine slacks, 6s. to 9s. 6d., according to quality. The tonnage brought forward into the London area owing to the recent Regulations of the Coal Controller has worked wonders for the London traders, and has undoubtedly helped very considerably to allay any fears as to adequate supply of fuel for the winter's needs, but from the accounts of many of the southern and western railway depots a great scarcity is still very pronounced. Gas for motor purposes seems likely to be somewhat restricted, as the Board of Trade have announced their intention to regulate the supply of gas in accordance with the motor restriction Order. In the shipping department, the difficulty to obtain vessels is still very keenly felt, and during the week, with the Christmas holidays in full swing, there has been practically nothing doing. The tenders for the Norwegian State Railways contract have now been sent in. The quantity enquired for is 18,500 tons of hard steam coal, and the deliveries are to be made during February and March. The coasting trade is brisk, and consignments are, to a large extent, in hand, and are waiting for the boats to take on board. Prices have steadily kept to the old figures. Tyne gas coke has fetched as high as 40s. per ton f.o.b. In the Humber ports, South Yorkshire hards have realised 35s. per ton f.o.b.; and freights are firm, at 21s. to London. Only 12 contract cargoes were reported for Friday's market, but a fair return has accumulated during the week, so that when business is fully resumed after the holidays, there will be a good number of arrivals in the River Thames ready for the London trade. This, however, is principally gas coal. The South Metropolitan Gas Company recently decided to advance the price of their gas to 3s. 7d. per 1,000 cu. ft. to all customers from the Christmas quarter, and the Gas Light and Coke Company issued a special appeal for all gas users to burn less gas and to economise in every possible way.

THE IRISH COAL TRADE.

THURSDAY, DECEMBER 27.

Dublin.

Business continued to be very brisk up to the time of closing for the holidays, and as all recent labour disputes had been settled, there were no difficulties in the matter of delivery throughout the city and suburbs. Except for the shortage of supplies, the Christmas trade compares quite favourably with former seasons, the severe cold having caused quite a run upon house coals. Last week only one quality of house coal was obtainable, and this was advanced to 50s. per ton net. Stocks are very low in the port at present. Coke is unchanged at 46s. per ton delivered, and there has been more demand among retailers. Kilkenny County Council last week passed a resolution protesting against the apathy and delay which characterised the treatment of the Castlecomer collieries by the Irish Government. The resolution pointed out that at a time when seaborne coal was almost unobtainable, and when prices asked for it were exorbitant, the Castlecomer collieries were raising coal in abundance, but it was not available for public consumption through the non-provision of transport facilities. They called on the executive to end the neglect of the Castlecomer mines, and thus do something practical towards mitigating the scarcity and high prices complained of. It is stated that the Castlecomer Collieries Limited has been registered as a joint stock company, with a capital of £160,000 in shares of £1.

Belfast.

With the resumption of business, merchants will be largely engaged in fulfilling orders which it was impossible to fully deal with before the Christmas stoppage. Prices had not been advanced at the time of writing this report. Quotations are as follow:—Best Arley, 46s. per ton; Orrell nuts, 45s.; English kiteben coal, 45s.; Orrell slack, 42s.; Scotch house, 41s. Gas coke is about from 42s. 6d. to 45s. per ton, and foundry coke from 63s. 6d. to 68s. 6d. per ton. From December 2 to 15 the total number of coal-laden vessels arriving in the harbour was 112. At the last meeting of the Harbour Commissioners letters were read from several of the local coal merchants requesting that they should be allowed to use the commissioners' cranes on Sundays for the discharge of coal vessels, and arrangements have accordingly been made for the purpose.

A vacancy for a certifying surgeon under the Factory and Workshop Acts at Tavistock is notified. A similar vacancy exists at Penarth, Glamorgan.

UTILISING BOILER CLINKER IN FRANCE.

The French Minister of Munitions recently issued a circular on the utilisation of the unconsumed fuel in boiler clinker and cinders, and has made provision for the suitable treatment of these materials in cases where the producers do not possess the requisite appliances. For those in a position to carry out the treatment themselves, particulars are given of the method recommended. In the first place, the material must be screened, because of the unnecessary labour otherwise involved in picking out the usable fuel by hand; whilst it would be impracticable to treat the unscreened mass by mechanical means (air or water) on account of the similar density of clinker, coke, and unburned coal. Moreover, in the case of the small fragments of coal which drop through the grate bars, there is a considerable difference in the product, according to the spacing of the bars and the class of coal used—small through-and-through coal and wide bars, for instance, necessitating classification with a screen which will correspond to the maximum size of the predominant combustible matter, whereas, in other cases, larger fragments will form the chief item. Jig screens are recommended, which will yield several classes of product. The low-grade screenings can be discarded, the others being hand picked. As unskilled labour is capable of doing this work, it is quite inexpensive; and it is proposed to pay 1 to 1½ fr. per cwt. bag of coal recovered, at which rate the workers can easily earn 9 fr. per day, so that, taking the cost of screening at 50 ctmes. per bag, the cost of the recovered fuel will be 2 fr. per cwt. Mechanical treatment at this stage is not considered advisable, by reason of its slowness and imperfect action, none of the appliances examined having been found satisfactory. The question is an important one at the present juncture, it being estimated that there are at least 200,000 tons of unconsumed fuel in the waste from boilers over the whole of France. An estimate is given of the monetary saving to be derived by treating 100 tons of clinker, which would cost altogether 940 fr., and yield 33 tons of small and fines and 66 tons containing 10 per cent. of combustible material. If the smalls are fit for burning, they can be used direct or after briquetting; and in the contrary event will, at least, be worth 10 fr. per ton for making briquettes and concrete, and thus bring in 330 fr.; whilst the fuel in the 66 tons of 10 per cent. material will be worth, at present prices, 175 fr. per ton, or 1,100 fr. in all, thus leaving a profit of 556 fr. on the 100 tons treated.

INDIAN AND COLONIAL NOTES.

Australia.

Half-Year's Progress in Queensland.—The coal mining industry during the first half of the present year has made very fair progress in the different divisions of the State. The returns given below show that the shipments from Woollongabba were 15,000 tons more than for the corresponding period of last year, while in other parts of the State there were improved outputs. In the Ipswich district trade has been brisk, and miners have made good money. Regarding development work, at the Aberdare Extended Colliery arrangements have been made to resume the sinking of a shaft which was commenced and sunk to a short depth by the Aberdare Co-operative Company Limited many years ago. Some prospecting has also been done in order to locate the seam of coal which was lost in the main workings when a fault was encountered, and the whereabouts of which it is thought has been determined. Underground operations have been resumed at the New Aberdare Colliery, and development work is in progress. A railway siding has been completed to the pithead, where the screens and other arrangements necessary for cleaning the coal have been erected, and in a short time this colliery should be a considerable contributor to the output of the district. At North Ipswich, a little more vigour has been instilled into operations, owing to the demand for coke for copper smelting purposes, and regular fortnightly shipments of coke are now sent north. On the Darling Downs, trade has been normal, and there is the usual market for the coal. Further west, the sinking of two shafts at the State Colliery at Warra is in hand. The Dundee Coal Company are opening out and working the Hartley seam, in their new tunnel, on a section of 3 ft. 9 in. of coal with four bands of shale of about 1 ft. 4 in., making a total thickness of 5 ft. 1 in. The coal is won on the double road system of mining. The Torbanlea Coal Company, in the new tunnel to the north of the fault, are opening up the Burrum seam with success. The output of coal from the Central district during the half-year showed an increase of approximately 4,431 tons over that of the corresponding period of 1916. The collieries contributing to the output decreased by one, but the trade was not lost to the district, being distributed amongst the others, and thereby relatively increasing the individual output. The output from the Blair Athol field was 62,714 tons 18½ cwt., equal to an increase of 3,975 tons 15½ cwt. over that for the corresponding period of last year. The Co-operative Colliery ceased to be a factor in the output, owing to the workings being flooded at the close of 1916. The company's future project is to open-cut the coal in conjunction with a complete removal of the overburden. The most interesting features in the mining operations have been the sinking of a shaft on No. 27 lease of the Newcastle Coal Limited, purchased during 1916 from the Blair Athol Coal and Timber Company, and the opening up of the small seam in Lease 52 of the Blair Athol Company's No. 2 pit.

Canada.

Output of Nova Scotia.—The coal production of Nova Scotia for 1917 will total approximately 5,735,000 tons, comparing with 1913 and the war period as follows:—1913, 7,263,485 long tons; 1914, 6,650,038; 1915, 6,630,000; 1916, 6,190,000; 1917 (estimated) 5,735,000 long tons. The production of the Dominion Coal Company again shows the largest decline, having fallen from 4,443,105 tons in 1916 to 3,934,000 tons in 1917. A striking feature is the number of small companies that have sprung up and are mining coal on abandoned areas and on the outcrops of the main fields. The aggregate output of these small companies reaches over 100,000 tons. Unfortunately, the gain from these smaller operations is small in comparison with the large reduction in the tonnages of the larger com-

panies. It is also to be anticipated that the production of 1918 will show a still further serious decline, and that next year's outputs will drop to a full 2,000,000 tons below those of the year preceding the outbreak of the war. The Military Service Bill of Canada is now in full operation, and the local tribunals are considering the question of the exemption of the coal workers. It is expected that exemption of these men from military service will be generally granted. It is thought that about 10 per cent. of the workmen now employed at the collieries are included in Class 1, now called the Colours. Beyond the scattered operations of the smaller companies, no important developments have taken place in the Nova Scotia coal fields since the year before the war, and hence, even were a full working force available, the production of coal could not be expected to reach that of 1913. The existing mines have been depleted, and no new collieries have been started to take their place. No matter how the war goes, it will be many years before the coal production of Nova Scotia can approach the figures of 1913.

Labour Costs and Unions.—A tremendous increase has taken place in the costs of mining coal, both in labour costs and in material prices. Wage increases have been given since early in 1916, totalling over 50 per cent., and material prices have doubled, and in some cases trebled. During the year an amalgamation of the rival miners' unions has been effected, and in the Sydney district the men are organised as the United Mine Workers of Nova Scotia. For the time being, the more radical element among the unionists are in control, and they have made a demand for a further increase in wages which is in no case less than 30 per cent., and in most cases is much more. It is quite certain that the coal operators cannot give the increase demanded, and stay in the business. The result will probably be the appointment of a Conciliation Board. The existing wage agreement continues until the end of the year.

Enquiry into Explosion.—As a result of the verdict of the coroner's jury, three prominent mining officials have been indicted by a grand jury on a charge of manslaughter in connection with the mine explosion at New Waterford in July last, when 65 men were killed. The officials in question are the manager of No. 12 Colliery, the superintendent of the district in which No. 12 Colliery is situated, and the deputy-inspector of mines. The two first-named are officials of the Dominion Coal Company, and the deputy-inspector is an officer of the Nova Scotia Department of Mines. The Department of Mines appointed a Commission of Enquiry, which investigated the conditions in the colliery immediately following the explosion. This Commission were of the opinion that the explosion was a gas or a gas and dust explosion, caused by a shot, which, instead of spending its energy on bringing down the coal, escaped in the form of flame through a crack at the back of the mining. The Commission was unable to assign blame to any persons, but recommended that the Coal Mines Regulation Act be amended so as to require the mine examiner to report not merely the presence of gas, but to mention some indication of its extent and quantity where present. After the finding of the Commission, the indictment of the officials by a grand jury has come as a great surprise to the mine officials of the province. The precedent seems a new one, and it has not been usual that criminal prosecution should follow a mining disaster except by the finding and direction of the Department of Mines. The indictment of the deputy-inspector of mines along with the mine officials is also a feature that is causing comment among mine officials.

COASTWISE SHIPMENTS IN NOVEMBER.

According to the returns issued by the Commissioners of H.M. Customs and Excise the following quantities of coal were shipped from the United Kingdom during November:—

From	Total cargo.		Total bunker.	
	1916.	1917.	1916.	1917.
	Tons.	Tons.	Tons.	Tons.
Bristol Channel ports	107,899	78,266	9,905	8,294
North-western ports	202,764	114,599	44,167	32,611
North-eastern ports	410,974	372,021	17,128	16,642
Humber ports	48,710	20,294	7,727	3,461
Other ports on east coast	1,306	9,761	10,272	2,977
Other English ports	2,085	5,371	3,097	2,508
Total from England and Wales	773,238	600,312	92,296	66,493
Ports on east coast of Scotland	37,171	37,986	7,265	7,060
Ports on west coast of Scotland	129,587	144,268	17,516	16,808
Total from Scotland	166,758	182,254	24,781	23,868
Irish ports	—	—	3,984	1,704
Total from United Kingdom	939,996	782,566	121,061	92,065

The destination of cargo shipments was as follows:—

To ports in	Nov. 1916.	Nov. 1917.
	Tons.	Tons.
England and Wales	554,375	493,757
Scotland	30,995	18,753
Ireland	354,626	270,056

The *London Gazette* announces that January 1 has been appointed a "special" day to be observed as a Bank Holiday in England, Scotland, and Wales.

The threatened strike of West Cumberland iron ore miners, which would have affected about 15,000 men, has been averted. A wages dispute had arisen, and the ballot revealed a narrow majority against a strike, the offer of a conference at the Ministry of Munitions being accepted.

United States Coal Prices.—Cabled reports this week indicate that the coal trade in the United States is still in a very unsatisfactory condition. The Fuel Administrator (Mr. Garfield) stated to the Senate Investigating Committee that if the war continued very long the Government would be compelled to pool coal and sell it at reasonable prices. Some operators, he said, were making the greatest profits in their history.

LABOUR AND WAGES.

South Wales and Monmouthshire

The delegates to the Eastern Valley district conference, Monmouthshire, have resolved to call upon the central executive council to demand from Mr. Clement Edwards, M.P., proof of his "German gold" allegations, or an unreserved apology.

The workmen employed at the Tirpentwys Colliery, Pontypool, have decided to contribute 4d. per week towards the relief of the dependants of the 100 men who have joined the Forces from the colliery.

A deputation of workmen from Nixon's Navigation Colliery waited upon the executive council of the South Wales Federation on Friday of last week, in order to submit to them proposals for re-arrangement of the working hours at the colliery, and after this had been considered it was decided that Mr. T. Richards, the general secretary, should communicate with the employers on the subject.

The new rule for auditing the Federation accounts at the central offices will not become operative for the current year. During the ensuing six months the question of adopting uniform books of account will be considered, and in the meantime local secretaries will continue to use their present books.

An application has been heard by the Committee on Production concerning men employed by the Ebbw Vale Company at their Victoria furnaces, and an award has been made that the rate for blowing in shall be based on a minimum throughout of 800 tons for grades of men such as keepers, slaggers, and hoistmen; and that the rate for the bed-men shall be on a minimum of 1,050 tons.

The general secretary reported to a meeting of the Enginemakers and Stokers' executive, held in Cardiff on Wednesday of last week, that he was consulting with the legal adviser of the association as to some clause of the National Insurance Act which affects members of their union. There had been, he stated, several cases of non-payment of the war wage, and after negotiations certain of these had been settled. Others had been left for the Joint Committee to deal with.

North of England.

The council of the Northumberland Miners' Association has unanimously accepted the coal owners' offer with reference to the application for an increase on the county percentage on minimum wages. The owners offered that, instead of the percentage being one-half of the county percentage over 50, which gave 35 per cent. at the present time, it should be five-sevenths of all percentages over 50, so that, with wages, as they now are, 120 per cent. above the basis of 1879, the men in receipt of minimum wages will receive 50 per cent. on the basis.

The executive committee of the Northumberland miners' Association has had under consideration the cases of those miners who, being compelled to lose a day's work on being summoned to attend military medical boards, are being deprived of the war wage allowance of 1s. 6d. for the day lost, and also for the pay Saturday in cases in which the lost day has occurred during the short week. The whole question has been referred to the executive of the Miners' Federation.

Men working on the discharge of ships, filling iron ore, and in the pit prop yards at Hartlepool, have been conceded an advance of 1½d. per hour, as against 2d. asked for, to come into force on January 1. The advance brings the wages of the stevedore labourers up to 22s. 4d. per week over pre-war rates, and those of iron ore fillers and prop yard workers to 22s. 1½d. over pre-war rates.

In view of the irregularity of employment, due to shipping difficulties very largely, at Northumberland and Durham collieries, the career of the mobility bureau which has been set up by the Coal Controller, and the working of which has been entrusted to the Miners' Federation, will be watched with much interest in this district. It may result in allaying the dangerously large amount of dissatisfaction which exists in the mining districts at present, especially

as separation allowances at the rate of 17s. 6d. per week are promised in connection with the scheme. At most, however, it can only be regarded as a palliative, and not as a remedy of the existing evil.

In his latest circular to the members of the Durham Miners' Association, Mr. T. H. Cann (secretary) deals with the problem of the great amount of unemployment in Durham colliery districts. He states that the financial strain on the association's funds is increasing, thousands of the members are bordering on starvation, and, unless something is done very speedily to remedy matters, the association will be compelled to take steps the necessity of which, under the circumstances, they would probably all deplore. The Coal Controller or his representatives have been approached, but the usual promises that the question would have the serious consideration to which it is entitled have not improved matters. The outlook is gloomier than ever, and the miners are forced to the conclusion, although the Controller is able to fix up an apparently satisfactory arrangement with the owners as to what happens when it comes to a question of whether workmen and their families shall be allowed slowly to starve to death, that the difficulties in the way are either insurmountable or that the war has so blunted our finer feelings that human sympathy is a secondary consideration to the rights of capital.

Announcing that the minimum wage settlement has been almost unanimously accepted by the members of the Durham Miners' Association as an agreement, subject to

Controller's control, for the period of the war, in all probability, the whole question will be of legislative consideration, Mr. Cann mentioning the acceptance of the figure of 8s. 8d. per ton, and thereby the relinquishment of the 3d. for each 1½ per cent., some may consider the settlement not altogether satisfactory, but there does not appear to him to be any real reason for discontent. So far as the minimum wage is concerned, he is not aware that that principle was ever demanded or conceded, and, remembering that £ s. d. is the standard from which our right to live is measured, he avers that only fools or narrow-minded bigots could seriously contemplate launching the county into a general stoppage for the sake of 1d. per day for a limited number of members. The element in the settlement most pleasing to him is the fact that it contains, in some slight measure, a redemption of an oft-reiterated pledge to do something for the lower-wage man. That alone ought to bring some consolation to the man who is called upon to sacrifice 1d. a day in the interests of men less fortunately placed.

Federated Area.

The Yorkshire Deputies' Association, at Barnsley on Saturday, discussed the treatment of their body by members of the South and West Yorkshire coal trade associations, and by resolution advised their own members to "ballot to strike in order to enforce proper recognition, the establishment of a joint board for determining wages and conditions of employment, and the establishment of our own county minimum wages appeal." The meeting was attended by delegates representing over 2,000 colliery deputies in Yorkshire.

At meetings of miners held in the Manchester, Bolton, and Leigh areas, it was announced that the Lancashire and Cheshire Miners' Federation had called upon the Miners' Federation of Great Britain to interview the Coal Controller with a view to putting a stop to the alleged profiteering in the coal trade, and to take off the recent advance of 2s. 6d. per ton. Lancashire and Cheshire miners at pit set meetings have affirmed their willingness to down tools unless this is done.

Scotland.

At the time of writing no settlement has been arrived at in connection with the threatened strike of the colliery clerks of Cowdenbeath district. Considering the attitude the miners' union is taking in the matter, it is expected that the notices recently lodged will not be allowed to expire.

An attempt is being made at Bedlay, where the miners have been out on strike for some time, to restart work by a number of the men. Much resentment is felt that union engineers are lowering and raising the "blacklegs," and the matter is likely to be brought before the Enginemen's Union. The delegates attending the Scottish Mine Workers' Union decided to increase the strike aliment to the men who are idle.

The pledge of the Coal Controller with regard to leaving out of account the war wage for men who are at light work and partially incapacitated, when arriving at the amount of their partial compensation, has not yet been carried out by the various indemnity associations, and the failure to do so is causing a considerable amount of trouble. It is almost certain that if the pledge is not carried out shortly, trouble involving stoppages at some of the collieries may arise.

At Avonhead Colliery, Longriggend, friction has taken place through the delay of the colliery company in paying the war bonus to workmen who were thrown idle through want of trade. It is now understood that the Coal Controller's Department has intimated definitely that the arrears due to the workmen will be paid on an early date.

At Swinhill Colliery, Lanarkshire, a dispute took place regarding the reduced rate paid to the men employed in a section of the Kiltongue coal which has recently been opened up by the coal-cutting machine. As a result of negotiations, a rate has been offered by the manager, which, with free explosives, was accepted by the men, and a stoppage has thus been averted.

Trouble has cropped up at Hassockrigg Colliery, Hart-hill, Lanarkshire, regarding the payment of bonus to men who are compelled to work on Sundays. The attention of the general manager has been drawn to the matter, and it is believed a settlement will be readily effected without loss of work.

Idle time is threatened at the Carron Company's collieries in the Maddiston district, through the refusal of a few of the firemen to become members of the National Union of Mine Workers.

At Smeaton Colliery, in the Lothians, there has been some confusion and misunderstanding in regard to the payment of the war wage, the men being paid seven days the one week and five days the other.

The miners in the Bannockburn and Carnock districts of Stirlingshire are arranging seasonable entertainments and gifts for the children of soldiers and sailors belonging to the district who have joined the Colours since the outbreak of war. The men have unanimously agreed that one day's war wage shall be the minimum subscription.

An increase of 3d. per day has been obtained for the bottomers at Glenburn Colliery, Prestwick, Ayrshire.

Work has been resumed at Wheatrigg Colliery, Ayrshire, where the miners have been on strike for 13 weeks. The strike arose out of resistance to a reduction of 6d. per ton imposed by the management for a curtailed draw. Although the men are now at work, the point at issue is still under the consideration of the Coal Controller.

Iron, Steel and Engineering Trades.

A mass meeting of the members of the Sheffield branch of the Iron and Steel Trades Confederation decided not to resume work after the holidays unless they were paid the increase of 12½ per cent. promised by the employers, but not sanctioned by the Government. The meeting was held in the Coliseum Picture Palace, with Coun. M. Humberstone, J.P., in the chair. Mr. W. Dodgson, divisional officer of the Confederation, said that the Confederation did not believe in strikes in peace times, and they were certainly opposed to a strike taking place at this time, in view of the very serious crisis through which the country was passing. The employers were convinced of the justice of their claims, and would have given them the advance, with arrears from October 12, but for Government inter-

Notes from the Coal Fields.

[LOCAL CORRESPONDENCE.]

South Wales and Monmouthshire.

Difficulties of the Coal Trade—Breakdown of the "Pooling" Scheme for France—Great Development of By-products Manufacture—Arrears on Contracts—Cases in Court—Reports Concerning Research Work.

As mentioned in our issue last week, a meeting of coal exporters passed a resolution against the proposed pooling of exports to France. Mr. T. E. Watson (of Pyma, Watson and Company), president of the Cardiff Chamber of Commerce, occupied the chair. It was evident at the outset that, not only was the matter very complex in so far as any arrangements could be made, but also that there were strong interests adverse to the suggestion. The root idea was that the profits of the business should be put into a common fund, and be distributed upon a basis relative proportionately to the amount of trade which each firm did prior to the outbreak of hostilities. There was the disturbing factor that certain exporters, who now do a large share of the trade, had very little before the war, even if they were in the business to France at all; and these naturally could not assent to any such proposal as that before the meeting. Other conditions adverse to the proposal—some of them referred to in a further paragraph—came also under discussion, with the result that difference of opinion was very marked, the opposition being at least as strong as the advocacy. It was decided that the voting should be confined to those present in the meeting; and the first result was that 36 voted for pooling and 16 against. Then it was decided that a count should be taken upon a basis of tonnage shipped from January 1913 to May 1916; and this reversed the result—for the figures were 9,696,484 against pooling, and 6,552,709 in its favour—this being an adverse majority of 3,143,775, which was a rejection of the recommendation of the executive committee. The total voting power in the meeting was about four-fifths of the shipment status in the period named.

This is not the only difficulty. The obstacles and hindrances can be gauged perhaps more accurately upon the floor of Cardiff Exchange than in another other way; its appearance—depleted of so many regular habitués who have gone to the war, and with many present-day frequenters so obviously idle—telling of the business decline that has been experienced. Yet loss of trade is temporary. The outstanding difficulties of the moment are two, namely—to make the control system workable with reasonable fairness to the various parties affected; and (more important because of its permanent character) to so adjust relations of capital and labour that the highest and lasting interests of all parties concerned may be duly and adequately safeguarded. These points are the subject of perpetual discussion, never more earnestly than at the present time.

Regarding control, the outlook of the industry is confused and uncertain, especially as every stage of control goes one step further in the direction of ousting the employer's freedom of operation, also the trader's, and puts weapons ever more effective into the hands of the most powerful of trades unions.

Another matter as to which coal exporters have difficulty at the present moment is that of the arrears on coal contracts. Originally, a committee of three coal owners and three exporters was constituted, but upon some difficulty arising as to election of chairman, the matter was referred to the Controller, who nominated Mr. Franklin Saunders, of Swansea, to be independent chairman or arbitrator. The committee objected to this, and a deputation saw him on the subject last week, submitting a suggestion of their own that the committee should stand in its original form without any specified chairman, and that in the event of disagreement Sir T. J. Hughes, who is chairman of the Welsh National Insurance Commission, should be called in to act as independent chairman.

Relative to the employment of ex-soldiers and ex-sailors after the war, a meeting was held in Swansea. The gathering was representative of employers and workmen, not alone of the anthracite coal industry, but also of other industries in Swansea. Mr. J. Vaughan Edwards presided, and with him were gentlemen representing the Ministry of Labour. Reports were presented concerning the work of the employment exchanges; also as to arrangements as to dealing with substitution work; and it is understood that these meetings will be continued monthly. Mr. Ivor Jones holds the position of secretary. The proceedings at this first meeting were necessarily only of a preliminary character.

A singular case of tuberculosis after an accident in the colliery was mentioned in the Pontypridd County Court, where a man formerly engaged at Llanhilleth Colliery claimed compensation from Messrs. Partridge, Jones and Company on account of an accident 13 years ago, when he was injured by a fall of clod which fractured his leg above the ankle. Tuberculosis supervened upon the accident, and three years later he sought to resume work, but failed to continue in employment. After a few months the compensation was again given. In August, however, following medical examination, his compensation was stopped; and he now claimed 18s. 6d. from September 1. Medical evidence attributed the tuberculosis to the accident, it being stated that there was no previous trace of consumption about the man, who at the present time was quite unfit for any form of work. Contrary medical evidence, on behalf of the respondents, was given by doctors, who stated that they could not connect the lung trouble in any way with the accident. The judge, however, gave a decision in favour of the applicant for the amount claimed, with costs.

Another singular case was heard at the same court. A lampman at Elled Colliery claimed payment of 18s. 6d. per week for the period of the recent strike which lasted for three months. It was stated that plaintiff, who had sustained an accident at the colliery previously, was employed on light work as a lampman; and when the strike commenced he presented himself for work, but was told that as there were no lamps to clean, there was no work the manager could offer him. The evidence of the manager, however, was that the strike had been in progress for a fortnight before he saw plaintiff, who asked if he might work, and he was then told this was impossible, as there were no lamps to clean, but that his job would be open to him as soon as work was resumed. It was contended, on behalf of the plaintiff, that if he had not commenced light work prior to the strike he would still have been entitled to compensation during the period of the strike. The judge decided in favour of the plaintiff, considering that respondents' case was quite unarguable, the man not having gone on strike in sympathy with the others.

A report of peculiar interest and value has been issued by Principal Knox, of the South Wales School of Mines, Treforest, dealing with industrial research work which may

be carried out in the South Wales coal field; and it is of all the more importance because of work of this character which has been initiated by Lord Rhondda in connection with the Cambrian Combine, and of similar work which is carried on elsewhere. After summarising certain operations of the Research Association, Principal Knox states that there are two possible methods of organising and developing the scheme which was passed by the management board. One would be the establishment of an approved association to be supported by the colliery companies, an association which would enable its members to provide financial support, their payments being recognised by the surveyor of taxes as business costs of the firm, not subject to income tax or excess profits tax, and these contributions, together with financial aid from the Government for a period of years, would form the necessary fund for establishing and developing research work. Other methods, he thinks, would be to establish an approved association for research on conditions laid down in a draft memorandum and articles of association.

In his opinion, under the first method, conditions imposed by the committee of council would seriously hamper and delay the work proposed in their research scheme, for it would be necessary to submit to that committee the proposed scheme with an estimate of expenditure, and thus would be incurred needless delay before permission was granted. Then, again, the results of any investigation would have to be first communicated to the committee of council, who would determine (after consultation with the association) whether, and, if so, to what extent, and under what conditions, the results should be made available. This course opens up needless possibilities for further delay; and then, further, the committee of council reserve to themselves the right to determine ownership of patents, designs, or results of investigations, and any benefits and profits arising therefrom.

Under the second method, however, the association, when approved, will be free to carry out its work without outside interference, and in a direction most suitable to the South Wales coal field. The scheme adopted by the management board includes, amongst other branches of research, the following, all of which can be started immediately:—

- (a) Low-temperature carbonisation, including the microscopic investigation of coals.
- (b) Gas producers suitable for Welsh inferior coals and smokeless fuels produced by low-temperature carbonisation.
- (c) Investigation of South Wales clays, silica, rocks, and dolomites for making highly refractory bricks.
- (d) Ferro-concrete supports for underground workings.

Confining the initial work to the fuel research and geological laboratories, operations will be divided into three sections:—

- (1) Chemical analysis of the various coals in the South Wales coal field for the purpose of general classification into (a) coals suitable for low-temperature carbonisation, (b) coals suitable for complete gasification in producers, (c) coals unsuitable for either of these purposes.

(2) Microscopic analysis of the same coals to determine whether causes producing unsuitable results were due to ingredients distributed throughout the coal or confined to certain portions of the seam, and whether it would be physically possible or economically advisable to devise means for their removal.

(3) Investigations into the best forms of retorts and producers for dealing with coals found suitable for either low-temperature carbonisation or complete gasification.

It will be necessary, in order to carry this through, to put upon the work two chemists, one geologist, one engineer, and a labourer, although if the existing staff were made use of in a consulting capacity, the services of the engineer and probably one chemist might be dispensed with. However, if all five appointments have to be made, the salaries would amount to £1,600 or £1,700 per annum. The chief chemist would receive £500, his assistant £250, the geologist £400, the mechanical engineer £350, and the labourer £130.

For investigation into South Wales deposits of clay, silica, and dolomite, another chemist would be required, at an estimated salary of £500 per annum; whilst the assistance of the members of the staff of the fuel departments would reduce the expense of running this particular department to the cost of one assistant at £250, thus making a total of £750 per annum. Then there would be ferro-concrete investigation, entailing the services of a good practical engineer; and Principal Knox notes that sufficient work has already been accomplished in this branch to permit of colliery proprietors putting this scheme into practice immediately if guided by an experienced engineer. The salary for a suitable man would probably be about £400 per annum.

Capital expenditure for new workshops, smithies, etc., and for additional research apparatus, would make up a total of £18,700. Adding the clerical and incidental expenses of the different departments outlined, the salaries and other expenditure for the first year would total approximately £3,350. Only a small part of the capital expenditure would, however, be required during the first year, enabling work to be commenced. A levy of ¼d. per ton from the subscribing colliery companies would produce the whole amount needed in two years. After investigation into low-temperature carbonisation and gas production had reached the stage when it was considered advisable to erect plant on a commercial basis, this could be put up either in connection with some colliery installation or at an electric power producing centre, such as that at Treforest, where it would be possible to utilise the gas for power production. Principal Knox predicts a time when operations will be followed by the erection of large central plant, where all the tars and other by-products could be treated in bulk.

It is stated that the Ynysamman Colliery, which has not been working regularly for some time past, is about to change hands, and that the new proprietors will undertake prompt developments.

The miners' executive intend taking some action with the object of reversing the decision of the central tribunal, which has refused exemption from military service to a checkweigher at the Raven Colliery. The local tribunal granted the exemption, but upon appeal the central body decided to the contrary. The general secretary of the South Wales Federation will communicate with the central tribunal, asking that the evidence should be reviewed.

The chairman of the Blaenavon Colliery Company (Mr. R. W. Kennard), speaking at the shareholders' meeting on Friday of last week, stated that the 75,000 shares recently issued would improve the amount available for working capital, and he added that their steel output would be double. Mr. Ritchie, who seconded the motion for adoption of the report, announced that washeries of an improved type were being put up, and he also made the statement that large coal was being crushed for the coke ovens, the irregular working of the pits not supplying sufficient small

Iron and Steel Supplies.—Of the total production of iron in Austria in 1917, 282,000 railway loads were reserved for military purposes, the remainder being all that was left for the various industries of both Austria and Germany. It is estimated that next year only 21,000 railway loads will be available for private industries.

to keep the ovens going. In ordinary conditions, it would not be an economical proposition to break up large coal for coking, but at the present time the loss would be less; and it was an advantage to keep the pits working to a greater extent than would otherwise be the case. From the blast furnace developments they anticipated great things, and the construction of railway sidings to the furnaces would pay for itself over and over again, enabling iron ore coming from the docks at Newport to be run right up to the furnace tips. A new gas cleaning plant would be installed, and they were considering the provision of greater electric power. Describing the improvement in the furnaces, he said that in the steel furnaces the old furnaces were not capable of turning out an average of more than 1,000 tons a week. One new furnace had been completed, and within the next few months three others would be at work, and they would have no difficulty in getting an output of 2,000 tons a week, perhaps considerably better, even after allowance was made for one or two of them being out of condition temporarily.

Three colliers sued Mr. E. Johnson, proprietor and manager of the Trebone Colliery, in the Rhondda, for small amounts as arrears of wages, being for a difference of 5½d. per day. They claimed that the minimum wage rate should be 9s. 1½d., whereas they had been paid only 8s. 8d. The defence was that the men were not entitled to the higher rate because they were not wholly employed underground. Mr. Johnson stated that the men spent four hours underground and four hours on the surface, and that they should put in the whole eight hours at their work. Judgment was given in favour of two of the plaintiffs, but in the third case the claim was withdrawn.

Northumberland and Durham.

River Wear Commissioners—Durham Enginemasters—"Combing Out"—Winding Men—Colliery to be Closed—Compensation Case—Homes for Aged Miners—Wage Pooling Case.

The Lambton and Hetton Collieries Limited, the Marquis of Londonderry, and the Ryhope Coal Company Limited, were amongst the donors of coal as Christmas gifts to the inmates of the Merchant Seamen's Houses, Sunderland.

Mr. R. W. Hall, resident manager of the Leasingthorne Colliery of Messrs. Bolckow, Vaughan and Company Limited, has been appointed general manager and agent to a colliery near Cardiff.

At the December meeting of the River Wear Commissioners, it was announced that the Marquis of Londonderry, Mr. H. M. Stobart, and Mr. J. B. B. Hawkins, coal owners' representatives, had all become disqualified as members by reason of their non-attendance. The clerk was instructed to call a meeting of coal owners to fill the vacancies. It was stated, however, that these three gentlemen were all on active service, and the chairman (Mr. R. M. Hudson) remarked that it was necessary, by Act of Parliament, to call the meeting, otherwise they would have been glad to recognise their services by re-electing them without that formality.

The annual delegate meeting of the Durham County Colliery Enginemasters, Boilerminders' and Firemen's Association was held on Thursday of last week. Mr. M. Westgarth (Ryton) was re-elected president by 315 votes to 97 for Mr. E. M. Coates (Crook). Mr. R. Dobson (Morton) was elected to the committee to represent the winding enginemasters, and Mr. W. Carr (Ferryhill) to represent other classes in the association. In his report, Mr. W. B. Charlton (agent) noted that the owners' secretary had stated that seven days' war wage would be paid to men who worked seven days on an average, and this he regarded as satisfactory. The Coal Controller had stated that he did not consider employees on private railway lines belonging to colliery companies as colliery workers within the scope of the war wage, but, as the result of representations, provisions had been made under which the whole of the members of the association were entitled to the wage. Dealing with the "combing out" of colliery winding men, he contended that the removal of one man in three would entail upon the two remaining the whole of the winding, which would violate the statutory rule, and court danger. They had been told to teach others. They could not teach a man under 22 years of age, and, if a man was fit to wind, he was fit for general service; while a man who started to learn at 45 and upwards never became a winding enginemaster. Such a proposal meant jeopardising the lives of men and boys descending and ascending the mines. They had never attempted to screen their members from military service, and, but for the imminent danger ahead if the proposal were carried out, no comment would have been offered. They felt bound to say that if the persons appointed under section 97 of the Mines Act, 1911, were the advisors of the "combing out," then their action was a libel on the charge of duties therein embodied. If the Miners' Federation executive had unwittingly assented to such a disturbance of what had been deemed absolutely necessary for safety, then it stood out as a tangible reason why all phases of mining should have representation on their committee.

It is stated that the East Castle Colliery of the East Pontop Colliery Company Limited is to be closed down at the end of the year, owing to the exhaustion of the local coal seams. The employees have received notices to terminate their employment. Between 40 and 50 men and youths will be provided with work at the East Pontop Colliery, it is said.

The Newcastle County Court judge has decided in favour of J. Donnison, rolleywayman, of Low Prudhoe, in the latter's application for £7 compensation from the Mickley Coal Company in respect of an accident on Boxing Day last year, when applicant slipped on the ice whilst leaving his work, and was injured. Judge Greenwell decided that the man would not have been where he was if he had not been returning from his work, and that the accident occurred on the employers' premises.

Crookhill district miners have formed a committee with a view to building some homes for aged mine workers in their district. At a recent meeting, nearly all the local miners' lodges were represented, and it was decided that a call of 1d. per fortnight should be made on full members and ½d. on half-members.

Addressing the shareholders in the Cargo Fleet Iron Company Limited at their annual meeting on Friday of last week, Lord Furness said it would interest them to know that their third blast furnace was now in operation, and giving satisfactory results, and that a large new Talbot steel furnace was now actively working. They now had six Talbot furnaces in their enlarged steel shop. The renewal of their second battery of coke ovens was being proceeded with, and, during the coming year, they expected to have three batteries of 50 ovens each in full operation.

Mr. George Simpson has been elected trustee of the Shankhouse lodge of the Northumberland Miners' Association for the 23rd consecutive year.

A rather interesting form of token fraud was penalised by the Seaham magistrates, when Wm. Fitzsimmons and Geo. Peel, hewers at Seaham Colliery, were each fined £3. It appeared that it was the custom of the colliery for three men working in the same place to pool their wages—a custom recognised by the owners. In this case, there was reason to believe that six men were pooling their wages—Fitzsimmons and two other hewers who were working in one place, and Peel and two others working in another. The assistant under-manager found Peel's token on Fitzsimmons' tub. Fitzsimmons and his mates were only averaging 5s. 6d. per shift, and the minimum rate of 7s. 8d. was being made up by the employers. Peel and his mates were averaging about 16s. per shift. Had the tub gone to bank with Peel's token in it, Peel would have been paid 1s. 8d. for it, and Fitzsimmons would still have received the minimum wage of 7s. 8d. The owners would thus have paid twice over for the same tub, and have lost 1s. 8d. The prosecuting solicitor stated these cases, which were difficult to detect, were believed to be common. He was instructed to press the case.

Yorkshire.

Goole Trade—Water Supply in Colliery Districts—Summonses for Short Weight—Miners Fined.

The port of Goole, which has been so badly hit by the war, prior to which it was greatly flourishing through colliery and other developments, is now looking out for new industries. At a meeting of the Council last week, the town clerk submitted letters from a London firm of consulting engineers desiring information in regard to available water supply, etc., in connection with a proposal for the erection of a power station and factory in the vicinity of Goole. The clerk was instructed to furnish all information and particulars. This having been done, a reply has since been received stating that the question as to whether the proposed factory will be situated in the district of Goole or in some other part is still under consideration. The Council has resolved to forward a copy of the correspondence to Sir Joseph Compton Rickett, and ask him to use his influence in securing the establishment of the proposed factory at or near Goole.

The colliery districts of the Doncaster area were well represented at an important conference which took place at the Mansion House, Doncaster, this week, to consider the water question in view of the great industrial developments which will follow the war. Doncaster Corporation, Doncaster District Council, and the councils of Hemsworth, Adwick, and Thurnscoe all sent delegates. The matter was discussed in camera for an hour and a half, and it was then decided to approach the Leeds City Council with a view to the opening up of negotiations with them for a supply of water on similar lines to those proposed in 1913. Leeds has millions of gallons running to waste, which would be of the greatest service to the Doncaster colliery area.

At Bradford on the 20th inst., Tom Johnson, coal merchant and contractor, of 75, Westgate, had to answer 10 summonses—two for not having weights and scales on one of his hawking carts, and eight for short weight in bags, the shortages varying from 4 lb. to 15 lb. The defence was that defendant had been away, and his employees had taken advantage and allowed carelessness. Mr. Johnson, it was said by his solicitor, was the last man who would think of taking advantage of poor people by selling short weight, and would take measures to see that in future better supervision of the business would be ensured. The stipendiary magistrate said he did not think there had been any deliberate intention to defraud, but the offences were serious ones, and there must be a fine of £5 on each summons—a total of £50.

A large number of summonses against colliery employees for various offences in the Denaby pit were heard at the Doncaster West Riding Police Court on Saturday last. A Conisboro' filler, named Bramall, was fined 25s. for damaging a safety lamp with a pick and failing to report it. Harold Bell (15), pony driver, Denaby, was fined 12s. for kicking a pony twice in the stomach. For riding on the backs of their ponies in the Denaby pit, W. Kitchen, J. Clarke, C. Jepsin, J. Farmer, and J. Hibberd, all pony drivers, of Denaby, were fined 30s. each. H. Taylor, miner, Conisboro', was fined 30s. for leaving a lamp in the pit; and Charles Rawlings, pony driver, Denaby, for deliberately kicking a safety lamp and damaging it, was fined 20s.

The year which is just closing has not witnessed any striking changes or developments in the southern portion of the Yorkshire coal field, for the simple reason that the war has, for the time being, put an end to all enterprise. The new pits at Rossington and Hatfield continue to open out. Shortage of men, however, and shortage of houses have both retarded development. When the war is over there will be room for building operations in the Yorkshire coal field of a very extensive character, for all the mining centres are in need of further dwellings. In the Doncaster and Mexboro' districts the need is very pressing.

Not only will houses be built, but half a dozen new collieries will be proceeded with at the first opportunity. The Markham Main at Doncaster is only waiting for the peace proclamation, to go forward at once. Then there is the projected new colliery at Finningley; the "German" pit at Harworth, now in the hands of a British firm; the Thorne Colliery of Messrs. Pease and Partners; the Firbeck pit, and other enterprises which will immediately be put in hand when men can be released for the work. Probably in no part of the country has industrial development been more seriously retarded than in the colliery district of which Doncaster may be said to be the centre.

At the annual meeting of the council of the Yorkshire Miners' Association at Barnsley, the election of officers resulted as follows: Vice-president, County Ald. Guest (re-elected); auditor, Mr. J. Ballance (re-elected); members of the Joint Committee, Messrs. F. Hall, M.P., S. Roebuck, J. Guest, S. Jacks, T. Phipps, and J. Richardson; members of the executive, Messrs. S. Shea, J. Mason, W. Lunn, J. Johnson, A. Senior, F. Wollerton, B. Wharham, T. Smith, and E. Whelan. A resolution was adopted and ordered to be sent to the Prime Minister opposing the proposed further conscription of man-power of the nation, unless guarantees are given that previous to that the fullest conscription of wealth shall be put into operation. Mr. Smith referred to a dispute which has existed for 26 weeks at Hound Hill Colliery, Barnsley. The Coal Controller's Department had interviewed both sides, and Sir R. Redmayne suggested terms for a settlement. He (Mr. Smith) had met Mr. R. Richardson, of Barrow Colliery, who had been appointed to represent the owner of the colliery (Mr. Broadhead). They agreed to certain proposals, but the owner now refused to allow Mr. Richardson to sign the agreement. They put the matter before Sir R. Redmayne again, and expected something being done to instruct the owner to sign the agreement, but that had not been done. They now learned that a few men were working at the pit, and coal was being

supplied to the Barrow and Strathford collieries by the assumption by them. The colliery companies asked that they could not discontinue taking such supplies, but were authorised to do so by the Coal Controller. The Council now decided, unless the collieries discontinued taking coal, the men working there would tender notice to leave work. Mr. F. Hall, M.P., a member of the Parliamentary Committee, reported that a suggestion was to be made to the ensuing conference at Nottingham of a proposal to erect in London memorial buildings in recognition of the lads who had given their lives in the war. The council instructed its delegates to ask that the proposal be referred to the districts, when a vote on the matter would be taken, and also ascertain the actual cost and upkeep of the proposed scheme. The council did not oppose the principle of the scheme, but considering the Miners' Federation of Great Britain equalled nearly one-fourth of the British trade union world, they claimed the right to have an estimate of their liability in the matter.

Lancashire and Cheshire.

Mr. A. E. Cooke, late manager at Messrs. Cross, Tetley and Company's Mains Colliery, Banfurlong, has taken an appointment near Bath.

Owing to the increased cost of labour and materials, the horse and motor owners in many South Lancashire colliery districts gave notice last week-end that all cartage and haulage rates will be further increased on January 1.

Over 3,000 females are now employed on pit brows at collieries in the South Lancashire coal fields, and many have been recruited from local cotton mills, and they appear to prefer pit work for various reasons to factory life.

Mr. Stephen Walsh, M.P., the Parliamentary Secretary of the Local Government Board, who, in addition to being chairman of the Workmen's Section of the English Mining Conciliation Board, is also a miners' agent at Wigan, publicly presented Ald. John Cheetham, J.P., a well-known miners' checkweigher, of Wigan, on Saturday night, with an illuminated address and a National War Bond for £50, in celebration of his silver jubilee as the first working man appointed a justice of the peace in this country.

The Midlands.

A case affecting the coal allowance custom of the Black Country came before the West Bromwich County Court judge on Friday of last week. A Dudley miner claimed £1 1s., the value of a load of coal from the Birchfield Colliery Company, Oldbury. Plaintiff said that Mr. Sadler, one of the directors of the company, discharged him on November 6 at a minute's notice, and witness claimed he was entitled to allowance coal for 14 days' work. The reason he was discharged was because he would not go down the pit alone. When he went to work he found there was no one else to go down, and he went back home. It was contrary to the Coal Mines Act for a man to go down the pits alone. Cross-examined, he said it was the custom that a ton of coal should be allowed when a married man had done 24 turns and a single man 48 turns. He denied that there were urgent repairs to be done in a main road, and that he declined to go and do them. Mr. Sadler said the man declined to go and do the repairs, and was sent home, and as he had not done the full number of turns he was not entitled to the coal. The case was adjourned for the attendance of the manager.

The Midland scheme, under which district organisations of colliery owners are co-operating with the Coal Controller, in mobilising supplies of pit timber, is steadily developing. The association which acts for Warwickshire includes 60 or 70 members, representing about 80 per cent. of the output. Maximum prices have been fixed, and with the aid of the Controller, the association can compulsorily acquire any timber in its appointed area of supply which is considered desirable for mining purposes.

Kent.

The output of Tilmanstone Colliery last week was 2,807 tons, and the Snowdown Colliery also brought to bank nearly 3,000 tons of coal.

The Betteshanger coal area, in the neighbourhood of Deal, is reported to have been the subject of satisfactory negotiations between the syndicate and several northern colliery proprietors. The matter, it is understood, will shortly be brought before the shareholders in the Betteshanger Boring Syndicate, which put down the borings that proved the coal in the area.

Scotland.

Grease Scarcity—Electrical Power Station—Shot-Firing Case—Metals and Banking—Mine Managers and Salaries.

A great scarcity of grease for colliery tubs exists in Scotland. Manufacturers have asked the Government to release more material for the manufacture of grease for this purpose.

The erection of a large electric generating station at one of the West of Fife collieries is being pushed forward. Water tube boilers of the Babcock and Wilcox type are at present being erected.

At Falkirk Sheriff Court, Hugh Brady, colliery under-manager at Meadowbank Colliery, was charged with having directed a pit fireman to direct a miner to act as a shot-firer notwithstanding that it was not practically possible for the miner to do the work if the fireman complied with the order. The Sheriff decided that the prosecution had not made out their case, and stated that it seemed to him that accused had done what was reasonably possible to carry out the order. The fireman had been convicted of a contravention, but accused had no reason to suspect that the fireman was not doing the work properly. The Sheriff also referred to the responsibility of an under-manager under the Order in such circumstances, and expressed the opinion that "manager" did not include under-manager. He accordingly found accused not guilty.

At a meeting of the West of Scotland Iron and Steel Institute, held in Glasgow on Friday evening of last week, Mr. H. Beard presiding, Mr. O. C. Beale read a paper on "Our Imperial Strength Based on the Metal Industries and an Efficient Banking System."

At a meeting of the Scottish Mine Managers' Association, Mr. William Stevenson (the president) discussed the proposal made by Mr. Robert Baird, on behalf of the Scottish Coal Owners' Association, to the law agents of the Mine Managers' Association. Salaries of all mine managers were to be increased by at least £75 per annum. The meeting resolved: "That the association regret that the coal owners have not conceded the principle of a minimum salary to mine managers; that the association do not consider the proposed increase of salary is adequate, yet they should accept the terms proposed by the coal owners; that the association hope the cordial relations which had existed between the managers and owners would continue." A copy of this resolution is being transmitted to Mr. Robert Baird, on behalf of the coal owners.

THE COLLIERY GUARDIAN

Monthly List of Recent Coal Literature.

I.—General.

- Coal Production Cost. J. B. L. Hornberger. "Coal Tr. Bull.," Nov. 1, p. 35. (Paper read before Natl. Coal Assocn., Pittsburg.)
- Financial Aids for Employees. W. L. Chandler. "Ind. Man.," Oct., p. 36. (Co-operative clubs, housing, benefit associations, thrift clubs.)
- Merit Rating of Coal Mines under Workmen's Compensation Insurance. E. C. Lee. "Bull. Amer. Inst. Min. Engin.," Oct., p. 1825; "Colliery Guard.," Nov. 16, p. 945.
- Belgian Coal and Coke Industry in the War. "Coal Age," Oct. 27, p. 713.
- Accident Statistics and the Operator. A. H. Fay. "Coal Age," Oct. 13, p. 615.
- The Flow of Water in Siphons. M. Halliday. "Trans. Inst. Min. Engin.," Nov., p. 107; 2 fig.
- The Coal Problem in France. "Colliery Guard.," Nov. 9, p. 884. (From "Bull. Soc. Ind. Min.")
- The Protection of Inventions. "Colliery Guard.," Nov. 23, p. 986.
- The Chemist in Mining. T. G. Watts. "Sci. and Art Min.," Dec. 1, p. 168. (Lecture to the Intermediate School, Pontypridd.)
- Coal Mine Shop Equipment. R. M. Magraw. "Coal Age," Nov. 3, p. 750; 4 fig.
- Coal in British Columbia. E. Jacobs. "Can. Min. J.," Nov. 15, p. 442.
- Fuel Conservation. J. B. C. Kershaw. "Times Eng. Suppl.," Nov. 30, p. 235. (Paper read before Lpool. Engin. Soc.)
- The Economics of Coal Production. Prof. H. Louis. "Colliery Guard.," Dec. 7, p. 1084. "Iron Coal Tr. Rev.," Dec. 7, p. 629.

II.—Education.

- Mining Education and Research. W. Pickup. "Colliery Guard.," Nov. 16, p. 933. (Pres. addr., Mchster. Geol. and Min. Soc.)
- The Government Miners' Training Schools. "S. Afr. Min. J.," Oct. 27, p. 188; Nov. 3, p. 209.
- Mine Managers' Examinations. "Colliery Guard.," Dec. 7, p. 1083; 4 fig.
- University Education in Relation to Mining Engineering. W. Ripper. "Colliery Guard.," Dec. 7, p. 1093. (Paper read before Midld. Inst.)

III.—Geology.

- On the Discovery of New Coal Deposits in Spain (Sobre descubrimiento de Nuevas Cuencas carboníferas en España). J. Herenza y Ortuño. "Rev. Min.," Sept. 8, p. 443; Oct. 24, p. 518; Nov. 8, p. 543; Nov. 24, p. 565; Dec. 1, p. 577.
- Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1916. A. Strahan. 56 pp.; 3 fig. H.M. Stationery Office. 1s. 6d. net.
- The Forests of the Coal Age. Dr. D. H. Scott. "Trans. Inst. Min. Engin.," Nov., p. 33; 18 fig.
- Note on the Correlation of Certain Seams in the Yorkshire Coal Field. P. F. Kendall. "Trans. Inst. Min. Eng.," Nov., p. 67; 2 fig.
- The Areas and Deposition of the Coal Fields of Western Europe. G. Blake Walker. "Trans. Inst. Min. Eng.," Nov., p. 77; map.
- Geological Structure of the Forest of Dean. T. F. Sibley. "Colliery Guard.," Nov. 2, p. 839. (Paper read before Forest of Dean brnch. Natl. Assocn. Colly. Mgrs.)
- On the Splitting of Coal Seams by Partings of Dirt. Part I: Splits that Re-join. P. F. Kendall. "Colliery Guard.," Nov. 9, p. 883. (Paper read before Midld. Inst.)
- The Jurassic and Lower Cretaceous Rocks in East Kent. G. W. Lamplugh. "Colliery Guard.," Nov. 9, p. 885; 2 fig. (From "Summ. of Progress of Geol. Survey.")
- Oil Prospects of the British Isles. W. H. Dalton. "Colliery Guard.," Nov. 23, p. 983. (From paper read before Inst. Petroleum Technologists.)
- Conditions of Deposition of the Triassic Lignites in the Maritime Alps (Sur les conditions actuelles de gisement des lignites triassiques des Alpes-Maritimes). E. Maury. "Comptes Rendus," Nov. 5, p. 636.
- Spitzbergen and its Resources. "Eng.," Dec. 7, p. 596; 1 fig. (Coal deposits.)
- Natal Coal Fields. W. T. Heslop. "S. Afric. Eng.," Aug. 1917, p. 33; Sept., p. 52.
- Antarctic Geology. G. Taylor. "Min. Mag.," Dec., p. 262; 5 fig. (Coal deposits in S. Victoria Land.)
- Novo Suzdzhensk Coal Deposits, Western Siberia. "Colliery Guard.," Dec. 21, p. 1181.
- The Geology of Manchester as Revealed by Borings. Dr. G. Hickling. "Colliery Guard.," Dec. 21, p. 1184. (From paper read before the Mchster. Geol. and Min. Soc.)

VI.—Working of Minerals.

- Strip Pit Mining of Bituminous Coal. H. H. Stoek. "Coal Age," Sept. 29, p. 522; Oct. 6, p. 568; Oct. 20, p. 672; 29 fig.
- Pillar Extraction in Thick Seams. R. W. Magraw. "Coal Age," Oct. 27, p. 708; 6 fig.
- Safety and Sociological Conditions in Utah. R. M. Magraw. "Coal Age," Oct. 13, p. 606; 4 fig.
- Methods of Mining in the Pennsylvania Anthracite Field. H. M. Crankshaw. "Trans. Inst. Min. Eng.," Nov. p. 113; 17 fig.
- The Thin Mine Problem. H. O. Dixon. "Trans. Inst. Min. Eng.," Nov., p. 135.
- A Fresh Aspect of Intensive Mining Thin Seams. G. G. Min. Inst. Scould.," vol. xl., pt. 1, st. Min. Eng.," Oct., p. 281; 5 fig.
- Coal in Crow's Nest Pass District, Alberta. "Colliery Guard.," Oct. 26, p. 789. (From Min. Eng.," Nov., p. 135.)
- Underground. J. Woodall. "Coal Age," Nov. 17, p. 840; 2 fig.

- Care and Maintenance of Cutter Bits. A. F. Fors. "Coal Age," Nov. 10, p. 794; 1 fig.
- Mechanical Appliances, Particularly Electric Transmission, in the Bleiberg Mining District (Die Benutzung maschineller Hilfsmittel, insbesondere die elektrische Kraftübertragung im Bleiberg Bergbaureviere). — Hege-wald. "Berg- und Hüttenmanisches Jahrbuch," No. 1, p. 1; illus.

VII.—Boring, Shaft Sinking, and Tunnelling.

- Uses of Concrete in Coal Mines. "Coal Age," Oct. 10, p. 564; 4 fig.
- Employment of Divers in Shaft Sinking. H. Grahn. "Colliery Guard.," Nov. 2, p. 837; 4 fig. (From "Glückauf.")
- Comparative Value of Hammer Drills. "Colliery Guard.," Nov. 2, p. 850. (From "Echo des Mines.")
- Deep Borings in Yorkshire, Kent, and Sussex. "Colliery Guard.," Nov. 23, p. 981. (From "Summ. of Progress of Geol. Survey.")
- Testing and Maintaining the Efficiency of Drills. H. H. Hodgkinson. "Compr. Air Mag.," Nov., p. 8553; 2 fig. (From "Eng. Min. J.")
- Critical Review of the Apparatus for Measuring the Strike and Dip of Strata in Deep Boreholes, and the Deviation of the Latter from the Vertical (Kritische Beurteilung der Apparate zur Bestimmung des Streichens und Fallens der Schichten in tiefen Bohrlöchern und der Abweichung der letzteren aus der Lotrechten). — Henke. "Techn. Bl.," Oct. 27, p. 161; illus.
- Sinking Through Deep Quicksands by the Unwatering Process (Das Durchteufen tiefgelagerter, stark treibender Schwimmsandschichten nach dem Entwässerungsverfahren). — Czermak. "Bergb. u. Hütte," Oct. 15, p. 353; illus.

VIII.—Explosives, Blasting.

- The Determination of Nitrogen in Substances Used in Explosives. W. C. Cope and G. B. Taylor. "U.S. Bur. Mines. Techn. Paper 160," 5 fig.

IX.—Timbering, Packing, etc.

- Resistance of Artificial Mine Roof Supports. W. Griffith. "Bull. Amer. Inst. Min. Engin.," Oct., p. 1797; 12 fig. "Colliery Guard.," Nov. 9, p. 886; 7 fig.
- Safe Compressive Stresses on Colliery Brickwork. W. C. Popplewell. "Colliery Guard.," Oct. 26, p. 786.
- Practical Wood Preservation. W. E. Hoyt. "Colliery Guard.," Nov. 2, p. 848. (From "Coal Age.")
- Replacing Shaft Timbers. E. B. Wilson. "Coal Age," Nov. 17, p. 839; 1 fig.
- Protecting Clay Ribs from Crushing. R. D. Hall. "Coal Age," Nov. 10, p. 801; 4 fig.
- Timbering in Brown Coal Mining (Der Streckenausbau im Braunkohlenbergbau). — Herwegen. "Braunk.," Oct. 26, p. 245; illus.

X.—Surface Arrangements.

- Tursdale Colliery, Durham. "Iron Coal Tr. Rev.," Nov. 9, p. 509; 6 fig.
- New Shaft at Kirkby Colliery. "Iron Coal Tr. Rev.," Dec. 21, p. 689; 7 fig.

XI.—Winding and Haulage.

- Counter-Balance and Equalisation of the Load in Hoisting. H. D. Pallister. "Coal Age," Sept. 29, p. 523; 2 fig.
- Making Coal Cars in Mines Safe. C. Scholz. "Coal Age," Oct. 20, p. 666; 1 fig. "Colliery Guard.," Dec. 21, p. 1195.
- Caging Arrangements at Deep Coal Mines. R. Gascoyne. "Coal Age," Nov. 17, p. 848.
- The Factor of Safety of Wire Ropes Used for Winding in Mine Shafts. J. A. Vaughan. "Jl. S. Afr. Instn. Engin.," Nov., p. 94; 6 fig.
- Rounding Curves on Haulage Roads. W. Dakin. "Iron Coal Tr. Rev.," Dec. 7, p. 642; 5 fig. (Paper read before Yorks. brch. Natl. Assocn. of Colly. Mgrs.)
- Notes on Winding (Betrachtungen über die Schachtförderung). — Macka. "Bergb. u. Hütte," Oct. 15, p. 364.
- Making Mine Cars Safe. C. Scholz. "Colliery Guard.," Dec. 21, p. 1195. (From paper read before Mining Section of the Natl. Safety Council.)

XII.—Signalling.

- The "Wigan" Apparatus for Cancelling Visual Shaft Signals. "Iron Coal Tr. Rev.," Nov. 23, p. 569; 1 fig.
- The Sterling Audible and Visible Indicator. "Iron Coal Tr. Rev.," Nov. 16, p. 541; 3 fig.
- The Operation of Magneto Telephones in Series to Avoid Gas Ignition in Mines. L. Fokes. "Iron Coal Tr. Rev.," Nov. 16, p. 549; 3 fig.
- Davis-Bolton Safety Direction Indicator for Winding Engines. "Iron Coal Tr. Rev.," Nov. 2, p. 491; 3 fig.
- The "Samson" Visual and Audible Indicator. "Iron Coal Tr. Rev.," Dec. 21, p. 698; 3 fig.

XIII.—Lighting.

- The Government Mine Rescue Cars. D. J. Parker. "Coal Age," Oct. 20, p. 678; 4 fig. (United States Govt. car.)
- Charging Racks for Miners' Lamp Batteries. "Coal Age," Oct. 13, p. 632; 4 fig.
- New Electrolyte for Miners' Safety Lamps. "Colliery Guard.," Nov. 2, p. 848.
- Lighting Safety Lamps by Electrical Ignition. L. Fokes. "Colliery Guard.," Dec. 21, p. 1179; 8 fig.

XIV.—Ventilation.

- New Patterns and Results of Oerlikon Blowers and Fans (Neuere Ausführungen und Resultate über Oerlikon-Gebläse und Ventilatoren). — Karrer. "Z. Turb. Wes.," Sept. 10, p. 244; Sept. 20, p. 253; Sept. 30, p. 263; illus.

XVI.—Coal Dust.

- Stone Dusting in Collieries: Some Observations on the Properties and Characteristics of Various Stone Dusts. L. G. Hill. "Proc. S. Wales Inst.," vol. 32, No. 2, p. 105; 12 fig.

XVII.—Explosions.

- Investigation of Explosion at New Waterford, Nova Scotia. "Can. Min. J.," Oct. 1, p. 387.
- Gas Explosion in Crow's Nest Coal Field. J. Ashworth. "Can. Min. J.," Oct. 1, p. 389; 3 fig.
- Gas Explosion at an Indian Colliery. "Colliery Guard.," Nov. 30, p. 1035; 2 fig. (From Report of Chief Insp. of Mines in India.)

XVIII.—Mine Fires.

- Extinguishing an Anthracite Mine Fire. "Coal Age," Sept. 29, p. 528; 2 fig.
- Cement Grouting for Mine Fires at the St. Eloy Collieries (L'Embouage aux Houillères de Saint-Eloy). "Bull. Soc. Ind. Min.," vol. xi., No. 2, p. 145; 11 fig.
- Mine Fires and their Prevention. J. Lloyd. "Lehigh Empl. Mag.," Oct., p. 122. (Paper read at VI. Annual Safety Congress.)

XIX.—Rescue and Ambulance.

- Equipment and Organisation of Mine Rescue Stations. A. J. Moorshead. "Coal Age," Oct. 13, p. 625; 2 fig.
- Practical First-Aid Suggestions. A. Ogilvie. "Coal Age," Oct. 13, p. 630; 11 fig.
- The Rotherham Rescue Station. "Iron Coal Tr. Rev.," Oct. 26, p. 463.
- Danger of Oxygen Rescue Apparatus. J. W. Paul. "Coal Age," Nov. 17, p. 838. (From paper read before Natl. Safety Council, New York.)
- First-Aid Training in Indiana During 1916. "Coal Age," Nov. 17, p. 844; 2 fig.
- Organising and Conducting Safety Work in Mines. H. J. Wilson and J. R. Fleming. "U.S. Bur. Mines Techn. Paper 103," 35 fig.
- Results with Rescue Apparatus in Prussian Mines in 1916 (Ergebnisse bei der Verwendung von Atmungs- (Rettungs-) und Wiederbelebungsgeräten im preussischen Bergbau im Jahre 1916). — Gropp. "Z. B. H. S.," No. 3, p. 157; illus.

XX.—Drainage, Pumping, etc.

- Some Notes on Air Lift Pumps. A. W. Purchas. "Eng.," Nov. 23, p. 561; 6 fig. (Paper read before Inst. Mech. Engin.)

XXI.—Briquettes.

- Coal Briquetting. "Colliery Guard.," Oct. 26, p. 787.
- Coal Briquetting, with Special Reference to Anthracite Coal. J. A. Yeadon. "Proc. S. Wales Inst.," vol. 32, No. 2, p. 145.
- Coal Concreted from Dust and Ashes. R. G. Lovell. "Colliery Guard.," Nov. 2, p. 836. (Paper read before Inst. Clay Workers.)
- Anthracite Culm Briquetting Plant. G. J. Mashek. "Colliery Guard.," Dec. 21, p. 1183; 2 fig. (From "Coal Age.")

XXIII.—Coke Ovens and By-Products.

- Distillation of Coal. "Jl. Soc. Chem. Ind.," Oct. 31, p. 1073. (Summary of statistics, etc., Europe.)
- By-product Recovery Coke Ovens. S. S. Dyson. "Chemical Engineering," Oct., p. 259.
- Coal Distillation under Pressure. J. H. Capps and G. A. Hulett. "Jl. Ind. Eng. Chem.," Oct., p. 927; 7 fig.
- Refractory Magnesia. R. C. Gosrow. "Metall. Chem. Eng.," Oct. 1, p. 415.
- Pyrometers and Pyrometry. "Colliery Guard.," Nov. 9, p. 895. "Engin.," Nov. 9, p. 403; Nov. 16, p. 497. (Discussion by the Faraday Society.)
- Low Temperature Carbonisation from the Gas Works Standpoint. "Engin.," Nov. 16, p. 423.
- The Production of Blue Water Gas on Small Works. W. W. Townsend. "Gas Wld.," Nov. 17, p. 364; 1 fig.
- Continuous Steaming in Vertical Retorts. "Gas Wld.," Nov. 17, p. 365.
- Some Experiments on Steaming in Continuously Operated Vertical Retorts. J. E. Blundell. "Gas Wld.," Nov. 3, p. 322. "Gas J.," Oct. 30, p. 206. (Paper read before Mchster. District Instn. Gas Engin.)
- Influence of Size of Coking Coal on Ammonia Yield. "Gas Wld.," Nov. 3, p. 10 (coking sectu.)
- Adaptation of Old Purifiers as Check Boxes. J. Terrace. "Gas Wld.," Oct. 27, p. 301; 2 fig.
- Recovery of Toluol from Gas Works. "Gas J.," Nov. 20, p. 366. (Report of sub-committee of the American Gas Institute.)
- Research on Refractory Materials. G. E. Foxwell. "Iron Coal Tr. Rev.," Nov. 23, p. 578.
- Coking of Illinois Coal. F. K. Ovtz. "U.S. Bureau of Mines Bull. 138," 71 pp.; 12 pl. and map.
- Some Observations of Benzol Extraction on Gas Works. J. H. Clegg. "Gas J.," Nov. 6; 1 fig. (Paper read before Mchster. District Junr. Gas Assocn.)
- Care and Maintenance of the "Jenkins De Brouwer" Stoking Machines. E. W. Wilson. "Gas J.," Nov. 6, p. 264. (Paper read before Mchster. Junr. Gas Assocn.)
- The Future of Benzol. "Engin.," Nov. 2, p. 387.
- The Most Economical Method of Carbonising Coal. J. West. "Gas Wld.," Nov. 10, p. 241. "Gas J.," Nov. 13, p. 314; 3 fig. (Paper read before Southern Assocn. Gas Engin.)
- Improvements in the Manufacture of Silica Bricks. C. E. Nesbitt and M. L. Bell. "Colliery Guard.," Oct. 26, p. 788. (Paper read before Amer. Soc. for Testg. Materials.)
- Coal Carbonising at Gas Works. R. Nelson. "Colliery Guard.," Oct. 26, p. 789. (Paper read before N. Engl. Gas Mgrs. Assocn.)
- Comparison of the Various Types of Coke Ovens (De la comparaison des divers types de fours à coke). "Echo des Mines," Dec. 9, p. 696.
- Benzol and Toluol Recovery in America. "Gas J.," Dec. 11, p. 505. (Report by U.S. Bureau of Standards.)
- Light Oils from Coke Oven Gas. W. H. Wright. "Gas J.," Dec. 4, p. 462. (Paper read before Amer. Gas Inst.)
- Benzol and Toluol from Carburetted Water Gas. R. J. Moore and G. Egloff. "Gas J.," Dec. 12, p. 463. (Paper read before Amer. Chem. Soc.)

Laboratory Methods for Benzol Recovery Plant Operation. F. W. Sperr, junr. "Metall. Chem. Eng.," Nov. 1, p. 548; 6 fig.

The Path of Travel of the Gases in the Coke Oven, and its Influence on the Products of Distillation. G. E. Foxwell. "Gas Wld.," Dec. 1, p. 11 (coking sectn.); 3 fig.

Coal By-Products and Colliery "Waste." Prof. C. M. Thompson. "Gas Wld.," Dec. 1, p. 17 (coking sectn.). (From paper read before the Cardiff Business Club.)

"B C O" Regenerative Ovens in Scotland. "Gas Wld.," Dec. 1, p. 18 (coking sectn.). (Otto ovens at Wilsontown.)

Nitrogen Products and Coal Supplies. "Colliery Guard.," Dec. 7, p. 1087.

Recent Developments in By-Product Coking. G. B. Walker. "Colliery Guard.," Dec. 7, p. 1095. (Abstract of paper read before Inst. Civ. Engin.)

Refractory Magnesia. R. C. Gosrow. "Colliery Guard.," Dec. 14, p. 1129. (From "Metall. Chem. Eng.")

The Refractory Properties of Magnesia (Sur les propriétés réfractaires de la Magnésie). Le Chatelier and Bogitch. "Comptes Rendus," Oct. 15, p. 488; 1 fig.

Holmes Centrifugal Type Gas Washers. "Engin.," Dec. 7, p. 502; 2 fig.

Refractory Building Materials (Ueber feuerfeste Baustoffe). — Hermanns. "Z. Dampfk. Betr.," Oct. 26, p. 337.

The Manufacture of Ammonia. G. A. Hebden. "Colliery Guard.," Dec. 21, p. 1180. (Paper read before Coke Oven Mgrs., Middl. brch.)

Modern By-product Coking. G. S. Cooper. 39 pp.; 17 fig. (Reprint of paper read before Junr. Instn. Engin.)

Modern Coking Practice. J. E. Christopher. With Analyses of Materials and Products, by T. H. Byrom. London: Crosby Lockwood and Son. 2 vols. 8vo. 7s. 6d. each net.

XXIV.—Fuels, Testing, etc.

Pulverised Coal for Air Furnaces. W. R. Bean. "Iron Coal Tr. Rev.," Sept. 27, p. 660.

Fuel for Steam Raising. "Power User," Oct., p. 214.

Lignite (Le Lignite). G. Franche. "Revue de Chemie Industrielle," Sept., p. 223. (Composition, briquetting, gas producers.)

The Chemical Control of Fuel Supplies. J. B. C. Kershaw. "Cassier's Eng. Mthly.," Nov., p. 338.

The Estimation of Sulphur in Coal and Coke. "Cheap Steam," Nov., p. 167.

Fuels and their Uses (Les combustibles et leurs Emplois). — Versepuy. "Echo des Mines," Oct. 28, p. 670. (Paper read before Congrès de la Société Technique du Gaz.)

The Utilisation of Brown Coal. J. L. Stevens. "Min. Eng. Rev.," Aug. 6, p. 281; Sept. 5, p. 323.

Recovery of Coke Breeze at Furnaces. "Gas Wld.," Nov. 3, p. 18 (coking sectn.); 1 fig.

Gas as a Motor Fuel. F. A. Talbot. "World's Work," Nov., p. 568; 5 fig.

Extraction Experiments with Brûx Brown Coal (Extraktionsversuche mit Brûxer Braunkohle). — Wegrzyn. "Berg. u. Hütte," Oct. 1, p. 338; illus.

Burning Coke Breeze in Bottom Draught Travelling Grates (Versuche zur Verbrennung von Koksgrus auf Unterwind-Wanderrosten). — Wirmer. "Z. d. Ing.," Oct. 6, p. 818; illus.

The Combustion of Coke (Die Verbrennung von Koks). — Gramberg. "Feuerungstechn.," Oct. 1, p. 1; illus.

Experiments in Firing with Inferior Clinkery Small Coals on Travelling Grates (Versuche zur Verfeuerung minderwertiger, schlackenreicher Feinkohle auf Wanderrosten). — Loschge. "Z. d. Ing.," Sept. 15, p. 766; Sept. 22, p. 787; illus.

Use of Pulverised Fuel in Locomotives. J. E. Muhfeld. "Jl. Amer. Soc. Mech. Engin.," Sept. 17, p. 760.

Fuel Economy. "Ry. Gaz.," Dec. 7, p. 625; 2 fig.

The Chemical Control of Fuel Supplies. J. B. C. Kershaw. "Cassier's Eng. Mthly.," Dec., p. 390; 6 fig.

Graphic Determination of Heat Units in Coal. W. C. Stripe. "Coal Age," Nov. 3, p. 755; 2 fig.

A Note on the Microscopic Examination of Coal. "Colliery Guard.," Dec. 7, p. 1085.

The Melting Point of Coal Ash. H. Piele. "Colliery Guard.," Dec. 21, p. 1193. (Paper read before Soc. Chem. Ind., Newcastle sectn.)

XXV.—Steam Engines and Boilers: Gas Engines.

Electric Heat Storage in Boilers. "Eng.," Nov. 2, p. 468; 5 fig.

Some Notes on Fuel Economy. A. W. Bennis. "Cheap Steam," Nov., p. 161. (Paper read before Assocn. for the Scientific Development of Industry.)

Quick Revolution Gas Engines. V. E. Green. "Gas Wld.," Nov. 17, p. 8 (power and industrial sectn.).

The Training of Firemen and the Safe and Economic Operation of Boiler Plant (Die Ausbildung der Heizer und die Sicherheit und Wirtschaftlichkeit im Dampfkesselbetrieb). — Herrmann. "Feuerungstechn.," Aug. 15, p. 257.

New Steam Turbines (Einige neuere Dampfturbinen). — Schapira. "Z. Oberschl. Ver.," p. 1; illus.

The Uniflow Engine. H. W. Morley. "Engin.," Nov. 23, p. 455.

Lubricating the Steam Engine (Die Schmierung der Dampfmaschinen). — Hilliger. "Z. Dampfk. Betr.," Sept. 21, p. 297; illus.

Arranging Boiler Plant for Firing Inferior Fuel (Massnahmen zur Verheizung minderwertiger Brennstoffe). — Deinlein. "Z. Bayer. Rev. V.," Sept. 30, p. 150.

The Utilisation of Waste Steam in Mining (Die Verwertung des Abdampfes in Bergwerksbetrieben). — Schapira. "Z. Berg. Betr. L.," Sept. 15, p. 215; Oct. 1, p. 231; illus.

Heat Accumulators for Exhaust Steam Utilisation (Wärmespeicher für Abdampfverwertung). — Schmidt. "Techn. Bl.," Sept. 30, p. 145.

Recent Patents on Firing Steam Boilers (Neue Patente auf dem Gebiete der Dampfkesselfeuerung). — Pradel. "Z. Dampk. Betr.," Oct. 5, p. 313; Oct. 12, p. 324; illus.

Fire Grates for Burning Peat Fuel (Feuerungsanlagen für Verwendung von Brenntorf). — Aulmann. "Feuerungstechn.," Sept. 15, p. 281; illus.

Evaporative Experiments in 1916 (Verdampfungsversuche im Jahre 1916). "Z. Bayer. Rev. V.," Sept. 30, p. 145; Oct. 15, p. 155.

Gas Firing Boilers. T. M. Hunter. "Iron Coal Tr. Rev.," Nov. 23, p. 567. "Gas Wld.," Nov. 24, p. 384. (Paper read before Inst. Electr. Engin.)

The Piston of the Uniflow Engine (Der Kolben der Gleichstrom-Dampfmaschine). — Hellemaus. "Z. Bayer. Rev. V.," Sept. 15, p. 139; illus.

The Copes Boiler Feed Water Regulator. "Engin.," Oct. 26, p. 367; 2 fig.

Working Costs of Prime Movers. O. Wans. "Colliery Guard.," Oct. 26, p. 783; 6 fig. (Paper read before Instn. Mech. Engin.)

Gas Engines and Dynamos. "Gas Wld.," Dec. 15, p. 7 (power and industr. sectn.).

Development of the Vertical Gas Engine. "Gas Wld.," Dec. 15, p. 9 (power and industr. sectn.).

Overworked Gas Engines. "Gas Wld.," Dec. 15, p. 13 (power and industr. sectn.).

Heat Engines. Capt. H. R. Sankey. "Engin.," Dec. 7, p. 489. (Hawksley lecture before Inst. Mech. Engin.)

Gas Firing Boilers. T. M. Hunter. "Iron Coal Tr. Rev.," Dec. 7, p. 637.

An Efficient Gas Fired Boiler Installation. J. C. Hobbs. "Proc. Engin. Soc. W. Penn.," Oct., p. 421; 12 fig.

Notes on the Uniflow Steam Engine. G. G. T. Poole. "Colliery Guard.," Dec. 14, p. 1127; 6 fig. (Paper read before N. Engl. Inst. Min. Mech. Engin.)

Boiler Management with Substitute Labour. C. F. Stromeyer. "Colliery Guard.," Dec. 14, p. 1131. (From report of the Mchster. Steam Users' Assocn.)

Reinforced Concrete Poles for Transmission Cables. A. V. Chitty. "Iron Coal Tr. Rev.," Dec. 7, p. 640; 1 fig. (Paper read before Assocn. Min. Electr. Engin., N. of Engl. brch.)

The Characteristic Curves of Diesel Engine Compressors (Die charakteristischen Kurven von Kompressoren der Dieselmotoren). — Balag. "Fördertechn.," Oct. 1, p. 141; illus.

XXVI.—Compressed Air.

Moisture in Compressed Air. R. S. Hawley. "Sci. and Art Min.," Nov. 3, p. 129. (From "Power.")

Theoretical and Actual Air Delivery of Air Compressors. R. S. Lewis. "Colliery Guard.," Nov. 2, p. 840. (From "Compr. Air Mag.")

XXVII.—Electricity.

Electrostatic Voltmeters. C. H. Wright. "El. Rev.," Nov. 2, p. 413.

Modern Dynamo Electric Machinery. A. Gray. "Jl. Frankl. Inst.," Oct., p. 553; 13 fig. (Rotary converters.)

Electrical Mining Accidents in Prussia in 1916 (Unfälle in elektrischen Betrieben auf den Bergwerken Preussens im Jahre 1916). "Z. B. H. S.," pt. 2, p. 104; illus.

Electrical Power from the Heat of the Earth. L. R. Freeman. "World's Work," Nov., p. 540; 2 fig. (Power generated from "Soffioni" in Italy.)

Running Transformers in Parallel (Der Parallelbetrieb von Transformatoren). — Kade. "E. T. Z.," Oct. 11, p. 493; illus.

Electricity in the Fushun Coal Field. "Iron Coal Tr. Rev.," Oct. 26, p. 459. (From "Gen. Electr. Rev.")

Economies in Colliery Electrical Plant. H. A. McGuffie. "Iron Coal Tr. Rev.," Nov. 2, p. 483; 10 fig. (Pres. addr. before Assocn. Min. Electr. Engin.)

Electrolysis in Underground Mines. "Colliery Guard.," Nov. 2, p. 849.

Drying Colliery Electrical Apparatus. L. Fokes. "Colliery Guard.," Nov. 23, p. 972; 12 fig.

Points on the Electrification of Collieries. A. C. Nelson. "Colliery Guard.," Nov. 30, p. 1031; 4 fig.

Storage Battery Locomotives. "Iron Coal Tr. Rev.," Dec. 21, p. 697; 2 fig.

XXVIII.—Surface Transport and Storage.

Coal and Ash Conveyor Tests. L. A. Quayle. "Power," Sept. 4, p. 325; 2 fig.

A 120-ton Coal Car for Virginian Railways. B. W. Kadel. "Railway Age Gazette," Aug. 17, p. 285; 7 fig.

Mechanical Handling of Goods in Engineering Workshops. G. F. Zimmer. "Cassier's Eng. Mthly.," Nov., p. 303; 15 fig.

Devices to Unload Coal from Cars. H. Goldstein. "Ind. Man.," Oct., p. 68; 9 fig.

Boiler House Design: II. H. E. Birch. "Ind. Man.," Oct., p. 58; 6 fig. (Coal conveyors.)

A Gasoline Scraper Power Shovel. "Eng.," Nov. 16, p. 515; 1 fig.

Coke Handling Plant at Warrington Gas Works. "Engin.," Nov. 16, p. 434; 6 fig.

Handling Materials Automatically with Skip Hoists. H. V. Schiefer. "Eng.," Oct. 26, p. 434; 14 fig.

American Plant for Coaling Locomotives (Amerikanische Anlagen zur maschinellen Bekohlung von Lokomotiven). — Hermanns. "Z. Dampf. Betr.," Sept. 7, p. 282; illus.

The Steam Collier "Elwick." "Colliery Guard.," Nov. 2, p. 839; 1 fig.

Coal and Shipping. XXIII.: Bunkers and Reservoirs for Storing Coal. F. J. Warden-Stevens. "Colliery Guard.," Nov. 16, p. 931; 4 fig.

Coal and Shipping. XXIV.: Coal Cargo Vessels. F. J. Warden-Stevens. "Colliery Guard.," Dec. 7, p. 1079; 3 fig.

High-Capacity Freight Wagons for the Burma Mines. "Colliery Guard.," Nov. 16, p. 935; 1 fig.

Effects of Storage on the Properties of Coal. S. W. Parr. "Colliery Guard.," Nov. 23, p. 982; Nov. 30, p. 1036. Dec. 21, p. 1186. (From "Univ. Illinois Bull. 97.")

Storage, Weathering, and Spontaneous Combustion of Coal. "Metall. Chem. Eng.," Oct. 15, p. 481. (Report of Natl. Electric Light Assocn. Cmtee.)

XXIX.—Sanitation, Diseases, etc.

Ankylostoma Duodenale as a Parasite of Felis Tigris. Lieut.-Col. Clayton-Lane. "Ind. Jl. Med. Res.," July, p. 210; 13 fig.

Health of the Working Force. O. P. Geier. "Ind. Man.," Oct., p. 13.

Hygienic and Sanitary Equipment. J. Roach. "Ind. Man.," Oct., p. 20.

Houses for Mine Villages. A. F. Huebner. "Coal Age," Oct. 27, p. 717; 11 fig.

New Concrete Dwellings near Pittsburg. "Coal Age," Oct. 20, p. 662; 7 fig.

Playgrounds for Mining Communities. H. B. Lacy. "Coal Age," Oct. 20, p. 668; 2 fig.

Welfare Work of Lehigh Valley Coal Company. Dr. S. P. Mengel. "Coal Age," Oct. 13, p. 622; 4 fig.

Design of Small Mine Hospitals. O. L. Puckett and J. B. de Hart. "Coal Age," Oct. 13, p. 610; 20 fig.

Miners' Housing in Scotland. "Colliery Guard.," Oct. 26, p. 790; Nov. 2, p. 841.

Factory and Workshop Welfare. "Colliery Guard.," Nov. 2, p. 848. (New Order by Secretary of State.)

XXX.—Mining Laws, Royalties.

Coal Mines Control Agreement. "Colliery Guard.," Nov. 2, p. 835.

Excess Mineral Rights Duty. "Colliery Guard.," Dec. 7, p. 1087.

Mining and Mining Law in Switzerland (Bergbau und Bergrecht in der Schweiz). — Henke. "Techn. Bl.," Oct. 27, p. 163.

COAL, IRON AND ENGINEERING COMPANIES REPORTS AND DIVIDENDS.

Avery (W. and T.) Limited.—The directors recommend an interim dividend on the ordinary shares of 5 p. 100. tax.

Cleveland Bridge and Engineering Company Limited.—The report for the year ended September 30 shows a gross profit of £47,287, and after payment of interest on debentures and making provision for depreciation, net profit of £39,952, to which must be added £4,283 brought forward. The directors recommend a dividend of 7½ per cent., free of tax, on ordinary shares, making 10 per cent. for the year, place to reserve fund £15,000, for contingencies £11,000, and carry to next account £5,637.

Cynon Colliery Company Limited.—The report for the year to September 30 states that profit is £7,021, to which has to be added £1,602, balance of excess profits duty over-reserved from 1916, transfer fees, rents, royalty from freehold property, income from investments, and bank interest, amounting to £908. There is also included the estimate of £5,000 for excess profits duty recoverable for the year, which with £9,949 brought forward makes a total credit of £24,480. The directors propose a final dividend of 7½ per cent., making 12½ per cent., less tax, for the year, and to carry forward £11,362.

Humphrey Pump Company Limited.—The directors again report that the conditions caused by the continuance of the war have adversely affected the company's business during the past year. Further developments of the new type of small pumps have been made, but, owing to unforeseen difficulties and the great scarcity of labour and materials for other than Government work, it has been found impossible to reach a remunerative basis.

Natal Navigation Collieries and Estate Company Limited.—Dividend of 3½ per cent.; same as a year ago.

Stanton Iron Works Company Limited.—With a view to centralising their business in London, the company has opened an office at Maxwell House, Arundel-street, Strand, W.C.2, and matters relating to their coal and cast iron foundry business will be dealt with at this office. The foundry agency arrangement which has existed for many years past between the company and Messrs. Beck and Company Limited is being terminated at the end of this year, and after December 31, 1917, all communications with reference to castings should be addressed to the company at the above address. The telegraphic address is "Cobbles, Eastrand, London," and the telephone number "Central 6808." Mr. Arnold Longden, who has represented the company for some years on the London Coal Exchange, will supervise the foundry section of the business, in addition to the coal business, during the period of the war.

West Canadian Collieries Limited.—The report for the year ended December 31, 1916, states that of the nominal share capital 39,682 shares remain unissued, 680,318 shares having been taken up. According to expectations, the result of 1916 shows marked improvement; shipments of coal amounted to 533,879 tons, an increase of 191,178 tons. This improvement is chiefly due to the expansion of sales to the commercial market, and to the quality of the coal extracted from Bellevue and Greenhill mines. Bellevue Colliery: Output, 341,693 tons; increase, 39,141 tons. Developments continue in proportion to output. Greenhill Colliery: Output, 192,186 tons; increase, 152,037 tons. Results have surpassed anticipations. Profit for 1916 amounts to £61,133, after writing off £13,017 for development. From this must be deducted £24,053 representing debenture interest and general expenses, and £2,172 paid on account of debenture sinking fund. Depreciation takes £22,016. This leaves £12,886 to be added to the amount brought forward, which from £12,248 has been reduced to £799 in consequence of a supplementary depreciation of £11,449 made on machinery and rolling stock. Credit is £13,685.

NEW COMPANIES.

Berry's Electric Limited.—Private company. Registered office, 86, Newman-street, Oxford-street, London. Registered December 18. To carry on the business of electrical and general engineers, etc. Nominal capital, £50,000 in £1 shares. Subscribers (one share): H. H. Berry and F. G. Kerly.

Brynamman Collieries Limited.—Private company. Registered December 14. To carry on the business as coal masters, colliery proprietors, mine owners, etc. Nominal capital, £60,000 in £1 shares. Subscribers (one share): R. T. Walker (Glasgow), J. W. M. Fry, and A. Calvert.

General Stampings Limited.—Private company. Registered December 19. To carry on either wholesale or retail the business of metal stampers, machine tool makers, etc. Nominal capital, £5,000 in £1 ordinary shares. Qualification, 500 shares.

Richmond and Wordsworth Limited.—Private company. Registered office, 38, Oxford-street, Sheffield. Registered December 17. To acquire any invention or patent process for use in the production of alloys. Nominal capital, £100 in 100 £1 shares. Directors: J. H. Sayles, W. H. Gray, and T. E. England. Qualification, one share.

West Ham Engineering Company Limited.—Private company. Registered December 19. To carry on the business of iron founders, mechanical engineers, etc. Nominal capital, £2,000 in 1,000 £1 preference shares and 1,000 £1 ordinary shares. Director, A. Bernstein.

This list of new companies is taken from the *Daily Register* specially compiled by Messrs. Jordan and Sons Limited, company registration agents, Chancery-lane, E.C.

Welsh coal exporters have decided to have a general meeting once a month, and the executive committee will meet shortly to discuss the position which has been created by the rejection of the "pooling" scheme. One notice of motion has already been given to abandon the idea of voting by tonnage, and to arrange that all decisions shall be by show of hands. A report will be made to the central executive in London dealing with exports to France, giving them the result of the voting in the "pooling" scheme and that body will probably take up the question at the middle of January. Meanwhile, local opinion is in favour of dealing with authorisations to export in accordance with the original scheme which distributed the orders under a scheme of allocation. Taking as basis a firm's shipments from January 1913 to May 1916, when each has in future shipped a quantity in relative proportion to that, the orders will be allocated to others who have not reached their percentage quantity.

THE FREIGHT MARKET.

Shortage and holiday influences combined to transaction of much business in the outward market this week. On the north-east coast, coal trade has, thanks to demands on official, been much brighter, and the shipment of coal has been at a much greater rate, that shipment has all been in requisitioned bottoms, and very little "free" tonnage has been on offer. The main business done has been the engagement of steamers for the carriage of coal to (Gothenburg, at from 185 to 190 kr., and to Stockholm at 192½ kr. Thus, it will be noted that Swedish rates continue to weaken, last week's figures being respectively from 187½ to 190 kr. and 195 kr. A vessel for Gothenburg is reported to have been fixed at Hull at 195 kr. At South Wales, all the chartering reported is for French scheduled destinations. However, in view of the Christmas holidays, exporters have not been pressing for tonnage quite so much.

Homewards, the River Plate market has been very dull, with 200s. asked for neutral tonnage from Buenos Ayres to the United Kingdom. At the United States, coal freights from Virginia are quoted at 80s. to the River Plate, and 84s. to Brazil. Tonnage on net form basis is in fair demand, at 260s. from Northern Range to France, with 360s. for West Italian discharge. On Committee account for heavy grain cargoes, Northern Range to the United Kingdom or French Atlantic is quoted at 50s., with 75s. for West Italy. Big rates are on offer for general cargo tonnage at the United States, but few vessels are coming forward. At the Far East, Saigon-Haiphong to the French Atlantic with rice is workable at 500s. Madras Coast to Marseilles with kernels continues quoted at 550s. Bombay, on d.w., to West Italy, is mentioned at 400s., with 275s. for United Kingdom discharge. Kurrachee to the United Kingdom on scale is quoted at 250s. The Mediterranean and Bay ore ports have a steady demand for tonnage at well maintained figures.

Tyne to Gothenburg, 1,600, 190 kr.; 1,700, 185 kr.; Northern French Range, 700, 46s., coke; and Stockholm, 2,700, 192½ kr.

Cardiff to Cherbourg, 1,760, 4½s. 3d., neutral; Dakar, 3,100, 85s. and 85s. 9d., fuel and coal; Rouen, 1,350 and 1,450, 74s. 3d., fuel, neutral; and St. Malo, 700, 22s.

Swansea to Caen, 1,100, 46s. 6d., neutral; and Bordeaux, 2,500, 69s., neutral.

London to Tyne, 300, 20s., burnt ore.

Hull to Rotterdam, 1,700, 53s. 3d., neutral; and Gothenburg, 195 kr.

CONTRACTS OPEN FOR COAL AND COKE.

For Contracts Advertised in this issue received too late for inclusion in this column, see LEADER and LAST WHITE pages.

Abstracts of Contracts Open.

CROYDON, DECEMBER 31.—Coke for the Guardians. Forms from the clerk, Union Offices, Thornton Heath.

HUNSLET, JANUARY 1.—Coal for the Guardians. Forms from the clerk, Union Offices, Glasshouse-street, Hunslet.

LANCHESTER, JANUARY 2.—Coal and coke (three months) for Workhouse and Cottage Homes. Forms from the clerk, Union Offices, Lanchester.

POWICK, JANUARY 2.—Coal for Worcester County and City Asylum. Forms from the storekeeper.

SLEAFORD, JANUARY 25.—250 tons of best hard steam coal (six months) for the Urban District Council. Particulars from the clerk, 27, Carre-street, Sleaford.

WARRINGTON, JANUARY 8.—15,000 or 7,500 tons (or portions thereof) of slack. Particulars from the tramways engineer, Town Hall.

The date given is the latest upon which tenders can be received.

CONTRACTS OPEN FOR ENGINEERING, IRON AND STEEL WORK, &c.

HOUNSLOW, JANUARY 9.—Tar and Pitch.—Tar and pitch for the Isleworth Urban District Council. Forms from the engineer, Council House, Hounslow.

KEIGHLEY, JANUARY 9.—Induced Draught Plant.—Induced draught plant to deal with the gases given off by 10 tons of coal per hour when burnt on chain grate stokers in use with water tube boilers of Babcock and Wilcox manufacture. Forms from the borough electrical engineer, Electricity Offices, Coney-lane.

LONDON, JANUARY 7.—Pitch, etc.—Pitch, tar, creosote oil, carbolic powder, and coke (12 months) for St. Pancras Borough Council. Forms from the borough engineer.

MADRID, MARCH 22.—Railway.—Secondary railway from Villadrid to Villafranca del Bierzo. Estimated cost, 51,165,079 pesetas. Tenders to Direccion-General de Obras Publicas, Ministerio de Fomento, Madrid.

MANCHESTER, JANUARY 2.—Castings.—Iron castings, malleable castings, and phosphor bronze castings (12 months) for the Cleansing Committee. Particulars from the superintendent, Cleansing Department, Town Hall.

WARRINGTON, DECEMBER 31.—Steel Shaft.—Mild steel shaft, 7½ in. square by 17 ft. 9 in. long, and turned at ends. Particulars from the manager, Longford Sanitary Depot, Warrington.

Lighting of Safety Lamps.—In the article on the "Lighting of Safety Lamps," by Mr. L. Fokes, which appeared in our issue of December 21, the saving of energy in a specified case was erroneously printed as "2.05 British thermal units," instead of 2.05 B.T.U. (or Board of Trade units).

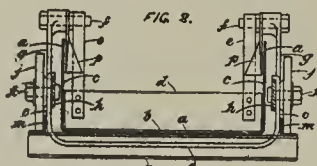
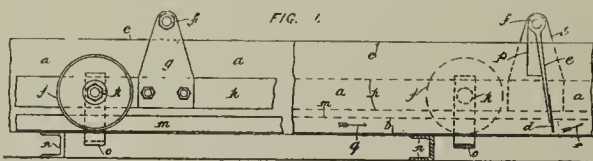
Partnership Dissolved.—The London Gazette announces dissolution of the partnership of F. S. Candelin and H. B. Sparrow, trading as H. B. Sparrow and Company, tin-plate merchants, 65 Fenchurch-street, London. The business will be carried on by the first-named as F. S. Candelin and Company.

Prices for French Coals.—The following prices are published in the list published in our issue of December 21:—Allier, Commentry Basin, Ferrières (over 60 mm.), 44 fr.; "gailletins" (42 to 60 mm.), 42 fr.; "gailletins" picked and through-and-through, picked and through-and-through, 44 fr.; unscreened smalls (0/18 mm.), 29 fr.

ABSTRACTS OF PATENT SPECIFICATIONS RECENTLY ACCEPTED.

109633. *Improvements in Superheating Apparatus for Boilers of the Fire Tube Type.* R. S. Portham, Billiter Buildings, Billiter-street, London, E.C. — This invention relates to superheating apparatus for boilers of the fire tube type, and especially suitable for adaptation to marine boilers. In marine boilers, particularly with those in which arrangements are made for oil firing in addition to coal firing, it is advisable to adjust the position of the superheater pipes in the fire tubes according to whether the boiler is being fired with oil or coal, otherwise the degree of superheat when using oil firing may be too high, and also the ends of the tubes may be liable to be burned. The object of the present invention is to provide an improved superheating apparatus, in which the superheater pipes may be adjusted in position in the fire tubes in accordance with the degree of heat generated by the combustion products. According to the invention, the headers to which the superheater tubes are attached, are so mounted as to be capable of adjustment relatively to the boiler plates, so that the superheater pipes attached thereto may be inserted or withdrawn more or less from the fire tubes. Means are provided whereby the adjustment of the headers may be readily effected. (Four claims.)

109902. *Improvements in Conveyors.* W. Thompson, 1, West-terrace, Ushaw Moor Colliery; H. Greener, West Lodge, Crook; J. Morgan, Stanley Villa, Crook; and M. Palmer, Esh Villa, Esh Winning, Durham. — This invention relates to conveyors of the type comprising a trough adapted to receive the material to be conveyed, and having therein a series of scrapers which are adapted to reciprocate, the scrapers being hinged and free to move on their hinges in one direction only. The object of this invention is to provide an improved conveyor of this type. Fig. 1 is an elevation, partly in section, of one construction of conveyor; fig. 2 is a cross section. In the figures, *a* is the conveyor trough, which has a flat bottom member *b* and vertical sides *c*. The trough may be made in sections suitably connected together. Suspended so as to hang down within the trough *a*, and extend across same, are a series of scraper plates *d* carried by hangers *e* hinged on short spindles *f*, supported by vertical side brackets *g* attached to connecting rods *h* provided one at each side of the trough *a*. The connecting rods *h* are supported by side wheels *j* mounted on axles *k*, said wheels running on angle irons *m* provided on the transverse channel irons *n*, which support the trough *a*. Each pair of wheels *j* is connected together by cross members *o* shaped to pass beneath the trough and retain the wheels in position. Stops *p* carried by the spindles *f* co-act with the hangers *e* to prevent the scraper



plates *d* swinging backwards. In fig. 1 the arrow *q* indicates the forward or working direction of the conveyor. In use, the material to be conveyed is placed in the trough *a*, and the connecting rods *h* are reciprocated lengthwise by any convenient reciprocating mechanism, for example, a reciprocating steam engine. The reciprocation of the rods *h* reciprocates the scraper plates *d* lengthwise of the trough *a*, and it will be seen that, as said plates are prevented from swinging backwards by the stops *p*, they push the material forward during the forward stroke (i.e., when travelling in the direction indicated by the arrow *q* in fig. 1), but during the return stroke they automatically swing forward in their spindles *f* in the direction indicated by the arrow *r* in fig. 1, and ride over the material. The material is thus intermittently pushed forward by the plates *d*. The scraper plates may extend upwards to the top of the trough, but the plates *d* illustrated in figs. 1 and 2 are of the preferred form, extending upwards to not quite half the height of the trough, and fitting closely to the sides and bottom thereof. This construction allows a certain amount of the material in the trough to escape over the tops of the plates *d* during the forward or working stroke, when there is an excess of material in the trough, and so relieve the pressure on the scraper members and connecting rods. (Two claims.)

109920. *Improvements in Stoves, Furnaces, etc.* W. C. Skinner, 102, Highland-avenue, Toronto, Ontario, Canada. — This invention has reference to fuel burning devices, such as stoves, furnaces, or the like, and relates more particularly to devices of the kind comprising a fuel chamber and a combustion chamber passing centrally therethrough, the said combustion chamber being provided with a valve controlled air inlet at its lower end, and with perforations in that portion of its wall situated within the fuel chamber, the arrangement being such that air for the combustion of the fuel passes laterally into the fuel chamber, while the combustion gases pass through the said perforations into the combustion chamber, there forming a combustible mixture with the air passing therethrough. The present invention has for its object an improved fuel burning device of this kind, and provides a device comprising the combination with the fuel chamber of a combustion chamber located centrally of said fuel chamber, an air chamber outside of said fuel chamber, there being openings for permitting air to pass laterally from the air chamber through the fuel chamber to the combustion chamber, and a normally closed grate beneath said fuel chamber and air chamber, said grate being adjustable to provide openings through which finely-divided ash can be removed from the fuel chamber and the air chamber. (Three claims.)

109907. *Improvements in Rotary Pumps.* E. Heginbotham, of E. Heginbotham and Company, Alma Bridge, Ashton-under-Lyne. — This invention relates to improvements in rotary pumps of that class comprising a cylindrical casing with a removable cover and an inlet and outlet to the casing, a cylindrical member within the latter provided with a transverse slot and rotated from without the casing, a sliding piston within the slot, and an eccentric pin secured to the casing or cover to engage with a slot in the piston formed at right angles to the side faces of the piston. In the aforesaid type of pump, the invention comprises the provision in the piston of a slot arranged diagonally to its side faces; a piston body fitting in a recess in the pump

cover across the joint formed by the pump casing and its cover, and a second recess in the pump cover to receive a packing washer between the body and the cover to keep the joints of the parts liquid tight, and the combination with the pump cover of a relief valve opening into the discharge outlet. (Four claims.)

109995. *An Improved Solid Fuel.* R. Bowen, Marle Hill, Cheltenham. — The object of the present invention is to produce an improved solid fuel having the same calorific value and characteristics as good quality coal, that is to say, a synthetic coal. The improved fuel is made from waste coal dust, coke dust, wood dust, or the like, which owing to exposure to the atmosphere, partial burning, or other causes, has lost to some extent its calorific value. The properties of the material forming the basis of the product are first ascertained by analysis, so that such quantities of volatile matter, hydrocarbons, and other matter, may be added as may be necessary to obtain the desired result, namely, an artificial fuel having the qualities of any particular grade of coal. One grade of coal may be blended with another grade of coal. By such a combination, a class of coal that may be now useless may be used in combination with other materials so as to convert the same into a suitable product to compete in the market with such classes of coals as there may be a demand for. For instance, anthracite dust may be taken, and its lacking volatile qualities may be made up so that it may enter into competition with the best bituminous or house coal. The essential feature of the present invention is an improved method of producing the blocks in strata. Each block appears to be a solid mass, as the layers cannot be readily separated while the block remains cool. It is only whilst being consumed that the layers gradually separate, as in natural coal. According to the present invention, instead of employing a binding material to connect separate layers of the material together to form a block, means are employed to prevent the layers of each block when hot adhering together perfectly as they would do when in that condition under pressure. One method of carrying the invention into effect is as follows:—The materials deemed suitable as a base for the artificial fuel are intimately mixed in a dry heat in a suitably heated and covered pan, and the superfluous moisture is driven off. Meanwhile the volatile matters to be introduced into the dry materials are mixed and melted by superheated steam or other vapour in an adjoining closed chamber until such matters are thoroughly incorporated with the vapour. These materials mixed with the superheated steam are then injected under pressure into the closed chamber containing the already dry and heated bases in such proportion and for such time as may be necessary to properly impregnate said bases. The proportions of the volatile matters and the time during which the impregnation is taking place are varied according to the higher or lower grade coal which it is desired to imitate. When mixed and impregnated, the material is withdrawn from the chamber, and may be rolled into sheets in layers one above the other in known manner, so as to render the finished material stratified. This enables it to be ignited more readily. When cold it is broken up into jagged and irregular lumps similar to coal, and is then fit for use. If desired, the material may be moulded in irregular jagged blocks of varying sizes by any press, the material being inserted in the mould part at a time and successive pressures being employed to produce the desired result. In either case the face of the layer just pressed or rolled is treated to prevent the layers forming the blocks adhering perfectly. The stratification of the material not only renders it more readily ignitable, but it allows the volatile matter to be more regularly consumed, as the layers thus formed open under the influence of heat increase the draught, and cause ignition to take place throughout the lump instead of on the surfaces only. (Four claims.)

110034. *Improvements in Smoke Consuming Furnaces, etc.* J. Farley, Cecil House, Hertford. — The invention relates to improvements in or connected with smoke consuming furnaces and water heaters. The primary object of the present invention is to prevent the escape into the atmosphere of the usual dense smoke, especially when stoking or feeding a furnace resulting in the waste of a large percentage of heat-giving constituents of the coal fuel, and the pollution of the air, and in a particular construction for attaining that end. The invention consists primarily in the provision of a central \cap or saddle-shaped chamber surrounded by the water of the heater, and placed immediately over the grate, the smoke and products of combustion being compelled to pass beneath the side wall or walls of said chamber to a side flue or flues, and therefore through the incandescent fuel. For this purpose, in the case of a steam boiler, the roof or crown of the furnace is undulated or formed with two depressions, forming with the side walls three compartments, the two outer ones constituting flues which lead to the uptake or chimney. The fire is principally in and beneath the central chamber, and the stoking or feeding door is arranged at the end of this central chamber, and at or near the top thereof, or, in other words, immediately below the crown of the furnace, so that the fresh fuel is necessarily fed on to the top of the fire. There is no uncontrolled outlet from the central chamber or furnace proper, so that the smoke and products of combustion, and when feeding the furnace the air entering by the feeding door, are compelled to pass beneath the depressions in order to reach the side flues, and consequently are caused to pass through the incandescent fuel in the furnace. Provision is or may be made for the admission of air or steam or like under pressure or not to the central chamber. The side flues are preferably provided with doors or dampers serving to regulate the draught. The grate is or may be mounted on a system of links or levers, so that it is adapted to rise and fall, and means are provided for raising it up to or nearly up to the undersides of the depressions, so that when the fire is low and feeding takes place, the smoke and products of combustion will be compelled to pass through the incandescent fuel on their way to the side flues. The entire furnace is surrounded by a water jacket, which forms part of the boiler, a considerable part of the boiler being arranged at the back of the furnace, and traversed by the side flues or continuations of them. If desired, the grate may be hinged in the centre so as to turn upward at the sides with the above object. (Twelve claims.)

110049. *Improvements in Conveyor Driving and other Belts.* A. E. Wale, 39, Thorp-street, Birmingham. — This invention comprises improvements in and relating to conveyor driving and other belts, and refers to belts constructed of wire helices inter-coiled one into the other, and usually running transversely of the belt. In a prior application No. 103907, a method was described suitable for open fabric. The object of the present invention is to provide a form of edge which is also suitable for close fabric. Fig. 1 shows a portion of the transverse helical interwoven fabric of a belt with an edge formed in accordance with this invention; fig. 2 shows a compound helix such as may

WET SHAFTS

MADE WATERTIGHT BY OUR CEMENTATION PROCESS.

SAVES COAL and LABOUR
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INCREASES OUTPUT

BY DOING AWAY WITH PUMPING.

(Cost of work recouped in a few months, and permanent results guaranteed.)

References :

Llay Hall Collieries, Wrexham, 2 wet shafts, linings cemented.
Wrexham and Acton Collieries, Wrexham, 2 wet shafts, linings cemented.
Wigan Coal and Iron Co. Ltd., Parsonage Colliery, Leigh, Lancs., 2 wet shafts, linings cemented.
Risehow Colliery Co. Ltd., Flimby, 2 wet shafts linings being cemented.
Pinxton Collieries Ltd., Pinxton Collieries, Alfreton, one wet shaft lining being cemented.

SHAFT-SINKING

By FREEZING or CEMENTATION.

Llay Main Collieries, Wrexham, 2 shafts sunk by freezing.

BY-PRODUCT COKING PLANTS

440 OVENS AT PRESENT UNDER CONSTRUCTION IN ENGLAND.

COAL WASHERS

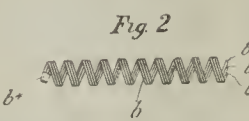
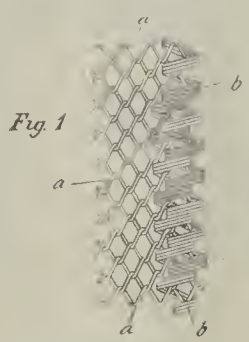
("BRITISH BAUM" SYSTEM).

47 PLANTS WORKING OR UNDER CONSTRUCTION IN GREAT BRITAIN.

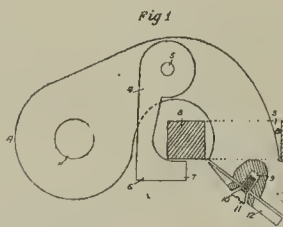
BRITISH MANUFACTURE THROUGHOUT.

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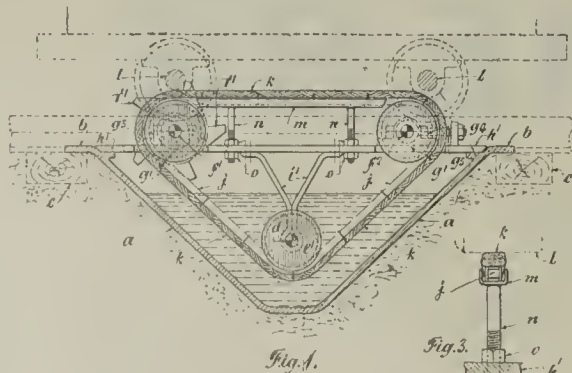
forming the edges of belts of interwoven fabric. Body of the belt is made up of the transverse helices are represented helices are shown of for convenience A compound helix made up of three helices b_1, b_2, b_3 is shown at fig. 2, but two or more helices for each compound helix may be used. The leading ends of the helices b_1, b_2, b_3 may be soldered together as at b_4 to facilitate threading of the compound helix into the ordinary transverse interwoven helical fabric of the belt. Fig. 1 shows two of such compound helices b threaded longitudinally along the edges of the belt fabric a , as before set forth. This particular example illustrates one (the inner) compound helix as engaging with $1\frac{1}{2}$ complete turns of every alternate transverse helix, and the other (the outer) compound helix as engaging one complete turn of the alternate transverse helices. The belt may be filled with pitch or any other suitable material, and may be covered with felt or like material to give it lateral stiffness and gripping power. With this object of giving lateral stiffness, straight wires are inserted at intervals diagonally in the grooves or valleys of the fabric, and interlock them with opposite diagonal wires in the grooves or valleys on the other side of the fabric which are threaded under them. Or wires may be used threaded axially into the transverse helices. (Four claims.)



110043. *Improvements in Hook Couplings Suitable for Mining Wagons, etc.* W. Price, 5, Upper Plaesnewydd-street, Bargoed, Glamorganshire.—A hook, fig. 1, suitable for mining and like wagons, and having at its front end A a hole 1 for connecting links or the like thereto, whilst the rear end B has a lug or tee piece projection 2. To insert the lug or tee piece end 2 into a hole or slot 3, the front end A of the hook has to be raised to the perpendicular, to allow the said lug or tee piece end 2 to pass through. The front end A should then be brought to the horizontal, thus altering the position of the lug or tee piece end 2 underneath the hole 3 through which it was inserted. A key shape piece 4 is then used, having at its upper end a hole 5, through which is inserted a rivet or bolt, and likewise through a hole at the bend of the hook. The key 4 has at its lower end 6 a lug or projection 7, which should overlap the link or the like 8, at the rear end B of the hook. If required, a hole 9 can be inserted into the rear end B of the hook, to receive a set pin or rivet 10, which has secured at its lower end 11 a swivel piece 12, which, when actuated, locks the rear end B of the hook, and prevents the link 8 from uncoupling. (Two claims.)



110085. *Automatic Lubrication of Wheel Axles of Colliery Wagons, Tubs, Corves, etc.* J. Baldwin, 181, Darlington-street East, Wigan; and T. Kevill, May Cottage, Wigan-road, Standish.—This invention has for its object to provide simple, compact, and reliable means for enabling the wagons to be uniformly and automatically lubricated, thereby dispensing with manual labour, and also ensuring the economical lubrication of the wagons. Fig. 1 is a longitudinal sectional elevation of one form of the improved apparatus; fig. 3 is a detail cross sectional view on an enlarged scale of the conveyor band. The grease or oil box a is made taper, and arranged with its upper and wider part level with the ground, brackets b being provided, by means of which it can be secured to the usual sleepers c . Within the lower part of the box a is journaled a cross axle d , upon which are mounted two loose wheels e^1, e^2 . Above the box are two further axles f^1, f^2 , and wheels g^1, g^2 and g^3, g^4 respectively, the axles f^1, f^2 being carried in bearings g^3, g^4 secured to a longitudinal member h^1 , attached to the box a , brackets i^1, i^2 being attached to the underside of the member h^1 to receive the axle d . Around each of the wheels e^1, e^2 in the box, and also around the wheels g^1, g^2 above the box passes an endless chain j . Secured to such chain on its outer side or edge is a rope k or sections of rope, or the like, which is, or are, adapted to absorb lubricant and hold it in a manner convenient for transferring it to the wagon axles l when the latter come in contact with it. Below each horizontal portion of each chain j and rope k is a channel-shaped support m carried by screwed supports n rendered adjustable by nuts o , and so arranged that any excess of grease or oil on the rope will be caught by the channel of the support, and directed back to the box a , the end of the channel support m opening into the box.



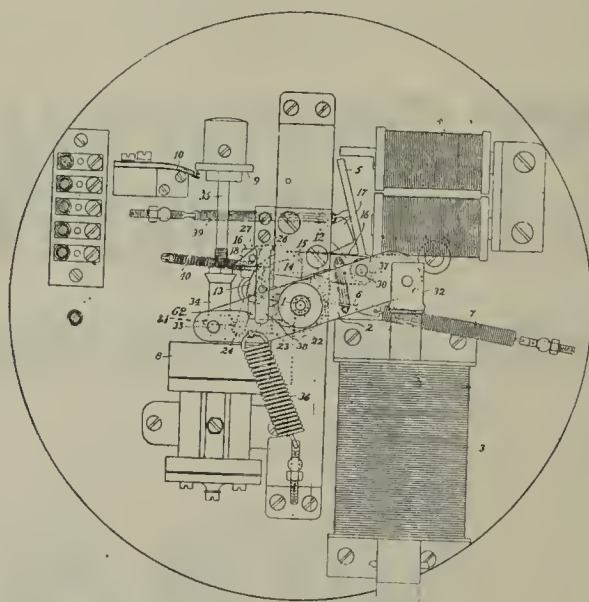
To exclude dirt, etc., the top of the box a may be covered in with a removable lid p having holes or slots for the chains and ropes to pass through, and to prevent rain, etc., entering the box, the edges of the holes or slots may be fitted with gaskets. The wheels e^1, e^2 may be supported in fixed bearings g^3 only are fixed, the wheels g^1, g^2 being mounted in order that any slackness taken up by the screws g^3 , although the wheels g^1, g^2 may be used for such purpose. The axles f^1, f^2 are sprocket wheels g^1, g^2 and g^3, g^4 respectively, and are keyed to the said axle f^1 is a wheel r having comparatively long teeth s with the improved lubricating apparatus in use, the axles, as they pass over the rails, first make

contact with one of the teeth of the wheel r , thereby rotating the axle f^1 through said wheel r . Consequently, the sprocket wheels on said axle advance the ropes, and bring forward freshly-coated parts in readiness for the next axle or wagon. Simultaneously, and during the whole time each wagon axle is passing over the device, said axle makes contact with the ropes, which, being coated with grease or oil, will lubricate the same, lengths of freshly-coated ropes being automatically left for the succeeding axle, as previously explained. In this way, the axles are evenly and automatically lubricated. The lubricant will preferably be of a consistency between grease and thick oil, so that it will tend to flow or settle on to the rope as it passes through. In this connection, a loose plate, or weighted float, may be placed on the surface of the lubricant to feed it downwards on to the rope. Whilst preferring to use rope as the medium for holding the grease or oil, any other and suitable material may be employed. (Five claims.)

110086. *Automatic Elevator.* G. B. Holdsworth and A. E. Horsfall, Shaw Lodge Mills, Halifax.—The subject of this invention is an elevator intended principally for transferring goods from a lower to a higher level in warehouses and the like, such elevator comprising a travelling belt, preferably endless, having at intervals pivoted hooks to which the goods can be attached; at suitable places on each floor or stage are projections which can be moved into the path of tailpieces on the hooks, which latter, on engaging the said projections, are thereby caused to tilt and drop their burdens. Hinged boards or the like at each stage allow the upward passage of the goods, and if sloping will guide them when detached from their hooks on to a table or to other desired place. (Three claims.)

110132. *Combining Liquid Hydrocarbons for Fuel in Internal Combustion Engines.* J. A. Stoneham, 4, London Wall Buildings, London, E.C.—Derivatives of petroleum having a flash point of above 120 degs. Fahr., and coal tar distillates having a flash point between 80 and 90 degs. Fahr., are mixed, generally in equal quantities, and to the above mixture of combined petroleum derivatives and coal tar distillates are added about 25 per cent. of benzene, and to that total mixture it is advisable in some cases to add 0.5 per cent. of ether. (One claim.)

110172. *Improvements in Signalling Apparatus for Mine Signalling.* W. A. Heyes, L. O. Heyes, and A. V. Heyes, Water-Heyes Electrical Works, Riverside, Wigan.—The present invention relates to improvements in signalling apparatus of the type in which signals are set up by a number of separate consecutive impulses, the first of which releases the indicating mechanism, that is to say, returns it to the position corresponding to "zero," or the starting indication, and is itself recorded or indicated. Fig. 1 is a back elevation of the mechanism. The pointer of the dial is mounted on a spindle 1, which spindle has keyed thereon a pair of ratchet wheels, one of which is operated by means of a pawl 11 on the finger 12, whilst the other is engaged by a pawl 15 on a finger 16. The finger 12 is pivoted at 30 to an arm 2 mounted to pivot freely around the spindle 1, and pivoted at 31 to the armature 32 of an electro-magnet 3. The opposite end of the arm 2 carries a pin 33 engaging under a collar 34 on a spindle 35, which spindle is connected to the piston of a dashpot 8. The spindle 35 carries at its upper end a collar 9 of insulating material which, in the lowest position of the spindle, rests upon contacts 10, in the circuit of a second cautionary signal, such as a lamp or bell operative on the completing of the said circuit by the pointer on the spindle 1 when it comes into one selected position of its range of indications. It will consequently be seen that depression of the armature 32 by the attraction of the electro-magnet 3 will cause the raising of the spindle 35, and will allow contact to be broken between the contacts 10, 10 until such time as the dashpot will allow, under the action of gravity, spring, or the like, the flange 9 to again descend to the position illustrated in fig. 1. A spring 36 normally holds the arm 2 in position, so that after the first impulse, which causes a



depression of the armature 32, the arm 2 will be drawn back into the position illustrated in fig. 1, which will cause the pawl 11, which on the depression of the armature 32 has ridden along one tooth of its ratchet wheel, to push the ratchet wheel bodily forward, and with it the spindle 1. The pawl 15 on the arm 16 acts as a locking pawl for the spindle 1. A raising of the spindle 35 by the first impulse of a signal will allow the spindle 1 to fly back to zero under action of the spring 7. The spindle 35 only remains raised for a sufficient time by the dashpot 8 to allow one impulse to follow another to complete a signal. When the lift or the like operator appreciates a signal, and responds to it by, for instance, starting the lift motor or engine, this will cause the circuit containing the electro-magnet 4 to be completed by known means, not shown, so that this latter attracts its armature 5, and so turns the arm 16 about its pivot 37, so that the pawl 15 is lifted clear of its ratchet wheel, and by the motion of this arm about the pivot 37, owing to the engagement of the pin 14 with the end 13 of the arm 12, the pawl 11 also will be lifted clear of its ratchet wheel, so consequently there will be no longer any restraining influence on the spindle 1, and this returns to its normal or zero position by reason of the tension of the spring 7 on a cord wound around and attached at one end of the spindle 1. The return of the spindle 1 to its normal position causes a finger 62 on the indicator spindle 1 to open a pair of contacts 38, which also

are in the circuit containing the electro-magnet 4, so that this circuit is broken and consequently the armature 5 no longer will be attracted, but will be pulled down into the position shown by means of the spring 39. (Seven claims.)

EXPLOSIVES IN COAL MINES.

The following is a complete list of Permitted Explosives to date:—

Part 1.—Explosives which have Passed the Rotherham Test.

Explosive.	Permissible maximum charge in oz.	Pendulum swing in inches.*
Abbate No. 2	18	2.54
Abel No. 1	14	2.85
Abel No. 4	18	2.79
Ajax Powder	12	2.69
Ammonite	18	2.44
Ammonite No. 1	24	2.42
Ammonite No. 4	30	1.76
Anchorite	14	2.73
A. 1. Monobel	28	2.78
A. 2. Monobel	22	2.44
Arkite No. 2	40	2.41
Bellite No. 1	20	2.74
Bellite No. 2	32	2.42
Bellite No. 4	18	2.92
Black Bellite	30	2.48
Britonite No. 2	24	2.26
Britonite No. 3	24	2.17
Cambrite	30	1.98
Cambrite No. 2	24	2.00
Denaby Powder	18	2.74
Dreadnought Powder	32	2.05
du Pont Permissible No. 1	18	2.82
Dynobel	22	2.61
Dynobel No. 2	24	2.46
Dynobel No. 3	18	2.50
Dynobel No. 4	30	2.35
Essex Powder	38	2.17
Expedite	32	2.62
Faversham Powder No. 2	24	2.61
Haylite No. 1	10	2.18
Haylite No. 2	18	1.96
Herculite	16	2.72
Kentite	18	2.64
Kent Powder	32	2.01
Kynarkite	20	2.21
Kynarkite No. 2	23	2.06
Melling Powder	12	2.62
Mersey Powder	18	2.60
Monarkite	26	2.67
Monobel No. 1	10	2.81
Nationalite No. 1	12	2.92
Nationalite No. 2	20	2.63
Negro Powder No. 2	20	2.21
Neonal	16	2.56
Neonal No. 1	30	2.51
New Fortex	10	2.61
Nitro-Densite	28	1.47
Pit-ite No. 2	32	2.15
Pitsea Powder No. 2	8	2.64
Rex Powder	20	2.61
Roburite No. 4	18	2.86
Stomonal No. 1	20	2.68
Stomonal No. 2	30	2.57
Sunderite	16	2.66
Super-Cliffite No. 1	26	2.53
Super-Cliffite No. 2	30	2.53
Super-Curtisite	16	2.71
Super-Excellite	10	2.74
Super-Excellite No. 2	14	2.72
Super-Excellite No. 3	36	2.73
Super-Kolax	30	2.10
Super-Kolax No. 2	32	2.21
Super-Rippite	18	2.53
Swale Powder	20	2.50
Thames Powder	32	2.78
Thames Powder No. 2	22	2.59
Victor Powder	18	2.96
Victor Powder No. 2	16	2.63
Viking Powder No. 1	26	2.44
Viking Powder No. 2	18	2.59
Westfalite No. 3	12	2.55

Part 2. Bobbinite.

(Permitted only for the purpose of bringing down coal in certain mines for a period of five years from 1st Jan., 1914.)

* This is the swing given to the ballistic pendulum at the Home Office Testing Station by firing at it a shot of 4 oz. of the explosive. It may be compared with the swing of 3.27 in. given by a shot of 4 oz. of gelignite containing 60 per cent. of nitro-glycerine.

DIARIES AND CALENDARS.

Sir W. G. Armstrong, Whitworth and Company Limited.

—Perhaps no subject more suitable in connection with a firm celebrated for armaments—certainly nothing more pictorially dramatic—could have been selected as the illustration of a wall calendar than the sinking of the "Blucher" by British warships. This is one of the best examples of pictorial art of its kind, both for the effectiveness of its drawing by the artist, Mr. Montague Brown, and the remarkably good colour effect. The transparency of the green sea is only one of the picture's merits. The usual tear-off slips at the foot of the illustration, and the references (in gilt letters) to the firm's high-speed steel and carbon tool steel, are the only business elements of the production.

Capt. F. I. Leslie Ditmas, F.G.S., M.I.M.E., of 343-345, Dashwood House, E.C., was "mentioned in despatches" for distinguished and gallant services on the Western Front in the *London Gazette* of December 11. This is the second time, and Capt. Leslie Ditmas was awarded the Military Cross last February for gallantry in the field.

Judgment in Irish Demurrage Action.—In the King's Bench Division of the Dublin Law Courts last week, judgment was delivered in the action which was brought by Mr. James McKelvie, trading as the Erin Steamers Company, ship owners in Scotland, to recover demurrage from Messrs. Wallace Brothers, who are Dublin coal merchants, in respect of a vessel carrying a cargo of coal consigned and delivered to the defendants in Dublin. The defence was that at the time of delivery of the cargo the bill of lading had not reached the hands of the defendants, and that consequently there was no priority of contract between them and the shippers. The case had been heard by Mr. Justice Gibson, sitting without a jury, and on the evidence his lordship had reluctantly decided against the plaintiffs. The plaintiffs then moved for judgment. Mr. Justice Dodd delivered the unanimous judgment of the court, giving the plaintiffs judgment for £27 demurrage and costs.

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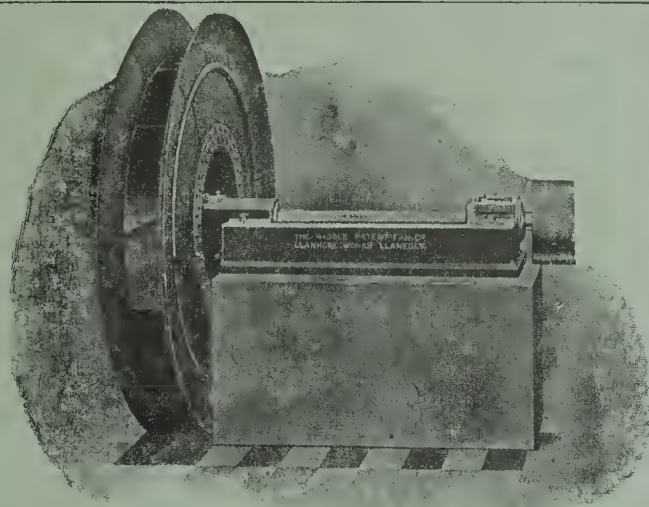
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VOL. CXIV.—No. 2974.

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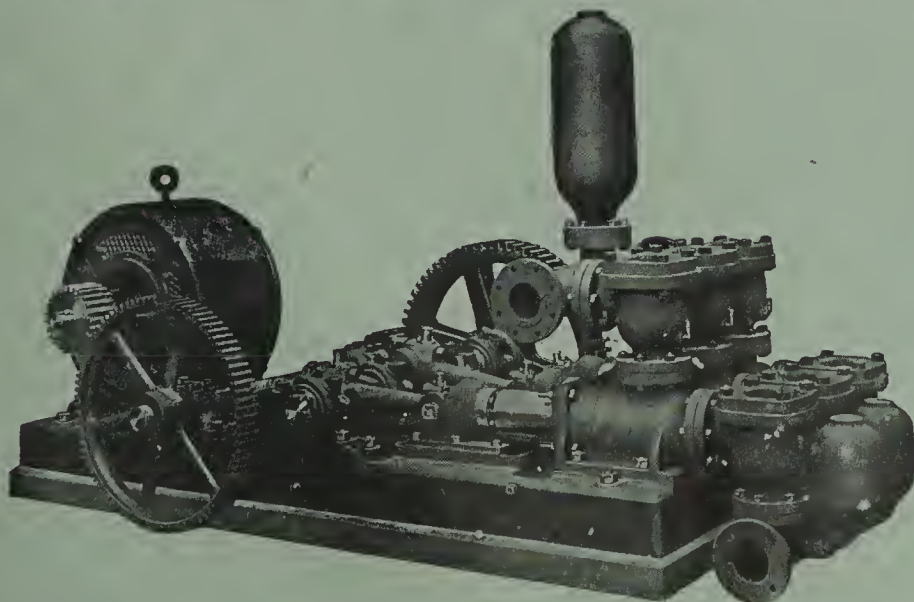
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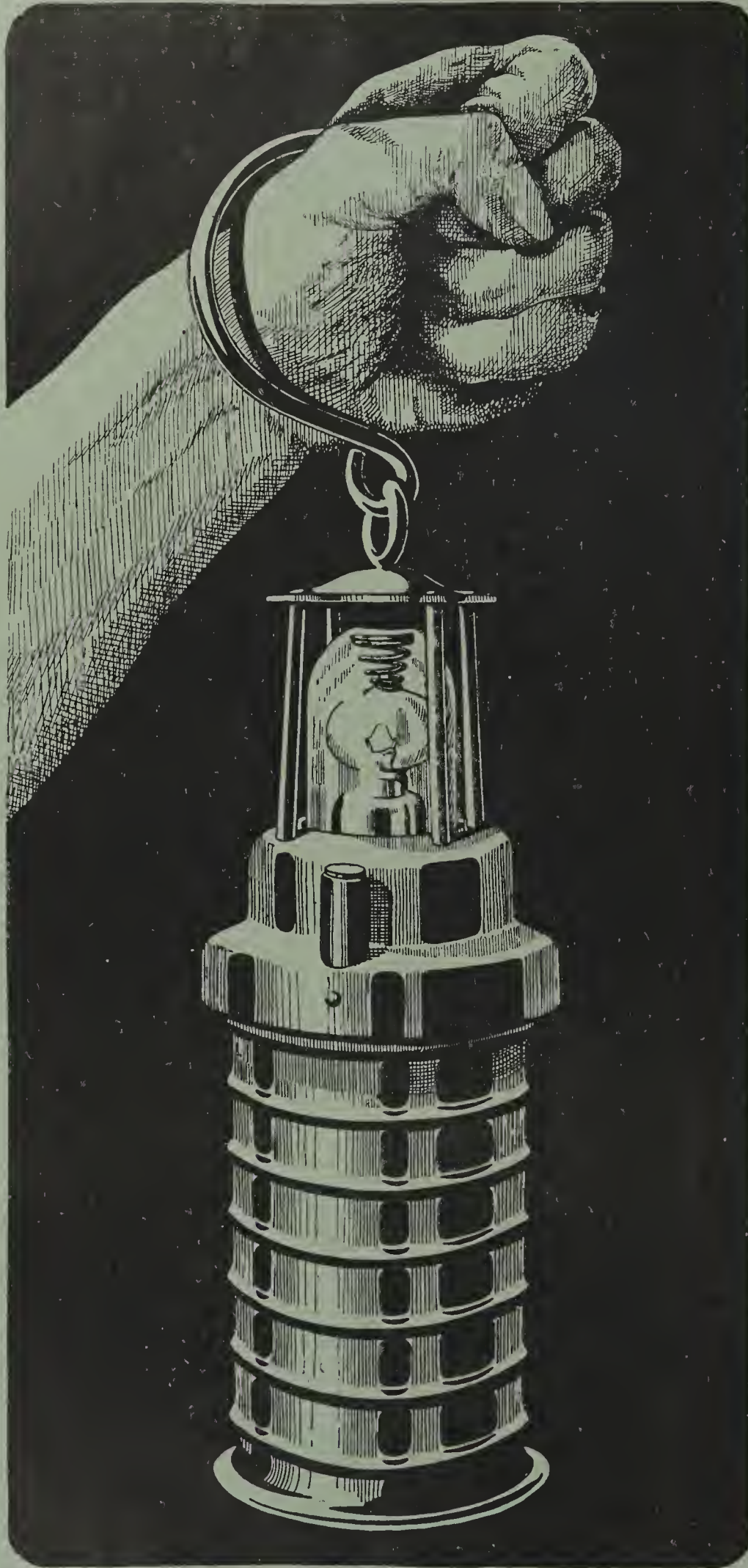
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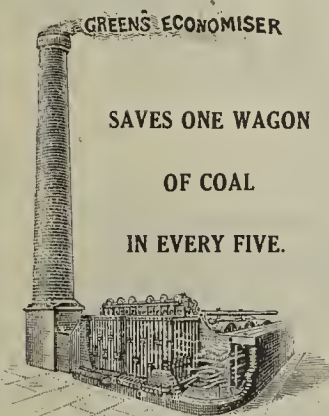
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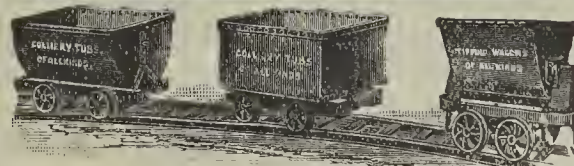
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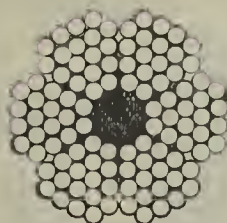
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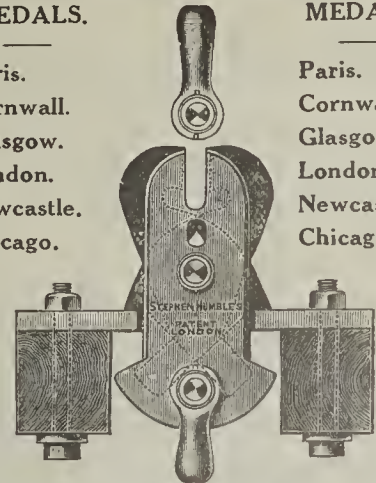
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Simplex Conduits Ld.	1229
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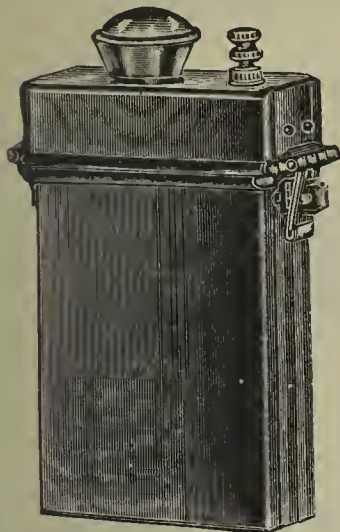
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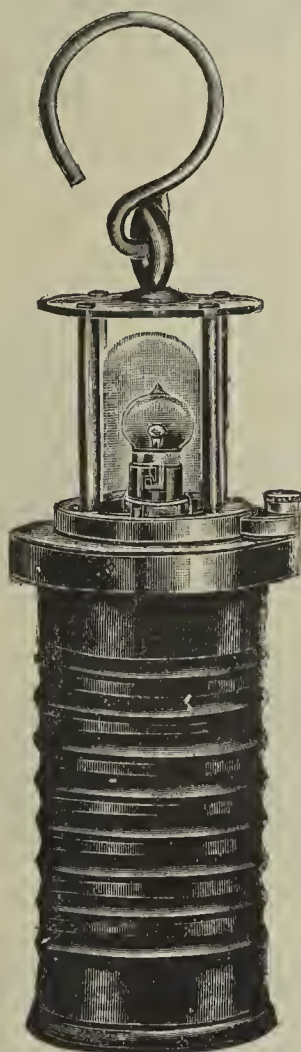
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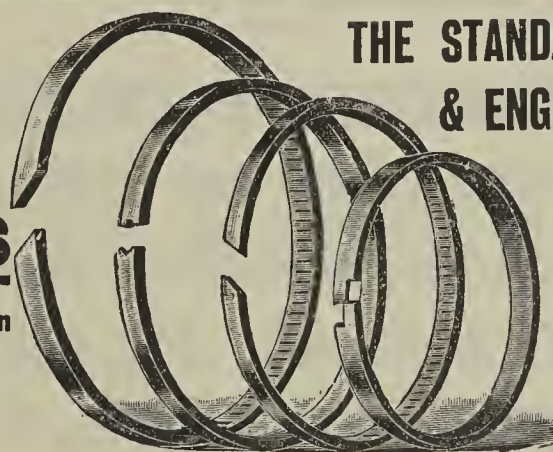
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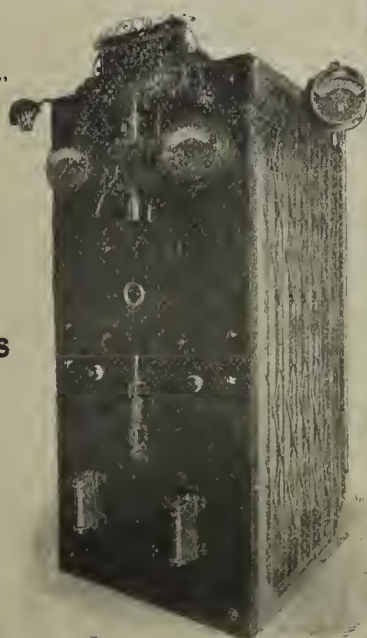
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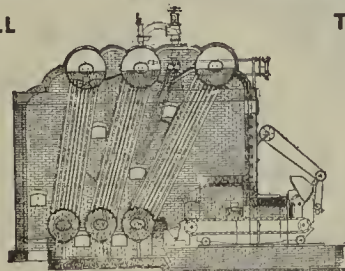
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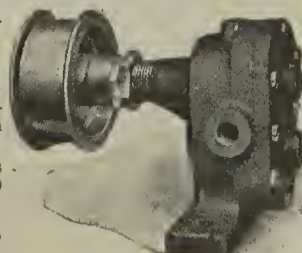
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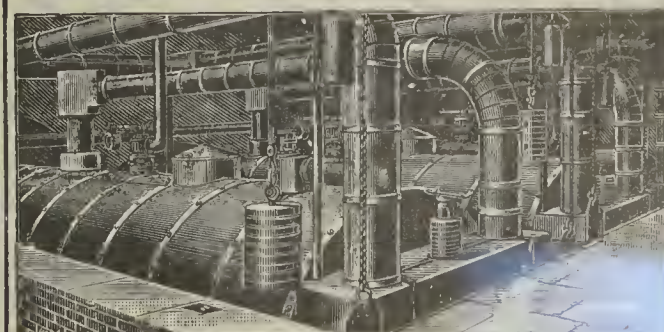


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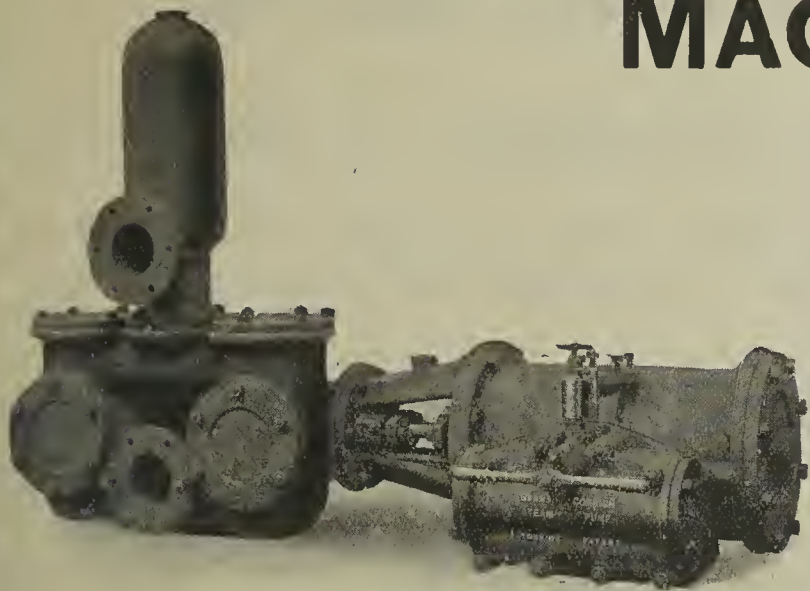


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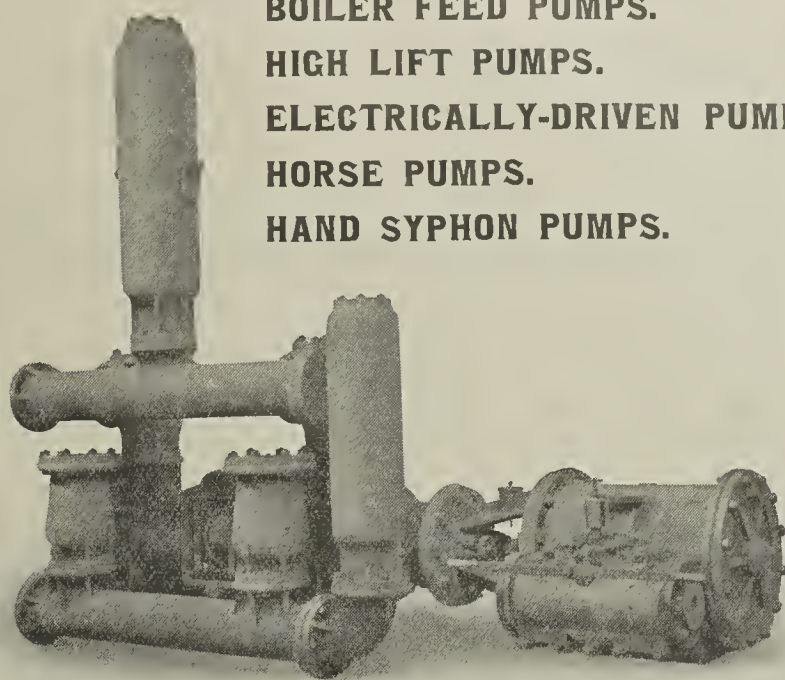


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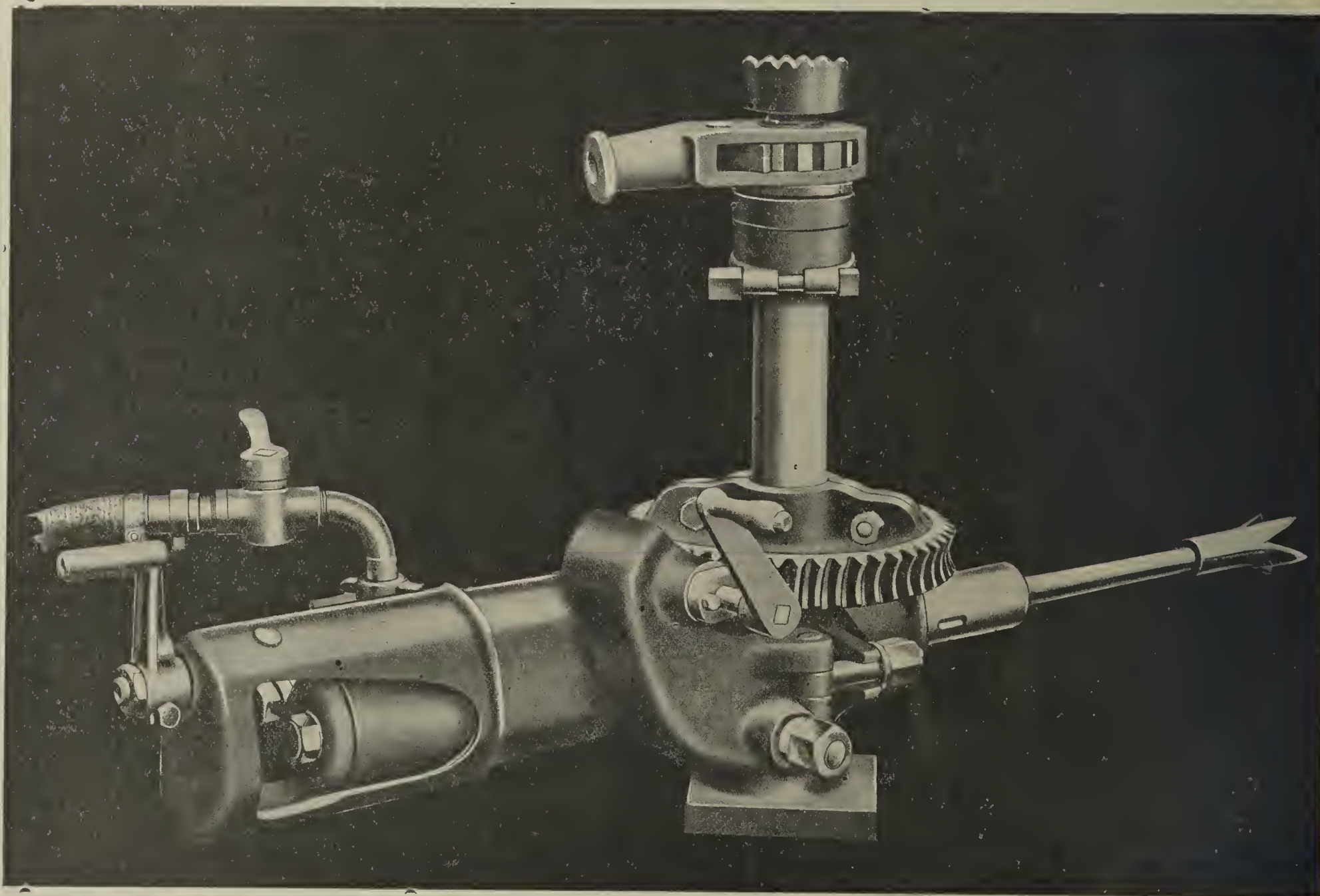
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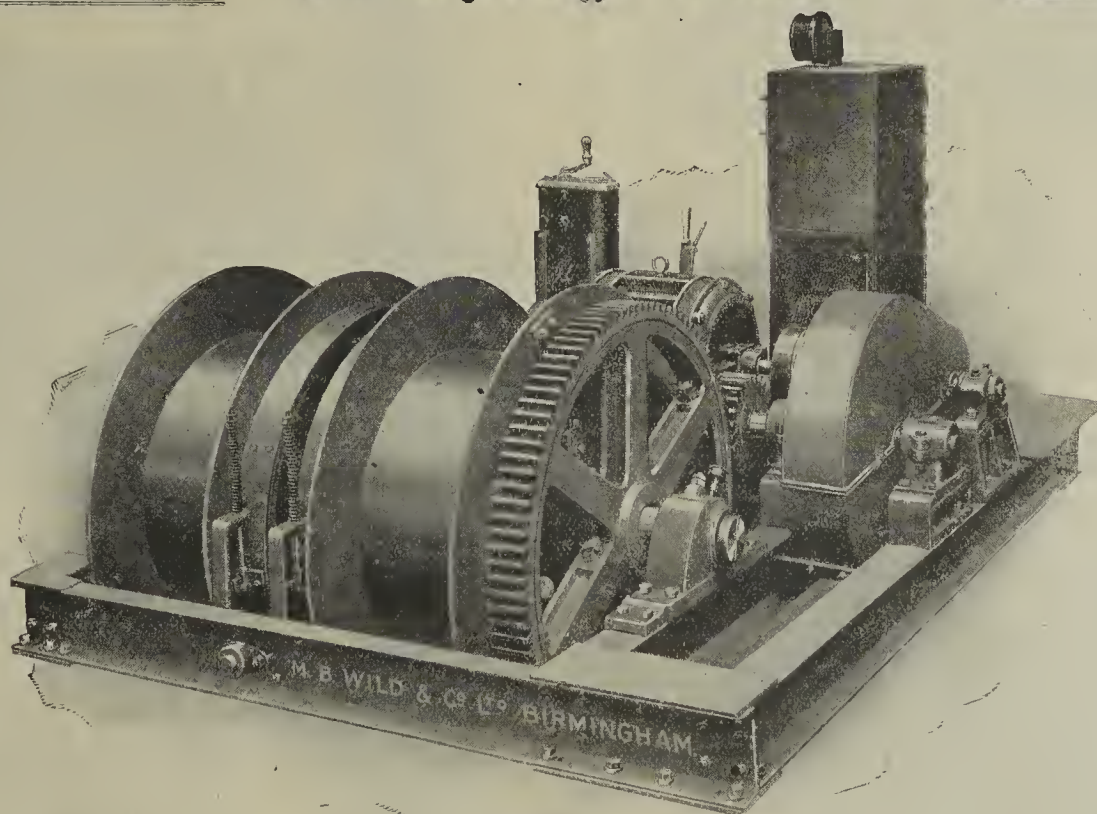


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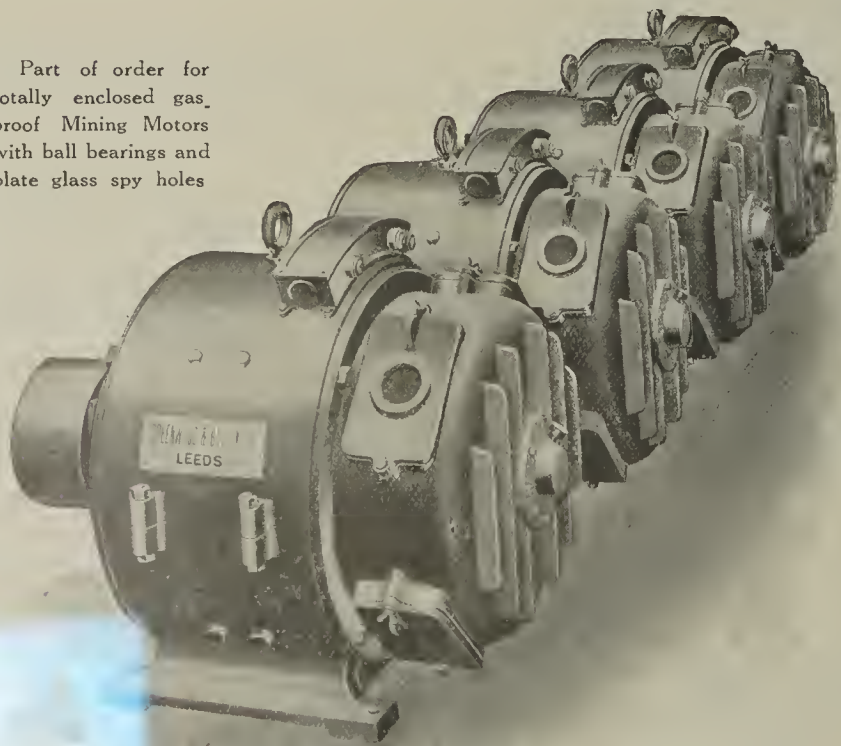
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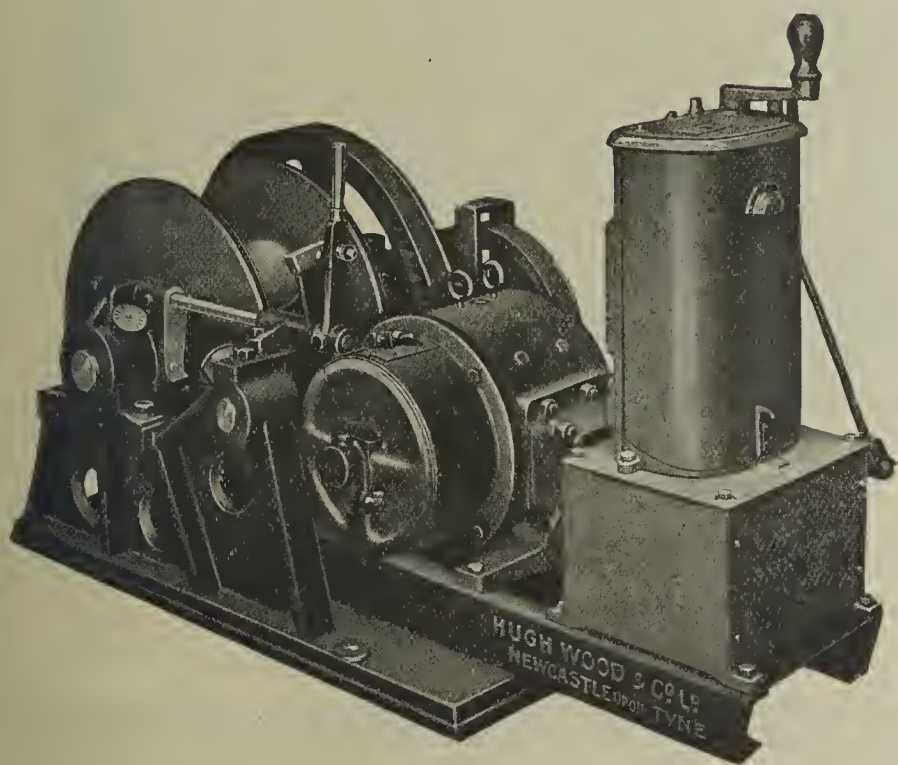
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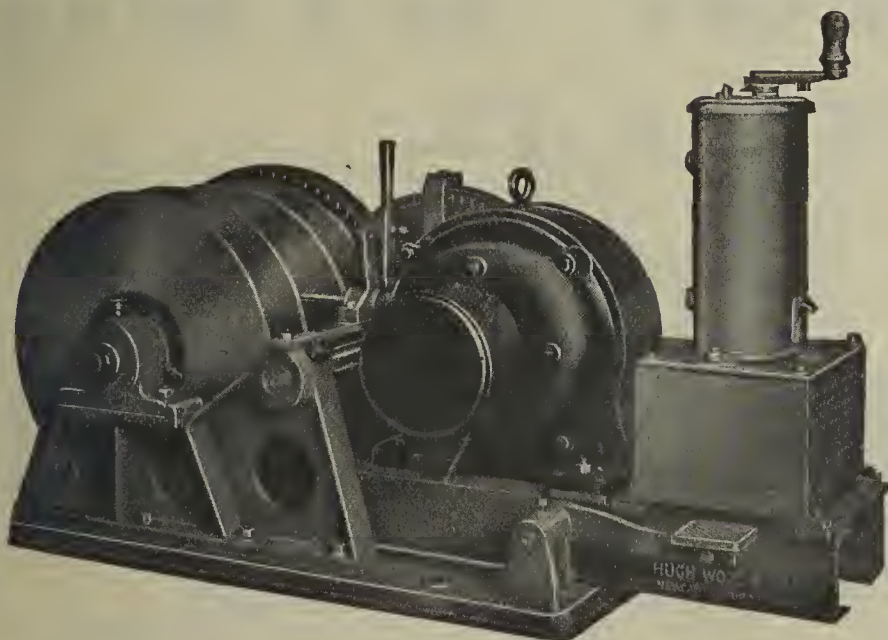
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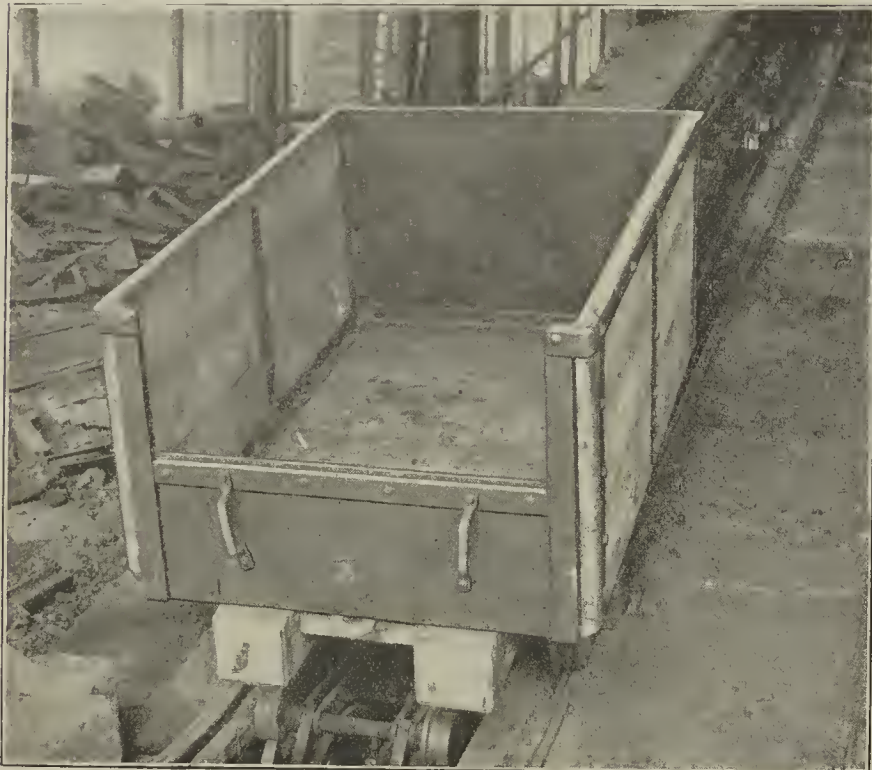
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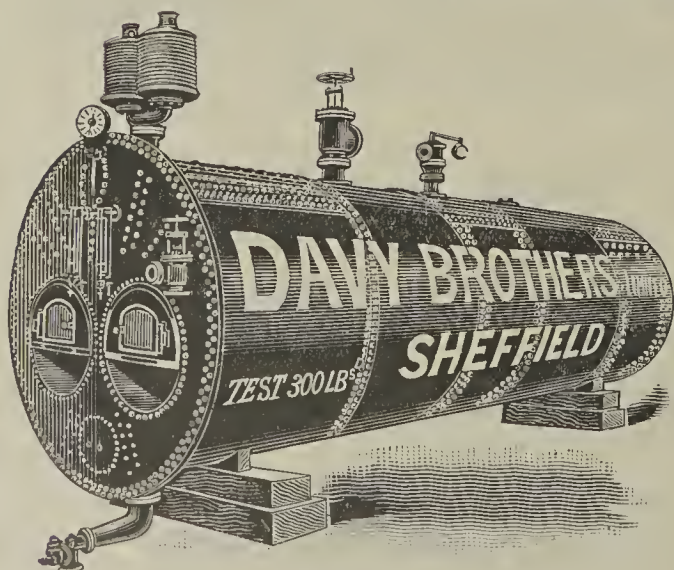
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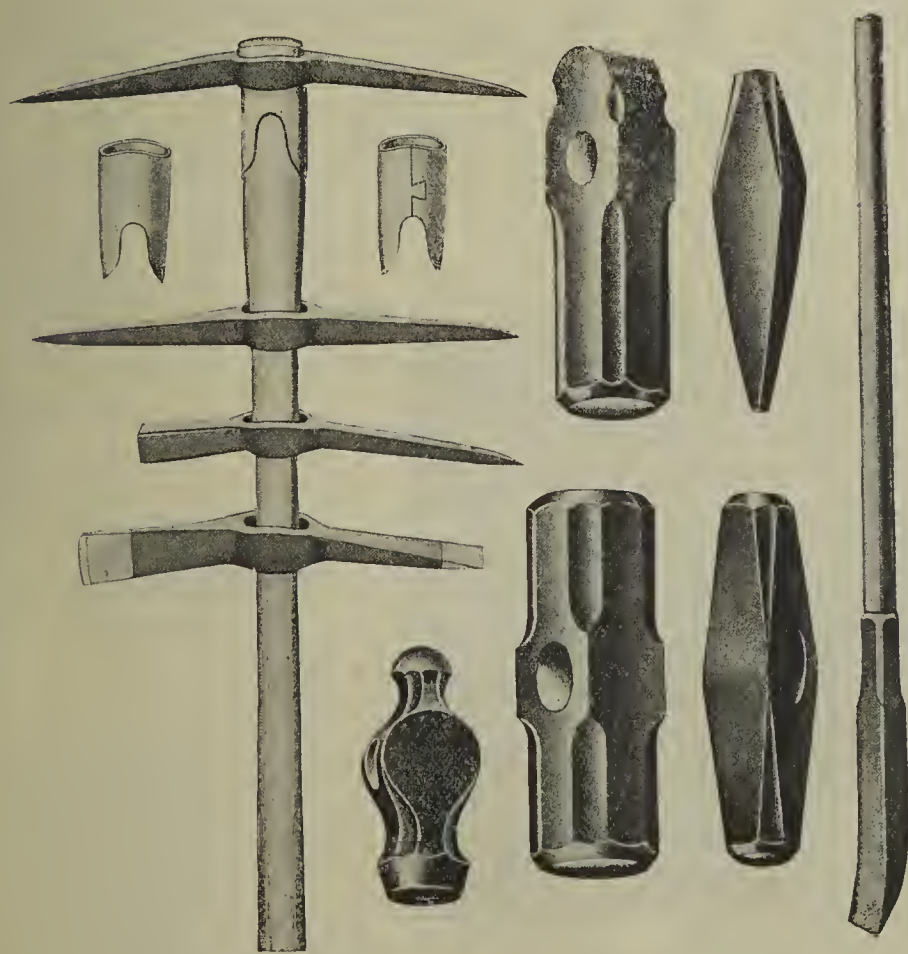
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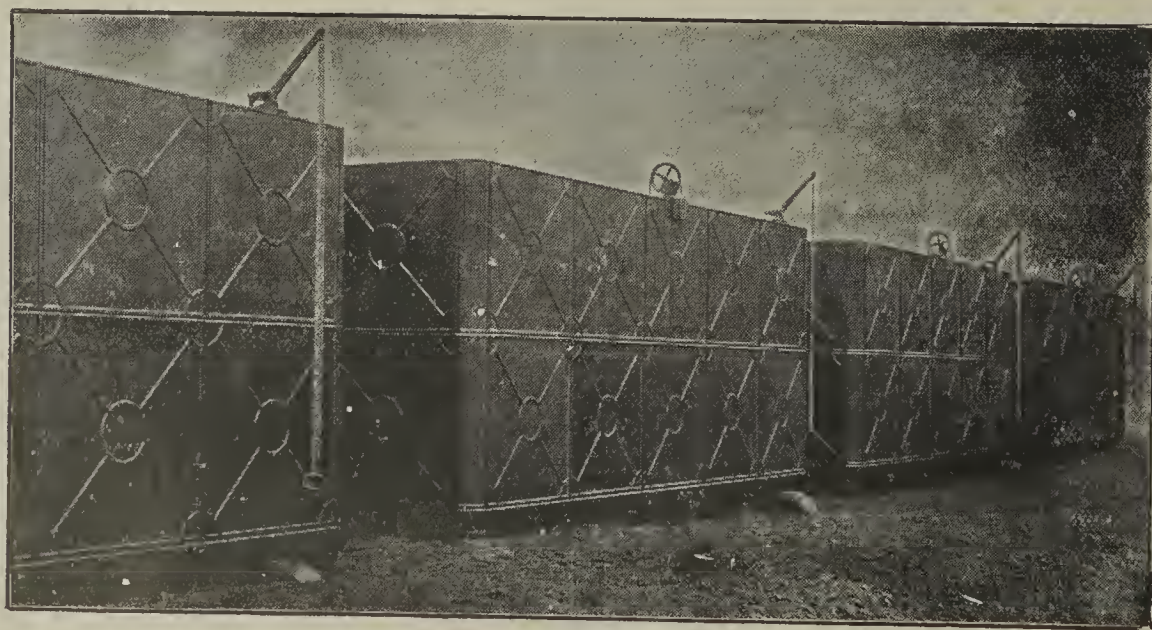
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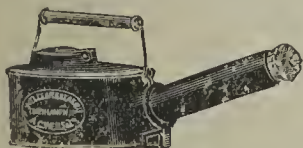


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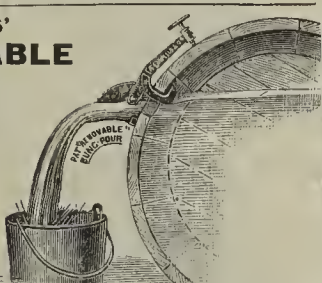


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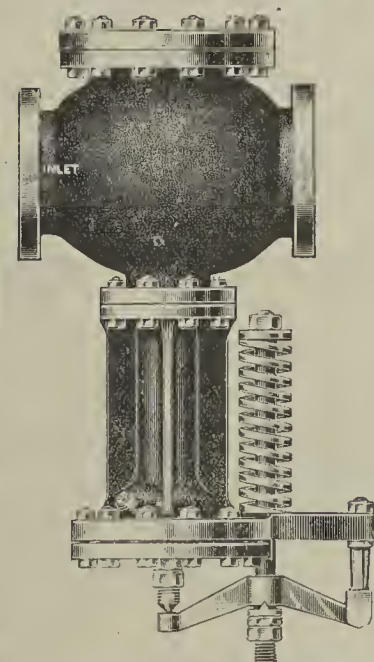


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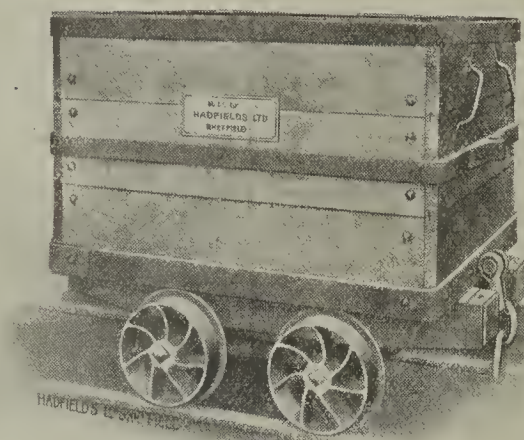
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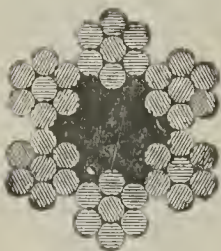
Wire Drawers, Manufacturers of all classes of Wire Ropes.

Patentees and Manufacturers of

LOCKED COIL AND FLATTENED STRAND WIRE ROPES.

HAY MILLS, near BIRMINGHAM.

Fig. 2. HAULING.



Lang's Lay Ropes.

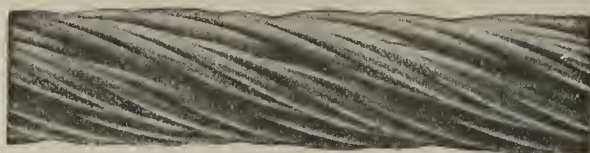


Fig. 26. WINDING.

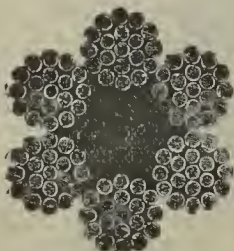


Fig. 1. HAULING.

Patent Flattened Strand Ropes.

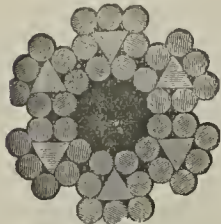


Fig. 4. WINDING.

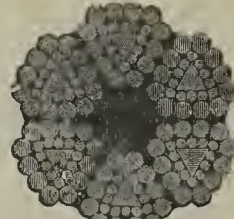


Fig. 13a. SINKING.

Advantages of Patent Flattened Strand Ropes.

1. Greater wearing surface, therefore longer life of rope and less wear upon pulleys.
2. Greater strength, thereby admitting of smaller ropes being used for existing loads, or of increased loads without increase in size of rope.
3. Spliced easily and more effectively.
4. Less tendency to twist and stretch in working.

Fig. 13a for Sinking and Fig. 11b for Cranes, &c., are non-twisting.

Fig. 11b. CRANE, &c.

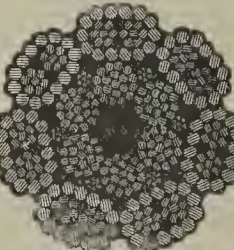
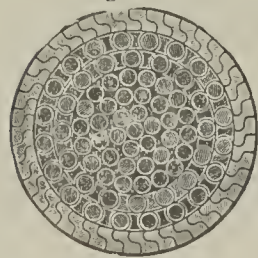


Fig. 15a.



WINDING

Locked Coil Ropes.

Indispensable for deep shafts.

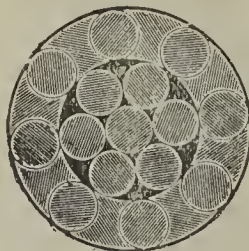
Stronger than any other rope of same size.

Entirely free from twist.

Smooth surface reduces wear to a minimum.

Duration far ahead of any other construction.

Fig. 20.



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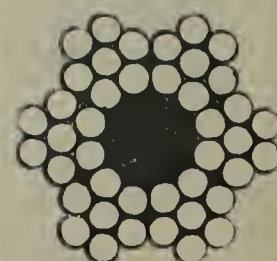
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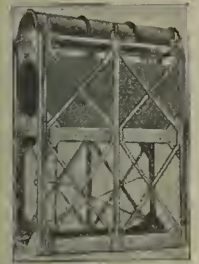
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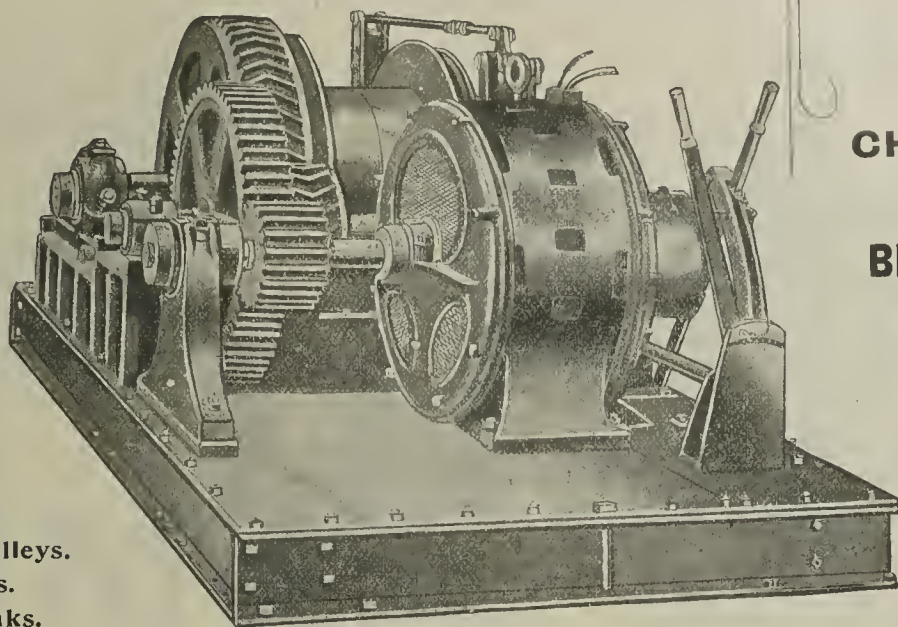


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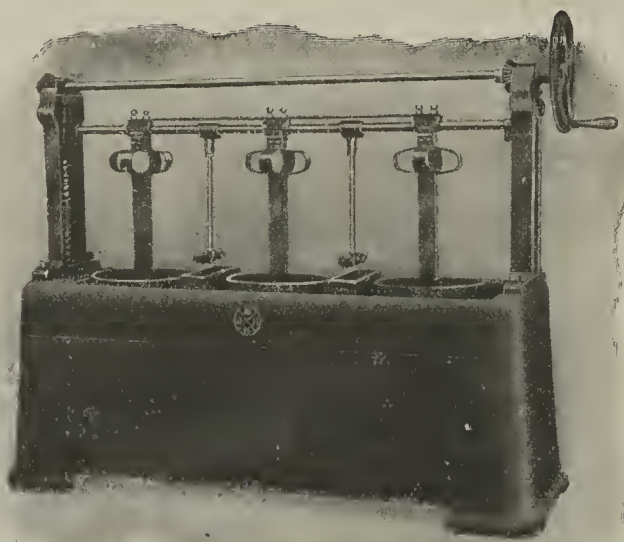
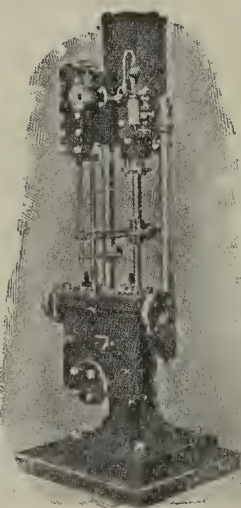
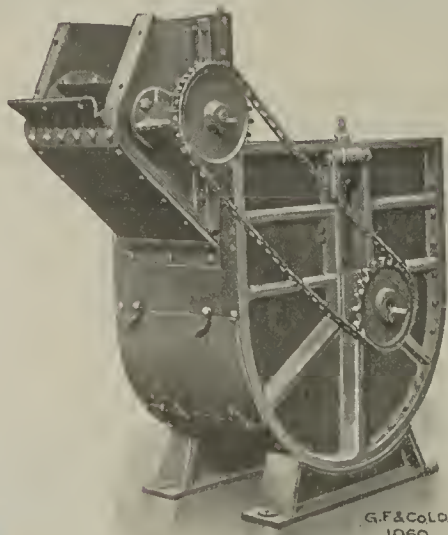
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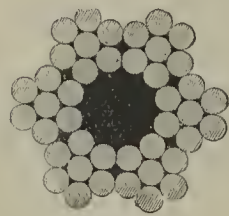
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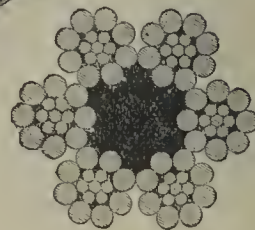


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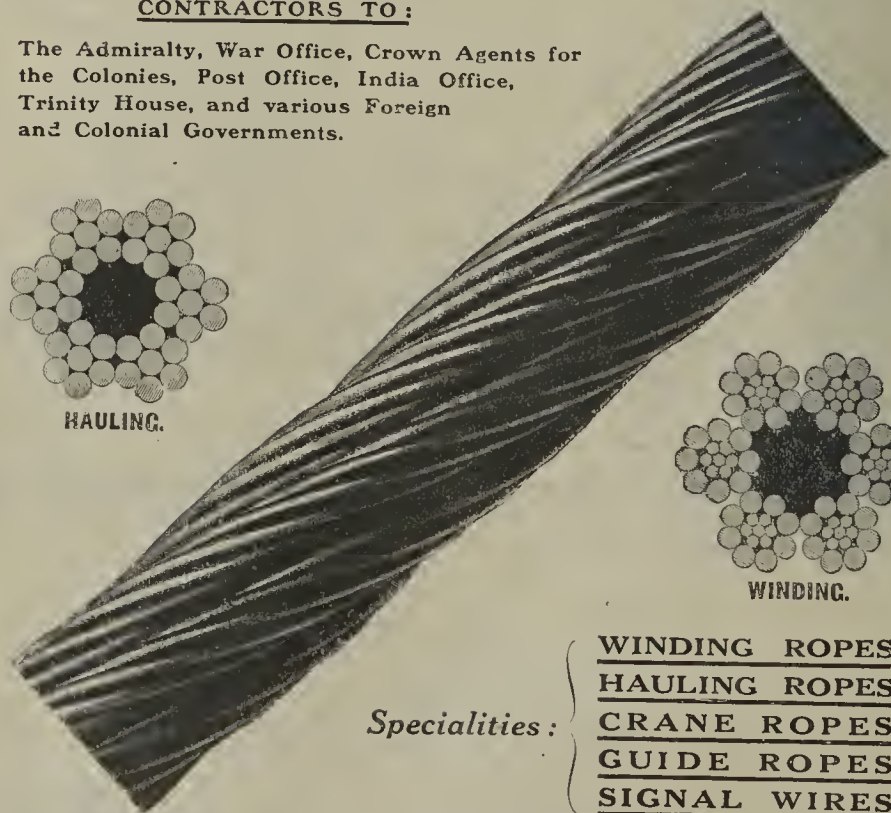
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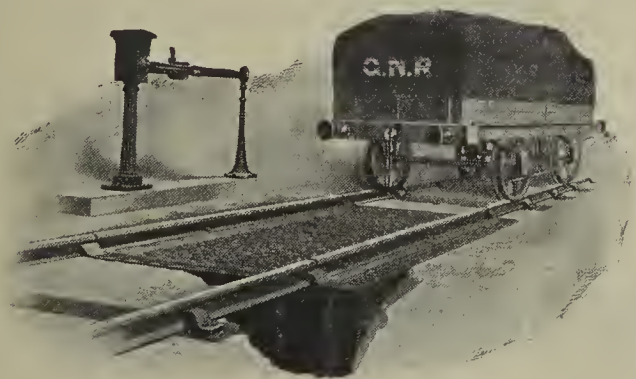
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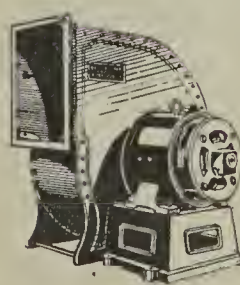
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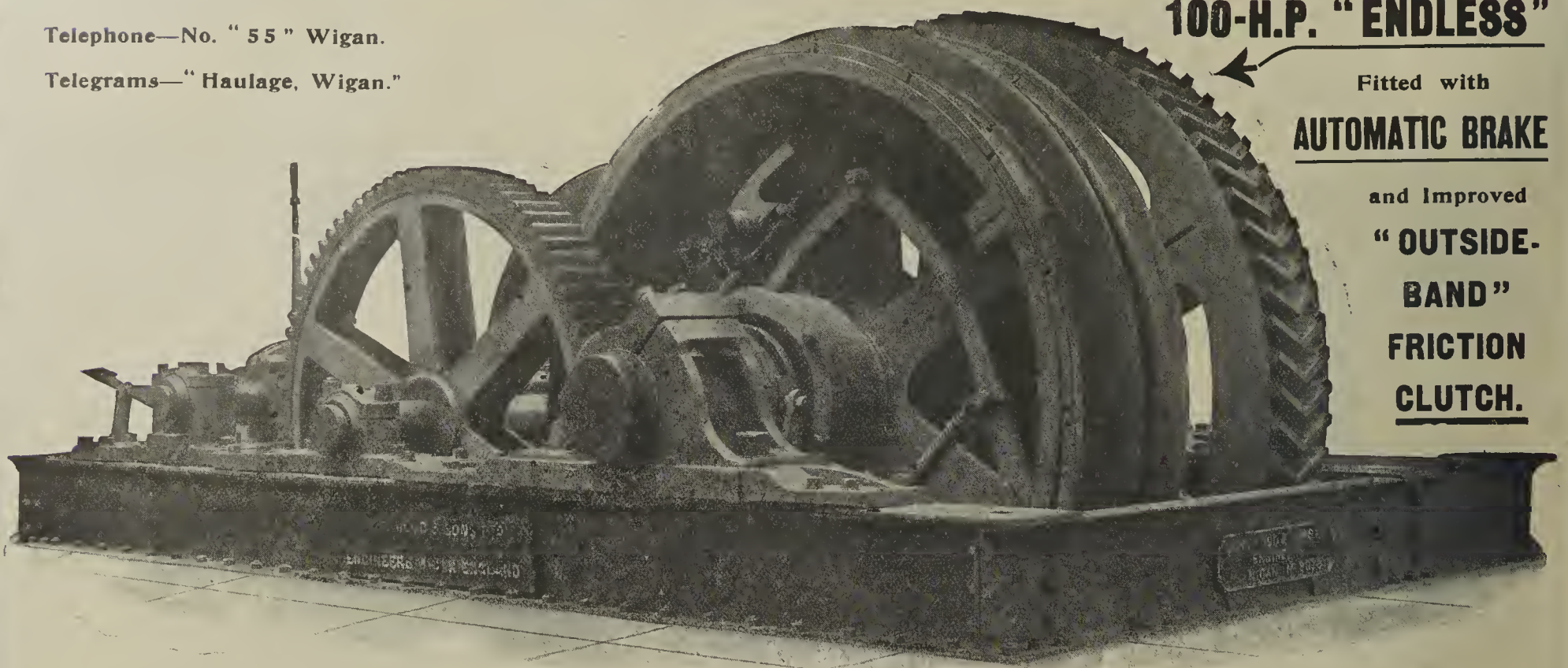
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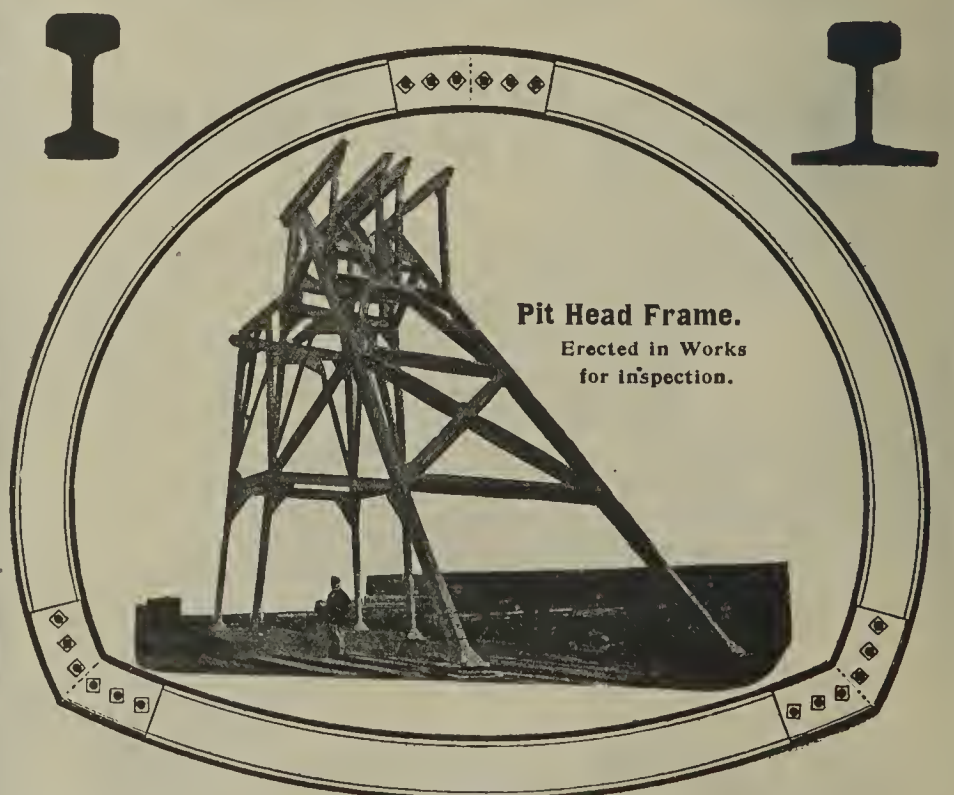
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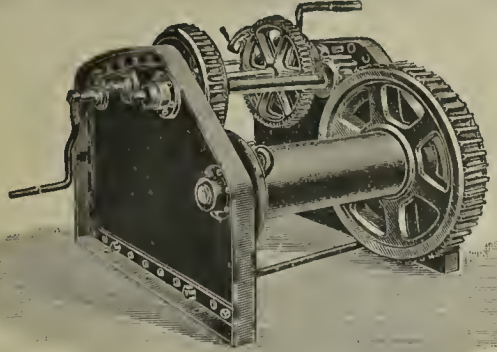
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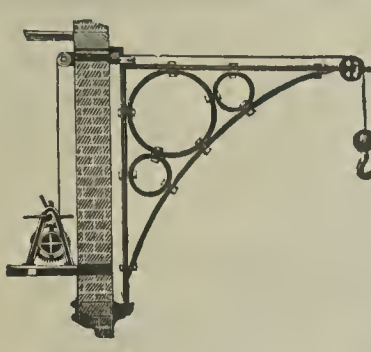
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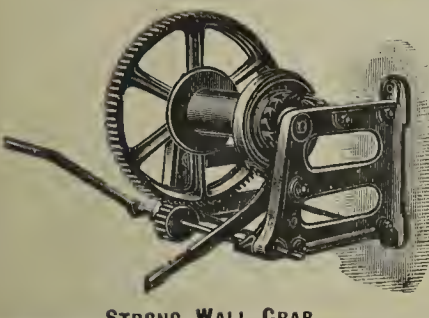
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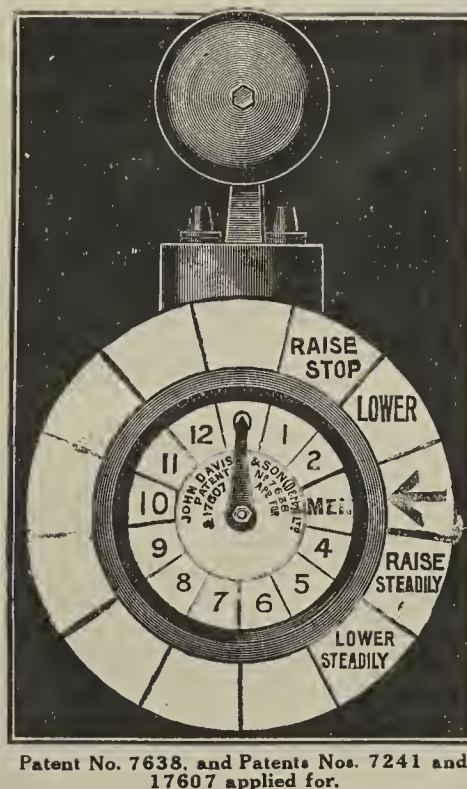
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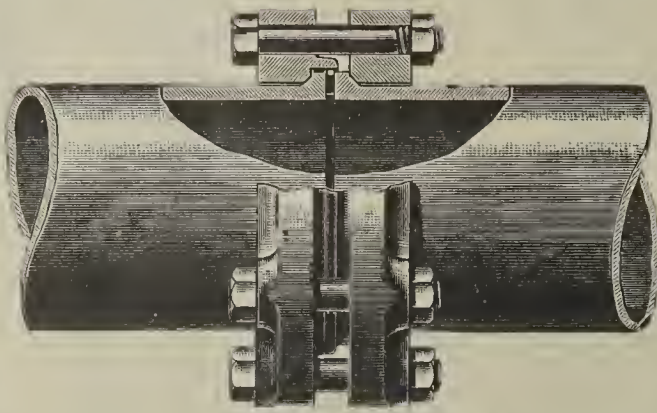
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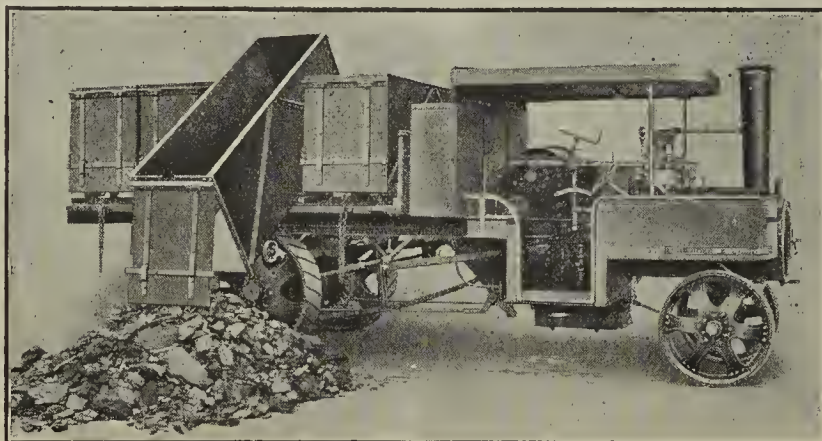
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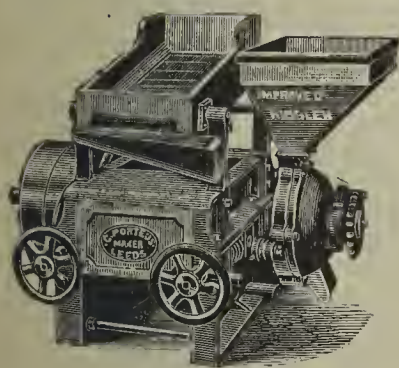
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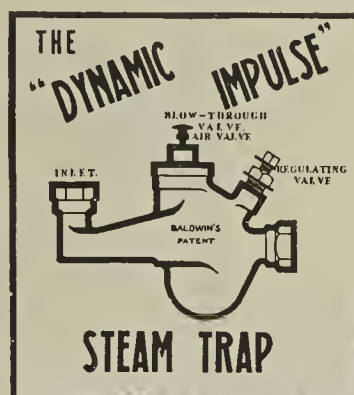
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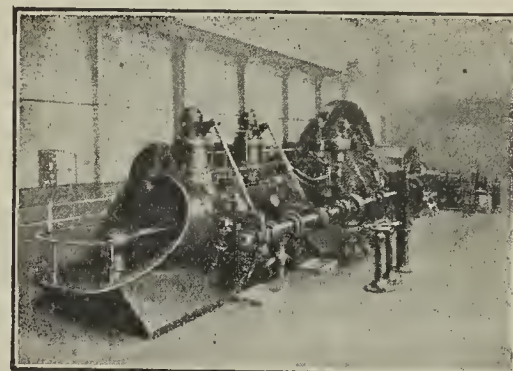


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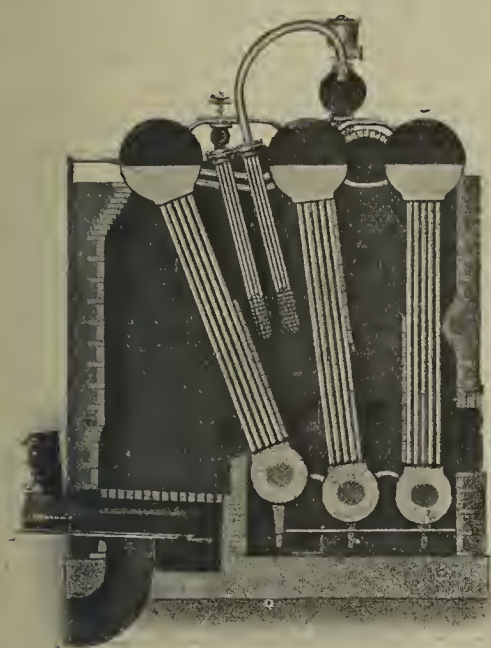
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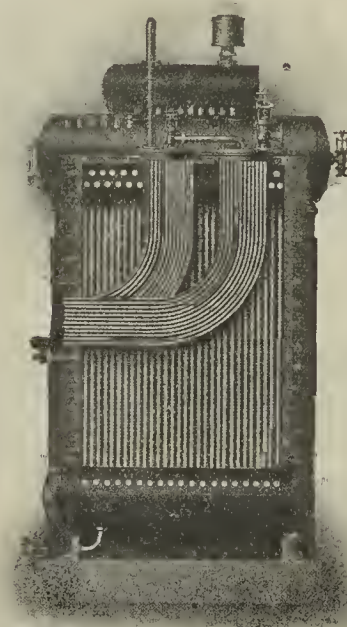
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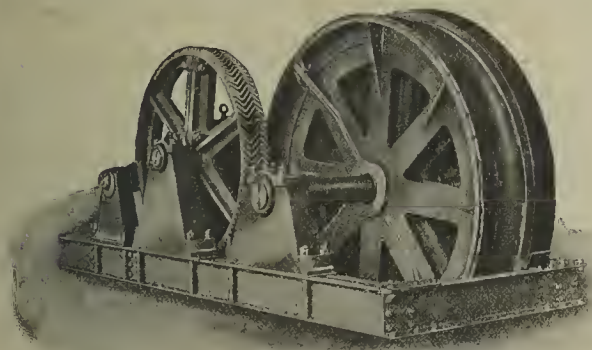
NO SCREW JOINTS.



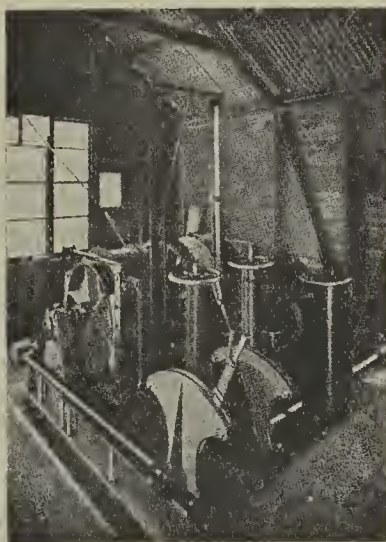
Water-tube Boiler, "Woodeson" patents,
Fitted with Patent Superheater and
Stoker of the Underfeed Type.



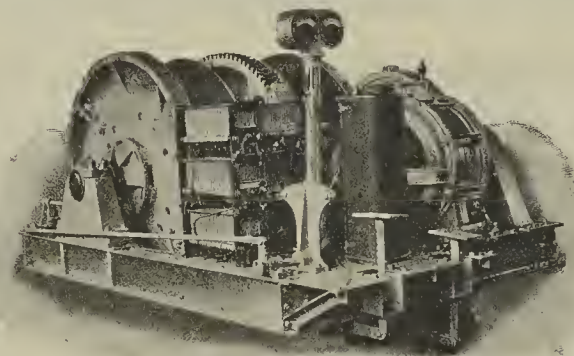
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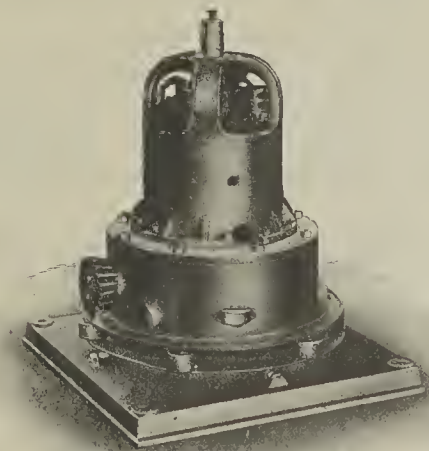
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Patents,

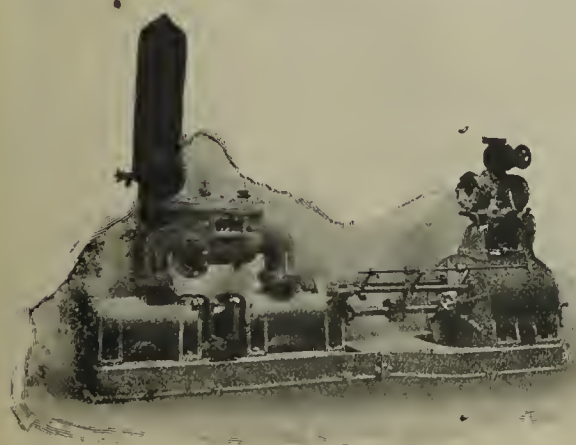
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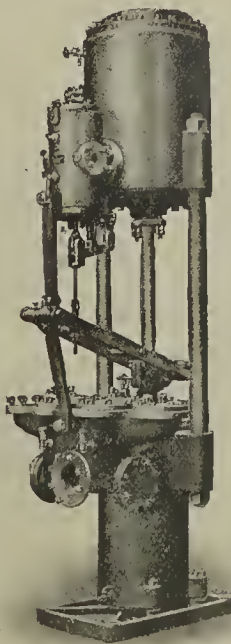
CORLISS TYPE
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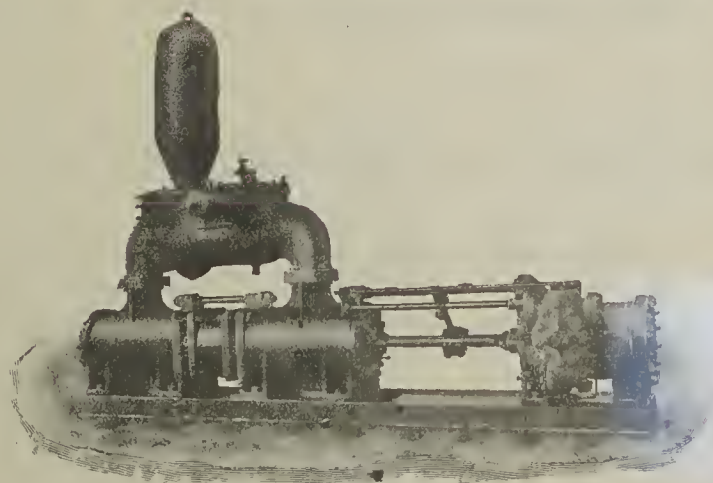
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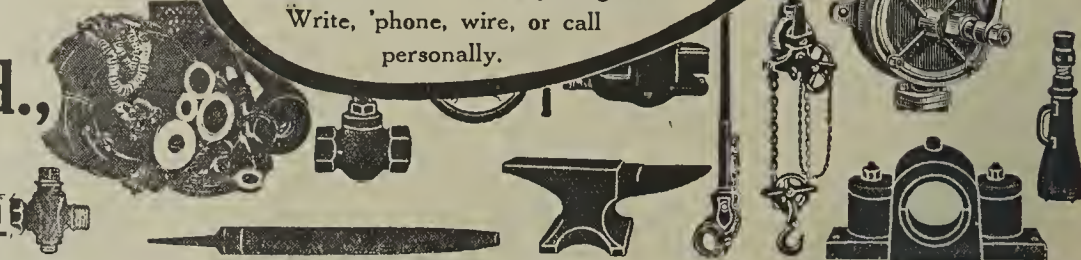
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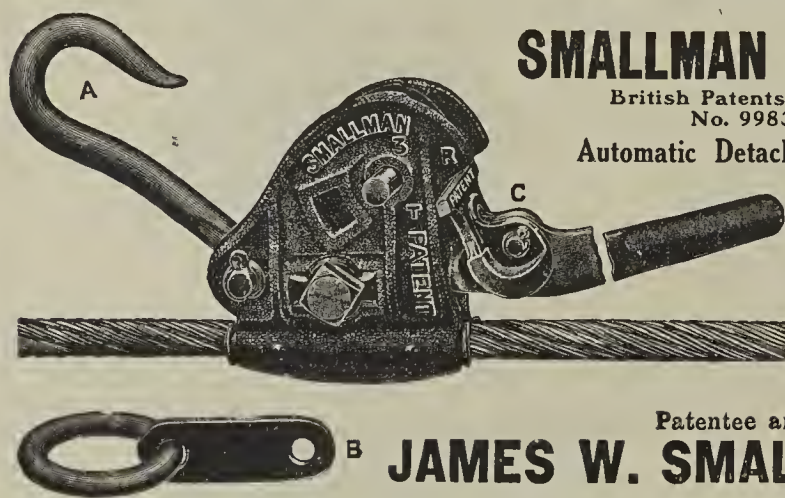
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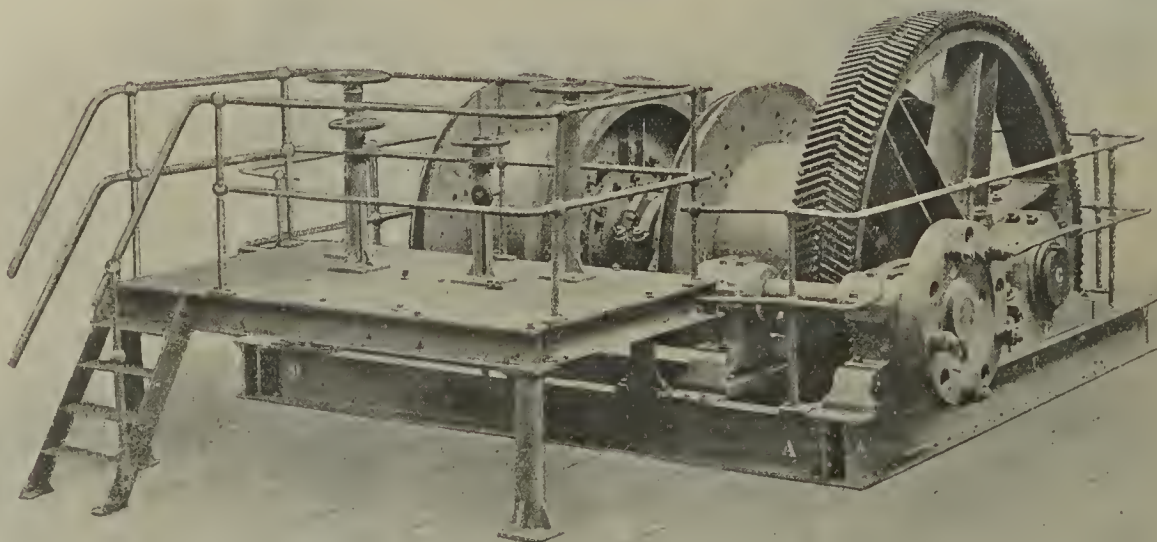
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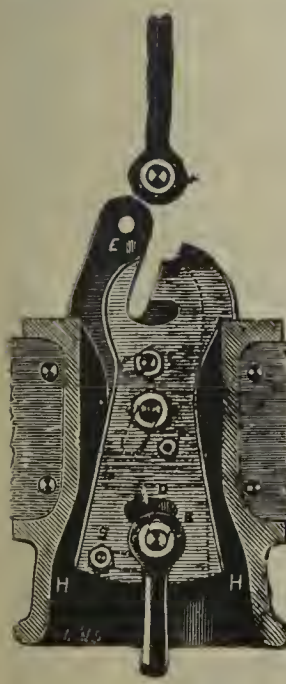
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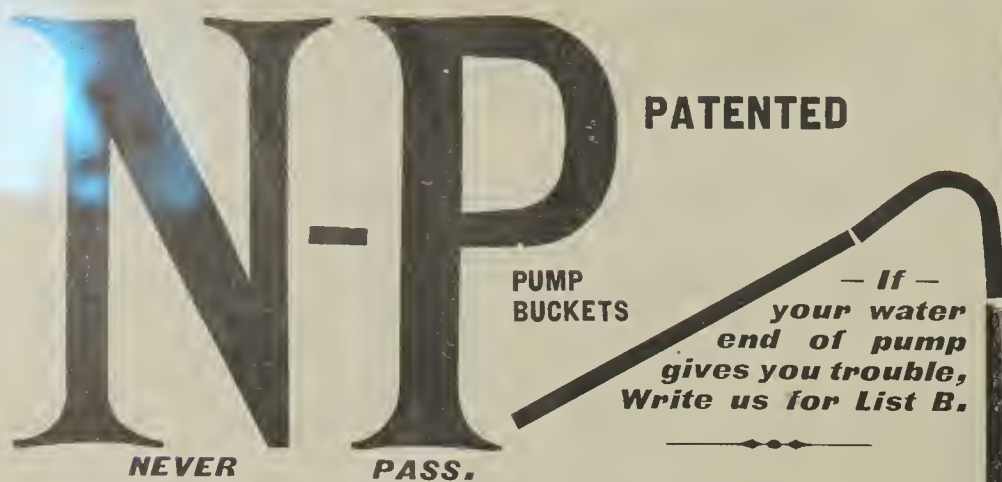
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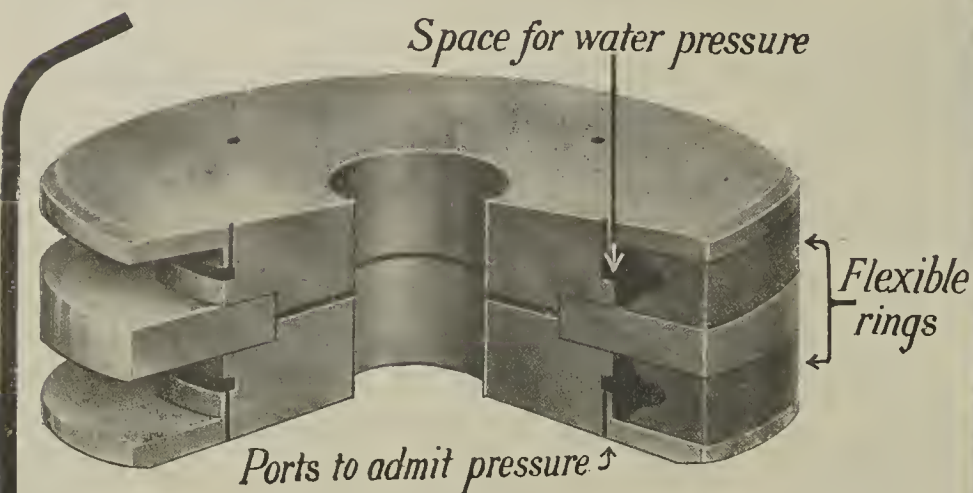


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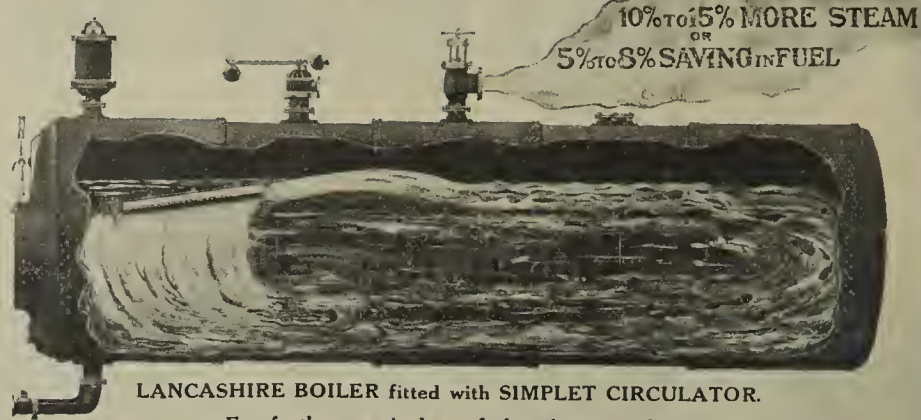
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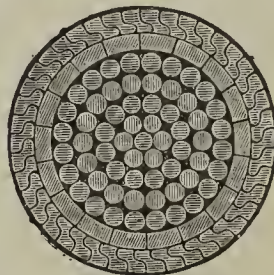
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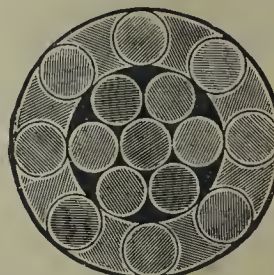
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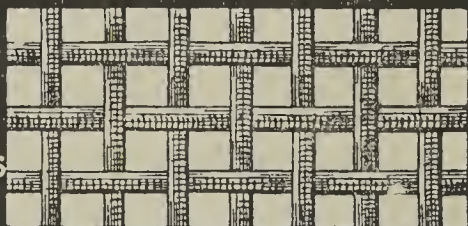
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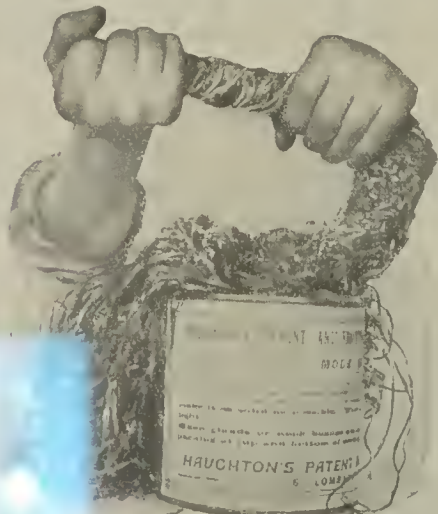
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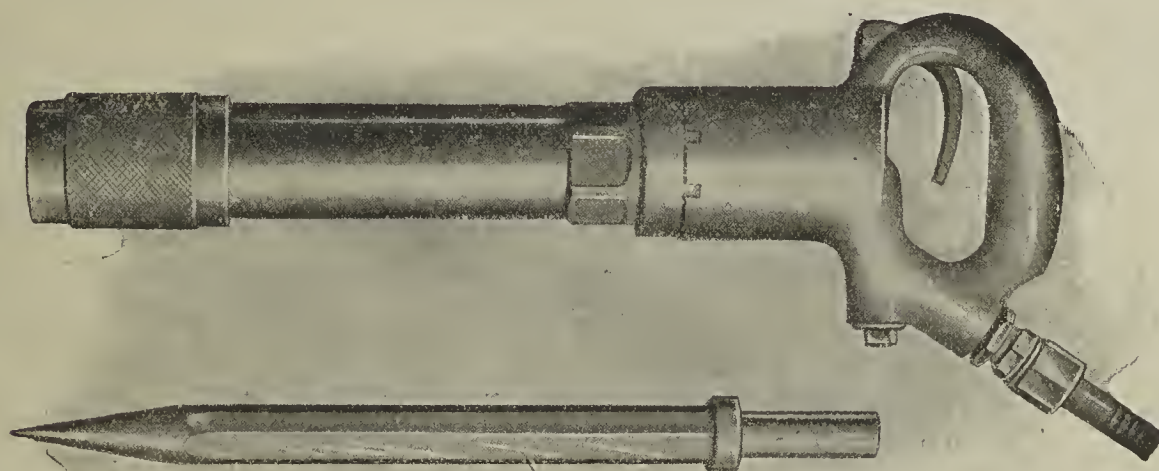
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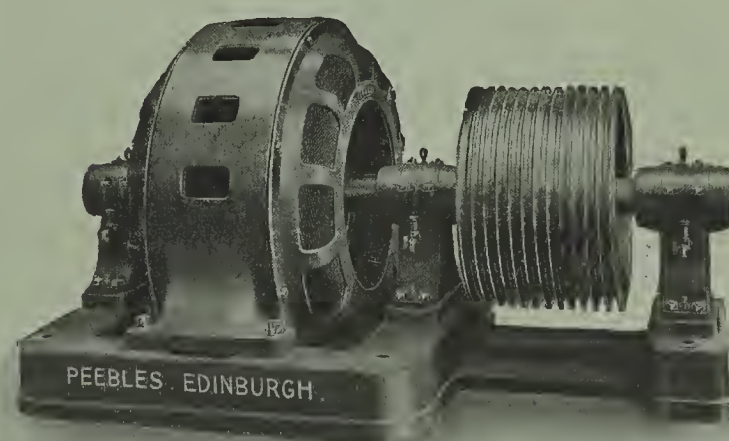
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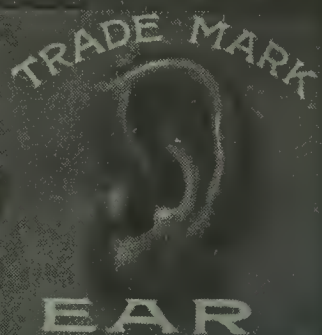
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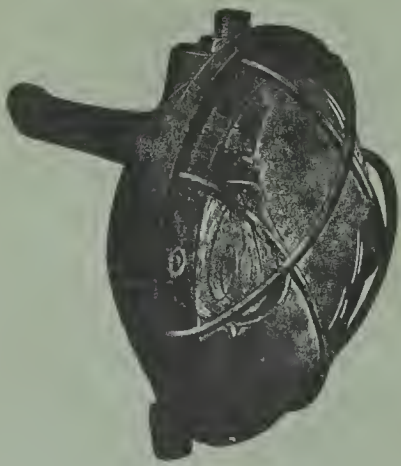
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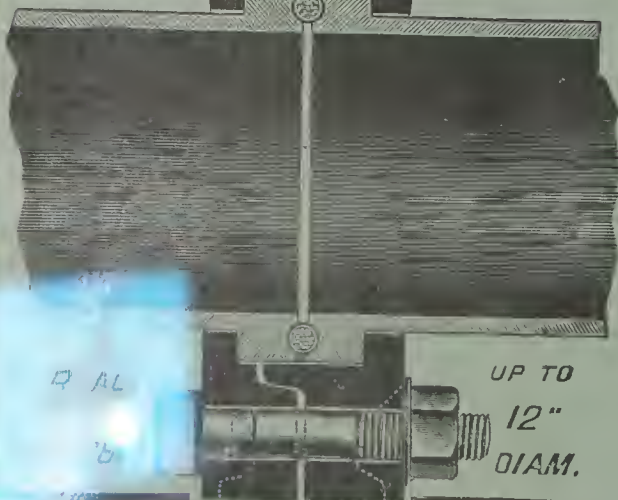
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